

Press release, June 2, 2021

Plastic waste in the sea mainly drifts near the coast

A study conducted at the Oeschger Centre for Climate Change Research at the University of Bern provides new insights into the pollution of the world's oceans with plastic waste. The modelling shows that most of the plastic does not end up in the open ocean, but beaches or drifts in the water near the coast.

The pollution of the world's oceans with plastic waste is one of the major environmental problems of our time. However, very little is known about how much plastic is distributed globally in the ocean. Models based on ocean currents have so far suggested that the plastic mainly collects in large ocean gyres. Now, researchers at the University of Bern have calculated the distribution of plastic waste on a global scale while taking into account the fact that plastic can get beached. In their study, which has just been published in the "Environmental Research Letters" scientific journal, they come to the conclusion that most of the plastic does not end up in the open sea. Far more of it than previously thought remains near the coast or ends up on beaches. "In all the scenarios we've calculated," says Victor Onink, the study's lead author, "about 80 percent of floating plastic waste drifts no more than 10 kilometers from the coast five years after it entered the ocean." Much of this plastic also washes ashore. The study's authors conclude that between a third to virtually all of the buoyant plastic washed into the sea is stranded. This has serious consequences for the environment, as coastal ecosystems are particularly sensitive to plastic pollution. Polluted coasts also dramatically lose their value for tourism.

The Nile pollutes the Mediterranean Sea

The proportion of stranded plastic is highest in the regions of the world with the largest sources of plastic waste. These include areas such as Southeast Asia and the Mediterranean. Concentrations are lowest in sparsely populated regions such as the polar regions, the coast of Chile and parts of the coast of Australia. For physics doctoral student Victor Onink, there are two reasons why there is so much plastic waste in the Mediterranean: On the one hand, a lot of plastic enters the Mediterranean Sea, particularly through the Nile. On the other hand, this sea is relatively small and closed. These factors also contribute to the high concentration of plastic.

Plastic waste must not be allowed to enter the sea in the first place

The Bernese ocean modellers also investigated the question of what proportion of the stranded plastic waste comes from where. Their answer: a lot of beached plastic is from local sources, especially when the local sources are large. Ocean currents also play a major role in the distribution

of waste. Regions with a high proportion of plastic originating locally include the coasts of China, Indonesia and Brazil. Conversely, regions were also identified where an above-average proportion of plastic escapes to the open sea. These include the eastern United States, eastern Japan and Indonesia. "In these places, it would be particularly effective to collect plastic waste before it can escape into the open ocean," Victor Onink points out.

The Bernese researcher takes a more skeptical view of initiatives to collect plastic from the ocean itself, which receive a great deal of media attention. "The concentration of plastic appears relatively low in the open ocean," Victor Onink points out. "It makes you wonder if resources are really being used most efficiently with these kinds of projects." Instead, it might be more effective to prevent plastic from reaching the open ocean in the first place, such as by fishing plastic out of large rivers or removing plastic from coastlines.

Rapidly reducing waste volumes

The new research results show where in the world such measures are particularly needed. "With our modelling, we present solid estimates of where the biggest problems with plastic waste in the sea are in the world," says Victor Onink. Now it is first and foremost a matter of finding political solutions to rapidly reduce the amount of waste. A reminder: Depending on the calculations, 1 to 13 million tons of plastic end up in the ocean every year.

Oeschger Centre for Climate Change Research

The Oeschger Centre for Climate Change Research (OCCR) is one of the strategic centers of the University of Bern. It brings together researchers from 14 institutes and four faculties. The OCCR conducts interdisciplinary research right on the frontline of climate change research. The Oeschger Centre was founded in 2007 and bears the name of Hans Oeschger (1927-1998), a pioneer of modern climate research, who worked in Bern.

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Publication:

Victor Onink, Cleo Jongedijk, Matthew Hoffman, Erik van Sebille, Charlotte Laufkötter: Global simulations of marine plastic transport show plastic trapping in coastal zones. *Environmental Research Letters*, June 2, 2021. DOI: <https://doi.org/10.1088/1748-9326/abecbd>

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