

Can We Find a Way to Solve Microplastic Pollution?

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DOI: <https://doi.org/10.15354/si.24.co173>

Funding: No funding source declared.

COI: The author declares no competing interest.

The issue of microplastic pollution has escalated in significance and urgency due to the global infiltration of minuscule plastic particles into terrestrial and marine ecosystems. Microplastics are generated through a variety of processes, including the decomposition of larger plastics, industrial operations, and the incorporation of microbeads into personal care items. These substances have been detected in sediments, lakes, rivers, oceans, and even the air we breathe. The detrimental impacts of microplastics on the well-being of wildlife are extensively documented. These particles present hazards to marine organisms such as seabirds, fish, and sea turtles via ingestion or entanglement. Moreover, they might function as vectors through which detrimental substances infiltrate the food chain. To adequately tackle this matter, it is imperative to adopt a multidisciplinary strategy that encompasses policy interventions aimed at restricting plastic production and consumption, advancements in waste management technologies, public awareness initiatives promoting sustainable lifestyles, and ongoing research to comprehensively comprehend the problem's magnitude and ecological repercussions. The assurance of a cleaner environment for future generations is contingent upon our collective efforts to mitigate microplastic pollution.

Keywords: Microplastic Pollution; Public Health; Management; Environment

Science Insights, 2024 February 29; Vol. 44, No. 2, pp.1235-1237.

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AN URGENT environmental issue, microplastic pollution impacts our land, rivers, and oceans. As the use of plastic products in everyday life continues to increase, microplastics have emerged as a significant concern due to the dangers they pose to human health, ecosystems, and marine life (1). Nevertheless, devising a resolution to the perplexing issue of microplastic pollution is a monumental undertaking that de-

mands the cooperation of organizations, sectors, localities, and individuals.

One of the primary contributors to microplastic pollution is the natural deterioration and weathering of larger plastic objects, which reduces them to smaller fragments (2). The issue is further compounded by the inadequate dispersal of plastic waste, which frequently enters aquatic environments where it decom-

poses into microscopic particles. It is crucial to improve waste management practices and decrease the quantity of plastic waste produced initially in order to address this issue.

An additional significant contributor to microplastic contamination is the incorporation of plastic microbeads into personal care items, including exfoliating scrubs and toothpaste (3). Although intended for disposal down the toilet, these minuscule plastic particles become entangled in the environment, potentially reaching marine organisms via ingestion, and subsequently entering the food chain. Although numerous nations have implemented bans on the incorporation of plastic microbeads into consumer goods, further measures are required to avert the discharge of additional varieties of microplastics into the ecosystem.

It is critical to implement policies and regulations that target the production, consumption, and dispersal of plastic products in order to effectively combat microplastic pollution. This encompasses measures such as encouraging the utilization of biodegradable and compostable substances, providing incentives for plastic waste recycling, and implementing regulations on single-use plastics like straws and bags (4). Several nations, including Canada, the European Union, and India, have implemented prohibitions and regulations to reduce plastic pollution; however, for a substantial effect, a global strategy is required.

Industries, alongside governmental initiatives, assume a pivotal role in mitigating the issue of microplastic contamination. By investing in recycling technologies, transitioning to more sustainable packaging materials, and implementing best practices for plastic waste management, businesses can help reduce their plastic footprint (5). Additionally, consumers can reduce their overall plastic consumption and opt for products that are plastic-free or have minimal environmental impact to help create a positive change.

Awareness and education campaigns are crucial for altering behaviors and attitudes regarding the use and disposal of plastic. Assembling knowledge regarding the detrimental impacts of microplastics on public health and the environment can enable individuals to make well-informed decisions and engage

in proactive measures aimed at mitigating the pervasiveness of plastic pollution in their daily routines (6). Education regarding the significance of sustainable practices and the imperative to safeguard our planet against plastic pollution can also be facilitated through the participation of organizations, schools, and businesses.

Technological advancements present auspicious resolutions to the predicament of microplastic contamination. The implementation of sophisticated filtration systems within wastewater treatment facilities can effectively capture microplastics prior to their discharge into the environment (7). Concurrently, the utilization of biodegradable polymers and alternative materials can mitigate the accumulation of plastic waste in landfills and oceans (8). In addition, scholars are investigating novel approaches to identify and track microplastic contamination in ecological systems, thereby contributing to the formulation of policies and the advancement of conservation endeavors.

Governments, industries, communities, and research institutions must form partnerships and collaborate in order to discover a solution to the problem of microplastic pollution. We can generate novel solutions and effect systemic change by combining our resources, expertise, and knowledge in pursuit of a common objective. In order to address transboundary issues such as ocean pollution, which do not respect national boundaries and necessitate coordinated action on a global scale, international cooperation is especially crucial (9).

Although microplastic contamination may appear to be an insurmountable obstacle, it is not for real. Significant strides can be achieved in the prevention and reduction of microplastics in the environment through the implementation of a comprehensive strategy that integrates industry initiatives, public awareness campaigns, technological advancements, and collaborative endeavors (10, 11). It is imperative that we all contribute to safeguarding our planet against the detrimental consequences of plastic contamination. By working collectively, we can devise a resolution to this urgent ecological dilemma that will benefit both present and future generations. ■

References

1. Campanale C, Massarelli C, Savino I, Locaputo V, Uricchio VF. A detailed review study on potential effects of microplastics and additives of concern on human health. *Int J Environ Res Public Health* 2020; 17(4):1212. DOI: <https://doi.org/10.3390/ijerph17041212>
2. Bajt O. From plastics to microplastics and organisms. *FEBS Open Bio* 2021; 11(4):954-966. DOI: <https://doi.org/10.1002/2211-5463.13120>
3. Chengappa S K, Rao A, K S A, Jodalli PS, Shenoy Kudpi R. Microplastic content of over-the-counter toothpastes - A systematic review. *F1000Res* 2023; 12:390. DOI: <https://doi.org/10.12688/f1000research.132035.1>
4. Cruz RMS, Krauter V, Krauter S, Agriopoulou S, Weinrich R, Herbes C, Scholten PBV, Uysal-Unalan I, Sogut E, Kopacic S, Lahti J, Rutkaite R, Varzakas T. Bioplastics for food packaging: Environmental impact, trends and regulatory aspects. *Foods* 2022; 11(19):3087. DOI: <https://doi.org/10.3390/foods11193087>
5. Vanapalli KR, Sharma HB, Ranjan VP, Samal B,

- Bhattacharya J, Dubey BK, Goel S. Challenges and strategies for effective plastic waste management during and post COVID-19 pandemic. *Sci Total Environ* 2021; 750:141514. DOI: <https://doi.org/10.1016/j.scitotenv.2020.141514>
6. Coffin S, Wyer H, Leapman JC. Addressing the environmental and health impacts of microplastics requires open collaboration between diverse sectors. *PLoS Biol* 2021; 19(3):e3000932. DOI: <https://doi.org/10.1371/journal.pbio.3000932>
 7. Pan Y, Gao SH, Ge C, Gao Q, Huang S, Kang Y, Luo G, Zhang Z, Fan L, Zhu Y, Wang AJ. Removing microplastics from aquatic environments: A critical review. *Environ Sci Ecotechnol* 2022; 13:100222. DOI: <https://doi.org/10.1016/j.ese.2022.100222>
 8. Song JH, Murphy RJ, Narayan R, Davies GB. Biodegradable and compostable alternatives to conventional plastics. *Philos Trans R Soc Lond B Biol Sci* 2009; 364(1526):2127-2139. DOI: <https://doi.org/10.1098/rstb.2008.0289>
 9. Bilawal Khaskheli M, Wang S, Zhang X, Shamsi IH, Shen C, Rasheed S, Ibrahim Z Baloch DM. Technology advancement and international law in marine policy, challenges, solutions and future prospective. *Front Mar Sci* 2023; 10:1258924. DOI: <https://doi.org/10.3389/fmars.2023.1258924>
 10. Watt E, Picard M, Maldonado B, Abdelwahab MA, Mielewski DF, Drzal LT, Misra M, Mohanty AK. Ocean plastics: Environmental implications and potential routes for mitigation - A perspective. *RSC Adv* 2021; 11(35):21447-21462. DOI: <https://doi.org/10.1039/d1ra00353d>
 11. da Costa JP, Mouneyrac C, Costa M, Duarte AC, Rocha-Santos T. The role of legislation, regulatory initiatives and guidelines on the control of plastic pollution. *Front Environ Sci* 2020; 8:104. DOI: <https://doi.org/10.3389/fenvs.2020.00104>

Received: January 10, 2024 | Revised: January 15, 2024 | Accepted: January 20, 2024
