

Freshwater is getting neglected when it comes to plastic pollution research

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"The oceans are the heart of the planetary ecosystem. But the arteries are all the freshwater."

Plastic pollution in lakes and rivers is on the research back burner—that's a problem.

That's according to a new study in the journal *Water, Air, and Soil Pollution* that tallies research on plastics in the oceans and in freshwater. Such studies overwhelmingly look at marine plastic pollution. When studies do look at freshwater plastic pollution, they report on microplastics rather than the larger macroplastics—anything from bottle caps to plastic bags, as long as it's larger than 2.5 centimeters—that clog lakes, streams and rivers, especially in the developing world.

"Considering the amount of plastics found all over the planet, the lack of decent studies on plastic pollution in freshwater habitats is surprising," the study's authors, Karl Matthias Wantzen, UNESCO chair of river culture and a professor at University of Tours in France, and Martin Blettler, a researcher at the National Institute of Limnology, told EHN in an email.

Blettler and Wantzen reviewed 171 studies published on plastic pollution in water. More than 98 percent of articles that reported on animals getting tangled in plastics focused on ocean environments, while less than 2 percent dealt with freshwater species, despite the fact that entanglement is difficult to detect in the oceans but "frequent in the freshwater system nearby large cities," the study says.

Likewise, no studies covered the use of plastics in nests of freshwater birds, although "the amount of plastic trash ending up in the birds' nests appears to be increasing in freshwater systems, with dangerous and deadly results," the study reports.

Perhaps most importantly, not enough is known about uncontrolled dumping of plastics into rivers in cities in the developing world. The authors write that waste management in developing countries is "strongly based on uncontrolled dumping."

Studying plastic waste in freshwater is important because, with few exceptions like wind and direct dumping into the ocean, all plastics in the ocean get there by streams and rivers, the researchers said.

Thompson beach (Paraná River, Entre Ríos State, Argentina; Credit M. Blettler)

The reasons why freshwater plastic pollution research lags behind ocean pollution research isn't clear, though it did get a later start as a field.

"Me and like two or three other people in the world kind of all had the epiphany at the same time that as much as we've studied plastic in the world's oceans there was just nothing out there on plastic in freshwater," Sherri Mason, a professor of chemistry and the sustainability coordinator at Penn State Behrend, told EHN, referring to 2012 and 2013.

Marine plastic pollution research got a much earlier start in the 1970s, Mason said. Since academic research builds on previous work, the disparity in focus could be a result of how long the fields have been around.

Though Mason had been teaching about marine plastic pollution, she hadn't considered plastics in freshwater until sailing on the Great Lakes. After finding no research on freshwater plastics in the Great Lakes to use in a class, she decided to do the research herself.

Marine plastic pollution research has also benefited from publicity campaigns. Charles Moore, the ship's captain who first studied the Great Pacific Garbage Patch, brought the issue to the fore by appearing on talk shows and speaking directly to the public.

"He did some crazy thing that most scientists don't do," Mason said of Moore's publicity campaign. "A lot of scientists, and I include myself in this, we're kind of socially awkward."

Non-research groups have taken up the issue as well. Notably, in 2018 National Geographic launched a multi-year campaign to address plastic pollution in the oceans called Plastic of Planet.

"The oceans are the heart of the planetary ecosystem," Mason said. "But the arteries are all the freshwater."

Science to spur change

Curupí Island (Paraná River, Entre Ríos State, Argentina) (Credit M. Blettler)

Plastic pollution research, policy and awareness are trending in a beneficial direction in some places.

"Several African countries, for instance have banned plastic bags long before the Europeans did," Blettler and Wantzen said. They pointed to an agreement to reduce the international trade of plastic waste, initiated by China's refusal of much of the waste it used to import.

While other countries like Bangladesh, Laos, Ethiopia and Senegal have begun to accept more, a much-needed conversation has begun and less plastic waste will move around the world as a result. All of that will help clean up the oceans and freshwater.

Plastic pollution must be addressed on a global level, the authors said, and research is needed to drive the conversation, as it can lead directly to changes in policy around plastics.

"There are some fantastic researchers who are really digging into this issue and publishing like crazy and really helping us understand the impact of plastic in the Great Lakes," Jennifer Caddick, Vice President for Communications and Engagement with Alliance for the Great Lakes, told EHN. It's led to positive trends in action and awareness around the Great Lakes, the world's largest freshwater system.

Caddick points to "the snowball effect" on plastic microbeads in personal care products, sparked by Sherri Mason's research that showed they made their way into all five Great Lakes. After Mason's research, states and cities started passing bans on plastic microbeads, eventually prompting industry to ask Congress to even out the patchwork of regulations popping up. Congress passed a ban on plastic microbeads in personal care products effective in 2017.

"That was a great example of how research and really clear data could galvanize public opinion and lead to some specific change," Caddick said.

It helped that the Great Lakes provide drinking water for 40 million Americans and Canadians. Research has shown plastic in tap water, bottled water and beer bottled in the area.

Ultimately, it will take more than research.

Wealthy countries that produce most of the research haven't solved the problem, the authors of the new study said. They also produce most of the plastic and plastic waste. Their solution of shipping plastic waste to poorer countries masks the problem, but makes it worse by moving plastics to places with fewer environmental regulations.

"In the end, we must abolish the concept of waste. All products must be able to be recycled, otherwise they must be forbidden," Wantzen and Blettler said.

And, the stakes are high, Mason said.

"This isn't about saving the planet, it's about saving ourselves."