

Microplastics: What are they and what can be done about them?

What are microplastics (MPs)?

While there is no universal definition for MPs, plastic fragments that are between 5 millimeters and 100 nanometer in length are generally considered MPs. MPs are not composed of a specific type of plastic, but some of the more commonly found MPs include polyethylene, polyvinyl chloride, polypropylene, polyethylene terephthalate, and polystyrene. They occur in various shapes including fibers, films, flakes, granules, foam, and fragments.

What are the sources of MPs?

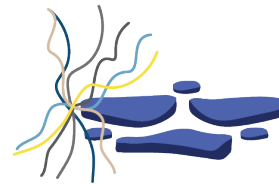
A significant portion of plastics that are manufactured are landfilled or released into the environment, and plastics released into the environment can be categorized as primary or secondary sources of MPs. Primary sources are plastics that are manufactured at a size that would constitute the manufactured product as a MP, such as some plastics nurdles and microbeads. Secondary sources are plastics that have undergone degradation, also known as weathering, through different mechanisms, such as photochemical, mechanical, and microbial, to create MPs.

Primary sources



Microbeads & Nurdles

Secondary sources



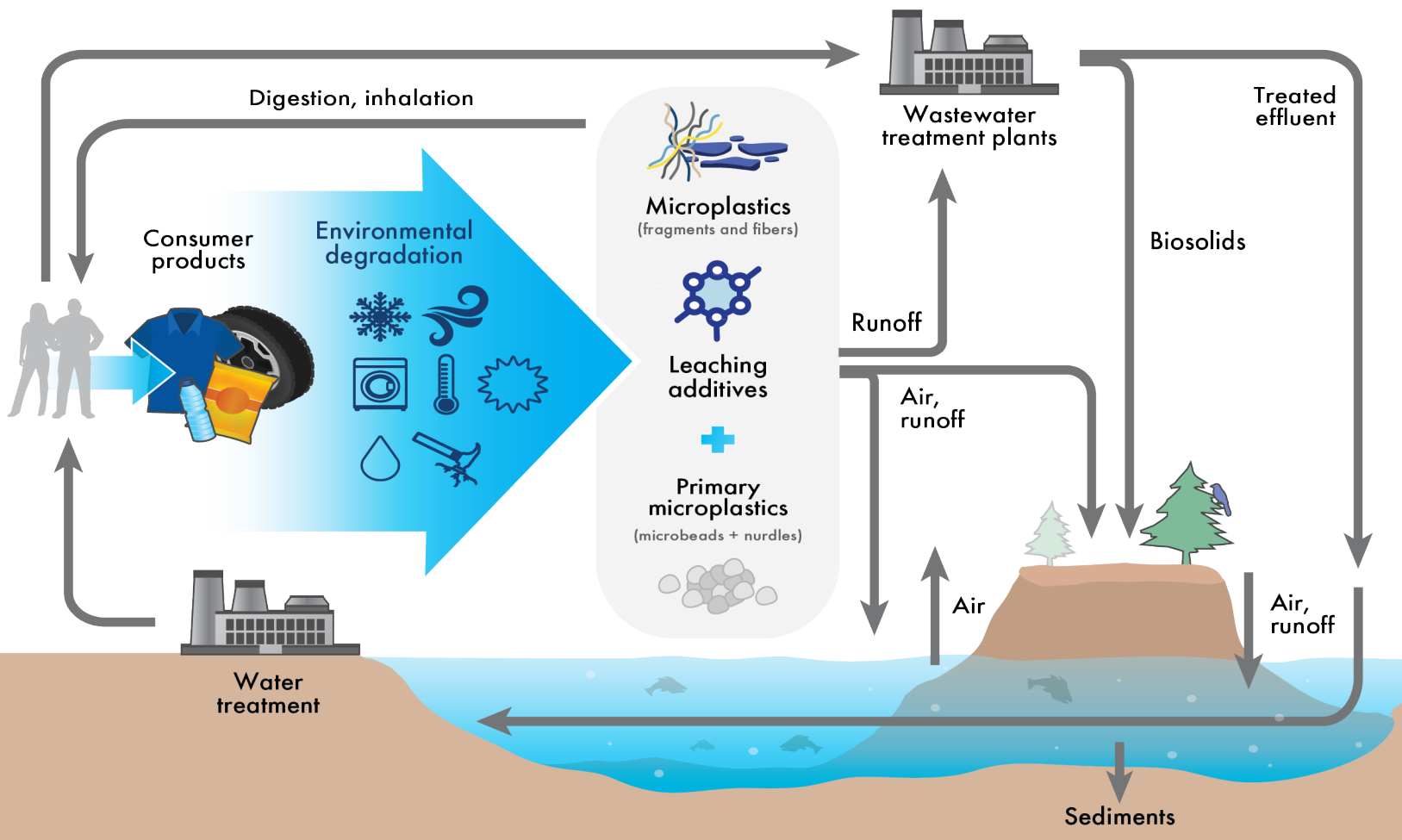
Fragments & Fibers

Why are MPs an environmental concern and how are they being regulated?

MPs can be digested by different organisms and passed through the food chain as documented in several studies, eventually leading to human exposure. Several studies have shown the presence of MPs in bottled water, tap water, seafood, and sugar^{1,2}. A study comparing the feces of healthy adults to the feces of people with inflammatory bowel disease (IBD) has shown a statistically higher number of MPs in the feces of the latter group³ indicating MPs may effect the digestive system. However, research in this area is still in its early stages, and there is a lack of consistency in experimental design among the different studies, making comparisons and conclusions more difficult. While studies evaluating the overall impacts of MPs on human health and the environment are ongoing, there has been some development and proposals of MP regulations based on the potential impacts indicated by existing studies.

How are MPs transported in the environment?

The small size of MPs facilitates their transport across different environmental media. A figure depicting some of the transportation and exposure mechanisms for MPs is included below for reference.



How can Barr help?

Barr has a breadth of experience solving complex problems associated with emerging contaminants that we leverage when evaluating MPs. Barr can help with developing an approach that allows for characterization of impacts by considering what sampling and analytical techniques would be appropriate for the site and use that information to evaluate potential risks associated with MPs. Barr can also assist with assessing current and potential future regulatory requirements that would be applicable to MPs, and if necessary, evaluating remediation options. Overall, Barr can offer a comprehensive approach to evaluating, planning, and mitigating risks associated with MPs.

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1. Carrington D. Plastic fibres found in tap water around the world, study reveals. The Guardian.
2. Cox KD, Covernton GA, Davies HL, Dower JF, Juanes F, Dudas SE. Human Consumption of Microplastics. Environmental Science and Technology. 2019;53(12):7068-7074. doi:10.1021/acs.est.9b01517
3. Yan Z, Liu Y, Zhang T, Zhang F, Ren H, Zhang Y. Analysis of Microplastics in Human Feces Reveals a Correlation between Fecal Microplastics and Inflammatory Bowel Disease Status. Environmental Science and Technology. 2022;56(1):414-421. doi:10.1021/acs.est.1c03924