IWA

the international water association

Specialist Group on MODELLING AND INTEGRATED ASSESSMENT

Newsletter: *Volume 9, Number 1, March 2014*

CONTENTS

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1.   Modelling and Integrated Assessment (MIA) Specialist Group

The objective of the MIA Specialist Group is to address and promote all aspects of modelling, simulation and the formal methods of applying systems analysis to managing and improving the quality of the aquatic environment. This includes the development and application of mathematical models and modelling tools such as optimisation algorithms, time-series analysis and forecasting, computational procedures for decision analysis and support, uncertainty analysis. It hereby stimulates transfer of knowledge between academia and industry and between different areas within the water cycle. The Group is also responsible for maintaining a forum for the discussion of inter-disciplinary issues within the IWA to augment the engineering and economic elements of problem-solving with those having human, institutional, and cultural dimensions to them. The Group is also directed, therefore, at developing and promoting the application of systematic procedures of Integrated Assessment.

The Specialist Group undertakes the following activities:
- Prepare newsletters of the Group's activities and developments;
- Convene conferences and workshops;
- Initiate research and case studies;
- Stimulate initiation and host Task Groups and Working Groups;
- Interact and streamline activities with other IWA specialist groups, as well as with other academic and professional organizations dealing with Modelling, Simulation, and Integrated Assessment in water systems.
- Start SG-internal committees on specific emerging topics of interest to prepare basis for MC discussions.

The Management Committee of the MIA SG is:

Chairman
Eduardo Ayesa
CEIT
PO Manuel de Lardizabal 15
E-20016 San Sebastian
Spain
Telephone: +34 43 21 28 00
Fax: +34 43 21 30 76
E-mail: eayesa ceit.es

Vice Chairman
Ingmar Nopens
BIOMATH
Ghent University
Coupure Links 653
B-9000 Gent, Belgium.
Telephone: +32 9 264 5932 (secretary)
Fax: +32 9 264 6220
E-mail: Ingmar.nopens@ugent.be

Management Committee
Peter Vanrolleghem (Canada)
Albert Guisasola (Spain)
Lina Belia (Canada)
Ignasi Rodriguez-Roda (Spain)
Manfred Schütze (Germany)
Stephen Siwila (Zambia)

Andrew Shaw (USA)
Dirk Muschalla (Austria)
Leiv Rieger (Canada)
Zhiguo Yuan (Australia)
Marie-Noelle Pons (France)
Cecilia Tamara Abellán (Switzerland)

News on the IWA Specialist Group on Systems Analysis and Integrated Assessment is available on our website, which is maintained by Marie-Noëlle Pons of the Laboratoire des Sciences du Génie Chimique, CNRS, Nancy cedex, France.
The website's address is: http://www.iwa-mia.org/

All members of IWA are welcome to **join the Specialist Group**. With every annual IWA registration, you can indicate which Specialist Group you wish to join. Please update your membership status online (http://www.iwahq.org/2s/membership/manage-your-membership.html) or by email to members@iwahq.org if you wish to become member of the Specialist Group on Modelling and Integrated Assessment and you did not indicate it on your IWA registration form. You may also directly contact Hong Li at IWA (hong.li@iwahq.org) for more information relating to Specialist Groups, Task Groups and Clusters).

All members are stimulated to send contributions for future newsletters. These should be addressed to the newsletter editor whose contact details can be found on the front page of this newsletter.

2. News and reports

NEWS FROM THE MIA SPECIALIST GROUP

Working groups: A Working Group (WG) is a sub-set of a Specialist Group (SG) with a restricted scope that can generate a wide range of activities around the WG's themes, e.g. conference and workshop organization, update of IWA's waterwiki, production of a series of reports, leaflets, papers, development of tools, website maintenance, etc.

Membership of, and participation in, a WG is open to all members of the hosting SG. The management of the WGs is defined internally by the SG. Members of the WG can join the WG management team after nomination and approval by the current WG management team. It is strongly suggested that the management team is rejuvenated periodically using an election procedure. A WG has no limitation of life time, is hosted by a relevant SG and does not receive any funding as opposed to a Task Group. Therefore, its formation needs approval from the hosting SG. In response to this definition, the MIA SG has compiled a procedure on how to apply for a WG in a subarea of MIA. This can be found on the IWA SG MIA website.

Since the release of the procedure, three WGs have been approved: Life Cycle Assessment (LCA) of Water and Wastewater Treatment, Modelling of Integrated Urban Water Systems (MIUWS) and Computational Fluid Dynamics (CFD) of unit processes in wastewater treatment plants. MIA is happy to receive more applications to continue its status of being a very active SG.

Modelling of Integrated Urban Water Systems (MIUWS)

The working group is led by Lorenzo Benedetti and Jeroen Langeveld.
Several actions were initiated or completed. First, an IWA WaterWiki group was created for dissemination to the broader community. A LinkedIn Group (IWA Working Group on Modelling of Integrated Urban Water Systems (MIUWS WG)) was also initiated and currently has 260 members. A questionnaire was launched to the LinkedIn group to identify interests and gather volunteers for the IWA WaterWiki pages. The WG will chair a dedicated technical session at the 13th ICUD in Sarawak (Malaysian Borneo) in September 2014.
Thank you!

Computational Fluid Dynamics (CFD) of unit processes in wastewater treatment plants

The working group was formed following a workshop discussing applications of CFD in water and wastewater treatment at the joint WEF/IWA WWTMod 2012 conference. Since then we have been organized in a formal structure as a working group (WG) of the Modelling and Integrated Assessment Specialty Group of the IWA. Nine original members formed a management team to guide activities of the working group.

Since inception, members of the WG management team have been involved in the following activities:
- Presented papers at the 2012 WEF annual conference
- Started a public [IWA Working Group on Computational Fluid Dynamics (SG MIA)] and private (IWA WG CFD Management Team) Group on the WaterWiki
- Started a discussion group on LinkedIn in 2012 which now has over 100 members (http://www.linkedin.com/groups?gid=4664268&trk=my_groups-b-grp-v)
- Developed a workshop at the 2013 WEF annual conference on CFD for wastewater
- Presented papers at the 2013 WEF annual conference
- Met as a group at the 2013 and 2014 WEF conferences
- Enlarged the management team to include four more members, including three young water professionals (YWP)
- Prepared two papers accepted as posters for the 2014 WWTMod conference
- Partially prepared two additional papers for future publication, one on "Good Modelling Practice for CFD in wastewater" and one on "State of the art in usage of CFD in wastewater treatment unit processes".

Future activities that are anticipated for 2014 include:
- Meeting of the management team as part of the WWTMod 2014 conference
- Complete papers for publication on Best Modelling Practice and State of the Art for CFD for Wastewater
- Plan for preparation of a Scientific and Technical Report on CFD for Wastewater

More info? Contact Ingmar Nopens (Ingmar.Nopens@UGent.be)

Life Cycle Assessment (LCA) of Water and Wastewater Treatment

The IWA Working Group for Life Cycle Assessment of Water and Wastewater Treatment (LCA-Water WG) was approved at the end of 2012. So far, the group recruited 42 experts from different backgrounds, countries, and different fields (research, academy, industry) which are actively participating in the sub-group group activities. An increasingly popular linked-in group has been established with a member count of 163 as of February 2nd. A workshop was already organized at EcoSTP 2013 held in Galicia (Spain) and another within the frame of the Summer School on the Environment in Girona (Spain) end of 2012. Other activities are foreseen for 2014. At WWTmod2014 in Spa (Belgium) a workshop will be organized entitled "Linking WWTP modelling with Life Cycle Assessment (LCA) and other Holistic models". A proposal for a workshop was also submitted to the IWA World Water Congress 2014 held in Lisbon (Portugal), where the first outcomes of the working group actions will be disseminated.

NEWS FROM THE MIA TASK GROUPS

IWA Task Group on Benchmarking of control strategies for wastewater treatment plants
The goal of the Task Group is to promote the use of the benchmark simulation protocols (BSM1, BSM1_LT and BSM2) and produce a Scientific and Technical Report (as part of IWA Publishing's series). In the mid 90s, the IWA Task Group on Respirometry began to work on the development of a simulation-based protocol (a 'simulation benchmark') that would be used for the objective comparison and evaluation of wastewater treatment plant control strategies. The main reason for initiating this work was that it was discovered that over the years numerous WWTP control strategies had been proposed in the literature, however, the literature did not provide a clear basis for comparison of these strategies because of the many confounding influences that have an impact on the system.

The 'benchmark protocol', as it is currently, is defined in terms of a comprehensive description of a standardized simulation and evaluation procedure including plant layout, simulations models and model parameters, a detailed description of disturbances to be applied during testing and evaluation criteria for testing the relative effectiveness of simulated strategies. The success of the BSMs in terms of publications (already more than 300 when counted three years ago) and research groups world-wide requesting access to the tool are strong indications of the need for this research.

The Task Group is happy to inform the readers of this newsletter that the publication of its Scientific and Technical Report (STR) is very close at hand. A preliminary version has now been reviewed by a small selected group of researchers and some final polishing of the text is being done. The final version should be submitted to IWA Publishing on January 15, 2014. Once the STR is completed the formal work of the Task Group is finished. However, as there are so many ongoing activities and development related to the BSM framework it is our intent to try to set up some other 'umbrella' for organizing the BSM efforts by all the different research groups involved. One possibility would be to create an IWA Working Group on benchmarking of control and monitoring strategies for urban wastewater systems. We would hope that such an approach would attract both experienced benchmarking groups as well as new groups interested to become involved in the work. This matter will be further discussed at WWTmod2014 in Spa, Belgium (March 30 – April 2) where professor Peter Vanrolleghem will present a paper on the future extensions of the BSM framework entitled "Towards BSM2-GPS-X: A plant-wide benchmark simulation model not only for carbon and nitrogen, but also for greenhouse gases (G), phosphorus (P), sulphur (S) and micropollutants (X), all within the fence of WWTPs/WRRFs". The BSM systems are currently in extensive use/development within the EU Marie Curie ITN project SANITAS and also play a prominent role within the EU COST Action ES1220 (Water 2020). System extensions related to greenhouse gas emissions, micro-pollutants and illicit drugs, physico-chemical activity, pH, phosphorus, sulphur, inclusion of sewer and receiving water quality models are some of the items currently on the BSM development agenda. For your information the Task Group maintains a website for publication of on-going activities (www.benchmarkwwtp.org) and for the STR check out IWA Publishing's website for pre-publication information and of how to reserve a copy:
http://www.iwapublishing.com/template.cfm?name=isbn9781843391463.

Information: Dr Ulf Jeppsson (chair), IEA, Faculty of Engineering, Lund University, PO Box 118, SE-221 00 Lund, Sweden. Phone: +46 46 2229287; fax: +46 46 142114; e-mail: ulf.jeppsson@iea.lth.se.

IWA Task Group on Design and Operations Uncertainty (DOUT)
The goal of the Design and Operations Uncertainty Task Group (DOUT) is to combine dynamic modelling with uncertainty analysis. This will take full advantage of process simulators and will provide utilities with more effective facilities. In order to aid this transition the DOUT group is establishing the state of the art in dealing with uncertainty and variability in engineering practice. In addition, the group is reviewing novel methods and approaches and assessing their feasibility for use in the wastewater treatment industry.

During the three years that the DOUT TG has been active, a working team of 26 volunteers has been put together, who are compiling the material for each of the chapters of an IWA Scientific and Technical Report (STR). The group is in the final stages of putting together the STR which will be reviews by expert reviewers from across 4 continents. The group is maintaining a WaterWiki webpage which in addition to information on DOUT provides learning materials covering key topics in the field of uncertainty. All documents are available for download without the need to register:
http://www.iwawaterwiki.org/xwiki/bin/view/WorkGroup_DOUT/WebHome

The task group is currently editing the Scientific and Technical Report. The STR contains ten chapters and is divided into three sections. The first section (Chapter 1) is an extended summary of the STR which discusses the scope, structure as well as brief overviews of each of the STR chapters. The second section (Chapters 2-7) of the STR covers the state of the art of uncertainty analysis. The third section of the STR (Chapters 8-10) cover the vision of uncertainty analysis from the point of view of the TG and it covers the gaps and weaknesses of current knowledge, future methods as well as examples of methods that can be implemented by practitioners today.

IWA Task Group on The use of water quality and process models for minimizing wastewater utility greenhouse gas footprint
The MIA SG supported Task Group GHG, focused on modelling N_2O and CH_4 of wastewater systems, has held open meetings, presented technical papers, contributed in workshops and seminars at numerous IWA events. TG working sessions have been held in Washington D.C., Amsterdam, and Quebec City. The next one is planned in Gent on March 28, 2014. A global full-scale N_2O modelling effort continues for calibrating/validating N_2O models. The first draft of the Scientific and Technical Report, compiling all of the TG's efforts, is planned for end of 2014.
The TG GHG is currently developing an N_2O Field Measurements Guide, for a consensus-based measurement approach to support modelling. A draft is planned by WWTmod 2014. If you are planning a measurement campaign or know of someone planning a measurement campaign who may be interested in collaborating or consulting with the TG GHG, do not hesitate to connect them. Similarly, if you have data that you would like to make available for modelling, do not hesitate to contact them. Contact details and more on the TG GHG can be found on their website http://www.iwataskgroupghg.com/. Also follow them on twitter @TG_ghg.

IWA Task Group on Good Modelling Practice

After publishing its Scientific Technical Report (STR) entitled *Guidelines for Using Activated Sludge Models* our focus shifted towards spreading the news and teaching modellers around the world on Good Modelling Practices.

Our last activity was a workshop at WEFTEC.13 in Chicago. In the Workshop #16 *Modelling the Right Way - Incorporate Good Modelling Practices Into Your Work!* We walked participants through the five steps of the GMP Unified Protocol and had round table discussions after every step with a plenary discussion at the end. We received an outstanding feedback and are convinced that we could contribute to Good Modelling Practice in the very active North American market.

The next IWA World Water Congress is approaching fast and the GMP Task Group will once again organize a modelling course (http://www.iwa2014lisbon.org/conference/pre-conference-workshops/). We hope to see you in Lisbon.We are also planning to have a modelling course at the next Nutrient Removal and Recovery conference in Gdansk, Poland.

The GMP Scientific & Technical Report is becoming a bestseller and made it on the Top10 list of new IWA books. Details of the STR are available via the following link:
http://www.iwapublishing.com/template.cfm?name=isbn9781843391746

Standard Notation
More and more modellers around the world are starting to use the new IWA Notation System for wastewater modelling proposed by Corominas *et al.* (2010)
(http://www.iwaponline.com/wst/06104/wst061040841.htm) and the GMP Task Group is doing everything to support this great initiative in order to facilitate clear communication in describing process models. *Please note that the above paper has been granted open access status* and that Water Science & Technology encourages the use of the new notation (http://www.iwaponline.com/wst/i2a.htm).
GMP Website (https://iwa-gmp-tg.irstea.fr/)

Our website is continuously updated and contains plenty of material for downloading. For instance it includes error-checked and corrected Gujer Matrices for 7 published models and a list of recent publications with GMP contributions (https://iwa-gmp-tg.irstea.fr/literature-and-downloads).
More information
For more information see our website: https://iwa-gmp-tg.irstea.fr/ or contact the Task Group Chair, Leiv Rieger, rieger@inCTRL.ca.

NEWS FROM IWA

IWA WaterWiki

Invitation to Participate

www.iwawaterwiki.org

The IWA Specialist Group on Modelling and Integrated Assessment has its own dedicated WaterWiki space!

Want to get involved? The IWA Specialist Group on **Modelling and Integrated Assessment** already has a dedicated private group space on the WaterWiki.

You can request access to the space here.

You will need to complete a short registration process in order to join the space. Register now by clicking here.

For more information on how to add content and interact with others using your Group Space, click here.

Open-access articles in your subject area:

The Waterwiki currently hosts over 1,000 open-access articles, reports and case studies. Articles are 'tagged' with a subject area, making it easy to find the content that interests you.

There are 26 articles tagged with 'modelling', including:

Computational Methods in the Management of Hydro-Environmental Systems, Application of Chaos and Fractal Models for Water Quality Prediction, Risk analysis, fuzzy logic and management of uncertainty, Mathematical Modelling and Activated Sludge Systems, Water Resources Management and Modeling.

We are always looking for new articles in your subject area. If you are able to write on any of the following subjects (about 600-1000 words), please do contact us:

Tools, environments and language; Geographic information systems and virtual imaging Hydroinformatics; Impact assessment of climate change; Water System Management; Analytical Methods; Monitoring and data for the MDGs; Systems Analysis; Monitoring.

As always, please feel free to contact me (cparker@iwap.co.uk) with any questions.

Chloe Parker
IWA WaterWiki Community Manager
cparker@iwap.co.uk

NEWS FROM IWA PUBLISHING

New Publications on Modelling and Control:

Computational Hydraulics
Numerical methods and modelling
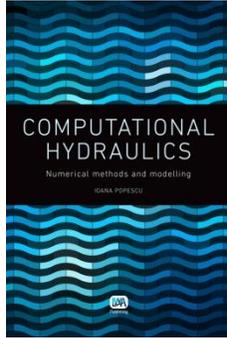
Ioana Popescu

ISBN: 9781780400440 • Jul 2014 • Paperback
IWA members price: £ 74.25 / US$ 133.65 / € 100.24

http://www.iwapublishing.com/template.cfm?name=isbn9781780400440&type=category

Computational Hydraulics introduces the concept of modelling and the contribution of numerical methods and numerical analysis to modelling. It provides a concise and comprehensive description of the basic hydraulic principles, and the problems addressed by these principles in the aquatic environment. Flow equations, numerical and analytical solutions are included.

The necessary steps for building and applying numerical methods in hydraulics comprise the core of the book and this is followed by a report of different example applications of computational hydraulics: river training effects on flood propagation, water quality modelling of lakes and coastal applications.

The theory and exercises included in the book promote learning of concepts within academic environments. Sample codes are made available online for purchasers of the book.

Applications of Activated Sludge Models
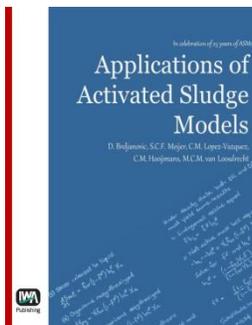
**D. Brdjanovic, S.C.F Meijer, C.M. Lopez-Vazquez, C.M. Hooijmans, M.C.M. van Loosdrecht**

ISBN: 9781780404639 • Jun 2014 • Paperback
IWA members price: £ 82.50 / US$ 148.50 / € 111.38

http://www.iwapublishing.com/template.cfm?name=isbn9781780404639__&type=category

In 1982 the International Association on Water Pollution Research and Control (IAWPRC), as it was then called, established a Task Group on Mathematical Modelling for Design and Operation of Activated Sludge Processes. The aim of the Task Group was to create a common platform that could be used for the future development of models for COD and N removal with a minimum of complexity. As the collaborative result of the work of several modelling groups, the Activated Sludge Model No. 1 (ASM1) was published in 1987, exactly 25 years ago. The ASM1 can be considered as the reference model, since this model triggered the general acceptance of wastewater treatment modelling, first in the research community and later on also in practice. ASM1 has become a reference for many scientific and practical projects, and has been implemented (in some cases with modifications) in most of the commercial software available for modelling and simulation of plants for N removal. The models have grown more complex over the years, from ASM1, including N removal processes, to ASM2 (and its variations) including P removal processes, and ASM3 that corrects the deficiencies of ASM1 and is based on a metabolic approach to modelling. So far, ASM1 is the most widely applied.

Uncertainty in Wastewater Treatment Design and Operation
Addressing Current Practices ad Future Directions
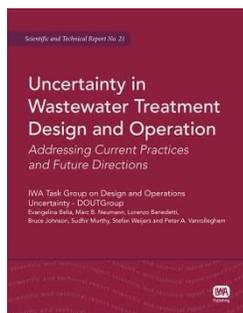
Evangelina Belia, Marc B. Neumann, Lorenzo Benedetti, Bruce Johnson, Sudhir Murthy, Stefan Weijers and Peter A. Vanrolleghem (IWA Task Group on Design and Operations Uncertainty - DOUTGroup)

ISBN: 9781780401027 • Aug 2014 • Paperback
IWA members price: £ 74.25 / US$ 133.65 / € 100.24

http://www.iwapublishing.com/template.cfm?name=isbn9781780401027&type=category

Uncertainty in Wastewater Treatment Design and Operation documents how uncertainty, opportunity and risk are currently handled in the wastewater treatment practice by consultants, utilities and regulators. The book provides a useful set of terms and definitions relating to uncertainty and promotes an understanding of the issues and terms involved. It identifies the sources of uncertainty in different project phases and presents a critical review of the available methods. Real-world examples are selected to illustrate where and when sources of uncertainty are introduced and how models are implemented and used in design projects and in operational optimisation. Uncertainty in Wastewater Treatment Design and Operation defines the developments required to provide improved procedures and tools to implement uncertainty and risk evaluations in projects. It will be a vital reference for utilities, regulators, consultants, and trained management dealing with certainty, opportunity and risk in wastewater treatment.

Benchmarking of Control Strategies for Wastewater Treatment Plants
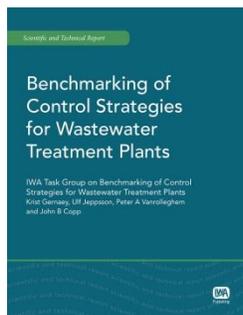
Krist V Gernaey, Ulf Jeppsson, Peter A Vanrolleghem, John B Copp and Jean-Philippe Steyer

ISBN: 9781843391463 • Aug 2014 • Paperback
IWA members price: £ 51.75 / US$ 93.15 / € 69.86

http://www.iwapublishing.com/template.cfm?name=isbn9781843391463&type=category

Many control strategies have been proposed in the literature for improved and more efficient operation of wastewater treatment plants. Unfortunately, their evaluation and comparison – either practical or based on simulation – is difficult. This is partly due to the variability of the influent, to the complexity of the biological and biochemical phenomena and to the large range of time constants (from a few minutes to several days). The lack of standard evaluation criteria is also a tremendous disadvantage. To really enhance the acceptance of innovative control strategies, such an evaluation needs to be based on a rigorous methodology including a simulation model, plant layout, controllers, sensors, performance criteria and test procedures, i.e. a complete benchmarking protocol.

This book is a **Scientific and Technical Report** produced by **the IWA Task Group on Benchmarking of Control Strategies for Wastewater Treatment Plants**. The goal of the Task Group includes developing models and simulation tools that encompass the most typical unit processes within a wastewater treatment system (primary treatment, activated sludge, sludge treatment, etc.), as well as tools that will enable the evaluation of long-term control strategies and monitoring tasks (i.e. automatic detection of sensor and process faults).

Membrane Biological Reactors
Theory, Modelling, Design, Management and Applications to Wastewater Reuse
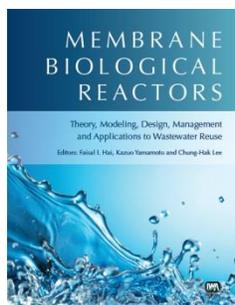
Faisal I. Hai, Kazuo Yamamoto and Chung-Hak Lee

ISBN: 9781780400655 • Nov 2013 • Hardback
IWA members price: £ 96.25 / US$ 173.25 / € 129.94

http://www.iwapublishing.com/template.cfm?name=isbn9781780400655&type=category

In recent years the MBR market has experienced unprecedented growth. The best practice in the field is constantly changing and unique quality requirements and management issues are regularly emerging.

Membrane Biological Reactors: Theory, Modelling, Design, Management and Applications to Wastewater Reuse comprehensively cover the salient features and emerging issues associated with the MBR technology. The book provides thorough coverage starting from biological aspects and fundamentals of membranes, via modelling and design concepts, to practitioners' perspective and good application examples. **Membrane Biological Reactors** focuses on all the relevant emerging issues raised by including the latest research from renowned experts in the field. It is a valuable reference to the academic and professional community and suitable for undergraduate and postgraduate teaching in Environmental Engineering, Chemical Engineering and Biotechnology.

SELECTED RESEARCH REPORTS

Developing a Standardized Protocol for Assessing the Biodegradability of Trace Organic Compounds
U3R10
Author(s): Wendell O. Khunjar
Publication Date: 02 Jul 2014 • ISBN: 9781780405575
Pages: 100
eBook Only
http://www.iwapublishing.com/template.cfm?name=isbn9781780405575

Linking BMP Systems Performance to Receiving Water Protection: BMP Performance Algorithms
SWC1R06bmp
Author(s): Larry A. Roesner
Publication Date: 02 May 2014 • ISBN: 9781780405438
Pages: 200
eBook Only
http://www.iwapublishing.com/template.cfm?name=isbn9781780405438

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Feedbacks from the SG leaders' forum November 2013

The SG Leaders' Forum on "Empowering SGs", held from November 7 to 8, 2013 in Valencia, Spain, was focusing on the long-term SGs' strategic planning, improved secretariat support to SGs, consultation of IWA's strategic plan 2014-2018, and cross-links among SGs, as well as updating SG leaders on the changes within IWA, etc.

In total 47 meeting attendees including 38 group leaders and 9 IWA and IWA Publishing staff members attended this meeting. It has been an extremely successful meeting with almost all the specialist groups represented, with ample discussions and many ideas coming out of the meeting both for daily practical issues and for strategic planning. It is important to keep this dynamics over time.
During the meeting, group leaders were updated on current activities and plans within IWA, on the annual review of the groups and what is new on IWA's support to specialist conferences. Groups also shared their experiences on how their SG, TG and WG have been working and organizing their activities. Close links between groups and Publishing were emphasised, in particular on how to better link the specialist conferences with publishing. Group leaders were also updated with the new communication and engagement plans.

More active involvement of members in the IWA SGs and SG management committee was also discussed in terms of balancing gender, age and regional distribution. It was suggested that all groups ask the management team members to agree on assigned tasks.
One of the most important items on the agenda was the consultation on IWA's Strategic Plan 2014-2018. Group leaders discussed different strategic priority areas and many ideas were collected, which have been considered in the detailed writing and revision of the second version of IWA's Strategic Plan.
During day 2 of the meeting, the main focus in the first part of the meeting was on how to cross-link groups and encourage joint activities by different groups. As a relatively new cross-linking mechanism, clusters were discussed in detail, with information on all 4 current clusters, and it was agreed that before the Lisbon SG leaders forum, all clusters would need to have their mission statements ready. During the meeting, group leaders also agreed to organize more joint activities in different formats.
Finally, before the end of the meeting, a general introduction was given on IWA's programmes explaining e.g., what an IWA programme is, how they are organised and how members can engage and contribute, etc. the AquaRating tool was presented as one of the example sub-items within programmes.

JOB OFFERS

Find the link to a postdoctoral researcher vacancy that we offer at ICRA (Spain). The candidates should have experience in wastewater treatment and especially on modelling and control. The position is linked to the European Project R3Water. The duration is initially for one year but could be extended up to 2.5 years.
http://www.icra.cat/job/postdoctoral-researcher-position/6

3. Coming conferences and events

RELATED UPCOMING IWA CONFERENCES AND EVENTS

WWTmod 2014, 4th IWA/WEF Wastewater Treatment Modelling Seminar,
30 March – 2 April 2014, Spa, Belgium

WWTmod2014 is the fourth international seminar on wastewater treatment (WWT) modelling after the successful events held in 2008, 2010 and 2012. WWTmod provides a platform upon which any relevant aspect of WWT modelling may be discussed. The main objective of WWTmod is consensus building. The process of consensus building is supported by obtaining insights from a diverse group of leading professionals: researchers, consultants, utilities, regulators, equipment manufacturers, and software developers. This year's edition will gather together (137) participants according to the following statistics, which do not differ from previous events:

Regional distribution	%		Organisation	%		Male/Female	%
Europe	54		Consultant	22		M	73
North-America	37		Utility	9		F	27
South-America	1		Academia	55			
Asia	2		Research institute	6			
Oceania	4		Software company	7			
Africa	2		Other	1			

The seminar starts on Saturday March 29th, 2014 with the YWP workshop organized by YWPs for YWPs. On Sunday March 30th six parallel workshops are scheduled. The day-long workshops provide a basis for rigorous discussion, debate, idea sharing, and compromise - the ground work for consensus building. Key conclusions reached during the workshops will be presented to the plenary audience in dedicated sessions occurring Monday through Wednesday (March 31st-April 2nd).

The following workshop themes were selected based on discussions on the LinkedIn WWTmod group space:

1. Where are we and where should we go with MBR modelling?
2. What do we need for "Total" Nitrogen Modelling?
3. How can modelling be effectively used for energy balance optimization?
4. Revisiting phosphorus removal: do the models give the answers we want?
5. Linking WWTP modelling with Life Cycle Assessment (LCA) and other Holistic models
6. Wet-weather modelling: Why and how should we tame the beast?

The program of the seminar is available at the WWTmod2014 website. The following session topics reflect the subject areas of the accepted oral presentations:

1. Session 1: Influent characterisation for full scale modelling
2. Session 2: Impact of diffusion
3. Session 3: Nitrogen modeling extended/revisited
4. Session 4: WWTP modeling: back to the future
5. Session 5: Primary/secondary sedimentation
6. Session 6: Models for new processes

The keynote lecture will be given by Daniel Nolasco who will share his experience of over 30 years in the application of models in consulting, and how this evolved. Other confirmed invited speakers are Glen Daigger (IWA) and Robert Schröder (EU Policy officer - DG Environment). A speaker from WEF is to be confirmed.

The WWTmod2014 website (http://www.biomath.ugent.be/WWTmod2014/) contains up-to-date information on important dates and travel directions (including all the available travel options to Spa). We look forward to seeing you soon in Spa.

Stijn Van Hulle   Ingmar Nopens – BIOMATH - UGent
LIWET & BIOMATH - UGent   Joshua P. Boltz - CH2M HILL, Inc.
Chairman, Organizing Committee   Chairmen, Scientific Committee

IWA World Water Congress & Exhibition, 21-26 September 2014, Lisbon, Portugal
www.iwa2014lisbon.org

The International Water Association will gather under the same roof 5,000 world water professionals from over 100 countries, in Lisbon, Portugal, from 21 to 26 September 2014.
The World Water Congress & Exhibition is the event of excellence for professional networking and cross sector knowledge transference. In such a rapidly evolving field, no one can afford to be left behind when it comes to the latest research and technological trends. Water professionals, both researchers and corporate visitors will create new, inspiring solutions to the World's water related challenges.

With the rapid evolution of science and technology the water sector is expected to raise the bar, using collective solutions that defend everyone's right to safe drinking water and sanitation provided by effective and sustainable services. In Lisbon, the frontiers of science and practice will be explored, bringing to life leading edge, pragmatics and innovative solutions for urban and basis wide water and sanitation challenges. The 2014 IWA World Water Congress & Exhibition benefits from its host city, Lisbon. The city is the closest European capital both to Africa and America and an inexpensive favourite with travellers from the world over. Lisbon is ready to host the best international ideas and the most dynamic global water professionals, who will be showcasing successful examples of enterprising regional systems, national policy initiatives, balancing private and public sectors, financial sustainability, and the regulation and benchmarking of water systems.

The diversified programme will include 400 platform presentations, 800 posters, workshops, pre-congress training courses and workshop, as well as presentations from world leading experts. Please note that there are also pre-Congress workshops and training courses. The 7000 m^2 exhibition will display over 200

global companies and 15 country pavilions.

Join us in Lisbon, to help shaping our water future.

2014 IWA PIA Europe and West Asia Regional Awards: Announcement of winners.

The Project Innovation Awards Programme (PIA) was established by the International Water Association in 2006 to recognise excellence and innovation in water engineering projects throughout the world. The Awards programme highlights IWA's belief that solutions to global water challenges can be achieved through practical and innovative applications.

This year, IWA is pleased to collaborate with European Water Supply and Sanitation technology Platform (WssTP) again on the 2014 IWA PIA Europe and West Asia Regional Awards competition. The Europe & West Asia Regional Winners of the IWA Project Innovations Awards will be honoured on 25 June 2014 at an awards ceremony in Brussels, Belgium during the Water Innovation Europe Conference 2014 (25 to 26 June 2014) at Diamant Conference Center. To find out more about the winners, check out www.iwa-pia.org.

IWA Leading Edge Technology Conference, 26 – 29 May, 2014, Abu Dhabi, UAE: Registration is open

The flagship IWA Leading Edge Water and Wastewater Technology (LET) conference is designed to be the place where new ideas are introduced and the opportunity is provided to interact with the "best of the best". For those who are looking to introduce new ideas and concepts, and those looking for them, this is the one conference of the year that should not be missed.

This year's IWA Leading Edge technology Conference will be held 26-29 May 2014 in Abu Dhabi, UAE. The registration is open now, please take the advantage of early bird registration rate and register **before 15 April**.

For more information, please visit the conference website of: www.let2014.org. You may also combine this conference with The Singapore International Water Week 2014 (www.siww.com.sg). As the Strategic Partner for the Water Convention, all IWA members will enjoy a 10% discount off the registration. Register **before 31 March 2014** to enjoy the Early Bird Rates (www.siww.com.sg/registration).

IWA Water, Energy and Climate Conference 2014: Solutions for Future Water Security, 21-23 May, Mexico City, Mexico: Registration is open.

The registration for the: IWA Water, Energy and Climate Conference 2014: Solutions for Future Water Security held in Mexico City, Mexico is now open at http://po.st/WECregister. All IWA members will enjoy discounted rates. Register **before 28th April 2014** to enjoy the Early Bird Rates. You can find more information on the conference and the conference programme at http://po.st/WECprogram. You can join the discussion online by using the following hashtag - #WECMexico2014.

4. Related publications and projects

SUMMARIES OF RELATED Ph.D. DISSERTATIONS

Relations between the variability of urban wastewater characteristics and the sociological structure of the catchment

By Nang Dinh LE at University of Lorraine (Nancy, France)
Supervisors: Dr Marie-Noëlle Pons (marie-noelle.pons@univ-lorraine.fr), Dr Jean-Pierre Leclerc

The variation of urban pollution related to human activity depends on several spatial and temporal scales: daily, weekly, annual, multi-year. A better anticipation of the variability of pollution which arrived to the wastewater treatment plant would improve their management and therefore their performances. To develop a model predicting these variations, different tools are used including demographic characteristics (age, sex, income), on the basis of land registry data, aerial photographs and sampling campaigns over 24h. The use of these tools is illustrated with the example of the Urban Community of Greater Nancy. The results of sampling campaigns in three different catchments (semi-rural village, residential area, and residential area with large hospital) are discussed, considering their relation with the human activities (day versus night, meals, laundry). These measurements also allowed a better understanding of the variability of some micropollutants such as heavy metals, alkali metals and alkaline-earth metals.

The daily variation pattern in the large city is less pronounced than in rural communities. This variability is probably related to the contributions of professional activities on the different sites. It depends on the modification of the collection network, lifestyle and demographics in the water catchment, in terms of spatial distribution and age classes in the studied area. The macropollution (C, N-NH$_4$, P), inorganic elements such as Na, K, Mg and Ca and metallic micropollution (Cu, Zn, Mn, Fe, Al) were considered. Pollution time peaks were observed: for residential areas, the first peak corresponds to human activity in the morning (around 10:00) before leaving home to work or school, the second peak corresponds to the activities at the time of returning home (around 20:00) after a day's work. We did not find a proper scheme for mixed zones (residential with commercial, industrial and hospital activities). Variations in flow and composition of the wastewater reproduce very well the human cycle, taking into account modifications in population, information on land use and daily journeys between home and work in the studied sites.

Keywords: grey water, metals, pollution, population mobility, optical brightener, green space, domestic pollution.

Statistical analysis and multivariate modelling of the long-term evolution of the permeability in full-scale membrane bioreactors

Nicolas Philippe (nicophile@gmail.com)

Supervisors: Prof. Mathieu Spérandio (mathieu.sperandio@insa-toulouse.fr) and Prof. Peter A. Vanrolleghem (peter.vanrolleghem@gci.ulaval.ca)
Place and date of defense: Irstea (Bordeaux, France), February 13th 2014.
Download: http://modeleau.fsg.ulaval.ca/en/publications/downloadable_phds/

The membrane bioreactor (MBR) technology used for advanced domestic wastewater treatment consists of an activated sludge process, based on suspended bacterial growth for pollutant removal, followed by a membrane separation stage instead of conventional settling.

The MBR technology has become increasingly popular for full-scale applications since the beginning of the last decade due to its superior treatment efficiency, but it suffers from two main economic drawbacks. On the one hand, its energy consumption is still high, due to scouring of membranes by coarse air bubbles for mechanical fouling control. On the other hand, the process is more difficult to operate, especially due to membrane operation (chemical cleaning, operational parameter setting ...) and requires better trained operators. One of the main goals of research is to improve knowledge about membrane fouling in order to find methods to predict and slow down its evolution.

Modelling is a tool to develop, assess and numerically adjust theories on MBR behaviour, in order to perform process optimisation. The aim is to integrate the different process aspects into one equation system: Filtration, biological and chemical processes, and energy consumption, using hydrodynamic and oxygen transfer models.

Even if there are many separate models (filtration models, biological models, aeration models), they are not fully compatible, nor adapted for fouling prediction. Furthermore, the complexity of the described phenomena is often prohibitive and not adapted for their application in large scale and long term experiments.

This work presents a new statistical tool, designed and applied for the investigation of links between operational variables and fouling indicators. This approach, based on multivariate regressions, has been designed especially to study full-scale plants at a long term time scale. The selection of input variables remains flexible, because the data array available at full-scale and on large time-scale is more restricted than in laboratory-scale studies. The model coefficients are determined for each considered filtration unit separately, because deterministic fouling laws seem to differ between plants, or even between membrane units.

The tool was applied on a full-scale MBR plant designed for 67000 person equivalent and equipped with hollow fiber membranes set up in four separate membrane tanks. The plant has been monitored for one year. Explanatory variables in this case are permeate flux, food to mass ratio, sludge retention time, iron dose, MLSS concentration and temperature. They were confronted with three fouling indicators: the daily permeability drift, the short term fouling rate within each flux step, and an indicator of hydraulic reversibility of fouling.

The main conclusions are that the daily mean flux is the main contributor to long-term fouling, followed by temperature and sludge retention time. The MLSS concentration, even if positively correlated with the short-term fouling rate, is negatively correlated with the long-term fouling rate, suggesting that rapid and reversible particle deposition can build a protection against less reversible fouling.

Coefficients of this multivariate analysis were then used in a predictive model for long-term permeability evolution. Results show that it allows predicting the permeability trend for two months after a four-month calibration period. This kind of model could be used in further full-scale applications to anticipate fouling and make MBR operation easier.

RELATED PROJECTS AND REPORTS

Modular Neural Networks and Their Role on Hydrological Phenomena studies

Author: Milad Jajarmizadeh

Different Artificial Neural Networks (ANNs) have been used in solving hydrological problems. Applied networks have its own advantages and disadvantages in solving problems. In the hydrologic phenomena neural networks have been developed such as Multilayer Perceptrons (MLP), Generalized Feed Forward (GFF), Radial Basis Function (RBF), Self-Organize Feature Map (SOFM) and Support Vector Machine (SVM) (Kisi et al.2012; Rezaeian Zadeh et al., 2010). A full discussion on ANNs can be found in basic literatures namely ASCE, (2000a,b), Maier and Dandy, (2000), Bowden et al,(2005) and Kalteh et al, (2008) in last decade. One of the challenging issue is related with architecture of networks. In regard with this idea, Zhang and Govindaraju, (2000) have introduced Modular Neural Network (MNN) in earlier of 2000's. The reason of using this idea is result in to generate some structure (number of layers) within the topology (architecture), which will promote specialization of function in each sub-module (Parasuraman et al., 2006). Advantages of MNN are not to have full interconnectivity between the layers. Therefore, a smaller number of weights are required for the same size network. This tends to speed the training and reduce the number of examples needed to train the network to the same degree of accuracy. A modular network will generally train faster than other networks, due to the fact that it has "short-cut" connections to the output, aiding in the weight adaptation for the hidden and input layers. The hidden layer panels can be same as for the other networks, except that modeller can configure the nonlinearity and the number of cells for halves of the layer. In general, a MNN is structured from two kinds of network, namely expert networks and a gating network. Expert networks may be of a variety of different types of neural networks. Each network is designed for a particular task. A gating network receives the input vector and produces as many outputs as there are expert networks (Wang et al., 2006). One of the issues that it is still under exploring can be how to best design the modular topology based on the data.

Modular neural networks have been used in various fields. Jajarmizadeh et al (In press) has been applied a feed forward neural network with combination of MLP for prediction of flow in a complex watershed. Bhatia et al., (2013) developed modular network for stream flow decomposition. Wu, 2012 predicted rainfall by applying the modular radial basis function neural network (M-RBF-NN) method. Moreover, Wu and Chau, (2011) studied on the optimal prediction of rainfall-runoff using MNN and ANN for two watersheds in China. Corzo and Solomatine, (2007) used modular neural network to separation of base flow during the flow simulation. In regard with prediction of evaporation, Parasuraman et al. (2006) developed the spiking modular neural networks (SMMN). Long et al. (2005) used a modular fuzzy neural network for climate prediction. In field of pollution, Almasri and Kaluarachchi, (2004) used MNN for simulation of nitrate in an agriculture catchment. Contribution of MNN in comparison with other networks is shorter. MNNs are still potential to development and evaluation these days due to having a large variety options. MNN can be derived from other networks such as MLP, RBF or fuzzy neural networks. They can be integrated with optimization methods such as SOM or Genetic Algorithm. In conclusion, it can be suggested that a neuro-hydrologist, who are interested to work with neural network for modelling hydrological phenomena, focuses to development of variety of MNNs and assessment their contribution with executive projects such as flood alarming systems, flow prediction/forecast.

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Demonstration project R3Water

R3Water "Reuse of water, Recovery of valuables and Resource efficiency in urban wastewater treatment", is a demonstration project funded by the call WATER-INNO-DEMO of the 7th EU Framework Programme which runs from January 2014 until May 2017. R3Water is coordinated by IVL (Sweden), involves 6 SMEs (Teqma, Perlemax, Aqua-Q AB, Prediktor, Ava-CO2-Forschung Gm, Ekolite Oy), 2 large companies (ADASA, Aquafin), 3 R&D centers (ICRA, IVL, VTT) and 1 association (DECHEMA), and is a demonstration project of 7.2 M€.

The main objective of the project is to demonstrate solutions that support the transition from a treatment plant for urban wastewater to a production unit of different valuables which will decrease the environmental impacts of that activity. Current research and development shows that these plants can be converted and upgraded into production units to provide energy, nutrients, water for re-use and possibly other valuables. This is achieved by improved resource efficiency in the plant as well as new technologies and business models that allow the re-use of resources from the incoming water. Within the field of these topics, new and innovative technologies will be tested and demonstrated in Belgium, Spain and Sweden. Part of this project involves innovative monitoring, state-of-the art modeling tools and advanced control strategies in order to increase resource efficiency in existing wastewater treatment plants.

Demonstration project demEAUmed

demEAUmed "Demonstrating integrated innovative technologies for an optimal and safe closed water cycle in Mediterranean tourist facilities", is a demonstration project funded by the call WATER-INNO-DEMO of the 7th EU Framework Programme which runs from January 2014 until June 2017. demEAUmed is coordinated by LEITAT (Spain), and scientifically coordinated by ICRA (Spain). It involves 7 SMEs (EUT, SICO, IDD, Alchemia-Nova, Radtke, Wapure, LGI), a large company (ADASA), 4 R&D centers and academic institutes (LEITAT, ICRA, UNESCO-IHE, IGB-FRAUNHOFER,) 1 non-profit European Economic interest group (EMWIS), 1 public body EC (JRC-IES), 1 hotel (Samba Hotels), and is a demonstration project of 5.8 M€.

demEAUmed will face two key challenges: the importance of the tourism economy and water scarcity characteristic of the area. The aim of demEAUmed project is the involvement of industry representatives, stakeholders, policy-makers and diverse technical and scientific experts in demonstrating and promoting innovative technologies, for an optimal and safe closed water cycle in Euro-Mediterranean tourist facilities, leading to their eventual market uptake. A representative resort placed in Catalonia, Spain, is considered as a DEMO site, where a representative part of all inlet and outlet waters will be characterised, treated with proper innovative technologies, and reused to reduce the carbon footprint of water management in an integrated approach at demonstration level. The incorporation of advanced monitoring and control systems and a decision support tool will ultimately define the best water management solutions by means of considered technological solutions. An exhaustive environmental and socio-economic assessment will also be conducted.

NEWSLETTER DISTRIBUTION: E-MAIL ADDRESSES NEEDED

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IWA Head Office:
Alliance House
12 Caxton Street
London, SW1H 0QS, UK
Tel: +44 207 654 5500
Fax: +44 207 654 5555
Web site: http://www.iwahq.org/
General e-mail: water﹫IWAhq.org
Membership e-mail: members﹫IWAhq.org