

Synthetic clothing fibers contribute vast amounts of plastic pollution on land

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176,500 metric tons of synthetic microfibers—chiefly polyester and nylon—are released every year onto terrestrial environments across the globe, according to a new study in the open access journal *PLOS ONE* by

Jenna Gavigan and colleagues at the University of California at Santa Barbara. The microfibers are shed from clothing during washing, and the amount ending up on land now exceeds the amount that enters waterbodies.

Plastic pollution in the ocean has received lots of attention in recent years, but waterways are not the only place that plastic accumulates. Fourteen percent of all plastic is used to make synthetic fibers, chiefly for clothing. Microfibers, defined as particles less than 5 millimeters in length, are generated in large quantities at every stage of a fiber's life cycle, especially during washing, which mechanically fragments synthetic fibers. When wash water becomes part of the flow to a [wastewater treatment](#) plant, the microfibers it contains may be retained along with biosolid sludge, which may be applied to cropland or buried in landfills.

To understand the global scope and distribution of synthetic [microfiber](#) release, the authors collected data on [global production](#), consumption, and release of plastics, incorporating further data on microfibers released during washing both by machine and by hand, and the accumulation and distribution of microfibers in [wastewater treatment plants](#) and the fate of the wastewater sludge that contains much of this plastic waste. Because many regions do not have detailed data on wastewater treatment, the authors approximated where necessary to develop a comprehensive picture, using median income as a proxy for likely degree of wastewater treatment.

The data does not represent the [total emissions](#) produced from clothing throughout its lifetime—for example, secondhand clothing is not accounted for. However, the authors' calculations showed that approximately 5.6 million metric tons of synthetic microfibers were released from apparel washing between 1950, the start of widespread use of [synthetic fibers](#), and 2016—half of it in the last 10 years. Just under

half of it ended up on land, either on the surface (1.9 million metric tons) or in landfills (0.6 million metric tons). Emissions are growing 12.9% annually, and current annual emissions to land (176.5 thousand metric tons per year) exceed those to waterbodies (167 thousand metric tons per year).

"Large-scale removal of microfibers from the environment is unlikely to be technically feasible or economically viable, so the focus needs to be on emission prevention," Gavigan said. "Since wastewater treatment plants don't necessarily reduce emissions to the environment, our focus needs to be reducing emissions before they enter the wastewater stream."

More information: Gavigan J, Kefela T, Macadam-Somer I, Suh S, Geyer R (2020) Synthetic microfiber emissions to land rival those to waterbodies and are growing. *PLoS ONE* 15(9): e0237839.

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