

Wastewater treatment plants significant source of microplastics in rivers

February 24 2016



Although wastewater treatment plants are catching 90 percent or more of the incoming microplastics in wastewater, the amount of microplastics being released daily with treated wastewater into rivers is significant, ranging from 15,000 to 4.5 million microplastic particles per day per treatment plant. These microplastics can be a source of pathogenic bacteria. Pictured here is some plastic found in wastewater influent (raw sewage entering a wastewater treatment



plant), near Bartlett, Illinois. Credit: Credit: Timothy Hoellein

Millions of tiny pieces of plastic are escaping wastewater treatment plant filters and winding up in rivers where they could potentially contaminate drinking water supplies and enter the food system, according to new research being presented here.

Microplastics - small pieces of plastic less than 5 millimeters (0.20 inches) wide - are an emerging environmental concern in ocean waters, where they can harm ocean animals.

Although the majority of ocean debris - including plastics - is transported to oceans from rivers, much less is known about how <u>microplastics</u> are entering rivers and affecting river ecosystems, according to Timothy Hoellein, an assistant professor at Loyola University Chicago.

Rivers are sources of drinking water for many communities and also a habitat for wildlife, Hoellein said. Fish and invertebrates eat the tiny pieces of plastic in rivers, which then make their way up the food chain - possibly ending up on our dinner plates, he said. Like microplastics in the ocean, plastics found in rivers carry potentially harmful bacteria and other pollutants on their surfaces.

"Rivers have less water in them (than oceans), and we rely on that water much more intensely," Hoellein said.

Hoellein previously found that water downstream from a <u>wastewater</u> <u>treatment</u> plant had a higher concentration of microplastics than water upstream from the plant. Now, new research by Hoellein and his colleagues studying 10 urban rivers in Illinois supports this initial



finding. Although initial estimates suggest that wastewater <u>treatment</u> <u>plants</u> are catching 90 percent or more of the incoming microplastics, the amount of microplastics being released daily with treated wastewater into rivers is significant, ranging from 15,000 to 4.5 million microplastic particles per day per treatment plant, according to the new research.



Microplastics – tiny pieces of plastic less than 5 millimeters (0.20 inches) wide – are well known as a pollutant of concern in the oceans. However, much less is known about microplastics in freshwater ecosystems. These microplastics were found in the North Shore Channel, a drainage canal connecting Lake Michigan to the North Branch of the Chicago River, near Chicago Illinois. Credit: Timothy Hoellein



Wastewater treatment plants were a source of microplastics in 80 percent of the rivers studied, regardless of the size of the river or the size and type of <u>wastewater treatment plant</u>. The new research also found that in each river, the tiny plastic particles that escaped the wastewater treatment plants were home to bacterial communities that were more likely to be potentially harmful than the bacteria found in the rivers.

"[Wastewater treatment plants] do a great job of doing what they are designed to do - which is treat waste for major pathogens and remove excess chemicals like carbon and nitrogen from the <u>water</u> that is released back into the river," Hoellein said. "But they weren't designed to filter out these tiny particles."

Hoellein will present new findings on microplastics in rivers Thursday, February 25 at the 2016 Ocean Sciences Meeting, co-sponsored by the Association for the Sciences of Limnology and Oceanography, The Oceanography Society and the American Geophysical Union.

The new research found that not only do microplastics stay in ecosystems for a long time, but they often travel a long way from their point of origin. The researchers found microplastics as far as 2 kilometers (1.24 miles) downstream from the treatment plants, which supports the idea that that rivers can transport plastic and pathogens over long distances, Hoellein said. As the microplastics travel downstream, they are being introduced and incorporated into many ecosystems, he added.

Hoellein said scientists are working to figure out how much plastic stays in the rivers and how much ends up in the oceans. Studying microplastics in <u>rivers</u> could help scientists better understand the entire lifecycle of these tiny pieces of <u>plastic</u> - from land to the ocean, Hoellein said.

"The study of microplastics shouldn't be separated by an artificial



disciplinary boundary," he said. "These aquatic ecosystems are all connected."

More information: The researchers on this study will present an oral presentation about their work on Thursday, 25 February 2016 at the Ocean Sciences Meeting. The meeting is taking place from 21 - 26 February at the Ernest N. Morial Convention Center in New Orleans. agu.confex.com/agu/os16/meetingapp.cgi/Paper/92690

Provided by American Geophysical Union

Citation: Wastewater treatment plants significant source of microplastics in rivers (2016, February 24) retrieved 27 April 2024 from <u>https://phys.org/news/2016-02-wastewater-treatment-significant-source-microplastics.html</u>

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