



Monitoring antibiotic resistance in wastewater

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Topics: Wastewater | Pollutants

Researchers at Eawag recommend setting up a monitoring system for antibiotic resistance in the synthesis report of the National Research Programme NRP 72 Antimicrobial resistance, similar to the wastewater monitoring for Sars-CoV-2.

Antibiotic resistance endangers human and animal health worldwide. In order to be able to introduce effective measures against antibiotic-resistant pathogens, it is important to have detailed knowledge of the current situation and how resistances are spreading in the environment. Wastewater treatment plants are a “hotspot” for resistance. Antibiotic resistant bacteria enter the wastewater treatment reactors with the wastewater from humans and animals. As part of the National Research Programme NRP 72 Antimicrobial resistance, researchers led by Helmut Bürgmann, Head of the Surface Waters Department at Eawag, are investigating how they penetrate the environment.

Wastewater treatment plants remove a lot, but not everything

“Wastewater treatment plants remove a large part of the antibiotic resistant genes and antibiotic resistant bacteria from the wastewater,” explains Helmut Bürgmann. “Nevertheless, we can still detect elevated levels in treated wastewater that is discharged into the rivers.” Downstream, concentrations usually decrease rapidly due to dilution and other processes. “At individual river sections far downstream of a wastewater treatment plant, however, we again found significantly elevated concentrations, which indicates growth of resistant bacteria in the river,” adds Helmut Bürgmann.

The researchers suspect that another important cause for the increased occurrence of resistant bacteria in rivers is heavy rainfall, because the large volumes of water can overload sewage systems and wastewater treatment plants. The catchment basins then overflow. Over a short period of time, large quantities of antibiotic resistant bacteria and antibiotic resistant genes can be flushed directly into

rivers. The Eawag researchers therefore propose increasing the retention capacity of wastewater treatment plants or of the catchment area as a whole.

Wastewater as a monitoring system?

However, the researchers' work also showed that wastewater can provide a lot of information about the resistances circulating in the catchment area of wastewater treatment plants. Together with the National Research Programme NRP 72, the researchers therefore recommend setting up a monitoring system for antibiotic resistance in Swiss wastewater treatment plants, similar to the wastewater monitoring for Sars-CoV-2. Further results and recommendations of the NRP 72 as well as a conclusion can be found in the programme summary "Improving the effectiveness of antibiotics, curbing resistance".

Cover picture: Antibiotic-resistant bacteria enter wastewater treatment plants through sewers. An Eawag research team investigated how they penetrate from there into the environment. (Photo: Alessandro Della Bella)

Related Links

Press release NRP 72, 15.11.2022

Programme summary NRP 72:

Eawag website: Swiss River Resistome

Eawag website: Tracking of Sars-CoV-2 in wastewater

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