Health Related Water Microbiology Specialist Group Newsletter

Volume 24 – May 2022

Contents

Message from our Chair

Dear colleagues and friends of the HRWM family!

A large number of dedicated colleagues have contributed to make this newsletter a special one again with many interesting articles. For this, I thank them all very much. Special recognition is due to Maronel Steyn for the excellent editing and to Daisuke Sano who, as HRWM secretary, fulfils his many tasks with great dedication.

Our long-cherished plan to create a Webinar Mini Symposium series has been realized. The format includes a call for contributions giving all members of the HRWM SG and interested colleagues the chance to actively shape the content of the webinar. Our first Mini Symposium held on 3rd December 2021 was a huge success and had 544 registered participants from 55 countries. It was entitled “Traditional and molecular indicators to characterise sewage in wastewater-based epidemiology” and was conducted in conjunction with the Global Water Pathogen Project (GWPP).

A big thank you goes to the organizers and moderators Andreas Farnleitner, Joan Rose, Anicet Blanch and Kwanrawee Joy Sirikanchana for their great effort as well as to all speakers for their excellent contributions. You can find a recording of the Mini symposium and the accepted abstracts on our HRWM website. Have a look at the comprehensive report about this Mini Symposium written by Joy Sirikanchana in the Newsletter.

Encouraged by the great success, the 2nd Mini Symposium Webinar is being planned. The call for contributions has already started. This time the Mini Symposium is organized in conjunction with the IWA Specialized Group Water Reuse (WR Chair Josef Lahnsteiner, WR Secretary Samendra Serchan). The title is "Recent Progress toward Microbiological Safety in Potable Reuse". We are looking forward to your submissions; deadline is May 31, 2022 (see information on the next pages).

The very latest news in terms of HRWM events is that our SG has successfully submitted a workshop proposal to the IWA World Water Congress. The title is "SG Health Related Water Microbiology and WHO Workshop: Recreational Water: Quality Translating Science to Policy". The detailed programme will be on the website soon (IWA World Water Congress & Exhibition, Water for smart livable cities, 11-15 September 2022 in Copenhagen, Denmark):
Link: https://worldwatercongress.org/

It is especially encouraging that our 21st symposium will now be realized! The organising committee is already busy with the preparations. The date has been set as 4 to 8 June 2023, Darwin. Australia. We are already very much looking forward to this long awaited conference coming together.

I would like to highlight a special publication, namely the Virtual Special issue of the Journal of Water and Health "SARS-CoV-2 in Water" (Editors: Eiji Haramoto, Gertjan Medema, John Scott Meschke, Susan Petterson).

In our series "introduction of international IWA Young Water Professionals" we have the pleasure to present in this Newsletter the Italian Chapter. Their main motivation is to bridge the gap between senior and young water professionals (YWPs), as well as between academia and industry. The YWPs will also be active in the frame of the 3rd IWA Conference on Disinfection and DBPs (IWA DDBPs 2022), which will take place from June 27 to July 1, 2022, in Milano, Italy.

It is so amazing to see that our members are very active in many areas and form a strong community. Thank you all for your commitment to keeping the science of Health Related Water Microbiology high! I look forward to more joint activities.

Enjoy reading the Newsletter.

Warm regards

Regina Sommer
HRWM Chair

Become an IWA member

Not yet a member and interested in joining IWA and specifically HRWM? Then click on the link below and see how you can become a member of this family.
https://iwa-network.org/join/

Updates on the estimation of human health risks by exposure to antibiotic resistant bacteria (ARB) in aquatic environments

-Article contribution by Mohan Amarasiri[1], Takashi Furukawa[1], Daisuke Sano[2], Kazunari Sei[1]

[1]School of Allied Health Sciences, Kitasato University, Japan.

[2]Department of Civil and Environmental Engineering, Tohoku University, Japan.

Antibiotic resistance has been identified as a major human health threat by the WHO and contribution of aquatic environments as reservoirs and transmission routes for antibiotic resistance dissemination has been highlighted. Therefore, a quantitative assessment on potential health risks of exposing to ARB in aquatic environments is essential in developing mitigation measures. To address that, Schoen et al. conducted a quantitative microbial risk assessment (QMRA) of exposing to methicillin-resistant and susceptible *Staphylococcus aureus* (MRSA and MSSA) via potable and non-potable reuse of reclaimed water (Schoen et al., 2021). The disease burden was calculated for skin infections and blood stream infections. When the wastewater and greywater log reductions are greater than 4.5 and 3.5 log during the wastewater treatment process, 95th percentile annual cumulative disability adjusted life years from MRSA and MSSA infections were below 10^{-6} DALY ppy benchmark. Since the enrichment rate of MRSA by horizontal gene transfer (HGT) during the wastewater treatment was small compared to the log reduction, QMRA was not significantly influenced by HGT.

Authors highlight several limitations of the study and provide valuable suggestions for improving the estimation of annual disease burden by exposing to ARB. Unavailability of strain specific dose-response relationships was highlighted as a major limitation. Available dose-response relationships are developed based upon administering high concentrations to guarantee the infection. Therefore, development of dose-response relationships with realistic doses was emphasized. As the HGT is the main mechanism for antibiotic resistance dissemination, development of a methodology to incorporate the effects of multiple HGT events during water use/reuse cycles was highlighted.

Exposure assessment is a major step in the QMRA process. AWARE (Antibiotic Resistance in Wastewater: Transmission Risks for Employees and Residents around Wastewater Treatment Plants) study is evaluating the prevalence of ESBL-producing *Escherichia coli* and carbapenemase-producing *Enterobacteriaceae* and the corresponding genes in the air, water, and sewage samples collected from wastewater treatment plants located in Germany, the Netherlands, and Romania. Prevalence will be evaluated for wastewater treatment plant workers and residents living within 300m from the treatment plant (resident group), and people living more than 1km away from the WWTP (comparison group). Targeted number of participants will be 450 WWTP workers (150 from each country), 800 residents living within 300m from the WWTP, and 1200 residents living further away from the WWTP. Evaluating the potential transmission of ESBL-E. coli and CPE from wastewater to WWTP workers and the residents will provide valuable information in estimating the human health risks of ARBs (Wengenroth et al., 2021).

Schoen, M. E., Jahne, M. A., Garland, J., Ramirez, L., Lopatkin, A. J., and Hamilton, K. A. (2021). Quantitative Microbial Risk Assessment of Antimicrobial Resistant and Susceptible Staphylococcus aureus in Reclaimed Wastewaters . Environ. Sci. Technol. doi:10.1021/acs.est.1c04038.

Wengenroth, L., Berglund, F., Blaak, H., Chifiriuc, M. C., Flach, C. F., Pircalabioru, G. G., et al. (2021).

Antibiotic resistance in wastewater treatment plants and transmission risks for employees and residents: The concept of the aware study. Antibiotics 10. doi:10.3390/antibiotics10050478.

Thailand health authority led COVID-19 wastewater surveillance campaign and national guideline development

- **Article contributed by Kwanrawee Joy Sirikanchana, Jatuwat Sangsanont, and Surapong Rattanakul**

From April to May 2021, wastewater surveillance was initiated by Thailand's Environmental Health Bureau, Department of Public Health, Ministry of Health, to monitor SARS-CoV-2 RNA (COVID-19) in wastewater from local fresh markets and residential buildings for migrant workers in provinces surrounding Bangkok, where outbreak clusters had been previously identified. The wastewater monitoring efforts were conducted before and after the Thai Traditional New Year in mid-April in support of clinical testing to inform the outbreak. COVID-19, by detecting N1 and N2 genes using quantitative PCR techniques, was found in wastewater from residential buildings and fresh markets, confirming the proof of concept for monitoring COVID-19 outbreaks in wastewater. Interestingly, COVID-19 was also detected in wastewater samples from some fresh markets that did not contain toilet wastewater, implying that the virus may have been contaminated into wastewater by other activities, such as meat and produce rinsing, surface contacting, hand washing, etc. These findings emphasize appropriate practices to prevent the spread of COVID-19 in public places.

Moreover, Thailand's first National Guidelines for COVID-19 Wastewater Surveillance were successfully developed in September 2021 with support from the Environmental Health Bureau in collaboration with Chulalongkorn University, King Mongkut's University of Technology Thonburi, and Chulabhorn Research Institute. The purpose of this manual is to provide up-to-date scientific information, methodology, and application guidelines for wastewater-based epidemiology (WBE) of COVID-19 outbreaks that can be adopted by interested parties, and to support the future development of nationwide wastewater surveillance systems for emerging disease monitoring.

Also, COVID-19 WBE was successfully implemented in wastewater from all 19 large to small municipal wastewater treatment plants in Bangkok from January to April 2021. The results showed that SARS-CoV-2 RNA has been found in wastewater prior to clinical cases that led to the third COVID-19 outbreak in Thailand.

More information can be found from Sangsanont et al. (2021) Sci. Tot. Environ. https://doi.org/10.1016/j.scitotenv.2021.151169.

Wastewater - SARS Public Health Environmental Response (W-SPHERE) -a Global Data Center for SARS-CoV-2 detection in wastewater and environmental samples

- **Article contributed by Andri Taruna Rachmadi**

Since the declaration of the global coronavirus disease (COVID-19) pandemic which began in 2019, there have been over 250 million cases and 5.0 million deaths recorded. Environmental

virologists quickly adapted their existing methods to detect SARS-CoV-2 RNA in wastewater to track community spread of the virus to enhance a program of wastewater-based epidemiology (WBE). Wastewater surveillance has the potential to provide a real-time view of trends in community infection. Public health struggles to monitor individuals and obtain good data to support testing, interventions (such as closures, masks, social distancing) and economic reopening policy decisions. Also, the wastewater surveillance can now support vaccination implementation and tracking the variants of concern.

Unlike COVID-19 case and mortality data, there was not a global dashboard to track wastewater monitoring of SARS-CoV-2 RNA worldwide. Currently, over 3000+ sites including cities, counties (regional) and national systems across the world are monitoring wastewater for SARS-CoV-2 or have communicated that they will be setting up for monitoring soon. Using COVIDPoops19 as a starting point the W-SPHERE datasets, along with their metadata and dictionaries, will be open for access and sharing across the globe in a number of reusable formats. The mission of W-SPHERE is to advance environmental surveillance of sewage to inform local and global efforts for monitoring and supporting public health measures to combat COVID-19. We use ArcGIS for online dashboards for data visualization, case studies, and employ geospatial and statistical tools for data standardization, comparison, and analysis.

On the W-SPHERE dashboard, the user has the option to select public health use cases based on specific characteristics such as the system setting (e.g., sewer, non-sewer system) or use case type (e.g., city level, national level, buildings, river systems, etc.). The story map will provide a closer look at the different steps (e.g., design, monitoring, and execution) for developing a program that uses the wastewater data for public health decision making.

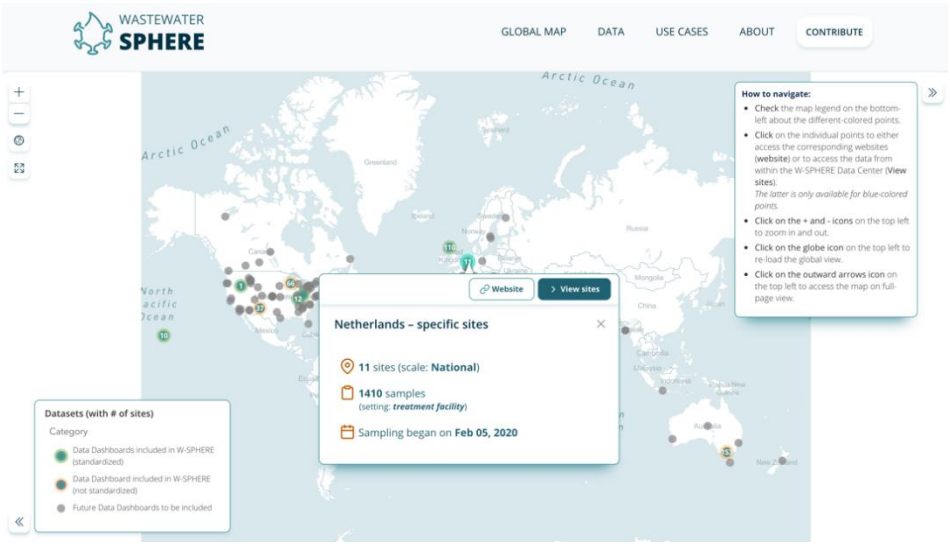


Figure 1: W-SPHERE global map

Currently, W-SPHERE has 14 datasets uploaded and available from 9 different countries consisting of 707 sites and more than 20,000 samples (Figure 1). More datasets are being added weekly. Sites included sewage from wastewater treatment facilities, sewer sites from sewer sheds directed towards parts of a community or specific buildings (e.g. social service, correctional facilities) and environmental samples (impacted rivers). Of the 14 datasets, ten report on the detection SARS-CoV-2 using N1 genes, five report on N2 genes, two datasets used the E gene (US-Honolulu and ES-Catalonia), and others report using multiple genes target. In the standardized datasets, information such as presence/absence results and population served by the wastewater treatment plant (WWTP) are included. In addition, SARS-CoV-2 concentration trends (increase,

slight increase, decrease, or no change) from a selectable time period are available (see Figure 2). The trend is calculated by using linear regression with the five most recent measurements/samples. As an open access dashboard, all the data are available to download in csv format.

Figure 2: W-SPHERE data trends layout

Compelling use case studies of wastewater surveillance for SARS-CoV-2 and uses in public health have been included. The Catalan surveillance network of SARS-CoV-2 is monitoring SARS-CoV-2 weekly from 56 WWTPs and used the information for:

i. Estimated circulation of SARS-CoV-2 in communities where clinical testing is far from optimal or less available.
ii. Assessment of the efficacy of containment measures implemented by Health authorities in different areas of the Catalan territory.
iii. Identification of potential outbreaks in monitored municipalities (forecasting of clinical cases, i.e., early-warning).

Another example can be seen with the Dutch dataset which demonstrated that the trends of the virus served an indicator of undertesting in city areas, early warning and localization of resurgence. Please visit our global data center website (https://sphere.waterpathogens.org/) and please do not hesitate to contact us if you have further questions or want to contribute your data.

Wastewater surveillance predicts the number of COVID-19 positives: Public verification experiment since November 2021

- **Article contributed by Daisuke Sano**

Wastewater surveillance on SARS-CoV-2 is being conducted all over the world, and it is time to verify how the wastewater surveillance can help identify the epidemic of COVID-19. A research group led by Tohoku University, Japan, has built a predictive model that estimates the number of new positive infections that will occur in the next week, based on the results of wastewater surveillance on SARS-CoV-2. This prediction model uses machine learning (neural network) based on the number of positive infection reports and the results of the wastewater surveillance in Sendai city for the past year or more (Fig).

The research team has decided to publish the predicted values every week and publicly verify the effectiveness of the forecast model. Currently, Tohoku University operates the "Information Dissemination Site for Norovirus Concentration in Sewage" (https://novinsewage.com/) in collaboration with Yamagata University, Sendai City, and Nihon Suido Consultants. As for norovirus infection, it is already known that the concentration of norovirus in sewage and the number of patients are significantly correlated. This site sends a warning email to registrants when the norovirus concentration in sewage exceeds a threshold value. In this public verification experiment, we will utilize this site to deliver weekly forecasts of the number of positives for COVID-19 to e-mail address registrants once a week. In the email, the predicted value one week ago and the actual number of positive infections will be also included as a guide to determine the accuracy of the predicted value.

The research team hopes it will be useful as a reference for infection control in daily life. In addition, medical institutions may be able to use it for planning the number of beds required for the next week and the staffing of rescue workers.

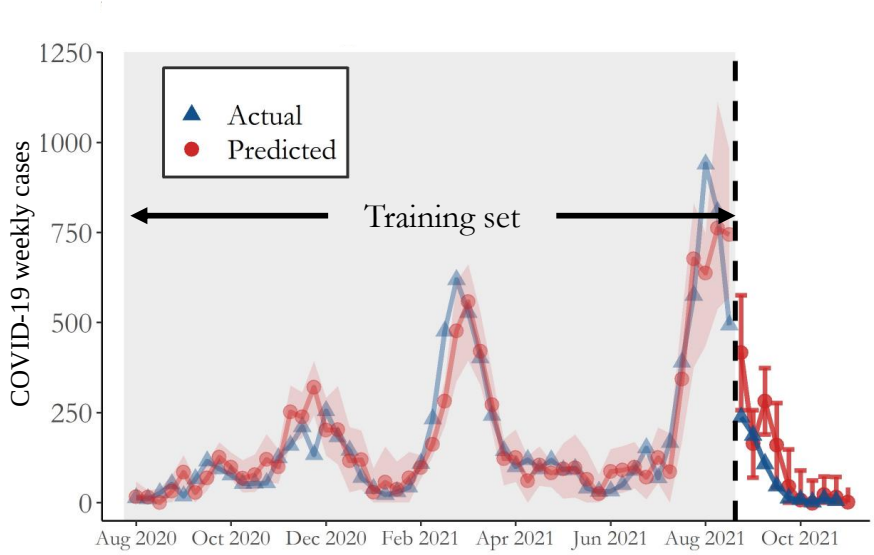


Figure 1: Neural network prediction of COVI-19 weekly cases based on wastewater surveillance results in Sendai, Japan

Large-scale wastewater epidemiology project in Latin America gets underway

- **Article credit Veronica Rajal**

Research led by Newcastle University (United Kingdom) in collaboration with Karolinska Institute (Sweden), the Campus Terra of the University of Santiago de Compostela (Spain), and MGI-tech has started sequencing wastewater samples collected in 2020 from Latin America to determine the SARS-CoV-2 variants circulating in the area - a project co-creating a Pan-American Network for Environmental Epidemiology (PANACEA).

PANACEA includes partners from the UK, Sweden, Spain, and 14 Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Panama, Paraguay, Peru, Dominican Republic, Uruguay, and Venezuela), which are analysing wastewater samples in a coordinated campaign to assess the real-time prevalence and genomic variants of the virus in cities across Latin America. The team is quantifying SARS-CoV-2 and gearing up to start targeting other pathogens as well as antimicrobial resistance (AMR).

PANACEA, with support from Northumbrian Water Group and Suez Group, aims to expand the current analytical capacities of the Latin American countries to implement Wastewater-Based Epidemiology (WBE) surveillance programs, building a resilient and sustainable monitoring network capable of obtaining real-time data to support public health decision-making. The scientists will develop and implement new molecular tools in environmental epidemiology and train new professionals capable of producing, analysing, and comprehensively interpreting data.

Dr. Marcos Quintela-Baluja, from the School of Engineering at Newcastle University, leads the project in close association with Dr Kelly Jobling. Dr. Quintela-Baluja said: “We are talking about a region under ongoing epidemics, including Zika, Dengue, Yellow fever, cholera and malaria. Traditional disease detection and management systems are based on diagnostic analyses of clinical samples. However, these systems fail to detect early warnings of public health threats at a broad population level and fail to predict outbreaks promptly. The COVID-19 pandemic has surfaced ideas for a rethink and strengthening of the entire global health surveillance architecture. As a result, WBE will become a gold standard in providing information on community-wide exposure and health status comprehensively and in near real-time.”

Professor David Graham, an international expert on AMR and research partner at Newcastle University, says “PANACEA could be a game-changer for integrated health protection in Latin America. Currently no such system exists, but our work with the United Nations on AMR surveillance has shown global health will be most improved through increased regional capacity for exposure and risk assessment, which is an aim of PANACEA. It is a pleasure to be involved in this landmark project”.

Dr. Lars Engstrand, professor in infectious disease control and Director of the National Pandemic Center and the Center for Translational Microbiome Research at Karolinska Institute says he and his team are very excited about the opportunity to provide the high-throughput infrastructure at Karolinska Institute for this project. “We have during the pandemic trained our lab team for large-scale studies using MGI tech automated systems in a very cost-effective way with rapid turn-around times. Now we will use our

experiences in virus and AMR surveillance in combination with microbiome analyses in this important project. We will do our best to provide high-quality data to the PANACEA network".

Professor Pablo Hernan Sotelo, head of the Department of Biotechnology in the Faculty of Chemical Sciences at the National University of Asuncion, and leader of the SARS-CoV-2 environmental surveillance project of the Paraguayan Research Agency (CONACYT) said "This project will allow us to get access to capacities that are not currently available in our country. At the beginning of the pandemic, we found local WBE initiatives in the region that helped us to rapidly develop methodologies to quantify SARS-CoV-2 in wastewater. PANACEA was born to provide international context to the effort of local scientists, which are the main actors to implement sustainable surveillance capacities in one of the most vulnerable regions of the world".

Dr. Verónica Beatriz Rajal, Professor in the Engineering College at National University of Salta (UNSa) and researcher of the Argentinian Research Council (CONICET), leads the Water and Soil Laboratory from the Research Institute for Chemical Industry (INIQUI, UNSa – CONICET). She said "Our laboratory has long been working on detecting different pathogens in water and quantitative microbial risk assessment. This experience allowed us to respond quickly to the surveillance of SARS-CoV-2 in wastewater across different points of Salta city, providing information about the dynamic of the viral circulation in the different areas to focus attention on the hot spots. The interaction with other Argentinian researchers within a national network led by the National Science and Technology Ministry was fruitful. We trust that joining efforts with colleagues from other countries through PANACEA will help the Latin America region face different challenges and increase capacities faster".

In Brazil, the network is supported by two focal points: the Federal University of Santa Catarina - located in Santa Catarina and the Environmental Company of São Paulo State - CETESB. Dr. Gislaine Fongaro, professor at the Federal University of Santa Catarina (Laboratory of Applied Virology of the Microbiology, Immunology and Parasitology Department), says that she and her team from the Laboratory of Applied Virology are ready to collaborate with PANACEA network. "Our group is engaging and studying several viruses (including SARS-CoV-2) and applying retrospective and prospective monitoring in urban and remote areas in Brazil, especially in Santa Catarina. PANACEA network will improve our understanding of the circulation of the pathogens on a continent-scale for public health purposes". Dr. María Ines Zanoli Sato, from CETESB's Department of Environmental Analysis, reinforces "This international effort is crucial to strengthen the technical-scientific capacity in the Latin America region to face the pandemic challenges, contributing to the building of other environmental surveillance actions considering WBE. FIOCRUZ (Rio de Janeiro), FEEVALE (Rio Grande Do Sul) and Federal University of Minas Gerais are also part of PANACEA.

Dr. Julián Carrillo Reyes, researcher at the Engineering Institute from National University Autonomous of Mexico, highlights the potential of the PANACEA Network to bring local efforts to an international context and demonstrate the usefulness of these tools in making decisions related to public health.

Dr. Matías Victoria Montero and other researchers at the University of the Republic and the Institute of Biological Investigations Clemente Estable (IBICE) are members of PANACEA in Uruguay. Dr. Claudia Etchebehere, researcher at IBICE said "Uruguay is a small country in Latin America with only 3.5 million inhabitants, but it is highly influenced by its neighbours Argentina and Brazil. Therefore, Uruguay needs to know how the epidemic develops in the region to predict the problems we will have shortly. Several laboratories from different institutions in Uruguay monitor SARS-CoV-2 in wastewater, especially in border cities. The possibility that PANACEA gives us to compare our results with results from the

region, standardise protocols, and sequence DNAis essential to advance the understanding of our reality".

In Chile, Dr. Paulina Assmann (Seremi of Science in the center-south region), promoted a network of laboratories working on the detection of SARS-CoV-2 in wastewater at the beginning of the pandemic. It included the participation of researchers from University of Atacama in Atacama (Dr. César Echeverría), Pontifical Catholic University of Valparaiso (Dr. Jorge Olivares) and Valparaiso University (Dra. Claudia Ibacache) in Valparaiso, Catholic University of the Most Holy Conception (Dr. Matías Hepp and Dra. Andressa Reis) in Concepción, and Andrés Bello National University (Dra. Aiko Adell) and University of Chile (Dr. Aldo Gaggero) in Santiago. Dr. Gaggero, from the Laboratory of Environmental Virology, Faculty of Medicine, said “The initial objective of this national network was to establish an environmental epidemiological surveillance program for SARS-CoV-2, through the analysis of wastewater, to generate information that can contribute to the management of the pandemic and to the knowledge of the epidemiological status in our country. In this sense, we are very interested in participating in PANACEA and contributing, in collaborative work with researchers from different Latin American and European countries, to generate useful and novel information on the circulation of SARS-CoV-2 variants in the region, which is currently not available”.Dr. Pablo César Rivera Navarro, Director of the Research Unit at the Costa Rican National Water Laboratory (LNA-AyA) and focal point for Costa Rica noted "

The PANACEA network has allowed us as a country to establish valuable collaborations within Latin America and the rest of the world. We have developed environmental monitoring strategies based on our shared experiences in response to disease outbreaks, e.g., cholera and SARS-CoV-2. Undoubtedly, the development of environmental monitoring systems for epidemiological surveillance will provide valuable tools for public health management at local and national levels".

Dr. Alejandra Carolina Zamora Figueroa from the Zoology and Tropical Institute at the Central University of Venezuela, together with the Venezuelan Scientific Research Institute, said "Our country is starting studies in environmental epidemiology as a new line of research, and in this way, we are joining the environmental monitoring of the virus that causes COVID-19. Our team is very pleased, the creation of PANACEA is an important initiative for local research institutions, because it constitutes a support network for the exchange of knowledge in favour of research and its applicability in environmental surveillance. This project will allow us to train in new molecular tools not yet developed in the country, and thus contribute to the detection of pathogens that influence public health throughout the Latin American region".

Other partners of the team leading efforts in their countries are Yaset Rodriguez at Technological Institute of Santo Domingo INTEC (Dominic Republic); María Teresa Alvarez Aliaga at University "Mayor de San Andres” and Antonio Macchiavelli (Bolivia); William Calero Cáceres at Technical University of Ambato (Ecuador); Alex Martínez Torres and Máximo Montalvo at Panama University (Panama), and Mónica Santa María Fuster at University of Engineering and Technology (Peru).

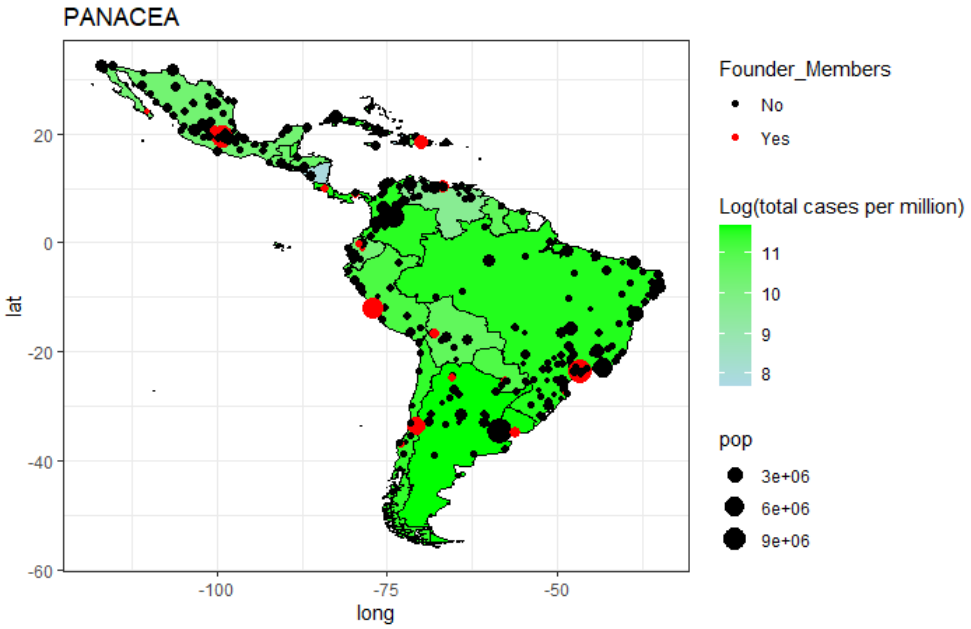
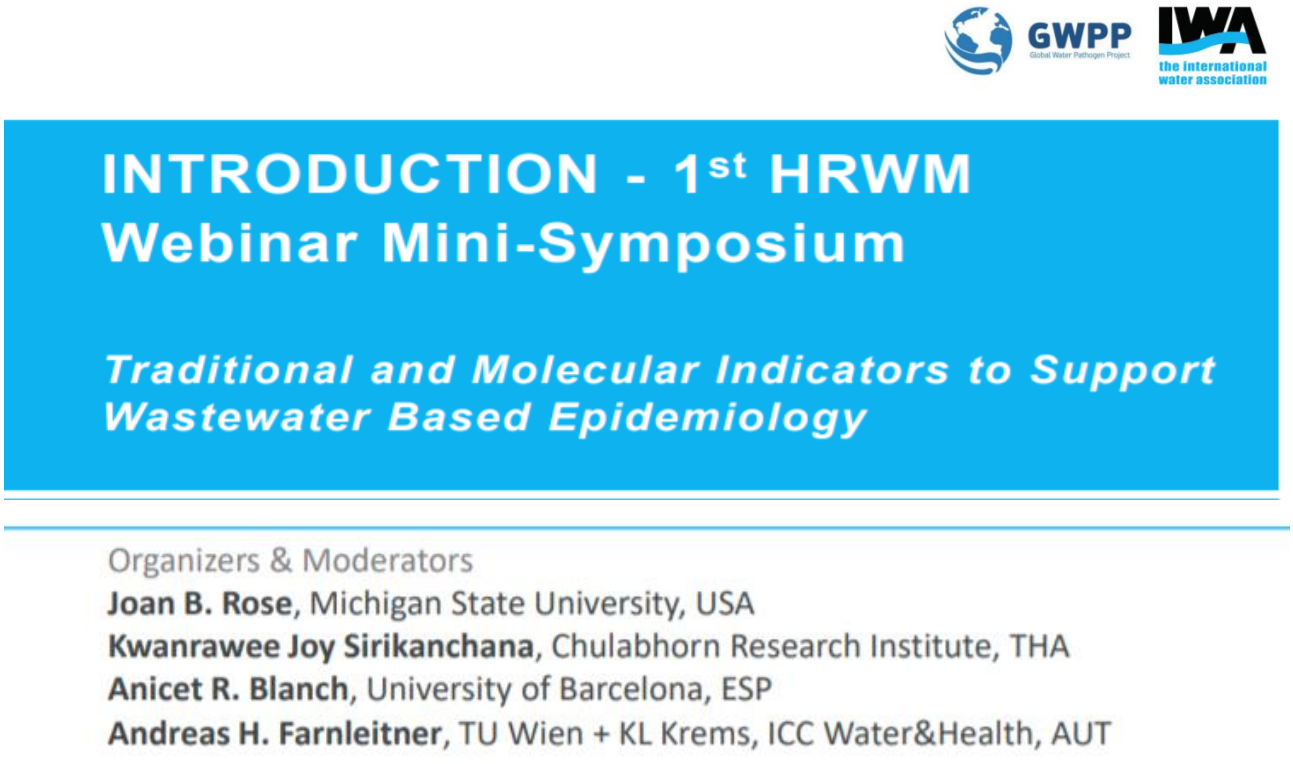


Figure 1: Map of Latin American countries shows the number of cumulative cases of COVID-19 per million population (Source: https://ourworldindata.org). The black dots are the number of cities with a population higher than 150,000 inhabitants, and the red dots are the cities with founder PANACEA members.



The HRWM SG is organising a series of free mini-symposium webinars as online events for HRWM members, other IWA members, and the general audience. These events are aimed at bridging the biennial WaterMicro

conference programs (latest in 2019) in Vienna, Austria, and the next conference planned for 2023 in Darwin, Australia.

The first mini symposium held on 3rd December 2021 had 544 registered participants from 55 countries.

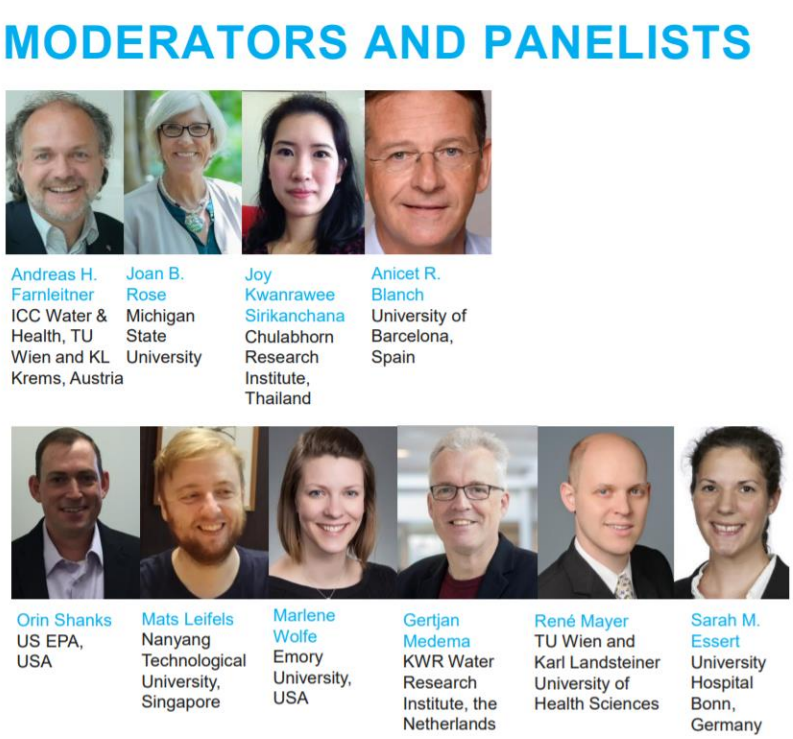
This webinar was organized and moderated by Professor Andreas Farnleitner from ICC Water & Health, TU Wien, and KL Krems, Austria; Professor Joan Rose from Michigan State University, USA; Professor Anicet Blanch from the University of Barcelona, Spain; and Dr. Kwanrawee Joy Sirikanchana from Chulabhorn Research Institute, Thailand. This webinar was conducted in conjunction with the Global Water Pathogen Project (GWPP).

The event commenced with a keynote presentation by Dr. Orin Shanks, Senior Research Geneticist, the United States Environmental Protection Agency. His presentation, entitled 'Human wastewater surveillance: A new opportunity for microbial source tracking', introduced the audience to the advantages and current practices of microbial source tracking (MST) markers in supporting wastewater-based epidemiology (WBE).

Five short presentations that were selected from among the submitted abstracts were divided into those related to viral- and bacterial-targeted WBE. The first three presentations focused on the indicators and MST markers supporting viral-targeted WBE. The first talk, entitled 'Normalisation of SARS-CoV-2 for sewage surveillance', was presented by Professor Gertjan Medema, Principal Microbiologist, KWR Water Research Institute, the Netherlands. His study highlighted the need for SARS-CoV-2 normalisation using a flow rate as a preferred parameter; however, crAssphage loading is also appropriate if the wastewater came from more than 5,000 populations. The second talk, by Dr. Mats Leifels, Research Associate, SCELSE, Nanyang Technological University, Singapore, was titled 'Application of MST markers to normalize shedding rates in a campus monitoring program in Singapore'. Dr. Leifels's work underscores the need for evaluating several relevant markers for their suitability in normalising shedding rates in specific, localised settings. Assistant Professor Marlene Wolfe from the Gangarosa Department of Environmental Health, Emory University, USA, presented the third talk. Her research, entitled 'Estimating relative abundance of two SARS-CoV-2 variants in wastewater settled solids', highlighted the need for PMMoV normalisation for the comparison of COVID-19 incidence rates with SARS-CoV-2 in wastewater solids across locations, and the capability to detect variants in wastewater solids.

The next two presentations represented the indicators and MST markers that support bacterial-targeted WBE. Sarah M. Essert, PhD candidate at the Institute for Hygiene and Public Health, University Hospital Bonn, Germany, presented her work 'Antibiotics and resistant genes as indicators for multidrug resistant bacteria?', which demonstrated positive associations between antibiotics and resistant bacteria and the differences in patterns between clinical and municipal wastewater. Lastly, Dr. Rene Mayer, postdoctoral researcher at TU Wien and KL Krems, Austria, presented his research titled 'High persistence of traditional and molecular faecal indicators support proportional auto-sampling of sewage'. His research concluded that both cultivation-based and genetic bacterial markers are stable over a 24-h period at 5 °C for both raw and treated wastewater, supporting the use of cooled automated sampling devices.

- **Article credit Kwanrawee Joy Sirikanchana**



The event concluded with the panellists discussing challenges and perspectives. They agree that there should be normalising parameter(s); standardized protocols or workflows; and referenced materials that can assist in data comparison within the laboratory, among sampling locations, or around the globe. However, care should be taken to balance efforts between searching for ideal solutions and further characterising the acceptable solutions at hand. Challenges also remain with regard to resource availability and capabilities around the world.

The recorded VDO and related resources can be found at:
https://iwa-network.org/learn/traditional-and-molecular-indicators-to-characterise-sewage-in-wastewater-based-epidemiology/?fbclid=IwAR34vFUa5SiWujytyQUWNOhDXamLfeY0HgypuoWjoEOYp6mreYmtV1AiW8o

The accepted abstracts to the mini symposium can also be found at:
https://hrwm-watermicro.com/

The upcoming mini-symposium series include the following topics: 1) Water reuse and risk assessment; 2) Disaster management, preparedness, and WASH; and 3) Recreational water quality.
Please stay tuned for calls for contribution and participation.

Joint IWA Webinar with Water Reuse SG will be held on July 27th, 2022

- **Article credit Daisuke Sano**

The joint IWA webinar of HRWM SG with Water Reuse SG will be held on July 27th, 2022. This joint webinar will give an overview on microbiological safety in indirect/direct potable reuse (IPR/DPR). Quantitative microbial risk assessment has been utilized for evaluating necessary log removal of pathogens, which needs to be met by combining treatment processes. How to give a credited log removal value to each treatment process is thus an important issue for water sector industries. In this webinar, recent progress in microbiological safety issues for potable water reuse will be presented. This webinar is held as one of the HRWM Mini-Symposium Webinar Series.

You need to use a submission form for entry. Make sure that you clearly indicate the highlights of your research in the form. The submission will be reviewed by webinar moderators, and all accepted abstracts will be presented on the HRWM SG website with approval from authors.

Due to the limited time of the webinar, only a few contributions can be integrated into the programme. We ask for your understanding if your contribution is not included.

The followings are key points of the webinar organization:

- Webinar is composed of one keynote speech, 4 selected presentations (5 min + 5 min discussion each), and final discussion.
- For your application a specific form has been prepared with the following structure:

1) clear connection to and impact on the subject of the Webinar,

2) main message,

3) emphasize the main results,

4) highlights (max. 100 words per text box).

Abstracts are collected by SG HRWM secretary Daisuke Sano and forwarded to the webinar organizing team, who is selecting the contributions and prepare the webinar program.

Please title the submission e-mail as “Abstract Submission to WR&HRWM Joint Webinar”

Joint webinar organizing team:

- Dr. Josef Lahnsteiner, Water Reuse SG Chair, VA TECH WABAG GmbH, Austria
- Dr. Regina Sommer, Medical University of Vienna, Austria
- Dr. Samendra Sherchan, Tulane University, USA
- Dr. Ricardo Santos, Instituto Superior Tecnico, Universidade de Lisboa, Portgul
- Dr. Hiroyuki Katayama, The University of Tokyo, Japan
- Dr. Daisuke Sano, Tohoku University, Japan

Journal of Water and Health - Virtual Special issue: SARS-CoV-2 in Water has been issued

- **Article credit Daisuke Sano**

The virtual special issue: SARS-CoV-2 in Water has been issued in Journal of Water and Health. Cutting-edge studies and reviews with regards to the potential risk of waterborne COVID-19 transmission, household water uses, hygiene during the pandemic, surrogate persistence within free-living amoebae, variant detection, case prediction modelling, and surveillance of SARS-CoV-2 RNA in wastewater are included. Please find details of special issue papers from the following link:https://iwaponline.com/pages/sars-cov-2_in_water

Getting to know the YWP Chapter from Italy (YWPIT)

- **Article credit: YWP Italian Chapter [ywpitaly@gmail.com]**

The Italian Young Water Professionals chapter (YWPIT) was officially approved in February 2022 by the Italian Governing Member (GM), UTILITALIA, and the International Water Association (IWA) headquarters. The group is coordinated by 11 steering committee members, supported by working groups, and currently includes about 80 members, coming from both academia and industry.

The main motivation to form the IWA's YWP Chapter in Italy was to bridge the gap between senior and young water professionals (YWPs), as well as between academia and industry, leading to the empowerment of YWPs active in Italy. Also, formal and informal connections between YWPs will be fostered thanks to the YWPIT group.

Key activities that will be organised in the first year of operations include:

- The organisation of a formal in-person meeting as Chapter launch event (planned during IWA's conference in Milan - Disinfection and disinfection by-products, June 2022);
- The organisation of an informal event with Italian YWPs to present the steering committee and the workplan;
- The participation in an in-person event together with the GM (Water Festival, Turin, September 2022);
- The organisation of virtual workshop(s);
- The preparation and distribution of an official flyer to increase group's visibility;
- The organisation of virtual meetings with other YWP chapters to plan collaborative activities;
- The creation of databases to collect members' expertise and need for professional development. Also, dedicated mentoring activities will be planned for successive years.

YWPIT is already in contact with other YWP chapters in Europe to exchange ideas and bring YWP chapters a step further.

If you want to know more about YWPIT and our activities, you can contact us at ywpitaly@gmail.com or find us on LinkedIn (https://www.linkedin.com/company/young-water-professionals-italy/).

In person and remote participants of the first informal event held in Turin in June 2021 (SIDISA Conference).

News from IWA Headquarters

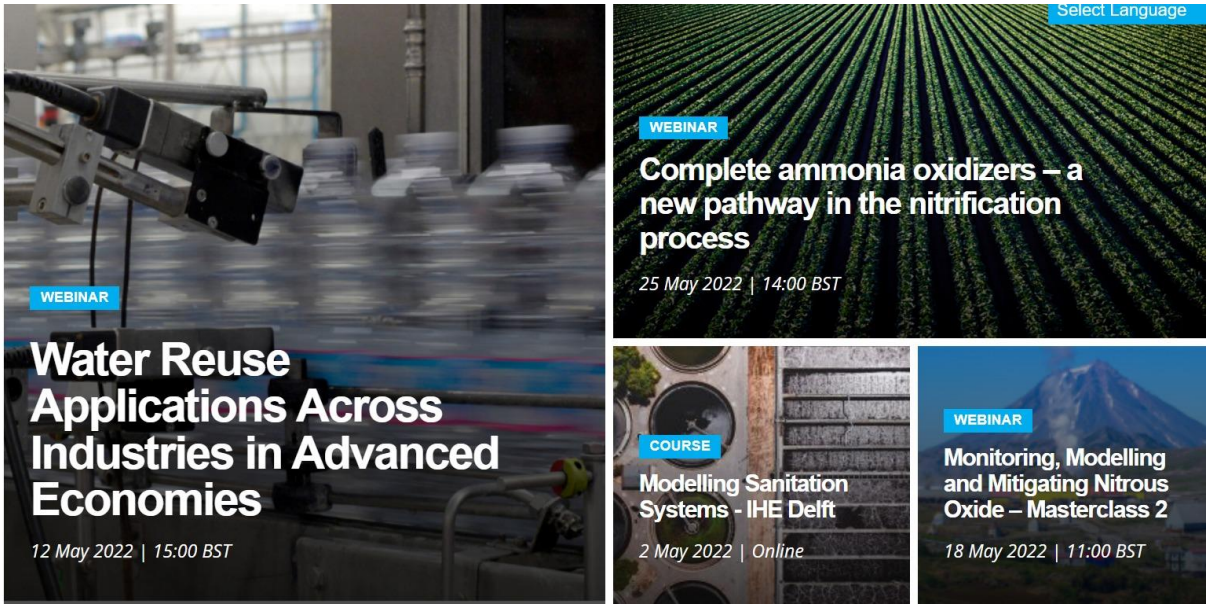
IWA is pleased to announce that registrations are now open for the upcoming World Water Congress & Exhibition in Copenhagen, Denmark, 11-15 September 2022.

Five days of critical discussions will shape the future of sustainable water management. Thought-leadership permeated workshops, debates, summits, business forums, keynote speakers, technical and training sessions and much more awaits you in Copenhagen. Networking opportunities, new insights and partnerships will enable new ideas and solutions to solve the global water crisis.

Secure your seat at the world's prime event shaping our water future, super early bird rates are now available for a limited time only, until 15 May 2022.

For more details on the WWCE in Copenhagen, please visit https://worldwatercongress.org/

IWA Learn

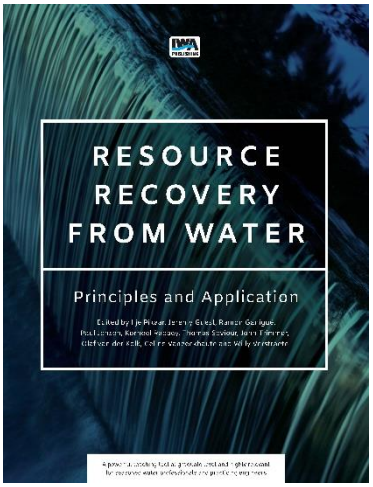


The place for learning & professional development in the water sector

Professionals in the water sector require continuous development to be able to stay abreast with the changing environment circumstances. No matter in which stage of your career, IWA provides you with guidance and opportunities to build up the competences required to succeed. This includes a set of tools on how to develop your career, as well as opportunity of professional updating, learning, training and networking. To learn more, visit the IWA Learn platform: https://iwa-network.org/iwa-learn/.

News from IWA Publishing

Selected books



Resource Recovery from Water: Principles and Application

Ilje Pikaar, Jeremy Guest, Ramon Ganigué, Paul Jensen, Korneel Rabaey, Thomas Seviour, John Trimmer, Olaf van der Kolk, Céline Vaneeckhaute & Willy Verstraete

ISBN: 9781789060317

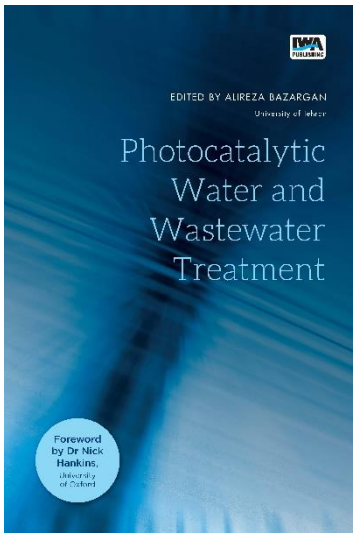
Feb 2022 • 470 pages • Paperback

IWA Members price: £ 101.00 / US$ 152.00 / € 126.00

Also available as an Open Access ePDF

https://www.iwapublishing.com/books/9781789060317/resource-recovery-water-principles-and-application

Throughout history, the first and foremost role of urban water management has been the protection human health and the local aquatic environment. To this end, the practice of (waste-)water treatment has maintained a central focus on the removal of pollutants through dissipative pathways. Approaches like – in case of wastewater treatment – the activated sludge process, which make 'hazardous things' disappear, have benefitted our society tremendously by safeguarding human and environmental health.



Photocatalytic Water and Wastewater Treatment

Alireza Bazargan

ISBN: 9781789061925

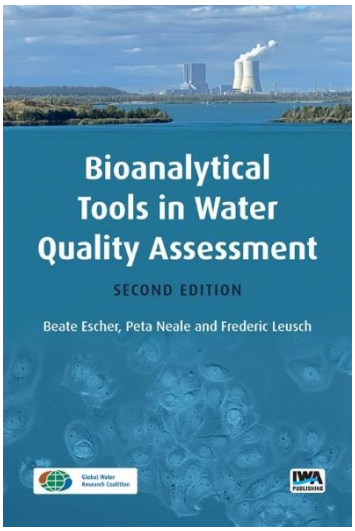
April 2022 • 220 pages • Paperback

IWA Members price: £ 86.00/ US$ 129.00/ € 108.00

Also available as an Open Access ePDF

https://www.iwapublishing.com/books/9781789061925/photocatalytic-water-and-wastewater-treatment

This book aims to provide an overview of how photocatalysis can be employed in water and wastewater treatment. Each chapter will attend to a different area of interest, starting with an introduction on the fundamentals of photocatalysis. The covered topics include metal organic frameworks (MOFs), photocatalytic reactor types and configurations, landfill leachate treatment, and life cycle assessment (LCA) of solar photocatalytic wastewater treatment. In addition, the final two chapters provide fresh new insight, by analyzing international patents on photocatalytic materials, solar photocatalysis, and nanotechnology.



Bioanalytical Tools in Water Quality Assessment (Second Edition)

Beate Escher, Peta Neale & Frederic Leusch

ISBN: 9781789061970

June 2021 • 462 pages • Paperback

IWA Members price: £86.00/ $129.00/ €108.00

Also available as an Open Access ePDF

https://www.iwapublishing.com/books/9781789061970/bioanalytical-tools-water-quality-assessment-2nd-edition

The book focuses on applications to water quality assessment ranging from wastewater to drinking water, including recycled water, as well as treatment processes and advanced water treatment. Emerging applications for other environmental matrices are also included. Bioanalytical Tools in Water Quality Assessment, Second Edition not only demonstrates applications but also fills in the background knowledge in toxicology/ecotoxicology needed to appreciate these applications. Each chapter summarises fundamental material in a targeted way so that information can be applied to better understand the use of bioanalytical tools in water quality assessment.

Selected journal papers

Monitoring of SARS-CoV-2 in wastewater: what normalisation for improved understanding of epidemic trends?

(OPEN ACCESS)

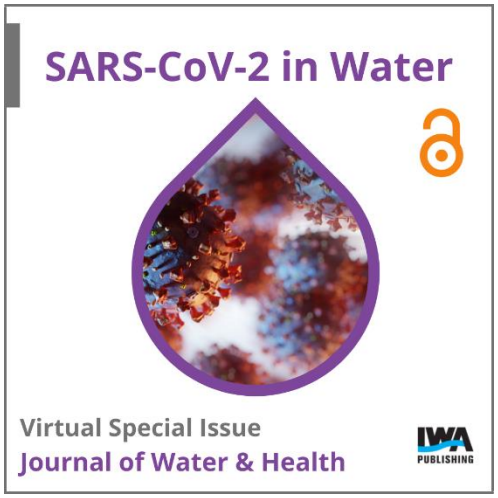
Charlotte Sakarovitch, Olivier Schlosser, Sophie Courtois, Cécile Proust-Lima, Joanne Couallier, Agnès Pétrau, Xavier Litrico & Jean-François Loret
Journal of Water and Health
https://doi.org/10.2166/wh.2022.012

Modeling the relationship between SARS-CoV-2 RNA in wastewater or sludge and COVID-19 cases in three New England regions
(OPEN ACCESS)
Elyssa Annesser, Emily Riseberg, Yolanda M. Brooks, Laura Corlin & Christina Stringer
Journal of Water and Health
https://doi.org/10.2166/wh.2022.013

Isolation and identification of potentially pathogenic free-living amoeba in drinking, surface, and stagnant water sources from Alborz Province, Iran
(OPEN ACCESS)
Ehsan Javanmard; Maryam Niyyati; Ali Taghipour; Marziye Fatemi; Hamed Mirjalali; Panagiotis Karanis
Journal of Water and Health
https://doi.org/10.2166/wh.2022.229

The fate and risk of nontuberculous mycobacteria in the water supply system: a review
(OPEN ACCESS)
Yalan Gan; Iftita Rahmatika; Futoshi Kurisu; Hiroaki Furumai; Dai Simazaki; Hanako Fukano; Yoshihiko Hoshino; Ikuro Kasuga
H2Open Journal
https://doi.org/10.2166/h2oj.2022.144

Recent Virtual Special Issue



We are delighted to share with you our special issue on SARS-CoV-2 in water, specifically targeted toward our Journal readership. Cutting edge studies and reviews on the water related health aspects of SARS-CoV-2 have been contributed by our research community related to the potential risk of waterborne COVID-19 transmission, household water uses and hygiene during the pandemic, and surveillance of SARS-CoV-2 RNA in wastewater.

Included in this special issue is an invited review by Professor Mark Sobsey on the risk of COVID19 transmission via faecal waste, wastewater, and water exposures.

Check out the peer-reviewed research in the Virtual Special Issue, here:
iwaponline.com/pages/sars-cov-2_in_water

Pegasus Drive, Stratton Business Park
Biggleswade
Bedfordshire
SG18 8TQ
United Kingdom

Tel: +44 (0)1767 604800
Fax: +44 (0)1767 601640
E-mail: iwap@turpin-distribution.com

P.O. Box 388
Ashland
OH 44805,
USA

Tel: +1 800 247-6553 (+1 419 281-1802 from Canada)
Fax: +1 419 281-6883
Email: order@bookmasters.com

IWA Head Office:
Republic – Export Building, First Floor
2 Clove Crescent
London E14 2BE
United Kingdom

Tel: +44 207 654 5500
Fax: +44 207 654 5555

IWA Global Operational Office:
Technology Innovation Center
No. 1 Xiankun Road
Jianye District
Nanjing 210019
China

Tel: +86 25 8222 6413

General e-mail: water@iwahq.org
Membership e-mail: members@iwahq.org
Website: www.iwa-network.org

Company registered in England No. 3597005
Registered Charity (England) No. 1076690