

FORUM:	Environment Commission
ISSUE:	Measures to Mitigate the Environmental Impact of Microplastic Pollution on Coastal Regions
STUDENT OFFICER:	Minchae (Kaylyn) Kim
POSITION:	Head Chair of Environment Commission

Introduction

According to the US National Ocean Service, microplastics are defined as “debris under five millimeters in length”. Though banned in various nations, microplastic pollution is still a widespread and perpetuating issue, with the United Nations Environment Program (UNEP) reporting 23 million tonnes of plastic waste ending up in bodies of water worldwide. According to the World Economic Forum’s *Global Risks Report 2025*, pollution is one of the major threats to human health and well-being. At first sight, this may seem like an exaggerated claim, but evidence shows microplastics in human blood, lungs, and



Microplastic debris on shores that inevitably end up in oceans

brains, establishing the urgent need for governments to successfully collaborate in instituting regulations on microplastic production in the private sector industries and investing in research and development (R&D) that can alleviate the existing effects of microplastic pollution on coastal communities.

Background

Microplastic pollution originates from the use of plastic that evaporates into the atmosphere, which is then consumed by marine creatures, potentially ending up in human diets, especially for individuals living near coastal regions where fish is a staple in their culture and diet. Yet, according to the United Nations Environment Programme (UNEP), in 2025, only around 9% of the 400 million tons of plastic produced each year is recycled. Furthermore, the amount of plastic production is expected to

increase by at least 3 times in the upcoming decades. Indeed, the Ellen MacArthur Foundation (EMF) reports that there may be more plastic in the ocean than fish by 2050. As a result, recognizing the consequences of this insidious cycle, including but not limited to increased risk of heart attack, stroke, and noncommunicable diseases, governments must urgently seek international collaboration and policies to cease this toxic cycle.

Problems Raised

Increased Vulnerability of Human Health

According to a recent study published in the Journal of the American Heart Association, which examined microplastics in coastal waters, regions in the Pacific Ocean, Atlantic Ocean, and Gulf of Mexico comprise at least 10 different types of plastic particles. When the researchers compared the health

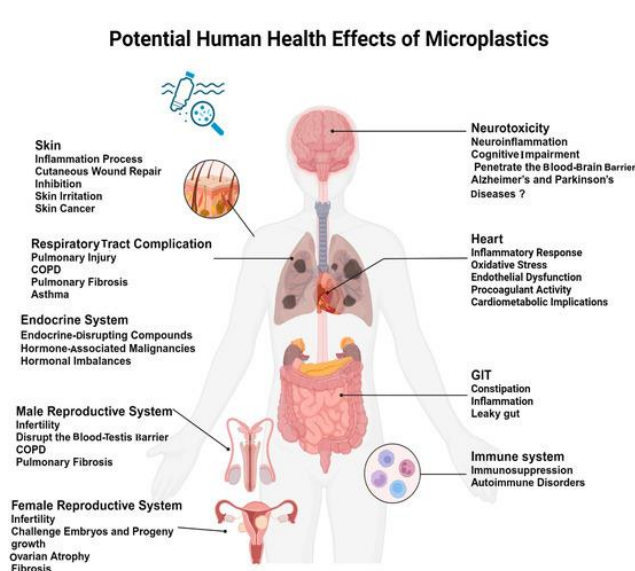


Diagram outlining the effects of microplastic exposure on the human body

conditions of individuals living near the polluted coasts to those of individuals residing near less polluted bodies of water, the study found a higher frequency of type 2 diabetes, stroke, and coronary artery disease in those living near coasts. Accordingly, scientists in this field often refer to the Gulf of Mexico as “Cancer Alley”, simply because of the sheer magnitude of petrochemicals---the chemicals used during plastic production---that end up in these oceans, which is correlated with some cancers. Dr. Leonardo Trasande, a Professor of Pediatrics and population health at the NYU Grossman School of Medicine, advises the public to “reduce our plastic footprint” by

avoiding microwaving plastic materials and using biodegradable alternatives in daily life, such as reusable ecobags or travel mugs.

Ethical Dilemma Regarding Autonomy Over Marine Life

Researchers estimate that the majority of plastic resulting from garbage typically ends up in oceans, often taking centuries to decompose fully. According to a comprehensive study spanning from 2010 to 2021, microplastic pollution is generally associated with decreased fertility and delayed growth for many marine organisms. In particular, fish are vulnerable to microplastics damaging their intestine, liver, gills, or brain, which can in turn affect basic skills needed to survive. In the meantime, microplastic pollution is also linked to increased mortality in certain invertebrates. Hence, this issue not only raises the

question of how the consumption of these marine organisms may lead to a phenomenon known as biomagnification, where the concentration of a particular contaminant increases as the food chain progresses, but also raises concerns about the ethical integrity of such initiatives. Are humans allowed to produce plastic at the expense of other species' physical well-being? Do humans have the authority to choose for other species? These are the questions



Marine life in a plastic-filled ocean

that researchers are attempting to answer as they approach the harsh reality of microplastic pollution.

Effect on Tourism and Local Economies

Coastal region economies may rely heavily on tourism as a primary source of revenue, which is why debris near coasts may jeopardize the economic stability of seaside cities. For instance, in the United States, tourism and recreation alone account for \$124 billion of the gross domestic product (GDP). In a study by the Marine Debris Program, beachgoers were less likely to visit beaches when debris was present. In contrast, the opposite effect was evident when debris was removed, with over \$217 million in additional tourism dollars generated and 3,700 new occupations established, underscoring the critical need to invest in debris-removing initiatives to sustain local communities.

International Actions

Microbead-Free Waters Act of 2015

The Microbead-Free Waters Act of 2015 was established to mitigate the spread of microbeads used in commercial products, including those for health and beauty purposes. The primary aim of this proposition was to minimize the ongoing cycle of microplastics in commercial products, where microbeads can inadvertently spread through toothbrushing or face washing, potentially harming marine biodiversity and health in rivers and lakes. Because the policies regarding microplastic particles differed state by state in the United States, Congress established this nationwide policy to decrease discrepancies or address missing information in certain policies. In other words, this act prevented all states from enforcing policies that promote the commercial or transportation spread of microbeads. Thus far, this policy has received both praise and criticism; some attribute the increased environmental awareness in

cosmetic corporations to this policy, whereas others believe that the policy's scope, which primarily targets rinse-off cosmetics with microbeads, is too narrow to be considered a truly effective policy.

Single-Use Plastics Directive (SUPD)

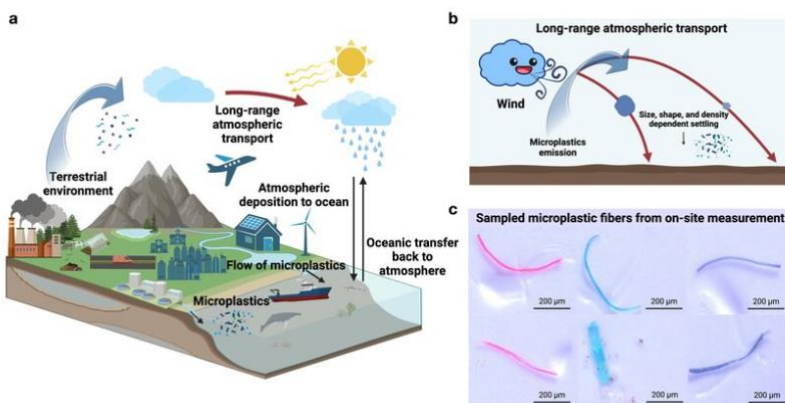
Single-use plastic products (SUPs) are plastics that are used only once or for a short period. According to the European Union, 70% of litter that washes up on shores is considered single-use plastic items. Hence, the European Union's Single-Use Plastics Directive, established in 2018 by the European Commission, has significantly altered the plastic industry in Europe. This policy's primary goal is to limit plastic usage by placing restrictions on the commercial selling and marketing of single-use plastic packaging. By 2030, the European Union aims to make 30% of plastic bottles composed of recycled plastic. Ten items are limited by the European Union, including, but not limited to, cotton bud sticks, food containers, beverage cups, cigarette butts, and wrappers.

Key Players

United Nations Environmental Program (UNEP)

The United Nations Environment Programme is a branch of the United Nations dedicated to reducing microplastic accumulation in the environment, which typically originates from littering,

plumbing leaks, and industrial consumption. According to the 2021 UNEP report titled "From Pollution to Solution", the United Nations cautions the global audience of the variety of health conditions that can affect vulnerable communities worldwide. By establishing the Clean Seas campaign and promoting the UN Alliance for Sustainable Fashion, the UNEP aims to raise citizen awareness



Visual representation of how microplastic particles travel through the atmosphere and other landscapes

of this ubiquitous issue while collaborating with government bodies to develop policies that drive change, both environmentally and paradigmatically.

Operation Clean Sweep (OCS)

Operation Clean Sweep was established to formally combat plastic pollution worldwide. Comprising 60 country members and 5,000 companies, this organization has made significant strides in maintaining high water quality and incorporating community-based approaches to sustainability. The

OCS program is transparent about all its findings and research with the public and relevant industries to inform civilians on the changes in international policies regarding microplastics.

The Republic of Rwanda

Although Rwanda is not a coastal country, it has made significant contributions to the fight against microplastic pollution that other countries or frameworks may take inspiration from. Since 2018, the government has established a ban on single-use plastic products, which was reinforced by fines of up to \$60 USD for using single-use plastic bags. Furthermore, the Rwandan government eliminated trash bins in public to promote waste recycling in households and private waste collection companies. Certainly, critics may argue that imposing these limits restrains individual freedoms, but these policies have truly led to a paradigm shift in the nation—a shift in perspective in which citizens are fully aware of the consequences of plastic pollution and are actively seeking sustainable practices in their daily lives.



Participants at a plastic recycling facility in Rwanda supported by the UNDP

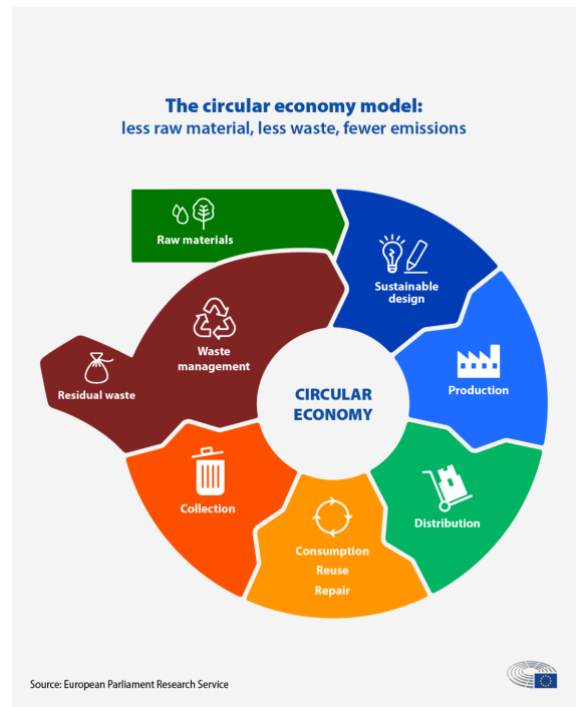
Possible Solutions

Technological Advancements

Researchers from Sichuan University developed an automated fish that absorbs microplastics by swimming around to collect the harmful material. This automated device is small, measuring only about 13 mm in length, and has the capacity to “heal” itself if the material is damaged. It can swim at speeds of around 30 mm per second, which is similar to that of other sea creatures. The mechanism behind this device is that it is composed of antibiotics and heavy metals that can form chemical bonds with microplastics. According to Phillip Demokritou, the director of the Nanoscience and Advanced Materials Research Center at Rutgers University, the key to the fight against microplastics is nanotechnology research that focuses on collecting material at the particle level. Although the logistical details of how this technology can be implemented have not yet been considered, this device demonstrates considerable progress toward a plastic-free environment.

Implementation of a Circular Economy

Scientists have predicted that by 2040, the volume of plastic will double and the stocks of ocean plastic will weigh over 600 million tonnes. Recognizing the urgent need for action, the costly nature of disposing of plastic, and the far more rapid pace of infrastructure development, economists propose the implementation of a circular economy, an approach that has the potential to reduce the production of more plastic through reusing, recycling, and regenerating products using the existing supply of materials. A circular economy aims to create healthy working conditions, products, and communities. The primary challenge with this form of economy is that corporations may find loopholes in government policies that can impede the effectiveness of this plan. Hence, encouraging local governments to invest in the research and development (R&D) of the circular nature of plastics will allow for solutions that are tailored to the needs of each region.



A visual representation of a circular economy, according to the European Parliament

Regional and International Policy Intervention

As previously mentioned, the Microbead-Free Waters Act of 2015 is one of the primary examples of a nationwide policy that has revolutionized industry production of microplastics in cosmetic brands. Accordingly, the establishment of regional collaboration between coastal countries with similar environmental conditions may facilitate formulating policies that 1) limit plastic pollution near coasts, 2) raise public awareness of the health consequences of inadvertent consumption of microplastics, and 3) motivate citizens to implement daily sustainable practices. Additionally, collaborating with existing international organizations, including the Global Partnership on Marine Litter or the International Atomic Energy Agency (IAEA), may provide a holistic view on the progression of microplastics across the world, highlighting which regions require the most financial or logistical guidance.

Glossary

Biomagnification

A biological phenomenon in which the concentration of a toxin or contaminant increases as the level of the food chain increases, resulting in further damage in species that exist at the higher trophic levels

Circular Economy

An economic system based on recycling and reusing old materials for new purposes for sustainability

Coastal Regions

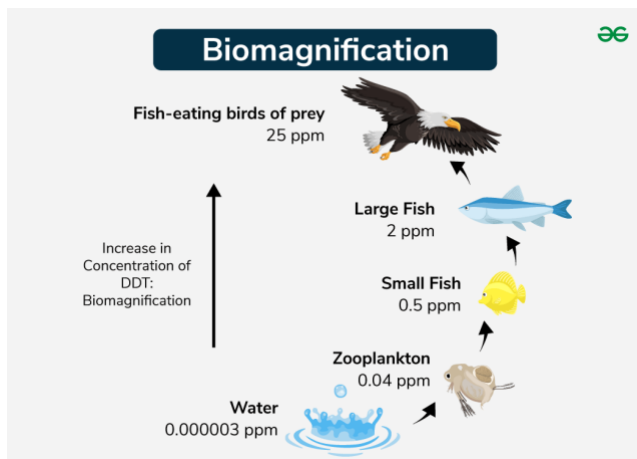
A geographical region bounded by a coastline, or the line separating the ocean and land, typically comprising shores, forests, or salt marshes, that hosts around half of the entire human population

Microbeads

A term referring to minuscule pieces of plastic typically found in cosmetic, hygiene, or other commercial products that cannot be filtered out using typical sewage treatments

Microplastic

A plastic particle with a bandwidth of less than or equal to 5 millimeters



Example of biomagnification of DDT

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