WEBINAR

DETECTING AND MANAGING COVID-19 IN SANITARY WASTEWATERWATER

On 24 June, participants from everywhere on the planet, including Barbados, Indonesia, Nepal and Zambia, gathered in the virtual space for a comprehensive update on scientific approaches to efficient pandemic management. Three leading wastewater technology experts gave fascinating presentations, and the ensuing discussion lasted well beyond the official end of this webinar, the fifth edition of an originally three-part event hosted by IAWD and the World Bank.

The sudden and enormously destructive impact of the COVID-19 pandemic has rattled decision-makers, researchers and businesses in every corner of the planet. Normally overlooked or happily taken for granted issues have moved to center stage, and one of those is the safety of water supply and wastewater management systems. Is the virus present in sewers? Do authorities have to worry about yet another contagion risk? What is the significance of virus residues in sludge?

The webinar on COVID-19 in sanitary wastewater brought answers to these questions, some reassuring, and some outright surprising.

> "The pandemic teaches us that capacity building is actually possible without meeting physically,"

remarked Moderator Stjepan Gabric, Senior Water and Sanitation Specialist at the World Bank, before proceeding to introduce the panelists.

The first to take the floor was Damir Brdanovic, PhD, Professor of Sanitary Engineering at IHE Delft (formerly UNESCO-IHE) Institute for Water Education and Endowed Professor at Delft University of Technology. He introduced the audience to project DEMOS, the Digital Epidemic Observatory and Management System. This is an interdisciplinary effort to create innovative early detection tools for pandemic management purposes. One of those tools is MEDiLOO, a non-invasive diagnostic system which has already seen field tests in the Philippines and Kenya. MEDiLOO is a portable toilet fitted with tools to monitor the health status of its users remotely. In

its current development stage, it uses sensors, optical identification cameras, hyperspectral cameras, urinalysis and lab chips to measure 11 parameters and detect 19 symptoms to indicate 15 medical conditions ranging from Anemia to Tuberculosis. While the concept is especially promising for pandemics management in difficult environments like refugee camps or disaster areas, Mr. Brdanovic states that the same technology would work in every bathroom, turning toilets into non-invasive diagnostic machines.

> "I have to ask you now to forgive the language, but here comes the Shit Killer."

Saying this, Mr. Brdanovic presented another spectacular DEMOS project, a microwave-based pathogen destroyer and sludge dryer. This system kills everything living in sludge, including viruses, leaving a totally inert, very dry material which can be reused in horticulture and will undergo field testing as soon as the Corona-related travel restriction are sufficiently lifted.

Next in the lineup was Dragan Savic, PhD, Fellow of the Royal Academy of Engineering and CEO of the KWR Water Research Institute, another DEMOS project mastermind. He focused on the possibilities offered by systematic sewer surveillance. He stated:

> "Wastewater epidemiology has been around for a decade. The idea originally arose from the fight against illicit drugs."

Sewer surveillance uses laboratory analysis to identify biomarkers and analyze their public health implications. The method holds considerable promise, because compared to individual testing, tracing sewers covers much larger shares of populations. Mr. Savic's experience from surveillance at a large wastewater treatment plant in the Netherlands showed a clear correlation between the occurrence of COVID-19 infections and virus markers in the wastewater of five cities. In one case, his team detected the virus a full six days before the first case was reported.

The Digital Epidemic Observation and Management System DEMOS aims at combining all available data sources, including sewer surveillance, clinical data, socio-economic observations, diagnostic devices like MEDiLOO and other data to create a reliable system for early warning, hot-spot discovery, mitigation planning and decision support from readily available components and without the need for large infrastructure investments. The final development stage will provide a web-based information service for the support of individual and group decisions. He explained:

> "We can help people to decide when and where to place or lift lockdowns, and not only in cities. This might even work in areas where there are no sewers. After all, wastewater has to go somewhere."

The third panelist, Norbert Kreuzinger, PhD, Associate Professor at the Institute for Water Quality, Resources and Waste Management at Technische Universität Wien, added a reality check to these fascinating visions, reporting the experiences from two independent Austrian municipal wastewater surveillance initiatives, one in Innsbruck and the other in Vienna. Both have run since the end of March, with official support on the ministerial level, and a strong commitment of larger cities to collect and provide test samples. There is also direct information exchange with the involved decision-making boards.

Mr. Kreuzinger generally notes that the pandemic crisis has brought out the best in the scientific community:

> “We are really joining forces. Networks are popping up and coordinating at an amazing pace, and the EU is helping to coordinate the effort. There is really exemplary global cooperation”,

he says.

Regarding his own field of expertise, he appreciates that the crisis has thrown a spotlight on public sanitation, a theme that would otherwise raise a “yuck!” under the best of circumstances.

> “Now we bring a novel approach to a huge problem, and everybody is very excited and glad to help.”

On the other hand, science had to hit the ground running, and Mr. Kreuzinger openly admits that the learning curve is steep:

> “Wastewater is a very complex matrix”,

he says. Also, with many properties of the virus unknown, making decisions regarding sampling, sample storage, preparation and testing methods involved a lot of learning by doing. Yet again, results showed encouraging correlations with the development of the pandemic.

> “One of the bigger problems we face is that we really have to think hard how many samples we can process every day,”

reports Mr. Kreuzinger, also describing the need for comparing detection results against other known viruses in a sample to determine how much of the COVID-19 residue you lose on the way between sampling and testing. While warning against exaggerated expectations, he lists the potentials of the method as a tool for trend analysis and management measures monitoring, a valuable method to complement other established approaches, and a detector of sudden recurrences after stagnation periods.

The rest of the webinar was spent answering questions from the audience, and obviously one of the main concerns was, if live virus in wastewater could present an additional health risk. The consensus here was a flat-out “no!”

Dragan Savic reported that monitoring the wastewater of five cities in the Netherlands had not come up with one single live virus, and Damir Brdanovic added:

> “The problem is not only corona, but at the moment, corona gets all the attention. Operators who take the usual precautions in wastewater treatment do not need to worry.”

With time running out fast, Mr. Kreuzinger dedicated his closing statement to his greatest worry:

> “Once the virus disappears, the funding may disappear.”

Yet, as he said, all indications point to the fact that the current situation will remain for a while, which might give the scientific community the necessary time to come up with something of lasting value:

> “A year from now we may have a detection and management approach to cover not only corona, but also the future pandemics.”

Further information including the recording can be found on our website!