



Micro plastics and their Impact on Marine Organisms and Ecosystems

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DESCRIPTION

The global proliferation of plastic waste has become an important environmental issue, with microplastics emerging as one of the most concerning pollutants. Microplastics defined as the plastic particles less than 5 mm in diameter, are ubiquitous in marine environments, posing a serious threat to all the marine organisms and ecosystems. These tiny particles result from the degradation of larger plastics and the direct release of microbeads found in personal care products, synthetic textiles and industrial processes. As microplastics accumulate in the oceans, they infiltrate the marine food chain, leading to detrimental effects on marine life and ecosystems, with consequences that also extend to human health and the global economy. Over time, larger plastic items such as bags, bottles and fishing gear degrade due to exposure to sunlight, wave action, and other environmental factors, fragmenting into smaller particles. In addition, many everyday products, such as toothpaste, cosmetics and cleaning products, tiny plastic particles intentionally added for exfoliation or scrubbing purposes. Once these products are washed down drains, microplastics easily bypass water treatment systems due to their small size, eventually entering rivers and oceans.

The omnipresence of microplastics in the oceans is staggering. Studies have revealed that microplastics can be found from the surface waters to the deepest parts of the ocean, including in remote regions such as the Arctic and deep-sea sediments. Plastic pollution has led to the contamination of nearly all marine environments, and the concentration of microplastics is expected to increase over time. One of the most important aspects of microplastic pollution is its widespread impact on marine organisms, from the tiniest plankton to the largest whales. Microplastics are ingested by a wide range of marine species, either intentionally or accidentally, as the particles often resemble natural prey such as plankton or fish eggs. For many marine species, ingesting microplastics can have severe consequences. Ingested plastics can accumulate in the digestive tract, leading to physical blockages, false satiation, and reduced feeding efficiency. Over time, this can result in malnutrition,

stunted growth, and decreased reproductive success. For example, some fish species have shown reduced energy reserves and impaired growth after consuming microplastics, which can affect their ability to survive and reproduce. Ingested microplastics may also leach harmful chemicals such as Bisphenol A (BPA), phthalates, and Persistent Organic Pollutants (POPs) into the tissues of marine organisms. These chemicals can interfere with endocrine systems, cause cellular damage and even lead to the development of tumors.

Plankton, the base of the marine food chain, is particularly vulnerable to microplastic pollution. Zooplankton takes microplastics for food, which can lead to reduced nutritional intake and lower reproductive success. Since plankton is a primary food source for many marine species, including fish and whales, the impact of microplastics at this level can ripple through the entire food web, potentially affecting higher trophic levels. The impact of microplastics is not limited to individual organisms; it extends to entire marine ecosystems. As microplastics accumulate in the environment, they disrupt natural processes, such as nutrient cycling and habitat formation. Microplastics can alter the structure of sediments and interfere with the ability of certain organisms, such as burrowing worms and bivalves, to filter feed or create burrows. This disruption can have adverse effects on the ecosystem, potentially altering the composition of benthic communities and affecting the overall health of marine habitats.

The effects of microplastics are not confined to marine ecosystems; they have significant implications for human health and the economy. As microplastics are ingested by marine organisms, they can bioaccumulate in the food chain, ultimately reaching humans who consume seafood. The potential health risks associated with microplastic consumption are not yet fully understood, but there is growing concern that these particles, along with the toxic chemicals they carry, may have adverse effects on human health, including hormone disruption, inflammation. By taking action now, there should be decrease in long-term consequences of microplastic pollution and work towards the preservation of marine ecosystems for future generations.

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