

Forum: Environmental Commission

Issue: Measures to limit the effects of microplastics in the marine environment

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Introduction

The marine environment consists of seas, bays, estuaries, oceans and other major water bodies on the planet. The marine environment provides many types of habitats that support the marine life and thus its safety is quite important. The earth is covered with about 71 percent water and the ocean holds around 96 percent of all Earth's water. Humans use plastics in their day-to-day lives and a significant amount gets dumped into the ocean which harms the marine environment. Every year, around 8 million metric tons of plastic which is the same as 25 thousand empire state buildings gets dumped into the ocean. This number is estimated to double towards the end of 2025.

There are 3 primary ways the plastic used by humans end up in the ocean. Firstly, when plastic is discarded rather than recycled, it drifts away whilst it's getting transported due to its lightweight and eventually enters drains where it ends up in rivers or sea. Secondly, through littering, plastic waste is carried by rainwater and wind into streams and rivers. Improper waste disposal is another cause of plastic in the ocean. Lastly, microfibers are released into waterways when we wash our clothes in the washing machine. Due to their miniature size, they don't get filtered out by waste water plants and thus end up in the ocean.

Small plastic pieces which are shorter than 5 millimeters are called microplastics. Microplastics can cause noteworthy issues for marine organisms who ingest them. 800 species worldwide are affected by fragments of plastic. Different marine organisms such as fish, seabirds and sea turtles can ingest these fragments of plastic, causing them suffocation, starvation and drowning. It is said that up to a million seabirds die in a year due to plastic waste and it takes up space in sea

turtles' stomachs, causing them to starve. These immense issues amongst others have pressed governments and organizations alike to find solutions to this problematic issue.

The general public also play an important role in limiting the effects of microplastics in the marine environment with their day-to-day decisions. Humans buy about 1 million plastic bottles per minute in total, and only about 23% of this is recycled. This shows how the general public and their use of plastic is important in order to limit the effects of microplastics in the marine environment. As the situation is worsening over the years due to the increase usage of plastic, it is vibrant to see that instant change and action need to be appropriated.

Definition of Key Terms

Microplastics

The world microplastics can be broken down into two parts: micro and plastic. Micro refers to the minuscule size which are less than 5 millimeters in length. Plastic refers to any type of plastic that can pollute the environment. These fragments of plastic are found in bottles, bags, clothes etc.

Marine Environment

Marine refers to anything which is aquatic such as the sea or ocean. Environment refers to anything which is a living or non-living thing that occurs naturally. Marine environment can consist of its habitats, coral reefs, plants etc.

Marine Debris

Debris is anything which has been discarded or destroyed such as litter, garbage, rubble, spoilage etc. More specifically, it is solid material which enters waterways and can potentially be dangerous to marine life.

Microfibers

Microfibers are a type of microplastic which are synthetic in material. They can be found in clothes which are made of synthetic materials such as polythene or nylon.

Ecotoxicological

Ecotoxicological refers to the effects of toxic chemicals on biological organisms. Microplastics are an example of materials that can contain such toxic chemicals.

Recycling

Recycling is the process of converting waste material into new materials and objects. It helps save material and help lower greenhouse gas emissions. It is very important for plastic as it reduces the amount of new plastic produces and less plastic being discarded.

Background Information

Sources of microplastics in the marine environment

The use of plastic is immensely popular throughout the world. Microplastics originate from larger size plastics. The harmful effects of the use of plastics are often talked about when considering the safety of the marine organisms in the marine environment. However, not many realize the importance of the origins of microplastics in the marine environment. It is imperative to understand the source of microplastics in the marine environment to devise a strong solution for this issue.

Environmental Action

The most common way microplastics are formed is through environmental action. Many products such as bags and bottles are made out of plastics. However, a large number of these products are not long-lasting and get thrown away in masses daily. It is estimated that around 4 trillion plastic bags are used worldwide annually but only 1% of those get recycled. The problem occurs as plastics do not decompose and yet are used in numerous ways due to their versatile and cheap nature. Additionally, the lack of recycling: as only 9% of the world's plastic gets recycled, also leads to waste just being discarded, eventually finding its ways to seas and oceans. As plastics float around the ocean along with debris, they are exposed to harsh solar radiation as well as constant corrosion from the action of wind and water waves. This happens over a long period of time, resulting in the plastics breaking down into smaller portions. The cycle continues repeatedly until they result into microplastics.

Human Cosmetics

Other ways microplastics are formed and end up in our marine environment come from deliberate human production of small beaded plastics. Microplastics are found in many products including soap, shampoo, deodorant, toothpaste, wrinkle creams, moisturizers, shaving cream, sunscreen, facial masks, makeup (e.g. lipstick or eye shadow), and children's bubble bath. The reason for these microplastics to be added to such cosmetics is due to the enhanced abrasive quality that microplastics provide, as well as to ensure that they provide proper exfoliation and cleaning. These microplastics find their way into seas and oceans through showers and other waterways. "A single shower could result in 100,000 plastic particles entering the ocean", says Mary Creagh, the Shadow Secretary of State for Environment in the UK.

Clothing

A largely unpopular source of microplastics comes from clothes that humans wear. It is not vastly known that our clothes are the third-largest direct source of microplastics in the ocean. Extra-thick wool-like clothing as well as sportswear, polyester yoga pants and many other pieces of clothing contain acrylic fibers. One may be unaware of these microfibers in their clothes. Microfibers are longer versions of microplastics, often known to be worse due to their larger surface area. Each wash of acrylic fabrics can release over 700,000 plastic microfibers, which can drain into wastewater treatment plants and eventually the ocean. It's estimated that some 190,000 tones (209,000 tons) of plastic microfibers are poured into the world's waters every year. These microfibers are leaked when one washes plastic clothes. Again, due to their microscopic size, they fail to get filtered out and get pumped back to natural waterways, ending up in the seas or ocean.

Impacts

There are various impacts of microplastics on marine life, however, these can be categorized into three main aspects: ecological damage, environmental damage, and social damage. Ecological damage is defined by the inflicted harm upon the environment and biological systems of marine species. Economic damage alludes the disruption in various elements of different oceanic industries. Social damage refers to the risks imposed to people through micro-plastics.

Ecological effects

Ecological damages encompass fatal effects on marine creatures due to entanglements, intake of micro-plastics and other micro-particles, physical destruction, damages done due to chemicals, and potential incursion of unfamiliar species which disrupts the ecosystem. Ecotoxicological harm imposed by chemicals involved results in severely harmful health effects for marine creatures. As conducted via research by Koehler in 2008, it was determined that due to plastic particles in the ocean, there was an inflammatory response in the circulatory system of certain marine organisms. Plastic was also evident to have permeated through cell membranes of species, leading to lethal health effects. Reproduction of marine organisms is altered by the presence of micro-plastics, which was found to have disrupted the egg production, sperm mobility and larval yield of oysters, in a research conducted by the National Academy of Sciences in 2016. In freshwater fish endocrine disruption was found due to intake of polyethylene, which resulted in an altered gene expression in male and female fish. A sample of European Perch fish were experimented to reveal that exposure to polystyrene constrains hatching of eggs, diminishes the growth rate, as well as negatively affects instinctive behavior of larvae.

Environmental effects

Plastic contains several different types of harmful chemicals as well as specific heavy metals (e.g. copper, lead etc.) which are dumped into the ocean, and harm the entirety of the marine life including the water, seabed and organisms. Microfibers are another aspect that compound with microplastics. Microfibers possess high density and a wide surface area, which leads to chemicals and organisms attaching to it. Together with microfibers, microplastics potentially result in twice the damage to the marine environment. Furthermore, when waste is moved from one water body to another, the organisms attached to the microfibers and plastics are transferred as well, which leads to an induction of invasive species which can cause disruption to the ecosystem and food chain in the marine environment.

Social effects

After microplastics have been digested by marine organisms, they can also end up in your food. Some of these microplastics come from fish liver as that is not removed prior to consumption. A lot of microplastics is found in sea salt possibly due to the different extraction method used. A recent study shows that 15 different brands of sea salt consisted of 273 microplastics per pound (600 particles per kilogram) of salt. Other studies have found that

microplastics can also occur in honey as well as beer in roughly the same amount. Although, the most public source of microplastics is found in seafood due to their regular consumption of these microplastics. The issue occurs when these microplastics do not pass through the digestive system and out by urine, they end up within the body of the organism. Additionally, many chemicals are used in the production of plastics. These chemicals can affect the brain as well as possibly the fetuses and their development. A recent study found that mussels and oysters harvested for human consumption had 0.36–0.47 particles of microplastic per gram, meaning that shellfish consumers could ingest up to 11,000 particles of microplastic per year.

Major Countries and Organizations Involved

United Nations Environmental Programme (UNEP)

The United Nations Environmental Programme, also known as UNEP is responsible for the organization's environmental activities. It aids developing countries in implementing environmentally sound policies and practices. UNEP states that their mission "is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations." UNEP urges to 'turn the tide on plastic' as microplastics in the sea are an all-time high. UNEP has launched an extraordinary global campaign to eliminate the use of microplastics by eradicating the unnecessary use of single-use plastics. The purpose of this campaign is 'to save the world's seas and oceans from irreversible damage before it's too late.' As stated by Erik Solheim, the Executive Director of UNEP. UNEP also has a clean seas campaign which raises awareness of the microplastics in the ocean. Furthermore, it encourages countries and businesses to take measures in order to elude microplastics from personal-care products and reduce disposable plastics items by 2022. Many countries including Indonesia, which is the second most microplastic polluting country, India, Uruguay and Costa Rica have joined this initiative.

United Nations Development Programme (UNDP)

The United Nations Development Programme is the United Nations worldwide development network. UNDP supports change and provides countries with knowledge, experience and resources in order to help the people build better lives for themselves. The UNDP consist of something called

sustainable development goals (SDG). SDG outlines how to achieve a better and more sustainable future. They address the global challenges which the world faces such as environmental degradation. Sustainable development goals consist of 17 global goals which were set by the United Nations General Assembly in 2015. The UNDP, through their SDG, wishes to reduce microplastics in the marine environment under goal 14 by 2030. The goal recognizes the importance marine and coastal biodiversity on the general public. The general purpose of these goals is to 'prevent plastics in the oceans and keep the oceans clean and safe.'

European Union (EU)

The European Union is a political and economic union which consists of 28 members located in Europe. Annually, countries in EU produce around 25 million tonnes of plastic waste in which less than 30% is recycled. Thus, the European commission has highlighted themselves to address the issue of plastic pollution through their release of 'strategy on Plastics in the circular economy.' This strategy actively portrays how the commission desires to reduce the impact of plastic pollution, protect the environment from plastic pollution as well as commit to reducing the amount of single-use plastics. It hopes to achieve this whilst nurturing growth and innovation, which, in turn, will result in a positive outcome for the future of Europe. The plan states that by 2030, all plastic packaging in the EU must be recyclable, the utilization of single-use plastics will be drastically reduced and there will be restrictions on the intentional use of microplastics. With this new strategy, the European commission will make recycling profitable for business through new rules on packaging and increasing the demands of recycling plastics. The EU have already drastically reduced the use of plastics bags, the European commission wishes to further improve this by taking measures to restrict the use of microplastics in products. It also encourages to completely stop littering at sea and support countries across the world for the same initiative such as India.

China

As of 2018, China is the largest contributor to plastic pollution and is radically ahead of its predecessor; Indonesia. China produces around 8.8 million metric tonnes of mismanaged plastic waste where 3.53 million metric tonnes ends up as plastic marine debris. Thus, China are guilty for the most plastic waste produced in the world. However, China has set ambitious targets to reduce this. The National Development and Reform Commissions (NDRC) has confirmed their commitment to reducing plastic waste pollution. One of its steps is to make it mandatory for retailers to charge customers for plastic bags and ban the production and sale of plastic bags which are less than 0.025

millimetres thick. Restrictions on importation of recyclable materials which includes 24 types of solid material into China has also been implemented by the government. China also urges their general public to increase the amount of recycling. However, China faces problems as their economy is rapidly growing which results in increase in orders of food delivery every day, which, in turn, results in a lot more plastic getting expended.

Indonesia

Indonesia is the second most plastic waste producing country in the world, after China. According to a report from the Wall Street Journal, together, China and Indonesia are responsible for more than one third of the plastic debris in the ocean. Indonesia produces 3.2 million metric tonnes of mismanaged plastic waste where an estimated 1.29 million metric ton ends up in the ocean. Thus, plastic pollution has been troublesome for Indonesia. In the top 20 most polluted rivers of the world, Indonesia's rivers are 4 of them. A large number of the Indonesian population use plastic bottles due to lack of government investment in water pipes and many use disposable plastics such as bags, cups, bottles and utensils in their day-to-day lives. The government has recognized this issue and has been committed to drastically reduce the number of plastic products which contaminate Indonesian waters. The government has allocated 1 billion dollars a year to tackle this issue, states the Indonesian coordinating minister at the 2017 World Oceans Summit. At the summit, representatives state that Indonesia will reduce its marine waste by 70% within 8 years. Other steps taken by Indonesia are putting tax on plastic bags, introducing a sustainable public education campaign and most contemporarily, turning plastic waste into road materials.

Timeline of Events

Date	Description of Event
1960	First reports of marine plastics debris impacting on marine species were published
1974	UNEP regional seas programme launched. This is an international collaborative approach to protect the marine environment and its resources. Formed in 1974, its primary aims were to address the degradation of the seas by supporting the achievement of international environment and development targets. It now implements a lot of UN's marine-related policies.
August 30, 1975	London Dumping Convention becomes effective. Its aim was to limit or prevent marine pollution in order to keep the ocean clean. One of its achievements are the ban on ocean disposal of low-level radioactive wastes and resolutions to end dumping of industrial wastes.

October 2, 1983	MARPOL 73/78 Convention becomes effective. Marine pollution is the long form of MARPOL. It is one of the most important international marine environmental conventions. Its aim was to minimize pollution of the oceans which primarily included garbage dumping from ships.
16 November, 1994	The United Nations Convention on the Law of the Sea (UNCLOS) becomes effective. UNCLOS is an international treaty which was signed and adopted in 1982 but became effective in 1994. The treaty addressed the concern with fishing and conservation of living resources on the high seas.
2005	UN general assembly delivers resolution on marine plastic pollution. This resolution included many important and vital information such as the environmental, economic and social impacts as well as further action necessary to prevent and significantly reduce marine debris, including plastics and microplastics.
2012	Global Partnership on Marine litter. Due to the increased amount of marine litter found at seas and oceans, the global partnership on marine litter was formed by UNEP. One of its specific objectives are to assess the emerging issue of microplastics entering the food web and its impacts on the welfare of marine fauna.
23-27 June, 2014	The first United Nations Environment Assembly (UNEA) of the United Nations Environment Programme (UNEP) was held at UNEP headquarters in Nairobi, Kenya. It concluded with delegates from 160 countries adopting a decision and resolutions on strengthening UNEP's role in reducing marine debris and microplastics.
23-27 May, 2016	The second United Nations Environment Assembly (UNEA) of the United Nations Environment Programme (UNEP) was held at UNEP headquarters in Nairobi, Kenya.

Relevant UN Treaties and Events

- United Nations Environment Assembly (UNEA-1), 23-27 June, 2017 (UNEP/E.A.1/L.19)
- United Nations Environment Assembly (UNEA-2), 23-27 May, 2016
- UNCLOS, 16 November 1994
- Resolution on Marine Litter and Microplastics (UNEP/E.A.3/L.20), 4-6 December, 2017

Previous Attempts to Solve the Issue

The Government of India aims to eradicate all single-use plastic in India by 2022 and has already banned it in many places around the country, including Delhi. It is now illegal for any store to hand out plastic bags, and in the larger commercial stores, such as Spencer's, citizens have to pay if they want to use plastic bags. This is similar to the taxes induced on plastic bags in European countries. Other countries, such as China, Morocco and Kenya, have prohibited the use of thin plastic

bags completely. Reportedly, this has been one of the most effective policies and has reduced the use of disposable plastic items.

In 2015, only 9% of 141 million tonnes of plastic waste was recycled, leading to an alarming statistic. This has resulted in awareness and plans in the private sector of recyclability for increasing this act. Bioplastics, which are used in packaging, are being focused on, as they are recyclable. As the head of the UN Environment, Erik Solheim states, “Plastic isn’t the problem. It’s what we do with it.”

Several countries are starting to impose bans on the use of plastic straws by replacing them with metal, paper or other biodegradable materials in many restaurants. Though this policy is yet to be enforced, it has already started to become a solution in many countries. Other companies are changing their policies to giving straws to their customers only on demand.

Possible Solutions

Recycling

Plastic is not biodegradable and thus eventually ends up in the oceans as waste. To improve this, recycling rates must increase drastically. As of now, only 9% of the world's plastics gets recycled. Increasing this number will reduce microplastics in the ocean as recycling helps keep plastics out of the ocean. It also reduces the amount of 'new' plastics produced and thus limiting the circulation of plastic around the world. Increasing the rates of recycling can be done in various ways. A simple way of achieving this is through distributing bigger bins. Rochford, who is the head of environmental services in England says, 'distributing bigger recycling bins help shift mindsets of the common people in the country.' Another easy way to increase recycling rates is by educating people the importance of recycling. Joe Flanagan, who is the director of waste management in Dedham, Massachusetts says that 'the educational component is key because people have to recycle quickly.'

Limitation of single-plastic use

Even if recycling is not that popular in certain areas of the world, people should reduce their use of single-plastic products. This is the fastest, easiest and most direct way for the public to limit the effects of the microplastics in the marine environment. Single-plastics products refer to plastic bags, water bottles, straws, cups, utensils, dry cleaning bags, take-out containers, and any other

plastics items which are used once and then discarded. The parliament backs EU on their ban on certain single-plastics products that are commonly found in seas or oceans. Limiting the use of these single-plastic products can be done in different ways as well. Limiting the use of unnecessary plastic products that can be replaced such as straws or plastics bags is a great way to start. This also helps the business understand that there are alternative ways which don't affect the marine environment. Another way is to purchase or use reusable versions of single-plastic products such as a permanent water bottle or reusable grocery bags.

Supporting Bans

Different countries or municipalities around the world have ban the use of single-plastic products. This policy can be adapted and implemented by many countries as well as small communities around the world. It can also be improved by adding bans to oxo-degradable plastics which are conventional plastics that can be broken down easily and contribute to microplastics in the marine environment. furthermore, there should be a ban on products which intentionally contribute to microplastics in the ocean. Previously, the ban has been limited to products such as cosmetics. However, this can be further enhanced through bans or measures to reduce the emission of microplastics through textiles, tyres, paint, cigarette butts and other products which advertise the intentional use of microplastics.

Ocean Clean Up

The ocean clean up initiative started in 2013 with a 16 year old boy who went swimming in Greece but saw more plastic in the ocean than fish. This made him think 'why don't we just clean it up?' and thus the ocean clean up initiative began. In 2014, there was a crowd funding campaign which raised 2.2 million dollars thanks to the people of 160 countries. Through further research, this launched a device which would trap marine plastics in the ocean and then extract it from the area. Additionally, the plastic extracted is then taken to land where it can be recycled or processed. It was also designed to capture microplastics. It was estimated that it could clean up 50% of the Great Pacific Garbage Patch in just five years. It is also expected to remove 90% of ocean's plastic by 2040. This device helps protect the lives of marine organisms as it uses the currents of the ocean to capture plastics in the ocean. This prevents the marine organisms from ingesting these plastics or microplastics which are around the area, resulting reducing the effects of microplastics on the marine environment. Further, countries could be encouraged to donate more towards this project or help

build small versions of their own in their areas where plastic pollution is imminent. This helps save the lives of the marine organisms and can be very useful for the future.

Bibliography

"About the Sustainable Development Goals - United Nations Sustainable Development." *United Nations*, United Nations, www.un.org/sustainabledevelopment/sustainable-development-goals/.

"About UN Environment." *UN Environment*, www.unenvironment.org/about-un-environment.

"About Us." *UNDP*, www.undp.org/content/undp/en/home/about-us.html.

Eriksen, Marcus, et al. "Microplastic: What Are the Solutions?" *SpringerLink*, Springer, 1 Jan. 1970, link.springer.com/chapter/10.1007/978-3-319-61615-5_13.

Foeeurope. "European Commission Takes Steps to Reduce Plastic Pollution." *Friends of the Earth Europe*, www.foeeurope.org/european-commission-steps-reduce-plastic-pollution-160118.

"Global Efforts to End Plastic Pollution: Single-Use Plastics." *Earth Day Network*, www.earthday.org/plasticban/.

Howard, Brian Clark. "A Running List of Action on Plastic Pollution." *National Geographic*, National Geographic, 11 Jan. 2019, www.nationalgeographic.com/environment/2018/07/ocean-plastic-pollution-solutions/.

Josh Gabbatiss Science Correspondent. "This Is How the EU's New Plastic Strategy Compares to the UK's Plans to Cut Pollution." *The Independent*, Independent Digital News and Media, 18 Jan. 2018, www.independent.co.uk/environment/eu-plastic-pollution-strategy-uk-environment-plan-theresa-may-prime-minister-a8164531.html.

McCarthy, Niall, et al. "Infographic: The Countries Polluting The Oceans The Most." *Statista*, Statista, 7 Aug. 2018, www.statista.com/chart/12211/the-countries-polluting-the-oceans-the-most/.

"Microplastics: Sources, Effects and Solutions ." *Chernobyl 30 Years on: Environmental and Health Effects - Think Tank*, 22 Nov. 2018,

www.europarl.europa.eu/news/en/headlines/society/20181116STO19217/microplastics-sources-effects-and-solutions.

Ming, Cheang. "Plastic Pollution: Firms and Governments Are Combating Millions of Tons of Waste." *CNBC*, CNBC, 23 Apr. 2018, www.cnbc.com/2018/04/22/plastic-pollution-firms-and-governments-fight-waste.html.

"Oceanic Society." *7 Ways To Reduce Ocean Plastic Pollution Today*,
www.oceanicsociety.org/blog/1720/7-ways-to-reduce-ocean-plastic-pollution-today.

"On World Oceans Day, New UN Report Recommends Ban of Microplastics in Cosmetics." *UN Environment*, www.unenvironment.org/news-and-stories/press-release/world-oceans-day-new-un-report-recommends-ban-microplastics.

"Plastic Pollution in Indonesia." *The Borgen Project*, borgenproject.org/tag/plastic-pollution-in-indonesia/.

"Plastic Waste: a European Strategy to Protect the Planet, Defend Our Citizens and Empower Our Industries." *European Union*, Publications Office of the European Union, europa.eu/rapid/press-release_IP-18-5_en.htm.

Tablado, Rafael. "3 Ways to Increase Recycling Rates." *Top 10 | Energy Digital*, Staff Writer, 27 Oct. 2014, www.energydigital.com/waste-management/3-ways-increase-recycling-rates.

Tmg. "How Can China Tackle the Problem of Plastic Pollution?" *The Telegraph*, Telegraph Media Group, 12 July 2018, www.telegraph.co.uk/news/world/china-watch/society/plastic-pollution/.

"What Are the Sources of Microplastics and Its Effect on Humans and the Environment?" *Conserve Energy Future*, 19 May 2018, www.conserve-energy-future.com/sources-effect-microplastics-humans-animals-environment.php.

"Fact Sheet: Single Use Plastics." *Earth Day Network*, 10 Apr. 2018,
www.earthday.org/2018/03/29/fact-sheet-single-use-plastics/.

Ocean Cleanup. "The Ocean Cleanup." *The Ocean Cleanup*, www.theoceancleanup.com/.