IWA SPECIALIST GROUP ON WETLANDS FOR WATER POLLUTION CONTROL

NEWSLETTER #55

WETLAND SYSTEMS FOR WATER POLLUTION CONTROL

April 2021

Contents:

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Contributions from everyone are welcome!

INTRODUCTION

Dear Members,

This Newsletter No. 55 of the IWA Specialist Group on Wetland Systems for Water Pollution Control is a special one. It marks the transition of Specialist Group (SG) Officers. This newsletter also finds us isolated in front of our screens at home due to the pandemic, when now more than ever, climate change and societal challenges call for our energy and expertise to accelerate the uptake of treatment wetlands and related nature-based solutions and build a more resilient future.

This newsletter edition was prepared jointly by the outgoing and incoming leadership teams as well as two IWA Young Water Professionals (YWPs) of the management committee, guaranteeing a smooth handover and a rich newsletter edition that shows us that in spite all limited physical networking activities, our members are active and out there, solving water challenges and mainstreaming the use of treatment wetlands.

This newsletter looks different than past editions because we are rolling out the new format handed down from IWA Headquarters. In this issue, you will find information about the election process, message from the chairs, opinion articles and our traditional SG interview.

Our SG newsletter gathers different updates and news from relevant projects, publications, and activities within our community, as well as some announcements and updates news from IWA Headquarters and IWA Publishing. Future editions of the newsletter will potentially be even more user-friendly, with a more interactive version accompanying our traditional PDF newsletter.

As always, most of the newsletter content is coming from you, and we thank you for that!

Warm regards,

Jaime and Pedro (incoming leadership team)
Laura and Stevo (YWP newsletter team)
Magdalena and Florent (outgoing leadership team)

SPECIALIST GROUP MANAGEMENT COMMITTEE

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Pedro Carvalho	Europe	Aarhus University	pedro.carvalho@envs.au.dk
Jaime Nivala	Europe	INRAE	jaime.nivala@inrae.fr

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(open position)	Australia / Oceana	—	—
(open position)	North America	—	—
(open position)	South America	—	—

Previous Chair and Secretary

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Florent Chazarenc	Europe	INRAE	florent.chazarenc@inrae.fr

FOREWORD

Dear IWA Specialist Group Members,

For the last four years we were honored to work with a vibrant community of professionals working diligently to deliver nature-based solutions for water treatment and water pollution control. At this point it is no exaggeration to say again that we are like a "wetland family" that motivates and supports each other. During our SG events like conferences, workshops, etc. we experience a unique and very friendly atmosphere, which enable us as a group to develop in a very sustainable and promising way.

As a result, we have issued two newsletters per year (except the last pandemic year), bi-yearly SG IWA conference and workshops in the meantime. We are also involved and developed in many task groups (both internal and interdisciplinary) as well as we are active on Facebook, with great contribution of all members but especially Alexandros Stefanakis. In the last years we put a lot of efforts to involve in our activities Young Water Professionals. Last year we faced a challenging situation and in consequence, based on group voting, we took the decision to postpone our regular conference for 2022.

According to our SG constitution, our term as SG officers, i.e. Chair and Secretary (Magdalena Gajewska and Florent Chazarenc respectively), was supposed to end last year (October 2020). In our last newsletter, published in February 2020, we presented our usual procedure for the election of our new leaders. We put a deadline to receive candidates on the 15 of June 2020. We received only one proposal. A vote was not necessary, and given the overall situation generated by the pandemic we decided, in accordance with IWA headquarters, to nominate our new leaders based on this proposal.

We usually make our election official during our bi-annual conference, and, as you know, we finally decided to postpone our event to 2022 in Thailand. In the context of this pandemic crisis we realized we missed to announce clearly the handover and to officially present Jaime Nivala and Pedro Carvalho as our new chairs. The handover of leadership was done in an online meeting which took place in February 2021. We are very happy to welcome the new leaders for next four years.

We are more than sure that the new leaders Jaime Nivala and Pedro Carvalho will continue and even speed up the momentum in taking our IWA Specialist Group forward in the coming years. We take the opportunity of this newsletter to wish them a successful term and we thank them to contribute to our wonderful wetland family.

Magdalena and Florent

YOUNG WATER PROFESSIONALS

In the last elections, seven YWPs became a part of the Wetland Systems for Water Pollution Control SG Management Committee. For now, only those that represent Europe (Anacleto Rizzo, Marco Hartl, Bernhard Pucher, Stevo Lavrnić and Laura Delgado-Gonzalez) and China (Wenbo Liu and Yi Chen) have been elected, but representatives of other parts of the world will soon get the opportunity to join us. The SG will surely benefit from their involvement and ideas they can bring.

Different activities are being planned for YWPs and we will keep you updated about their development. For now, we can tell you that we would like to give YWPs a special place in future SG newsletters so that YWPs can introduce themselves to our international IWA SG community and to present their research. We will be conducting interviews to those of you looking forward to share your work and experience as a YWP. If you like the idea, let us know by email (laura.delgado-gonzalez@inrae.fr) and we will contact you!

Stevo and Laura

WELCOME

Dear IWA SG members, colleagues, and friends,

It is with great honour and sense of commitment that we take the role as co-chairs to lead our specialist group. We do this with the weight on our shoulders of keeping a tradition of exemplary and strong leadership, but also with a warm heart thanks to the kind and supportive messages that we received from the current management committee. Our first message goes to Magdalena and Florent: our sincere thanks for all your effort and dedication to the group over the past four years! We know that it was not easy, especially this past year, and with the uncertainties surrounding the organization of our 2020 SG conference, which was ultimately pushed back until 2022. The second message is for our specialist group as a whole: As stated in our application, we have applied as co-chairs, with the ambitions to:

- build on the successful integration of the Young Water Professional initiative in the SG and its management committee, to further strengthen the links between all generations of SG members;
- support continued interactions with other IWA SGs to bridge the gap on new challenges related to climate change, resiliency, and circularity, including opportunities opened by the European focus on the Green Transition and the different roles that wetland systems (natural and constructed) can provide. (e.g., Sustainability in the Water Sector, Efficient Urban Water Management, Environmental Engineering Education);
- start a new initiative (IWA Task Group) to renew the efforts made by the SG for "Mainstreaming the Use of Treatment Wetlands". The previous Task Group was a huge success, and we should revise challenges and opportunities to further consolidate the best practices in the field of treatment wetlands.
- explore new opportunities to promote knowledge sharing and learning across disciplines, such as webinars and/or targeted regional activities

For those that do not know us, we have both been working in the European academic world for the past 15 years. You can read more about us here:

Jaime Nivala: https://www.researchgate.net/profile/Jaime-Nivala

Pedro Carvalho: https://www.researchgate.net/profile/Pedro-Carvalho-36

It was unfortunate that we could not meet and exchange ideas with you in the conference in Thailand in 2020. Our opportunities for in-person meetings are still limited in 2021, but we are making our best efforts, together with our SG management committee, to launch activities to bring us closer until our next SG conference in Thailand in 2022. We want to continue to run our SG in an inclusive manner, so please write to us if you have ideas for SG activities or if you have an interesting contribution for the next newsletter. We will continue the tradition of publishing one newsletter twice a year (March/April and October/November). Please remember that our online platform IWA Connect is accessible to all IWA members, so you can also directly share and launch discussions there at any time.

Best regards to all and looking forward seeing you hopefully sometime soon,

Pedro and Jaime

SG CONFERENCE UPDATE

We have all made the difficult decision to postpone our bi-annual IWA SG conference, but the good news is that there are new dates: 6 – 10 November 2022. Save the date! The SG group thanks the conference organization committee for their dedication and commitment to host our conference in Bangkok in 2022.

Assistant Prof. Dr. Onanong Phewnil and Dr. Suthee Janyasuthiwong
Kasetsart University, Thailand
It is our sincere hope that safe travel will be possible next year and that we can all meet in Thailand. Information about abstract submission and other important dates will be published in the next newsletter.

HIGHLIGHT STORY

Translation of IWA Treatment Wetland Books into Spanish and Hindi

Guenter Langergraber[1] and Carlos Arias[2]
[1]BOKU University Vienna, Austria
[2]Aarhus University, Denmark

The two Open Access eBooks prepared be the IWA Task Group on "Mainstreaming the Use of Treatment Wetlands", the TW textbook (Dotro et al., 2017) and the new Wetland Technology STR (Langergraber et al., 2019) have been translated into Spanish and are currently translated into Hindi (Indian national language).

The Spanish translation of the TW textbook was done by Spanish speaking colleagues from the wetlands group under the lead by Carlos A. Arias (Aarhus University) and Ismael L. Vera-Puerto (Universidad Católica del Maule, Chile). The translation was supported by:

- Dr. Florentina Zurita, Universidad de Guadalajara, Mexico
- Dr. Diego Paredes, Universidad Tecnológica de Pereira, Colombia
- Dr. Gabriela Dotro, Cranfield University, UK
- Dr. Carlos A. Ramírez Vargas, Aarhus University, Denmark
- MSc. Luis Rojas, Universidad Católica del Maule, Chile

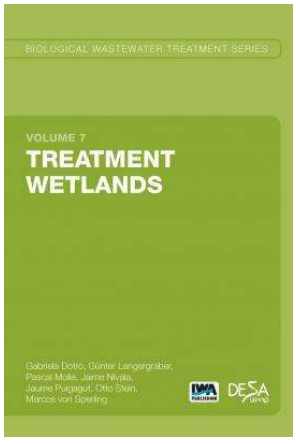
Now available OA: https://iwaponline.com/ebooks/book/817/Tecnologia-de-humedales-para-tratamiento

The Spanish translation of the Wetland Technology STR was edited by Carlos A. Arias (Aarhus University) and Jaime A. Lara-Borrero (Pontificia Universidad Javeriana, Colombia). The translation was supported by:

- Dr. Jordi. Morató, UPC, Barcelona, UNESCO Chair of Sustainability, Spain.
- Dr Gladys Vidal, Universidad de Concepción, Chile.
- Dr. Carlos A. Ramirez-Vargas, Aarhus University, Denmark.

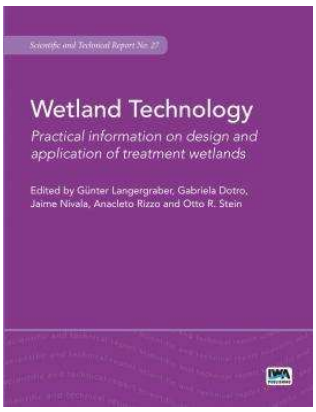
Now available OA: https://iwaponline.com/ebooks/book/818/Humedales-para-Tratamiento

The Hindi (Indian national language) translations are funded by the India-EU cooperation PAVITR (*Potential and Validation of Sustainable Natural & Advance Technologies for Water & Wastewater Treatment, Monitoring and Safe Water Reuse in India,* https://www.pavitr.net/). The translation of both books is currently on the way with aim of popularizing treatment wetlands in the Indian subcontinent.



Dotro, G., Langergraber, G., Molle, P., Nivala, J., Puigagut, J., Stein, O.R., von Sperling, M. (2017): Treatment Wetlands. *Biological Wastewater Treatment Series*, Volume 7, IWA Publishing, London, UK, 172p. eISBN: 9781780408774

http://wio.iwaponline.com/content/16/9781780408774



Langergraber, G., Dotro, G., Nivala, J., Rizzo, A. , Stein, O.R. (Eds., 2019): Wetland Technology: Practical information on the design and application of treatment wetlands. *IWA Scientific and Technical Report* No.27, IWA Publishing, London, UK, 164p. ISBN13: 9781789060164.

https://www.iwapublishing.com/books/9781789060164/wetland-technology-practical-information-design-and-application-treatment

INTERVIEW

Interviewing Professor Jamidu Katima

Frank van Dien

ECOFYT, The Netherlands

Frank van Dien: I am really pleased to get to interview you, since Assistant Professor Karin Tonderski said that you are the most interesting person in our little wetland universe! I have never met you, unlike the majority of the people who have been interviewed so far, but especially I am happy that we have the first African in our series. And with Karin's recommendation, I am ever so curious about you! I read that you held many positions and have been involved in many organisations (way too many for the little high-light list here on the right) and that you won the 2007 Nobel prize for Peace as a member of the Intergovernmental Panel on Climate Change (IPCC)! So now, for starters: Where in your life did things definitely turn in the direction that resulted in your role in the world of Constructed (or Treatment) Wetlands?

Professor Jamidu Katima

1955	Born in Katoro-Bukoba, Tanzania
1982	Process Engineering University of Dar es Salaam
1986	MSc, Loughborough University of Technology UK
1990	PhD, Leeds University, UK
1999	First wetland built
1995 – 2018	Team Leader of Constructed Wetland and Stabilisation Ponds Research Group – University of Dar es Salaam
2018 to date	Vice Chancellor, Kampala International University in Tanzania
2018 to date	Member of Scientific and Technical Advisory Panel of the Global Environmental Facility

Jamidu Katima: My interest in wetlands started during the 6th International Conference on Wetland Systems for Water Pollution Control, which took place in Sao Pedro, Brazil in 1998. By then our Research Group was actively involved in Research in Waste Stabilisation Ponds, trying to find the reason why they were not working efficiently, particularly in Tanzania and other tropical countries. Myself and my colleague Prof. Tolly Mbwette decided to attend the 6th Conference, with the intention of expanding our understanding in soft technologies in wastewater treatment systems. The conference was an eye opener and during that meeting we decided to start research in wetlands alongside waste stabilisation ponds. When we went back home, we decided to change the name of our research group to Construction Wetlands and Waste Stabilisation Pond Research Group (CW-WSP). Even before we started researching in wetlands, we decided that we should bid to host the 8th International Conference on Wetland Systems for Water Pollution Control in Tanzania. Our motivation was that the wetland technology should be exposed to as many people in Africa through their participation in the International Conference in Tanzania. Our wish was answered during the 7th International Conference on Wetland Systems for Water Pollution Control, which was held in Florida, USA in 2000. Tanzania was nominated as the venue for the 8th International Conference on Wetland Systems for Water Pollution Control.

Frank van Dien: So, you were really involved in an early stage! And how active, to want to host the IWA conference, immediately! So: what has kept you working on wetland systems?

Jamidu Katima: The interest to continue working in wetland is driven by the fact that there are so many towns in Tanzania which do not have wastewater treatment systems. Conventional systems cannot work for them, as such the viable option is to use soft technologies

such as stabilisation ponds and wetland systems. However, our experience has shown us that constructed wetland systems have to be adapted to different situations. For example, available space, amount and quality of wastewater to be treated and many other factors influence the design and configuration of the wetland systems. Majority of design equations were developed in temperate climate, which require some modifications when designing wetland systems for tropical countries. Furthermore, majority of people in our area do not regard wetland systems as biological reactors which require continuous maintenance, as such sustainability of these system is an issue which we continue to work on. In short when we build a new system it gives us challenge and new experience to continue thinking of how to modify the systems to make them more efficient.

Frank van Dien: I understand your problems... The next question that comes up is: do you see these wetlands as an ultimate solution for domestic/ municipal wastewater? And if so, in general or just occasionally, i.e., when no sewer system is available?

Jamidu Katima: Yes, in my opinion the wetland systems are not necessarily an ultimate solution, but rather a major solution for domestic / municipal wastewater treatment, particularly in developing countries, where mechanical systems have failed because of so many operation factors. In our experience we have encountered situations where sewer systems are not available, a combination of other onsite treatment systems such as septic tanks and wetland systems have worked well.

Frank van Dien: Do you know that you are the first interviewee to speak out such a strong 'YES' for the wetland systems? But that it is very well in line with what many other wetlanders did say: it makes sense in developing countries, because of lower investments and 'understandable' operation skills. Can you tell me: what do you do, besides wetlands, what are your other interests?

Jamidu Katima: My other research interests are in solid waste treatment systems, particularly looking on ways of producing valuable products from solid waste, agro-waste especially, which is very abundant in countries whose economies are driven by agriculture. But this is not done in isolation, we are interested to see if we can increase global environmental benefits. When left to rot these wastes generate greenhouse gases, but using them to produce biodegradable plastics, not only we contribute to fighting global warming, but also, we replace fossil plastics which have been approved to be persistent in the environment. The other area which I am working on is the Chemicals Management, this is because I am currently a member of Scientific and Technical Advisory Panel (STAP) of the Global Environmental Facility (GEF) focusing on Chemicals and Waste Cluster.

Frank van Dien: What is the most promising application area for wetland systems, besides domestic/municipal wastewater?

Jamidu Katima: We have applied wetland systems to industrial wastewater, particularly food and beverage industries, their performance is superb. We have also applied the wetland systems to treat tannery waste, since we have not built commercial scale, we cannot claim with certainty its performance. We have also applied wetland system for acid mine drainage. Again, this has not been applied to large industrial scale, the results from the pilot scale are impressive though. We have realised that a combination of domestic waste and industrial waste improves the performance of the wetland systems.

Frank van Dien: Is there, to your knowledge, a Treatment Wetland that is an example for us all? Or just one that you can bring to our attention, for some specific reason?

Jamidu Katima: As I mentioned above, CW configuration depends on the situation for which they have to be applied. The following pictures provide that idea. The message I want to give here is that each application may require different intervention.

Malfunctioning mechanical aeration, wastewater treatment system at Kleruu Teachers' Training College in Tanzania.

Situation on the site after the failure of a mechanical treatment system.

A Horizontal Sub-Surface Flow Constructed Wetland with baffles to improve the retention time and thus treatment performance.

An L-Shape constructed wetland at Mahe, Seychelles. The design was adopted to meet the space requirement.

Sloping constructed wetland system at Seeta School, Uganda, the design was adopted to meet the requirement of sloping terrain.

A combination of Septic Tank and Constructed Wetland at Bariadi Prison in Tanzania

Septic tank

Mangrove constructed wetland system for treatment of domestic wastewater from beach hotels

Frank van Dien: What is the most needed area of further research and study for treatment wetlands?

Jamidu Katima: Majority of design equations for wetland system are based on BOD removal equations. These equations might not be suitable for wetlands intended for other pollutants. For example, we have found out these equations are not suitable for designing wetlands intended for pathogens removal. And this may be true for many other pollutants for example acid mine drainage. Continuous research on design equations targeting particular pollutant is necessary, if we want the wetland systems to be applied to other wastewaters, particularly industrial wastes.

Frank van Dien: How could we get to more cooperation in research? Would you have an answer to that?

Jamidu Katima: Having worked with some colleagues from the north e.g., the Late Prof. Sven Eric Jorgensen of the Royal Danish School of Pharmacy – Copenhagen and Prof. Rob Van Deun of Thomas More University of Applied Sciences, Belgium, we have learnt that there are more mutual benefits in expanding knowledge on the operation of the soft technologies. We should encourage our Universities and Organizations that fund research such as European Union, Africa Development Bank, Swedish Development Corporation, NORAD, USAID, GIZ, Third World Academy of Science etc., to support north-south research collaboration.

Interviewing Professor Jamidu Katima

What does this world need most at the moment?
At the moment the world needs most to attain sustainable development by 2030 for all countries. Some of the Goals are focussing on human health, and clean water and sanitation. These cannot be achieved without proper, efficient and affordable wastewater treatment technologies such as wetland systems.

What does the world need most at the moment, concerning water?
Water is a scarce commodity that we need to conserve. If we may apply circular economy concepts on water systems, we can achieve a lot. The amount of water used once is quite significant. If the technologies can enhance the amount of wastewater reuse that will be a noble contribution.

Frank van Dien: What are your interests, besides your work on CWs, in your spare time?

Jamidu Katima: In my spare time I do volunteer work caring for orphans. I am the Chairman of an Orphanage Centre in Tanzania going by the name “Chama cha Kulea Watoto Yatima na Wasiokuwa na Makazi Maalum (CHAKUWAMA, Swahili for: Orphanage and Special Homelessness Children Association)”. My major task, apart from overseeing the activities of the centre, I raise funds from well-wishers to help in paying for salaries of staff, school fees, medical expenses, uniforms etc. Currently the Centre has about 65 children (boys and girls).

Frank van Dien: That is so good to hear! I wish you will be very successful in supporting this centre! My last question is: who would you like to be interviewed next time?

Jamidu Katima: I wish to propose Prof. Zhu Hui, one of the youngest professors in China, with many publications in her name, on a variety of processes in wetlands, of the Northeast Institute of Geography and Agroecology in Changchun, China. The reason to choose her, apart from her superb publication record, the majority of past interviewees are of male gender and also very few, if any interviewees are from her region.

REGIONAL UPDATES

ASIA UPDATE

An ecological restoration project of Jingsheng River in Lingshi County, Jinzhong City, Shanxi Province, China

Shaohui Lv[1] and Yaqian Zhao[2]
[1]Shanxi Chongde Guangye Energy Conservation and Environmental Protection Technology Co., Ltd., Taiyuan, Shanxi, China (E-mail: sdsj168@126.com)
[2]Regional Coordinator for China, IWA Specialist Group "Wetland Systems for Water Pollution Control"; Xi'an University of Technology, China (E-mail: yaqian.zhao@ucd.ie)

A large scale micro-ecological filter bed system was built in 2018 for river water treatment and ecological restoration in Shanxi Province, China. It provides a good showcase of solving the black and smelly water problem and improving the urban landscape and residents' living standards. The system is running well for 2.5 years.

Figure 1. Overview of the micro-ecological filter bed system

Jingsheng River, a tributary of Fenhe River, runs across Lingshi County, Jinzhong City, Shanxi Province, China. Due to the reasons of increased pollution sources, lack of water exchange and accumulation of sediment on the riverbeds, the water quality has deteriorated and the black and smelly water is getting serious in recent years, which had a bad impact on the urban landscape and the lives of nearby residents. In order to improve this situation, Lingshi County government launched a comprehensive ecological restoration project of Jingsheng River in 2018. Shanxi Chongde Guangye Energy Conservation and Environmental Protection Technology Co., Ltd. oversaw the river water quality restoration.

Figure 2. Riverside prior to the project.

Shanxi Chongde Guangye Energy Conservation and Environmental Protection Technology Co., Ltd. is based in Taiyuan, the capital city of Shanxi Province, China. The company has designed the micro-ecological filter bed based on information from the National Wetland Research Institute and the European water system ecological restoration theory.

The micro-ecological filter bed technology is composed of two sections of aquatic landscape plants and ecological matrix layer. It is a comprehensive technology that integrates the achievements of environmental engineering, structural engineering, and ecological forestry, and is used for water ecological treatment and restoration. When the sewage flows through the system, the pollutants are purified and treated under the multiple effects of physical, chemical, and biological processes. The technology has the advantages of low investment, low energy consumption, simple maintenance and management, good efficiency of pollutant removal, and can be combined with landscape construction to beautify the environment.

Figure 3. Close look of the system.

The large micro-ecological filter bed project of 6,600 m^2 was designed to treat river water of 7,767 m^3/d with total investment of 13 million Chinese yuan (1.6 million Euros). The river water was firstly introduced to a sedimentation tank for suspended solids removal. It was followed by a microbial denitrification tank. Thereafter, the effluent is pumped into the micro-ecological filter bed treatment system. After the treatment, the effluent flows into the clear tank and further into the river. The final effluent water quality can meet the Level A Chinese standard of "Pollutant Discharge Standard for Urban Wastewater Treatment Plant" (GB18918-2002). The influent and effluent water quality are shown in Table 1. The entire system was designed for automatic control without manual management in normal working conditions.

Table 1. Water quality of influent and effluent.

	COD (mg/L)	NH_3-N (mg/L)	TP (mg/L)	TN (mg/L)
Influent	23	3.63	0.26	10.8
Effluent	6	1.24	0.15	8.81

This micro-ecological filter bed can not only meet the needs of sewage treatment, but also serve as a part of the river landscape. According to the local climate, soil and other environmental characteristics, the project planted local flowers, reeds and yellow calamus to provide local residents with aesthetic value and recreational benefits.

11th Cross-Strait Symposium on Constructed Wetlands Held in Wuhan, China

Zhenbin Wu and Zisen Liu
Institute of Hydrobiology (IHB) of the Chinese Academy of Sciences, 7 Donghu South Road, Wuhan 430072, China wuzb@ihb.ac.cn; liuzisen@ihb.ac.cn

The 11th Cross-Strait Symposium on Constructed Wetland was held in Wuhan, China, in December 25-29, 2020. More than 230 scholars, experts and technical staff from over 40 universities, institutes and enterprises in cross-strait regions attended the symposium via present and virtual manner. The theme of the symposium was centered on the role of constructed wetlands in regional environmental protection and ecological restoration in the COVID-19 post-epidemic era.

The symposium consisted of two keynote speeches, five plenary speeches, 33 oral presentations, and more than 50 poster presentations and submitted papers. Topics varied from the elimination and control of pathogenic microorganisms in the air; wetland protection and restoration; heavy metal removal by microalgae; and treated wastewater upgrading via constructed wetland etc. As part of the symposium program, attendees had a field trip to the demonstration base of the ecological restoration of water ecology of the East Lake, Wuhan, and visited the exhibition on COVID-19 battle in Wuhan.

The symposium was jointly organized by Institute of Hydrobiology (IHB) of the Chinese Academy of Sciences, China University of Geosciences, Sun Yat-sen University in Taiwan, and Taiwan Wetland Society, while Wuhan University of Technology; the Water Area Administration Office of the West Lake; Committee for Environmental Biology under the Chinese Society for Environmental Sciences; Wuhan Technology and Business University; and Hainan Tianhong Municipal Design Co., Ltd sponsored the symposium.

Since 2008, the Cross-Strait Symposium on Constructed Wetland, initiated and organized by Prof. Zhenbin Wu and Prof. Lei Yang, has been held eleven times in Wuhan, Kaohsiung, Haikou, Taipei, Yichang, Hangzhou, Chiayi, Yinchuan, Shenzhen and Kaohsiung, respectively. It has served as an increasingly mature and diversified platform for the cross-strait experts and technical managers through conversation, investigation, staff exchange and other various forms. The experts and representatives communicated with each other, exchanged ideas & promoted friendship, and gained dozens of cross-strait exchange cooperation and fruitful achievements.

The 11th Cross-Strait Symposium on Constructed Wetlands. (Photo Credit: IHB)

Professor Zhenbin Wu delivered a keynote lecture at the Symposium. (Photo Credit: IHB)

Professor Yang Yang delivered a keynote speech at the Symposium. (Photo Credit: IHB)

The attendees had a field trip to the demonstration base of the ecological restoration of water ecology of the East Lake, Wuhan. (Photo Credit: IHB).

The attendees visited the exhibition on COVID-19 battle in Wuhan. (Photo Credit: IHB)

A new modular constructed wetland is the future of sewage treatment in rural China

Jun Zhai and Wenbo Liu
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In the last decades, the water pollution caused by the random discharge of rural sewage and the use of dry toilets has attracted attention in China. With the progress of urbanization, rural wastewater treatment is an important part of new rural construction in China. Generally, the rural sewage is wastewater from toilet, washroom, bath, and house-feeding poultry and livestock. Comparing to the rural domestic wastewater, the rural sewage usually contains more organic and nitrogen pollutants. Besides, the life and work styles in the rural China leads to great varieties of quality and quantity of sewage, and the dispersed residence causes difficulties in collecting the sewage and high cost in pipe network construction. Currently, the treatment technologies for rural sewage in China is still those centralized treatment technologies for urban domestic wastewater. However, these technologies are not suitable for rural sewage in China due to their high cost in facility construction, operation and maintain.

A new modular constructed wetland (CW) system has been designed and developed to solve the problems in wastewater treatment in rural China. This CW system consists different modules: one septic-tank module, one inlet tank module, and one or more CW modules. The rural sewage influent is stabilized in the septic-tank module. Then, inlet tank module changed the continuous influent into intermittent by using pulse inlet. This also improves the oxygen level in the CW modules. The pollutants are removed in the CW and the effluent can reach the requirement in national Standard 1B (COD≤60 mg/L, NH_3-N≤8mg/L, TN≤20 mg/L, TP≤1mg/L).

These modular CW systems are suitable for the decentralized sewage systems in rural China. As designed, one CW module could meet the treatment requirement for one single household (2-4 persons, 1-2 m^3/d), and when 8-10 CW modules are employed, the system can meet the needs of sewage treatment for small villages (10-20 households). All the modules are produced and can be quickly installed in the field, with extremely low cost of construction. There are back-flush pipes integrated into the modular CW systems, which ensures the CW will not be blocked during the long-term operation. The low maintain fee and easy maintain routine further improves the applicability of this modular CW systems in the less developed rural area of China.

This new CW system has been used to in decentralized rural sewage treatment projects in Tangjiaba Village, Geleshan Twon, Jushilin Village, Bishan Town, and other rural areas in Chongqing, Sichuan Province, Jiangxi Provinces, etc. The advantages and successful application show that this new type of CW, integrated self-cleaning pulsed vertical flow constructed wetland, is an ideal technical for sewage treatment in the rural areas and the future of sewage treatment in rural China. This new CW is also perfect candidate technologies for decentralized wastewater treatment in the developing countries.

EUROPE UPDATE

Wastewater and sewage sludge treatment using constructed wetland and for a sustainable usage in agriculture (TRESOR)

Olfa Mahjoub[1], Giuseppe Luigi Cirelli[2], Feliciana Licciardello[2], Teresa Graziano[2]
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Regional Context and Rationale

The Mediterranean Region is increasingly witnessing scarcity and degradation of the freshwater resources. The recurring and prolonged drought periods threatening the Southern Rim are particularly relevant. In addition, the eminent sea water level rises and is increasing the pressure on the development of agriculture and tourism activities which may affect their sustainability. On both sides of the Mediterranean Rim, sea water intrusion has already affected coastal aquifers that used to serve irrigation, thus depriving the farmers of the main water resource, and constraining them to find alternatives to preserve their agricultural activities. These concomitant conditions made non-conventional water resources for irrigation one of the privileged options to be promoted by decision-makers among the communities to guarantee water and food security.

Wastewater (WW) is recognized as one of the curses of the region whose discharge has resulted in the degradation of the marine environment. Transforming this curse into a blessing requires the participation of the scientific communities and the contribution of all the stakeholders of the water sector, from both sides of the sea. Secondary treated WW for irrigation is facing various challenges related to the variability of their quality, directly or indirectly linked to high costs of the energetic consumption. The production of sewage sludge is inevitable and represents a real threat to environment and health in addition to being insufficiently used for energy production. These challenges are faced by societies both in Italy and Tunisia.

The use of Nature-Based Solutions (NBS) for the treatment of WW and sewage sludge can drastically lower the cost of treatment and enhance the non-restrictive reuse of treated WW and sewage sludge after the upgrading of their qualities. If well managed, such practices will reduce the discharge of effluents to the receiving environment and improve soil quality through the use of biosolids as organic fertilizer. Within the concept of circular economy, the application of NBS can also integrate good practices and address the Nexus Water-Energy-Agriculture approach.

Objectives

TRESOR project stands for “Traitement des Eaux usées et des Boues Résiduaires et Usage Agricole Durable” (Wastewater and sewage sludge treatment and the sustainable use in agriculture). The project is funded by the EU in the framework of The European Neighborhood Instrument, Transboundary Cooperation (IEV CT) Italy-Tunisia 2014-2020. It aims at the conservation and the sustainable use of natural resources in the partner countries. More particularly:

- disseminating NBS for the treatment of WW and sewage sludge.
- valorizing treated WW and sewage sludge in agriculture.
- popularizing the NBS.
- addressing the impacts on the agricultural system.

Project Partners and Structure

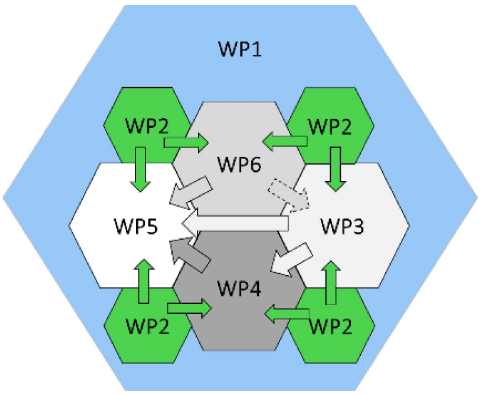
TRESOR is implemented by 6 partners from Sicily and Tunisia, namely:

- National Research Institute for Rural Engineering, Water and Forestry – INRGREF, Tunisia (Beneficiary)
- University of Catania – UNICT, Italy (Partner 1)
- Commune of Scicli – SCICLI, Italy (Partner 2)
- Regional department of Agriculture, Rural Development, and Fishery – ASSAGRI, Italy (Partner 3)
- National Center for Water Technologies – CERTE, Tunisia (Partner 4)
- National Research Institute for Agricultural Research – INRAT, Tunisia (Partner 5)

The NGO Sidi Amor is associated to benefit from activities’ outcomes, including trainings and meetings.

The project encompasses 6 Work Packages described as follows:

1. Project management and coordination (WP1).
2. Communication and dissemination (WP2).
3. Pilots' design, implementation, and evaluation of performances (WP3).
4. Reuse of treated WW and sewage sludge (WP4).
5. Capacity building and technology transfer (WP5).
6. Agronomic, socio-economic, environmental, health and energetic evaluation (WP6).



Innovation and experimental activities

The use of NBS to treat WW and the sewage sludge for a non-restrictive use in agriculture is the main innovative aspect of the TRESOR project.

In Italy, a hybrid treatment wetland (Figure 1) will be implemented at demonstration scale to treat part of the effluent of the conventional WW treatment plant of the Scicli municipality (located in the Ragusa province, Sicily). The effluent will pass through a three-stage constructed wetland constituted by a first horizontal sub-surface flow, a vertical flow and a second sub-surface flow units, planted with *Phragmites australis, Canna Indica* and *Typha latifolia, respectively.* Treated WW will be used to irrigate a citrus plantation, and vegetable and garden crops located close to the experimental facilities, using drip systems.

Moreover, part of the sewage sludge (from the primary sedimentation phase) will be treated by four drying reed units. The units, planted with *Phragmites australis,* will be placed in parallel and fed in alternating loading/resting cycles (Figure 2). For each cycle, or load, a single unit will be fed, while the others will rest. The mineralized sludge will be tested as fertilizer in the citrus plantation as well.

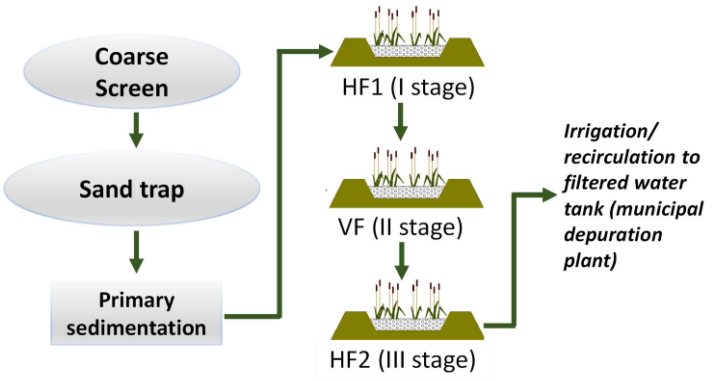


Figure 1. Layout of the hybrid treatment wetland that will be implemented in Scicli (Ragusa, Sicily)

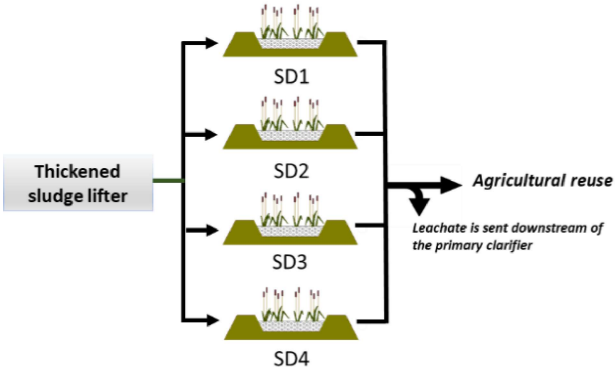


Figure 2. Layout of the drying reed units for sewage sludge treatment that will be implemented in Scicli (Ragusa, Sicily)

In Tunisia, the pilot will be installed in the reclaimed water irrigated area of Oued Souhil, Nabeul district, Tunisia that has been receiving wastewater for more than 35 years. It will include three basins with vertical flow to work in parallel for three days - one of them will be working in alternative load. Commonly, *Phragmites australis* will be used. Then, one basin with horizontal flow will follow, planted with *Typha angustifolia*. The pilot plant will treat the secondary effluents that farmers used to use for irrigation (Figure 3). One basin will be dedicated for the treatment of sewage sludge. Like in Italy, this will be an open-air workshop, a living lab, where surrounding farmers practicing reclaimed water reuse can observe the construction of the wetlands, their operation, and their maintenance throughout the project and beyond. Irrigated plots will be installed around to test the produced water for the irrigation of raw edible crops to investigate the non-restrictive reuse and the innocuity of agricultural products.

For sewage sludge, basins will be installed in parallel.

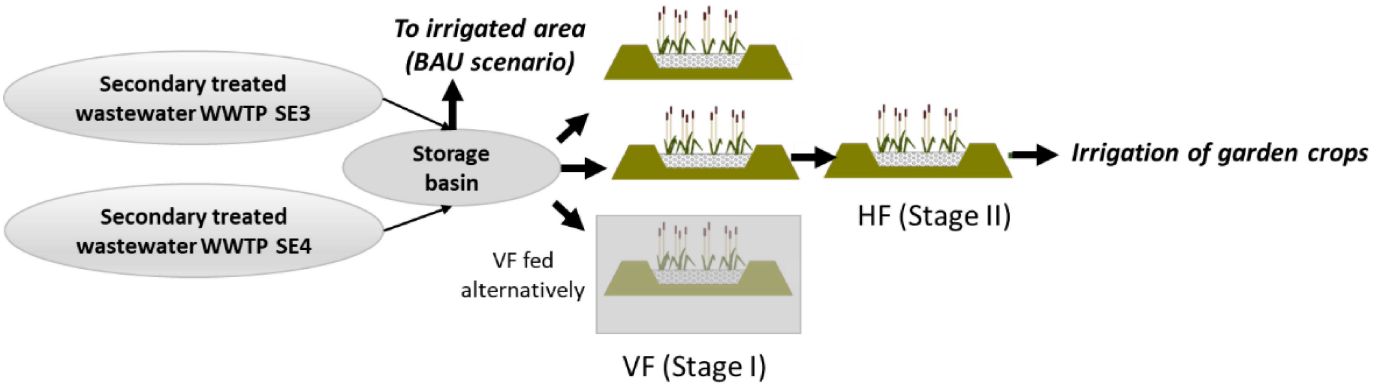


Figure 3. Layout of the hybrid treatment wetland that will be implemented in Oued Souhil (Nabeul, Tunisia)

Other activities that will be implemented within the TRESOR project are:

- the organization of workshops for technology transfer and the training of operators in the agricultural sector in the areas affected by the plants, researchers / teachers, technicians, workers in rural areas, etc.);
- the realization of surveys and analysis of the experimental plant life cycles in the Med Region for the transfer to other environments.

In this regard, the project uses an integrated approach considering the circular economy and the water-energy-agriculture relationships to increase the resilience in a climate change context.

Communication activities

With regard to the communication activities, the project will strengthen transboundary relations through cooperation-based actions within the framework of the European Union, whose strategic role in pursuing common goals of economic, social and cultural sustainability, especially in the Mediterranean region; this can be further emphasized by a research and cooperation project such as TRESOR.

Apart from disseminating the project outputs among the partners, communication and dissemination activities are aimed at highlighting the impact of the project in terms of know-how exchanges, sharing of skills and competencies, and increased innovation flows for the territories involved and the related civic societies.

The communication plan includes a deeply articulated multimedia communication mix, based on a wide repertoire of actions and strategies aimed at spreading on-going and final results in terms of technical innovation and wider socio-economic advantages: a website (www.tresorprojet.eu); two social media channels on Facebook and Instagram, brochures, newsletters, videos, etc.

Expected results

The main expected results are:

1. Adoption of NBS or a sustainable management of wastewater and the sewage sludge for non-restrictive agricultural use;
2. Reuse of treated WW and mineralized sludge for irrigation and fertilization, respectively, in citrus plantations of the Mediterranean Region;
3. Sustainable management of treated WW and mineralized sludge to mitigate environmental and health risks;
4. Professional enhancement induced by the sustainable management of treated WW and mineralized sludge through training and capacity building of operators in the water sector (ministries, technicians, farmers, etc.);
5. Commitment of the operators in the water sector to spreading NBS in other areas suffering scarcity and degradation of the freshwater resources.

News from the COST Action Circular City

Guenter Langergraber
BOKU University, Vienna, Austria
Chair, COST Action Circular City

https://circular-city.eu/

The COST Action Circular City started in October 2018 with main aim and objective to build an interdisciplinary platform for connecting city planners, architects, system designers, economists, engineers and researchers from social and natural sciences that develop nature-based solutions in the urban landscape that facilitate circular economies based on the 3Rs (Reduce, Reuse and Recover) and allow cities to cope with future challenges.

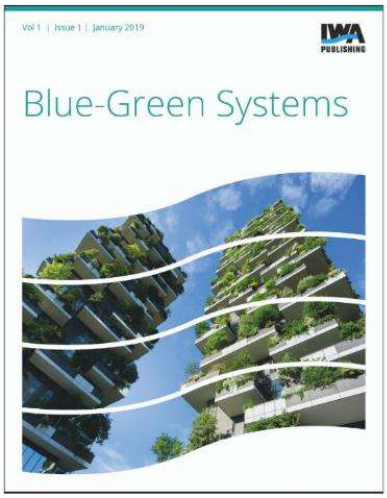
The Action is a network of 500+ researchers from over 40 countries. The work in the COST Action is organised in 5 Working Groups:

- WG1: Built environment
- WG2: Sustainable urban water utilisation
- WG3: Resource recovery
- WG4: Urban farming
- WG5: Transformation tools

Additionally, we have started specific groups:

- The Green Wall Cluster, and
- The Circular City Cell (with aim to support integration of the work of the WGs).

The first main result of the Action has been WG papers for the Special issue "***Towards Circular Cities***" in the IWA publishing Open Access journal ***Blue-Green Systems*** (https://iwaponline.com/bgs/pages/towards_circular_cities_special_issue). The six papers of the Special Issue have been published in February/March 2020 and gained over 27,000 page views and over 7,000 downloads during the first year after publication.



The basic concepts and ideas of the COST Action Circular City can be viewed in an **animation video** (https://www.youtube.com/watch?v=R3NXLb-W1pg; subtitles are available in 34 languages).

The final result of the Action will be a guideline on how nature-based solutions can be used to support circularity within the urban environment. During the last year, meetings have been held monthly to further work towards this final goal.

The current state of the work will be presented in the Special Issue "***Water and Circular Cities***" in the MDPI journal ***Water*** (ISSN 2073-4441; https://www.mdpi.com/journal/water/special_issues/water_circular_cities). Of course, other papers related to the topic are also welcomed for the special issue. Deadline for submission of papers for the Special Issue is 31 May 2021.

If you are interested to get more information on the Action and/or want to receive the Circular City news, please let me know (guenter.langergraber@boku.ac.at).

Developing intensified treatment wetlands in Spain and Portugal keeping in mind sustainability and biodiversity considerations

Miguel Martín and Carmen Hernández-Crespo
IIAMA-Universitat Politècnica de València, Spain

The main objective of LIFE19 RENATURWAT is to demonstrate that the use of CWs as advanced treatment in small WWTP can reduce not just nutrients, emerging pollutants and pathogens but may be a key element in biodiversity strategy in rural areas. At a time when Urban Wastewater Treatment Directive (UWWTD) is under review, maybe is a good moment for approaching Water Framework Directive (WFD) and EU Biodiversity Strategy: if WFD includes biological indicators in water masses quality assessment, why not consider, at least qualitatively, these indicators in WWTP effluents?

Many watercourses in Mediterranean regions have intermittent flow, so the discharges from WWTPs are the only water flowing for the greater part of the year. Furthermore, in some small permanent streams, the base flow is lower than the discharges. In both cases, treated wastewaters accomplishing UWWTD targets are not enough to meet the WFD objectives because discharge limits are too high when no water dilution exists, or it is lower than discharge. The recent regulation on water reuse (EU 2020/741) establishes WQ targets for agricultural irrigation uses but does not for environmental uses.

The link between treated wastewaters and aquatic environment using Horizontal Surface Flow CWs (HSFCW) is known as “Water harmonica” concept developed by Kampf and Claasen at the end of the 20th century. We know some examples about it and we know that it works, but our aim is to demonstrate that it works better if an intensified vertical flow CW (VFCW) is used previously as upgrading treatment.

The second key point of the project is about the reuse of solid wastes; specifically, the sludge from drinking water treatment plant (DWTS) in order to integrate the principles of the circular economy model. Prof. Zhao and collaborators have extensively studied the use of this waste as active substrate in CWs, so we know its potential. Complementary, we have carried out several studies at laboratory and pilot scale to test high hydraulic loading rates (HLRs) with different WWTP effluents. The results indicate that it is feasible to work at high HLRs (up to three $m^3/m^2/d$). This allows treating high flows in relatively small areas and giving an upgrading treatment to the effluents.

Figure 1. DWTS open-air solar drying before granulation process.

Now, it is time to take a step forward and work at demonstrative scale. Our proposal is to combine a 100 m^2 VFCW with DWTS as active substrate, with a 100 m^2 HSFCW in series. The inflow to VFCW comes from a secondary treatment with N removal (output 12 mg N/l) but without P removal (output 2.5 mg P/l). Additionally, a second 100 m^2 HSFCW will be built receiving waters from the secondary treatment. The objective of this second unit is to compare the differences observed in aquatic biodiversity when the inflow has different quality.

The main expected result in VFCW is to reduce TP concentrations from 2.5 to 0.5 mg P/l, working with hydraulic loads between 1 and 3 $m^3/m^2/d$. Also emerging pollutants removal will be studied. Continuously saturated and tidal flow operation modes will be studied. Each of them has its advantages and limits in oxygenation, ammonia and total nitrogen removal, emerging pollutants removals, etc. Biological disinfection in HSFCW will be studied by monitoring *Escherichia coli*. Macroinvertebrates will be considered as indicators of the biodiversity enhancement as well as for their role in the disinfection process as filter feeding organisms. Biodiversity study will be completed with amphibians, pollinator insects and natural predators for agricultural pest control.

Figure 2. VFCW pilot plants with DWTS as substrate active.

The project will also assess the socioeconomic impact of this nature-based solution in rural areas and the business plan for DWTS valorisation on a larger scale. The replicability along the Magro River is expected at the end of the project and the final objective is to use all the DWTS produced in Valencia's drinking water plants and some in Portugal. By networking with others ongoing projects as LIFE18 INTEXT, we hope to give a major boost to the development of treatment wetlands in Spain.

The project is an example of collaboration among private companies (Global Omnium, Aguas de Portugal), public-private (Emivasa), NGOs (Fundación Global Nature) and universities (Universitat de Valencia, Universitat Politècnica de València). The LIFE RENATURWAT project has received funding from the LIFE Programme of the European Union.

More news about LIFE19 RENATURWAT:

https://www.facebook.com/Renaturwat/
https://twitter.com/LifeRenaturwat
http://www.liferenaturwat.com/

Discussing further development and cooperation in modelling

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The well-known CWM1 model was published in 2009 (Langergraber et al., 2009) giving a general modelling framework based on the Activated Sludge Model (ASM). During discussing limitations and needed improvements Günter Langergraber made clear why they used the number 1 — for sure the idea was that once there should be improvements made towards a Version 2 and so on. And so, after 10 years, the modelling community got together in 2019 at WETPOL in Aarhus to start the organisation of workshop to further advance the cooperation and development of models for Treatment Wetlands.

In June 2020, a virtual two-day Workshop on "How to advance modelling and better cooperate within our community" was organised by Nicolas Forquet, Ania Morvannou (both INRAE, France), Mathieu Gautier (INSA Lyon, France) and Bernhard Pucher (BOKU, Vienna, Austria).

Figure 1: During the last hour of the two-day workshop the participants are still smiling

The main topics discussed included:

- What factors and mechanisms should we, as a community, focus on first?
- Engineering-oriented models
- The need for data!
- How to improve our collaboration?

The workshop has proven yet again that there is a strong need for development and inclusion of new processes to describe emerging pollutants, pathogens and clogging. While this is needed at a level of high detail, easy to use design models capable of integration in water management tools are equally important. Further development shall use an upscaling approach using open data and surrogate models to reach this goal and thereby be driven by our community connecting modellers, experimentalists and practitioners to create a high impact. A direct outcome of the workshop is the preparation of a paper presenting how modelling could help to make treatment wetlands a successful tool in the European Green New Deal and its importance for urban water management. Further results will be presented at WETPOL 2021 in a dedicated modelling Session (Abstract submission deadline 15th of April, more information in "Upcoming Events" section of this newsletter).

Effective and replicable wetland designs: how will the digital revolution trigger a wetland revolution?

Tamás Gábor Pálfy
Ghaemesh Digital Wetland (tamas@ghaemesh.com)

Ten years ago, I was a green-eared student in field research of natural wetlands. I knew little about why someone would engineer one, other than as sanctuary for wildlife. Then I attended a course on natural wastewater treatment. Soon, a big book landed on my lap. I was amazed. I was certain that with low-cost and low maintenance, wetlands could solve existing problems of water quality management. I learnt at that time that engineering equations existed, but not that people had been awarded respectable PhD titles for creating computational models of wetlands.

Many people feel that design equations and models are for engineers, while models are for scientists. This is where we should wait a minute. Design equations stem from the approach that a polluted flow can be considered uniform and captured in a wetland. This assumption means that a population number can be used for scaling up (m2/PE). Then the hydraulic load [m3/m2/day], with mean concentrations lets us calculate the daily pollutant flux per unit of wetland area [g/m2/day]. The wetland itself, where all the uniform pollution stream is directed, remains a black box, because engineering assures that processes will happen good enough for treatment.

Thanks to decades of research, the design equations made wetlands smaller, more effective and more resilient. Design equations became key elements of national standards and guidelines to treat domestic wastewater. Examples are the Austrian standard ÖNORM B 2505, or the French framework for the two-stage vertical flow filters for treating raw sewage. These works sum up huge scientific achievements, and thousands of wetlands had been built in Europe. Guidelines have been created to help engineering and replicability. These guidelines are the direct acknowledgement of wetland technology and an absolute success. However, with seven years of modelling experience for the industry, I believe they are a creativity trap and potential sinkhole for investment money. This is a time to tip the intricate balance toward a wetland revolution with new opportunities in the digital era instead of mediocrity of looking at guidelines as an ultimate solution.

To deliver my vision of the digital revolution in the wetland field, let's turn first from the success of the rules of thumb toward a failure. Guidelines will work well and can become better as long as the water quantity is greatly correlated to the population. Consider the term population equivalent. Wherever the flow is variable, modelling appeared in the wetland domain: to understand better combined sewer overflows, denitrification wetlands, and supplementary treatment of wastewater effluents. Have you ever wondered, why? In my opinion, everyone wants to build a wetland with preliminary evidence that it will work. Researchers and engineers know this well. Modelling appeared instead of thousands of wetlands, and I want to share with you a new perspective on these tools. All it takes is thinking as an engineer dealing with variable flux.

An easy example of variable flux is a wetland receiving combined sewer overflows during storm events. These wetlands receive urban stormwater mixed with domestic sewage. Flow rates are obviously dependent from the storm event. Concentrations also vary depending on the mixture that the wetlands get. This is one reason why targeted modelling of these wetlands was first and published in 2005 by Ulrich Dittmer and his colleagues (Dittmer et al., 2005). Another example is a free water surface wetland (FWS) treating nitrate. This is a lesser known but a better understood example. In FWS, not only the flux can vary, but a broad variability of wetland shapes and sizes have been built, modelled and documented. And certainly, the amount of information tells why modelling appeared. According to a 2012 review paper of FWS wetlands, concentration removal ranges from 3% — 9% [N=66, median: 52%]; pollutant removal rate is 0 to 9 g N/m^2/day (Kadlec, 2012). There is work to do in terms of replicability. This is the reason why decision tools have been popular in wetland research lately (Rizzo et al., 2018). The third example is likely the least evident: supplementary treatment of municipal wastewater treatment plant effluents. Even at a single operator, the numbers for effluent concentration will show variability in terms of treatment technology, age, inflow and operation at different plants. This complexity is further increased by the sensitivity of receiving waters recorded in the watershed management plans. The fact that emission and inflow thresholds coexist

in Europe and the limited availability of space sets the challenge to design only the right wetlands in supplementary treatment settings. You do not want them to be too small, too big, or miss out on a pollutant.

I worked on decision-support modelling and model development with a vision that a day would arrive when these engineering modelling tools would be broadly used. I was thinking we took one step but it feels like we took two. The first step is that several tools are now scientifically proven and waiting for early adopters. The second is that the number of tools NOW means hybrid wetlands can be designed. My vision is customized treatment trains, to use the customer's data to design for exactly what his/her project needs, to satisfy emission or stream quality standards he/she faces. Designing hybrid wetlands will be the Easter egg of opportunities. I am certain that the balance is already moving in favour of data-based design on a massive scale. In the last 25 years a lot of non-variable flux wetlands have been built, but not that many for variable flux, and now this could change fast. All it takes is piloting and showing replicability before the boom starts, and it is my obligation to help people to see the opportunities as this happens.

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Reed bed system for beach wrack management in the CONTRA project

Alicja Kupczyk, Katarzyna Kołecka, Magdalena Gajewska
Gdańska University of Technology, Poland

The CONTRA project - "Baltic Beach Wrack- Conversion of Nuisance To a Resource and Asset", brings together partners from six Baltic countries, including fourteen member institutions of the project and twenty-two associated organizations. Activities under the CONTRA project have been going on since autumn 2018.

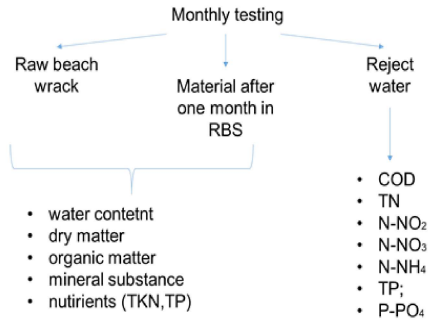
The main goal of the CONTRA project is to increase knowledge of the sustainable management of material thrown out by the Baltic Sea in order to improve water quality and increase the possibilities of using the potential of algae. The project is conducting research on six case studies and one of them is FERTIWRACK (located in Swarzewo, Puck Bay, Poland) with the aim of turning Beach Wrack into fertilizer by means of RBS. Based on existing knowledge on sludge treatment reed beds are mainly use to dewatering and stabilizing sewage sludge from different stages of wastewater treatment. In the reed bed system there are two main processes, which take place without additional chemicals (environmental friendly solution): dewatering and stabilization. Dewatering takes place in way of mainly the water infiltration through the bed and outflow in the form of reject water and evapotranspiration of water from above-ground parts of reeds. This process leads to the increase in the content of dry matter as well as reduction in both the volume and mass of the raw material. Stabilization occurs through differences in oxidation-reducing potentials, resulting in mineralization of organic matter as well as nitrogen transformations. Effect of stabilization is to lower the content of organic compounds, which reduces their ability to digest and eliminate unpleasant odors. Thus it has been foreseen that reed bed system seem to be a potential solution in the case of beach wrack treatment. This method potentially could give the possibilities (i) to use of macroalgea despite their seasonal occurrence; (ii) fertilizer production; (iii) treatment with use of NBS in place of origin.

Objectives to be investigated during the project: (i) location - close distance between macroalgae collection place and reed bed system; (ii) adequate space for the system construction means dose of macroalgea for m2, (iii) optimization of fertilizer production and ensuring low impact for the environment (possible no impact). GUT designed pilot plant of the reed bed system, which was built in October 2019 on the wastewater treatment plant in Swarzewo.

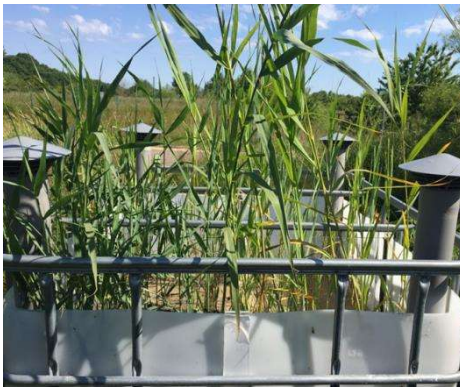
View of Beach Wrack near Swarzewo

Shredded macroalgae

Site of pilot plant



Scheme of methodology of testing



Plant growth - *Phragmites australis*

Beach wrack after 6 months in RBS (May, 2020)

After over one year of investigation, we could conclude that beach wrack can be treated by means of RBS as sewage sludge. Sewage sludge contains significant amounts of water and nutrients like Beach Wrack.

Sample	water content [%]	dry matter [%]	mineral substance [%]	organic matter [%]
Raw sewage sludge	99-93	1-7	42-26	58-74
Raw beach wrack	95.0	5.0	51.1	48.9

The reed bed system allows for significant dewatering and stabilization of Beach Wrack.

Sample	water content [%]	dry matter [%]	mineral substance [%]	organic matter %]
Sewage sludge after treatment	86-58	14-42	41-52	59-48
Beach Wrack after treatment	13.6	86.4	56	44

Beach wrack material is a source of nutrients for reed and has a positive effect on its growth, which indicates good fertilizing properties.

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Revisiting the value and potential of surface flow wetlands: A UK perspective

Gabriela Dotro, Tao Lyu and Bruce Jefferson
Cranfield University, UK

There are over a thousand subsurface flow (SSF) wetlands in the UK, primarily used for sewage treatment but also farm and urban runoff management, industrial applications, and airport de-icer treatment. The technology was first introduced in the mid-90s, based on soil-based horizontal flow wetlands but was quickly modified to use gravel as the main treatment media. One water utility, Severn Trent Water, pioneered their development and implementation and today, the company has over 600 of these systems, primarily for tertiary treatment. As water quality standards have tightened through the years, these horizontal flow systems primarily designed to retain residual solids and particulate biochemical oxygen demand have been modified to treat dilute crude sewage as well as secondary effluents (Griffin and Pamplin, 1998), provide full nitrification (Butterworth et al., 2016) and retain phosphorus (Dotro et al., 2014). Recently, modifications of the French flowsheet for full treatment (Khomenko et al., 2019) and full-scale implementation of reactive media systems have also been adopted.

A new outlook

Although treatment wetlands have always had the potential to deliver multiple benefits, and this has been recognised in conference presentations (McInnes 2021), industrial research and academic research (Athorn, 2018) it is actually in the last five years that the concept of designing for multiple benefits in sewage applications has started to be explored at UK wide level. The global and regional interest and new sources of funding for "nature-based solutions" have provided treatment wetlands with a unique opportunity to be recognised for their ability to deliver multiple benefits. Flagship schemes like the Ingoldisthorpe surface flow wetlands implemented by Anglian Water jointly with the Norfolk Rivers Trust have raised awareness with environmental and economic regulators, green investors and end users, boosting interest in the technology (IWA, 2021). Scottish Water has been developing new flowsheets, consisting of anaerobic baffled reactors followed by aerobic SSF wetlands, with an additional surface flow wetland element to specifically enhance the provision of ecosystem services.

At the same time, there are over a thousand new or tightening phosphorus consents in sewage works coming into force in the next five years. A coordinated effort between the environmental and economic regulators for England and Wales are aimed at facilitating investment in innovative solutions, especially those that support multiple benefits like nature based solutions (EA, 2020). As a result, surface flow wetlands that had been historically relegated to only industrial or coal mining applications due to the large land area required for their implementation, are currently being (re)assessed as a potential tertiary sewage treatment technology. As an example, during WETPOL 2015 held in York (UK), the experience with "integrated constructed wetlands" ("ICWs") from Ireland was presented to a room with representatives from consultancies, water utilities and researchers (Carty and Crabbe, 2015). The informal feedback in the room was shared concern when the footprint of 30 m^2/PE was flashed on the screen, in stark contrast to UK's ambitions to design wetlands with footprints smaller than 1 m^2/PE. In 2021, the picture has changed dramatically, with companies still wary of the land intake required but willing to entertain the idea of a 30 m2/pe tertiary wetland if it means avoiding chemical dosing installed at a site serving 200 PE and a recognised contribution to natural capital, biodiversity and cultural ecosystem services.

How the treatment wetland community can help

New research projects collaboratively funded by UK and Irish water utilities are emerging, some of which combine conventional and intensified subsurface flow wetlands (see PhD advert) and others focused specifically on surface flow systems. On the latter, Cranfield University is currently delivering a strategic research piece collaboratively funded by 10 UK water utilities, Irish Water and the Environment Agency - to propose a framework for robust design and implementation of surface flow wetlands. In addition to analysing data from the academic literature, the project utilises a combination of an electronic survey and a virtual workshop with key experienced wetland designers (by invitation only), to attempt to capture the wealth of experience on design and implementation of surface flow TWs from around the world. **The views from anyone who has been involved with either the design or the monitoring of surface flow wetlands for phosphorus removal are welcome until the 23rd April 2021,** to enable the Cranfield team to compile and anonymise experiences to complement the findings from published data analysis.

The project will generate three outputs: a) a confidential report to the sponsors, b) an open access publication containing key learning points and curated datasets and c) design and implementation guidelines issued jointly with the Constructed Wetland Association. It is hoped this work, combined with ongoing field scale

trials undertaken by the water utilities with support from the regulators, will enable further opportunities for realising the potential multiple benefits of using treatment wetlands as nature-based solutions to sewage management.

For any queries regarding the project, the practitioners survey, or wider Cranfield wetlands research please contact Gaby at g.c.dotro@cranfield.ac.uk .

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MIDDLE EAST AND AFRICA UPDATE

A word from the Regional Coordinator

Assistant Prof. Dr. Alexandros Stefanakis
German University of Technology, Oman
Technical University of Crete, Greece

The Middle East region is the driest region of the world with only 1% of the world's freshwater resources. Nature-based solutions and particularly Constructed Wetlands are slowly expanding in the MENA region. Despite the limited dissemination of wetland technology in the region, it is the MENA region where we can find large Constructed Wetland facilities mostly for industrial wastewater. However, not all (<50%) generated wastewater in MENA is fully treated, while only a very small fraction of the treated effluents is reused. Thus, there are obvious opportunities to promote wastewater reuse, but only few countries in the region have taken initiatives towards this direction. In this section are some recent news from both research and industry fields on constructed wetland projects.

A modified two-stage vertical flow constructed wetland study targeting effluent irrigation standards

Assistant Prof. Dr. Alexandros Stefanakis
German University of Technology, Oman
Technical University of Crete, Greece

Published study: Alwahaibi, B., Jafary, T., Al-Mamun, A., Baawain, M.S., Aghbashio, M., Tabatabaei, M., Stefanakis, A.I., 2021. Operational modifications of a full-scale experimental vertical flow constructed wetland with effluent recirculation to optimize total nitrogen removal. Journal of Cleaner Production 296, 126558, https://doi.org/10.1016/j.jclepro.2021.126558.

In the MENA region, there is a lack of studies evaluating the performance of different wetland designs and operational modifications at full-scale. In general, there is limited information on the application of CWs in hot and arid climates. In the Middle East region, the number of CW facilities is estimated at only a few dozens, and only a small number has been presented in the literature (Stefanakis, 2020). Therefore, the main research goal of this study was to evaluate the efficiency of a full-scale experimental Vertical Flow Constructed Wetland (VFCW) and test different operational modifications in order to achieve an effluent quality according to the Class A of the Oman Standard with focus on total nitrogen removal, allowing for its reuse in agriculture, an increasingly in-demand objective in hyper-arid environments.

The full-scale VFCW system was designed with 100% effluent recirculation and was built at the wastewater treatment plant of Quriyat city (45,000 residents) in Oman as a research facility for municipal wastewater treatment under desert environmental conditions. The VFCW consists of two stages, having 3 beds in the first stage and 2 beds in the second stage (following the common French system design). It receives 50 m^3/d, i.e., 25 m^3/d of raw wastewater and 25 m^3/d of the recirculated effluent (at 100% recirculation rate), with an average hydraulic loading rate of 0.135 m/d. The net treatment area of both stages is 995 m^2. An anoxic tank equipped with a submersible mixer allowed for up to 100% recirculation of the treated effluent (effluent of the

second stage - VF2 beds). The recirculated treated effluent was mixed in the anoxic tank with the raw influent sewage before applied with gravity to the first stage beds. The effluent of the first stage - VF1 beds was collected in a pump station and then applied to the VF2 beds through spray nozzles (14 per bed).

With this setup, high removal rates were reached for organic matter (98.7% and 97.8% removal of BOD5 and COD, respectively) with average effluent concentrations of 3.94 mg/L and 18.83 mg/L. Total Phosphorus removal was also high (97.2%) but a gradual increase of the effluent concentration occurred after the fifth operational month (as more or less expected). However, given the high limit value in the Standard (30 mg/L), it is not anticipated that the effluent value will exceed it. A complete elimination of faecal coliforms was also measured, as the treated effluent was chlorinated.

The average TKN and NH_4-N levels in the treated effluent were also decreased to 1.23 and 0.28 mg/L (98.57% and 99.52% removal), respectively, indicating strong nitrification in the system. The recirculation practice seemed to have improved TKN and NH4-N removal compared to the traditional French CW system, considering the reported removal rates (84-93% for TKN; Morvannou et al., 2015; Paing et al., 2015). However, the system provided an average NO_3-N effluent value of 23.5 mg/L (Total Nitrogen - TN 24.97 mg/L), higher than the Standard limit for reuse (11.3 mg NO_3-N/L). This implied that additional actions should be further taken to improve the denitrification rate.

In order to enhance the nitrate removal, four modifications were tested: (1) increase of the HRT in the anoxic tank from 2 to 5 hr, (2) increased water level in the VF2 beds (at 30 cm below the media surface) thus increasing the HRT in the bed to 3 days, (3) removal of the spray nozzles in the VF2 beds to reduce the oxygen supply, (4) step-feeding of raw wastewater to the second stage pump station and its alternative by using an external carbon source. It was found that the combination of (1) - (3) with effluent recirculation provided a NO3-N effluent concentration close to the limit value. With the simultaneous application of step-feeding (external carbon source was used in this case; raw wastewater step-feeding was not considered in the design of the research VFCW, and the existing pump and pipes could not handle the additional volume), the effluent NO3-N did eventually drop well below the limit value.

This study demonstrated that with further testing and optimization of the operational parameters of the passive VFCW system, high rates of nitrification and denitrification are possible. The tested VFCW represents a sustainable treatment technology feasible for hot and arid climates, and not only, that can provide an effluent quality appropriate for irrigation with low overall operational costs.

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New constructed wetland project awarded for the treatment of produced water from oil fields

Assistant Prof. Dr. Alexandros Stefanakis
German University of Technology, Oman
Technical University of Crete, Greece

In February 2021 it was announced that a new wetland project was awarded by Petroleum Development Oman (PDO, the leading oil & gas exploration and production company in the country) for the treatment of 40,000 m³/day of produced water coming from oil fields located in Rima, Oman. The contract was awarded to a well-known France-based international environmental company that is implementing its first such project in the Middle East. This will be the second wetland project implemented by PDO. This new project consists of a large wetland system and evaporation ponds over a surface of more than 400 hectares. It is estimated that it will reduce the oilfield's carbon footprint with 65.7 KT per year of avoided carbon dioxide emissions equivalents (CO2e) per day, while it will also generate 82 GWh savings in energy per year, compared to the conventional, energy-intensive disposal method of pumping the water into deep aquifers under high pressure.

NORTH AMERICA UPDATE

Treatment Wetlands, Third Edition

Scott Wallace[1], Jaime Nivala[2], Pascal Molle[2], Kela Weber[3], Marcos von Sperling[4]
[1] Naturally Wallace Consulting LLC, Minnesota, USA
[2] INRAE, Lyon, France
[3] Royal Military College, Ontario, Canada
[4] Federal University of Minas Gerais, Belo Horizonte, Brazil

The third edition of the Treatment Wetlands textbook is underway. The third edition has been split into two: one dedicated to treatment marshes (Kadlec, 2020) and another to subsurface flow treatment wetlands. The edition on subsurface flow wetlands represents a substantial expansion to the previous book and includes updates on fundamentals as well as new chapters on clogging, microbiology, pathogens, micropollutants, concept of design, deriving design and operational parameters, statistical interpretation of wetland monitoring data, and climate influences on wetland design and performance. The update also includes new chapters on the design, implementation, and management of horizontal flow (HF) wetlands, vertical flow (VF) wetlands, French VF wetlands, aerated wetlands, fill and drain wetlands, Combined Sewer Overflow (CSO) wetlands, and sludge treatment wetlands. The anticipated publication date is 2022.

Kadlec R.H. (2020) Treatment Marshes for Runoff and Polishing. CRC Publishing, Boca Raton, Florida, USA. ISBN 9781138322622 1056 pp.

Mercury cycling under extreme flooding in coastal wetlands

Alex Chow
Clemson University, South Carolina, USA

A field study was conducted that illustrates the impacts of hurricanes and flooding on mercury in coastal wetlands (Tsui et al. 2020). It highlights the fates of trapped pollutants in wetlands under climate change conditions and extreme weather events.

An informative video has been published here: https://www.youtube.com/watch?v=tzMHWJ4Y7xg

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SOUTH AMERICA UPDATE

Wetlands Brazil Group contributes to spread wetland technology in Brazil and Latin America

Pablo Heleno Sezerino
Universidade Federal de Santa Catarina (UFSC), Brazil

In 2011 a specialized group on constructed wetlands applied to wastewater treatment was established in Brazil. This group is formed by different universities, consulting enterprises, independent consultants and many students from undergraduate and post-graduate courses. The main group idea is to spread wetlands technology to elevate sanitations conditions in Brazil, mainly concerning small communities. In this way, every two years a national conference is organized and every semester a small letter is prepared and freely distributed online (www.gesad.ufsc.br/apresentacaowetlandsbrasil/). More information about the next conference is in the “Upcoming Events” of this IWA SG Newsletter.

Recently an e-book was published by nineteen Brazilian researchers with eight different chapters showing the history of treatment wetlands applications in Brazil to specific implementations such as grey wastewater and micropollutants treatment, French vertical flow wetland adapted to tropical conditions, hydrodynamics and the macrophytes role. This book written in Portuguese is available for free download and is especially useful to students and wetlands technology engineers.

www.gesad.ufsc.br/files/2021/02/E-book-WETLANDS-BRASIL-Experiências-Brasileiras-1.pdf

TASK GROUP UPDATES

Katharine Cross[1] and Fabio Masi[2]
[1] Water Cities, Thailand
[2] Iridra srl, Italy

The IWA Task Group for Nature Based Solutions for Water and Sanitation has been working with the Science for Nature and People Partnership (SNAPP) Sanitation for and by Nature (NatureSan) group (https://snappartnership.net/teams/water-sanitation-and-nature/) to develop material on how Nature Based Solutions (NBS) can be used for wastewater management while providing co-benefits for people and nature.

The outputs include a web-based tool led by the Catalan Water Research Institute (ICRA) which is still under development that will help to advise those interested (e.g., water managers, regulators, municipality administrators, etc.) on the different options available when dealing with water quality issues in urban wastewater systems.

As part of the process of developing the web-based tool, a series of factsheets and accompanying case studies have been put together with support from the IWA Task Group and merited a stand-alone publication. The factsheets and case studies detail a selection of NBS as part of the process of treating domestic wastewater, while also providing ecological and social co-benefits. These NBS include treatment wetlands, as well as innovative approaches such as willow systems, living walls and green roofs. Case studies provide the evidence of how these wastewater treatment options are applied in practice. More information is available at: https://www.iwapublishing.com/books/9781789062250/nature-based-solutions-wastewater-treatment

The publication is expected to be released by April/May 2021.

NEW PROJECTS

Two projects on nature-based solutions for water treatment have been funded under the H2020-SC5-27-2020 call "Strengthening international collaboration: Enhanced natural treatment systems for water security and ecological quality in cities". The projects NICE and MULTISOURCE will start in June 2021 and will both run for four years.

NICE (iNnovatIve and enhanCed naturE-based solutions for sustainable urban water cycle)

Project Leader: Isaac Fernández (CETIM)

The overall objective of NICE is to widen the availability of enhanced Nature Based Solutions [NBS] to provide circular urban water solutions. NICE will provide key knowledge for the design and implementation of NBS, closing urban water loops. In this respect, NICE solutions will make available reusable water for different purposes (e.g., non-agricultural irrigation, toilet flushing), in addition to mitigating pollution and runoff and constituting an attractive and integral part of the urban landscape.

NICE strategy will be based on the comprehensive study of existing NBS together with R&D at lab and Urban Real Labs [URLs] (11 URLs, 18 pilots, 8 countries + 4 Fellow Sites) of innovative NBS covering the whole urban water cycle (wastewater [WW], greywater [GW], river basins [RB], stormwater [SW] & Combined Sewer Overflow [CSO]). High-potential technologies such as green walls, vegetated rooftops, rain gardens & hybrid subsurface wetlands will be studied and enhanced with especially tailored bioaugmentation strategies, reactive materials & other filling media, novel design & plants.

The NICE consortium is comprised of 14 partners: CETIM (ES), AQUALIA (ES), ICLEI (DE), Politechnika Gdanska (PL), Aarhus University (DK), IRIDRA (IT), INRAE (FR), EcoBIRD (FR), Politecnico di Torino (IT), Sveriges Lantbruksuniversitet (SE), Lisode (FR), Gate2Growth (DK), Desert Research Centre (EG), and Aquas y Aquas de Pereira (CO).

MULTISOURCE (ModULar Tools for Integrating enhanced natural treatment SOlutions into Urban wateR CyclEs)

Project Coordinator: Jaime Nivala (INRAE)

The overall aim of MULTISOURCE is to create an innovative process for implementing enhanced natural treatment systems in urban water cycles, thus promoting multiple sources for urban water reuse and avoiding the discharge of polluted water without treatment. The project will develop the modular tools required for a holistic approach to increasing water security and ecological quality in cities via a co-design process where water stakeholders shape the development of the tools. These open-source tools will address both urban water availability and location and selection of Nature-Based Solutions for Water Treatment (NBS^{WT}) and Enhanced Natural Treatment Systems (ENTS) while taking into account the environmental, economic and societal framework for a given urban region, with a special focus on life cycle analysis and circular economy. The project will include piloting of new enhanced natural treatment systems for various urban water streams (wastewater, stormwater, rainwater, runoff), monitoring existing and new enhanced natural treatment systems for removal of biological and chemical hazards, and developing policy-oriented risk assessment guidance. The tools will be demonstrated in cities within the EU and internationally, accompanied by new and innovative business models that promote water and economic circularity and facilitate the planning, financing, and implementation of enhanced natural treatment systems in urban water cycles worldwide.

The MULTISOURCE consortium is comprised of 20 partners: INRAE (FR), Aarhus University (DK), Alchemia-Nova (AT), Ayuntamiento de Girona (ES), Citta Metropolitana di Milano (IT), Forum for Equitable Development (SI), Ho Chi Minh City University of Technology (VN), ICLEI (DE), ICRA (ES), INRAE Transfert (FR), INSA (FR), IRIDRA (IT), Métropole Lyon (FR), Montana State University (US), NIVA (NO), Oslo Kommune (NO), Rietland (BE), Universidad Federale de Santa Catarina (BR), UFZ (DE), Water Europe (BE).

DIVAGRI (Revenue DIVersification pathways in Africa through bio-based and circular AGRIcultural innovations)

Project coordinator: Sebastien Clerc-Renaud, Hochschule Wismar

DIVAGRI was funded under the H2020 call CE-SFS-36-2020 "Diversifying revenue in rural Africa through bio-based solutions". The project will start in May 2021 and run for four years.

DIVAGRI aims to increase the productivity, income and economic opportunities of subsistence and smallholder farmers in arid and semi-arid regions of Sub-Saharan Africa by implementing state-of-the-art, innovative bio-based solutions, including multifunctional constructed wetland systems, that will improve agricultural production, enable diversification of crops and increase added-value, create environmental, social and economic sustainability, and generate new local economic opportunities. Based on identified challenges and mitigation measures, the overall goal of the DIVAGRI project is to provide African subsistence and smallholder farmers with tools to sustainably improve farm productivity, profitability and resilience through improved management of farming resources, output diversification and creation of high-value circular bioproducts.

The vision is to contribute to sustainable livelihoods in rural areas of Africa, through domestic agri-food systems which can sustain growing populations in an inclusive and environmentally friendly way in the long term. DIVAGRI increases the productivity of the African agri-food systems, connects supply to demand and turn wastes into resources through connected value networks within the bioeconomy through selected enabling bio-based solutions tailored to specific conditions in the five target countries.

The consortium is comprised of 21 partners: Hochschule Wismar (HSW), Institut für Polymertechnologien e.V. (IPT), alchemia-nova GmbH (ALCN), Stellenbosch University (SU), Agricultural Research Council (ARC), Namibia University of Science and Technology (NUST), University of Cape Coast (UCC), National Agricultural Research and Development Institute (NARDI), İstanbul Avrupa Araştırmaları Derneği (IAAD), Council for Scientific and Industrial Research - Crops Research Institute (CSIR), Botswana University of Agriculture and Natural Resources (BUAN), Lake Agege Farm (LAF), Instituto Superior Politecnico de Manica (ISPM), Center for Research and Technology Transfer to Communities (CITT), Lisha Empowerment and Development (LISHA), Namibia Rotomould CC (NMR), G&G Extrusionstechnik GmbH (G&G), FH Joanneum GmBH (FHJ), Asociacion de la Industria Navarra (AIN), Institut Po Ovoshtarstvo-Plovdiv (FGI), Ss. Cyril and Methodius University in Skopje (UKIM).

LooPi®. Plant-based mobile unisex urinal for public spaces (beta version)

Project coordinator: Theresa Heitzlhofer (alchemia-nova GmbH)

National funding program: Stadt der Zukunft 6. Ausschreibung, BMK, Austria

LooPi® is a self-sufficient unisex plant-based urinal for public spaces. The waste water is cleaned via an integrated plant wall and then reused for flushing. Nutrients contained in urine are transformed into plant biomass and fertilizer. The overall aim is to bring LooPi® from TRL 4 (lab scale) to TRL 7 (prototype in operational environment). LooPi® has been nominated for the Green Concept Award 2021 in the category "architecture & tiny houses". https://www.gp-award.com/en/produkte/loopi

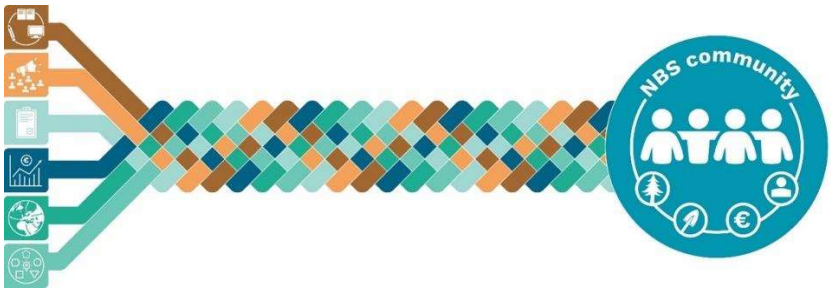
The LooPi® consortium is comprised of two partners: ALCN (AT), BOKU (AT). Design partner: EOOS (AT).

NetworkNature (supporting the nature-based solutions community to increase impact)

Project Coordinator: Nea Pakarinen, ICLEI – Local Governments for Sustainability

NetworkNature, funded under Horizon2020, **gathers nature-based solutions (NBS) resources, projects, best practices and tools under one roof.** The pioneering service creates opportunities for local, regional and international cooperation to **increase uptake of nature-based solutions.** NetworkNature supports the NBS community, through its six impact pathways:

1. Improve the capacities of NBS innovators and practitioners
2. Raise societal awareness of the benefits of NBS
3. Support mainstreaming of NBS across policy sectors
4. Enhance attractiveness of NBS for businesses
5. Strengthen NBS connections between Europe and the world
6. Increase understanding of benefits and risks of nature-based solutions



To support cooperation, Network Nature coordinates the H2020 Nature-Based Solutions Task Forces that strengthen synergies between projects. The goal of the Task Forces is increase awareness of the multiple benefits of NBS; create a strong evidence base for NBS on an EU level and an increase in partnerships for upscaling NBS. There are currently six Task Forces, consisting of H2020 project experts in each topical field. **To raise awareness,** NetworkNature highlights a timely topic in the NBS field with its semestral themes, identified in consultation with the nature-based solutions community. **The first semester theme** running from March to July 2021 is '**Nature-based solutions in light of the pandemic'.** During this semester, NetworkNature gathers and disseminates information from a wide range of stakeholders, to increase knowledge and collaboration on the nexus of NBS and health.

ICLEI Europe, IUCN, BiodivERsA, Oppla and Steinbeis 2i are behind NetworkNature, working closely with the European Commission Directorate-General for Research and Innovation and Executive Agency for SMEs. With expertise in research, implementation, business strategy, policy and communication, the team is well equipped to nurture and champion the growing nature-based solutions community. Explore the NetworkNature platform here.

UPCOMING EVENTS

5th Pan-American Conference on Wetland Systems

Pablo Heleno Sezerino
Universidade Federal de Santa Catarina (UFSC), Florianópolis,Brazil

Together with the Red Panamericana de Sistemas de Humedales / HUPANAM, Wetlands Brasil Group is organizing a Latin American Conference to be held next 28th April in the Florianópolis City, south of Brazil, that will be as presential and online. www.conferenciahumedales2020.com.br

WETPOL 2021 Virtual: Announcement and Call for Abstracts

WETPOL 2021
BOKU UNIVERSITY - Austria

9th International Symposium on Wetland Pollutant Dynamics and Control
September 13-17, 2021

Dear colleagues,

Due to the still unpredictable situation we had to make the decision to hold WETPOL 2021, the 9th International Symposium on Wetland Pollutant Dynamics and Control, as a full virtual event. We keep the original dates as planned (13-17 September 2021) and will do our best to organise the virtual event in a way so that you can still feel the wetland's spirit.

Abstracts can be submitted until **30 April 2021** via the conference website: http://wetpol.com/abstract-submission/. The sessions cover a wide range of topics related to wetland science, see http://wetpol.com/abstract-submission/sessions/ for more details. Several Special Issues in well-known journals will be available for publication of the full papers. Details will be announced in due time. Besides the sessions, several workshops have also been proposed. The topics of the workshops accepted are:

- Treatment wetlands and water reuse: from potential to implementation
- "Vertical Space Exploration" - Social, Financial and Legislative Barriers and Solutions for the Launch of Green Walls for Wastewater Treatment in the Built Environment "
- Nature-based design of water circularity across the building-community-landscape scale: a real-world mountain lab
- Setting full sail towards future resilient cities: Strategies to apply NBS to close water and nutrient cycles within the green-blue-grey infrastructure
- LIFEPOPWAT, development of “Wetland+” technology, a new treatment tool for the removal of HCH and its transformation compounds
- PAVITR, India-EU cooperation on the potential and validation of sustainable natural & advance technologies for water & wastewater treatment, monitoring and safe water reuse in India
- WATERAGRI, WATER retention and nutrient recycling in soils and streams for improved AGRIcultural production
- CWetlandsdata - Towards the "Constructed Wetlands Knowledge Platform" for sustainable development

We do hope that also the virtual edition of WETPOL 2021 will attract your attention and we are looking forward to receiving your abstracts soon.

Best regards,

Guenter Langergraber & Thomas Hein, Co-Chairs, WETPOL 2021
Bernhard Pucher & Gabriele Weigelhofer, Co-chairs, Local Planning Committee WETPOL 2021

Website: http://wetpol.com/ ... Email: wetpol2021@boku.ac.at ... Twitter: @wetpol2021

NEWS FROM IWA HEADQUARTERS

How far are we from reaching SDG 6? A target-by-target analysis

In March this year, UN Water, in collaboration with other UN entities responsible for SDG 6 targets, launched a report to summarise the progress towards achieving universal access to water and sanitation globally by 2030.

Consultation Open – Call to Action on Regulating for Citywide Inclusive Sanitation

In June 2020, IWA launched a new initiative Regulating for Citywide Inclusive Sanitation (R-CWIS). Through this initiative, in collaboration with representatives from regulators and organisations across the globe, IWA aims at identifying the needs, opportunities, and tools for action to support and inspire regulators in their contribution to achieving citywide inclusive sanitation in the context of the SDGs.

Digital congress programme announced

An overview of the programme for the Digital World Water Congress has been published by IWA. Packed with information on the themes, topics and timings, you can view this now to start planning your schedule at the congress. To view the programme overview, please click here.

IWA Awards set for Digital World Water Congress

The upcoming Digital World Water Congress is set to play host to IWA's 2021 Awards. The awards, held every two years, recognise the outstanding achievements of IWA members and water sector professionals.

IWA supports study on climate-resilient water management

IWA, along with other partner organisations such as The Nature Conservancy, is an official endorser of the new report "Integrating EbA and IWRM for climate-resilient water management" published by GIZ.

Grundfos Sustainability Report 2020 is published

IWA Member Grundfos is a global water technology company committed to pioneering solutions to the world's water and climate challenges and improving the quality of life for people. They have published their Sustainability Report for 2020, which is structured around three main pillars: Water, Climate and People.

IWA ramps up efforts to mark World Water Day

IWA marked UN World Water Day on 22 March, held annually to raise awareness of the 2.2 billion people without access to safe water. Although for many years IWA has actively recognised World Water Day, in 2021 the Association became a formal supporter of the awareness day.

New Water Safety Planning Factsheet on Engaging Vulnerable Groups

IWA has published a new factsheet entitled "Engaging vulnerable groups in the implementation of Climate Resilient WSP". Both vulnerable and marginalized groups have disadvantages that need to be considered in provision of safe water and accessible water supply.

Deadline approaching for IWA & Cranfield scholarships

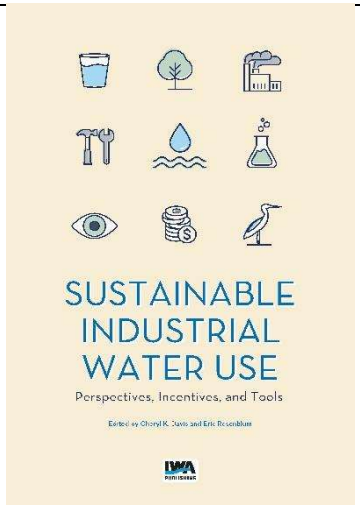
IWA, together with Cranfield University, is offering 15 scholarships across our MSc courses in Water & Wastewater Engineering, Water & Sanitation for Development and Advanced Water Management. Those awarded the IWA Excellence Scholarships will have their fees (at overseas or UK rates) paid and will benefit from enhanced engagement.

IWA marks World Wetlands Day

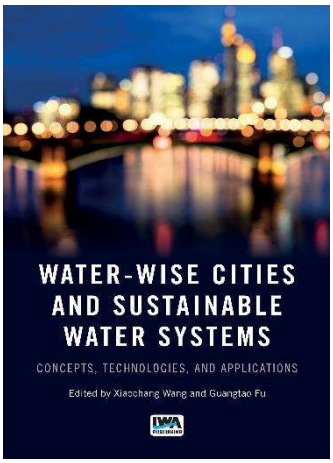
IWA is supporting awareness of #WorldWetlandsDay today. Currently 2.2 billion people do not have access to safe drinking water. By 2050, we will require 55% more water due to population growth, and wetlands are key to providing freshwater. We must do more to improve water management, reduce pollution, and enhance wetlands restoration efforts.

New Publications

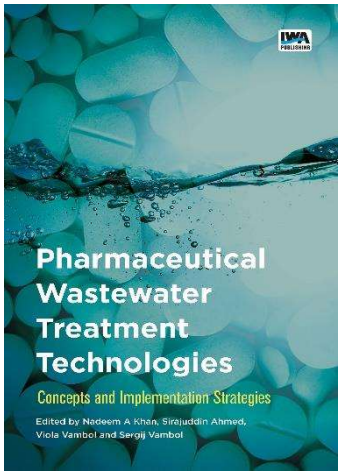
Selected books



Sustainable Industrial Water Use: Perspectives, Incentives, and Tools
Cheryl Davis; Eric Rosenblum
ISBN: 9781789060669
February 2021 • 450 pages • Paperback
IWA Members price: £90.00 / US$ 135.00 / € 113.00
Also available as an Open Access ePDF
https://www.iwapublishing.com/books/9781789060669/sustainable-industrial-water-use-perspectives-incentives-and-tools
This new anthology brings together the voices of the executives, plant managers, investors, inventors, regulators, policymakers and advocates leading industry to sustainable water use. They discuss how they redesign facilities to operate in water-short areas, change the rules to encourage responsible water use, and bridge the gap between companies and communities. They also report on the risks facing industry, and the tools they use to measure, treat, and reuse water more sustainably.



Water-Wise Cities and Sustainable Water Systems: Concepts, Technologies, and Applications
Xiaochang C. Wang; Guangtao Fu
ISBN: 9781789060751
December 2020 • 400 pages • Paperback
IWA Members price: £86.00/ US$ 129.00/ € 108.00
Also available as an Open Access ePDF
https://www.iwapublishing.com/books/9781789060751/water-wise-cities-and-sustainable-water-systems-concepts-technologies-and
This is the first book to provide comprehensive insights into theoretical, systematic, and engineering aspects of water-wise cities with a broad coverage of global issues. The book aims to (1) provide a theoretical framework of water-wise cities, (2) provide a brand-new thinking on the design and management of sustainable urban water systems, and (3) provide a technological perspective with successful case studies of technology selection, integration, and optimization on the “fit-for-purpose” basis.



Pharmaceutical Wastewater Treatment Technologies: Concepts and Implementation Strategies
Nadeem A. Khan; Sirajuddin Ahmed; Viola Vambol; Sergij Vambol
ISBN: 9781789061321
January 2021 • 400 pages • Paperback
IWA Members price: £98.00/ $147.00/ €123.00
https://www.iwapublishing.com/books/9781789061321/pharmaceutical-wastewater-treatment-technologies-concepts-and-implementation
This book covers the various aspects of pharmaceutical sources, treatment technologies, and the harmful effect on the natural environment. The book will also highlight the concept of the 3Rs (reduce, reuse and recycle) as applied to the treatment and resource recovery systems for pharmaceutical treatment. The different innovative technologies will deal with reducing the energy requirements, the physical space requirements and impacts of treatment plants.

IWA Publishing Journals Open Access from 2021

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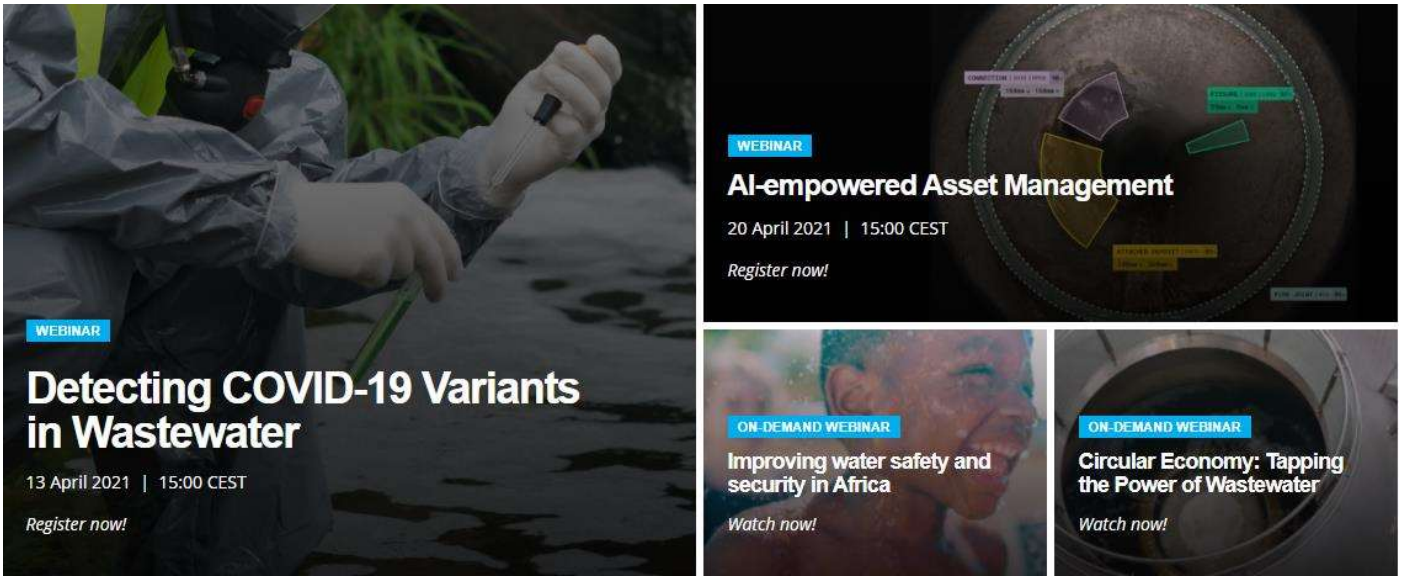
To learn more, visit the IWA Learn platform: https://iwa-network.org/iwa-learn/



BECOME A MEMBER OF THE IWA SPECIALIST GROUP ON WETLAND SYSTEMS FOR WATER POLLUTION CONTROL

The IWA Specialist Group (SG) on Wetland Systems for Water Pollution Control is a dynamic and international SG whose members come from a diverse range of backgrounds including practitioners and scientists from academia, consulting, and public organizations. The SG focusses on the following core issues: 1) to improve the understanding of the fundamental interactions amongst water, soil, plants and microorganisms inside wetland systems for water pollution control; 2) to explore innovative applications and realize the full potential of wetland technology worldwide; 3) to mainstream wetland technology within the larger field of wastewater treatment and water pollution control, and to define international guidance for proper design, implementation, and operation of treatment wetland systems; and 4) to facilitate and promote research activities for the mainstreaming, development, and advancement of treatment wetland technology worldwide.

For IWA members, who already have Connect login details, please go to https://iwa-connect.org/group/wetland-systems-for-water-pollution-control/ and simply click on "Join Group" button on the top right.

For new friends, please register to join IWA by visiting https://iwa-connect.org/subscribe and then follow the link above to join the Wetland Systems for Water Pollution Control Specialist Group.

WRITE TO THE WETLAND SYSTEMS FOR WATER POLLUTION CONTROL SG

Our newsletter is an opportunity to share information, points of view, policy developments, research activities, and events worldwide. Our editorial team encourages SG members to contribute to future editions of the newsletter with information on any relevant projects, conferences, or workshops. Contributions should not exceed three pages, and can be in the form of short papers, reports on recent events, descriptions of new projects. The main objective of newsletter contributions is to foster communication, collaboration, and knowledge exchange amongst our members.

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If you would like to contribute to a webinar on the use of wetlands for water pollution control or have an interesting story you would like included in a future newsletter, please contact us.

Disclaimer: *This is not a journal, but a Newsletter issued by the IWA Specialist Group on Wetland Systems for Water Pollution Control. Statements made in this Newsletter do not necessarily represent the views of the Specialist Group or those of the IWA. The use of information supplied in the Newsletter is at the sole risk of the user, as the Specialist Group and the IWA do not accept any responsibility or liability.*

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