United Nations Environment Programme

Research Report

The Question of:

Microplastic pollution

Introduction

Products made from plastics can be incredibly useful, however, the material they are made of can pollute the environment a whole lot more than we believed. The most severe damage caused by microplastics is in natural waters, but they contaminate the air and the soil too. There are two types of microplastics: primary and secondary(see in key terms), they enter natural ecosystems from a variety of sources, including, but not limited to, cosmetics, clothing, and industrial processes.

It is common knowledge that plastics take several hundreds of years to decompose, and since the discovery and first use of plastics, the industry developed, but the greatest problem of the production of such materials remained: waste and decomposing.

The Committee

The UNEP (United Nations Environment Program) is a UNO (United Nations Organization) introduced by the United Nations Conference on the Human Environment in 1972. It is the UN's main authority that sets environmental issues on the global agenda.

Their main focus is to guide institutions, NGOs and governments on the way to a more sustainable world. Furthermore, they assess trends and environmental conditions on a global, regional or national level. The UNEP conducts many operations around the world, which are categorized under: climate change, chemicals and waste, disasters and conflicts, ecosystem management, environmental governance, environment under review and resource efficiency.

This committee follows the standard Rules of Procedure, which means it is not an ad-hoc committee.

Key Terms

Microplastics:
small, barely visible pieces of plastic that enter and pollute the environment

Primary microplastics:
any plastic fragments or particles that are already 5.0 mm in size or less before entering the environment

Secondary microplastics:
microplastics that are created from the degradation of larger plastic products once they enter the environment through natural weathering processes

Sewage treatment plants/wastewater treatment plants (WWTPs):
WWTPs filter and clean the wastewater originating from both households and production sites. Their importance shows in that the cleansed water they discharge enters the natural waters

Food chain:
a series of organisms each dependent on the next as a source of food

Biodegradable:
materials that are able to decompose without human assistance, through biological processes

Ingestion:
absorption

Degradation:
a process of fragmentation due to natural causes such as sunlight, rain, etc.

General Overview

"Scientists have reported finding traces of plastic and hazardous chemicals in Antarctica, which before now was the last part of the planet that remained mostly untouched by the damaging effects of human activity."- stated David Nield in an article published by SienceAlert, a webpage that focuses on scientific studies and publishes articles about news and development as well as alarming phenomena in the field of sciences.

Common awareness regarding plastic waste has risen immensely, as more and more studies focus on the plastic waste and debris in oceans, however the presence of microplastics in freshwater ecosystems, air and soil are not as well known.

Microplastics are several types of plastics that enter the natural ecosystems. Some types have reported to be biodegradeable by certain types of organisms such as fungi, bacteria, some types of worms, while other types have not been reported to be biodegradeable by any types of organisms so far.

Microplastics are considered dangerous because during their degradation toxic chemicals are embedded into them and they enter the food chain in the oceans at the very bottom: zooplankton. As the plankton are consumed by other heterotropthic animals, the microplastics contaminate higher and higher participants in the food chain, at the end: humans. A study done at the Argentinean coastline of the Rio de la Plata estuary, found the presence of microplastics in the guts of 11 species of coastal freshwater fish. These species of fish represented four different feeding habits: detritivore, planktivore, omnivore and ichthyophagous. But we are not safe, even if we do not consume seafood, as the microplastics in the natural waters can reach us in the form of sea salt, and any type of food we eat. They can be ingested into any type of organism including fishes, reef-building corals, plankton, and any other animal that feeds on these; and the chemicals these microplastics carry can remain in the waters.

Microplastics entering the environment can come from a wide range of sources such as, but not limited to:

Sewage treatment plants:

Sewage treatment plants, also known as wastewater treatment plants (WWTPs), remove contaminants from wastewater, primarily from household sewage, using various physical, chemical, and biological processes. Usually WWTPs have a primary and a secondary treatment stage, so that they can efficiently remove ideally all types of waste. In the primary stage they use physical processes, while the secondary treatment consists of biological processes.

Microplastics have been detected in both the primary and secondary treatment stages of the plants. A study estimated that about one particle per litre of microplastics is being released back into the environment, with a removal efficiency of about 99.9%.

When these treatment facilities are functioning properly, the contribution of microplastics into oceans and surface water environments from WWTPs is not disproportionately large. However, it is important to note that in certain countries sewage sludge is used for soil fertilizer, which exposes plastics in the sludge to the weather, sunlight, and other biological factors, causing fragmentation, and essentially causing the release of microplastics that are not visible to the naked eye.

Car and truck tires:

The estimated per capita emission ranges from 0.23 to 4.7 kg/year, with a global average of 0.81 kg/year.
The relative contribution of tire wear and tear to the total global amount of plastics ending up in our oceans is estimated to be 5–10%.

Cosmetics industry:

Some companies have replaced natural exfoliating ingredients with microplastics, usually in the form of microbeads. Microbeads can be composed of polyethylene, polypropylene, polyethylene terephthalate, and nylon, and they are usually components of personal care products such as but not limited to face washes, toothpaste and hand soap. The microbeads from these personal care products are mostly filtered out by WWTPs, but an average of 0-7 microbeads per litre is being discharged and enters aquatic ecosystems (both freshwaters and seas/oceans). Considering that one WWTP filters 160 trillion litres of water per day, the daily number of microbeads entering the environment is about 8 trillion.

This not only has a negative impact on the wildlife, but also in terms of toxicity because plastics such as microbeads have been proven to absorb dangerous chemicals such as pesticides and polycyclic aromatic hydrocarbons, and such microplastics entering the food chain at the very bottom can be harmful to humans as well.

Although many companies have committed to phasing out the use of microbead in their products a research found that there are at least 80 different facial scrub products that are still being sold with microbeads as a main component.

Clothing:

Studies have shown that many synthetic fibres, such as polyester, nylon and acrylics, can be shed from clothing and persist in the environment. Thes types of microplastics can be found anywhere in the environment, they pollute the air, the soil and our waters. The process of washing clothes causes garments to lose an average of over 100 fibres per litre of water, meaning, that is the number of plastics that enter the oceans.

Manufacturing:

Many industrial sites in which convenient raw plastics are frequently used are located near bodies of water. If spilt during production, these materials may leak into the surrounding environment, polluting waterways. Overall, there is a significant lack of research conducted about specific industries and companies that contribute to microplastics pollution.

Packaging and shipping:

Some statistics indicate that in 1970, commercial shipping was the origin of over 23,000 tons of plastic waste that has been dumped into the marine environment. In 1988, an international agreement (MARPOL 73/78, Annex V) prohibited the dumping of waste from ships into the marine environment. However, shipping remains a dominant source of plastic pollution, having contributed around 6.5 million tons of plastic in the early 1990s.

Plastic water bottles:

Plastic (mainly PET) bottles only get into the environment through human waste. Some can be recycled but the cost of the process is usually higher than the cost of the production process, leading

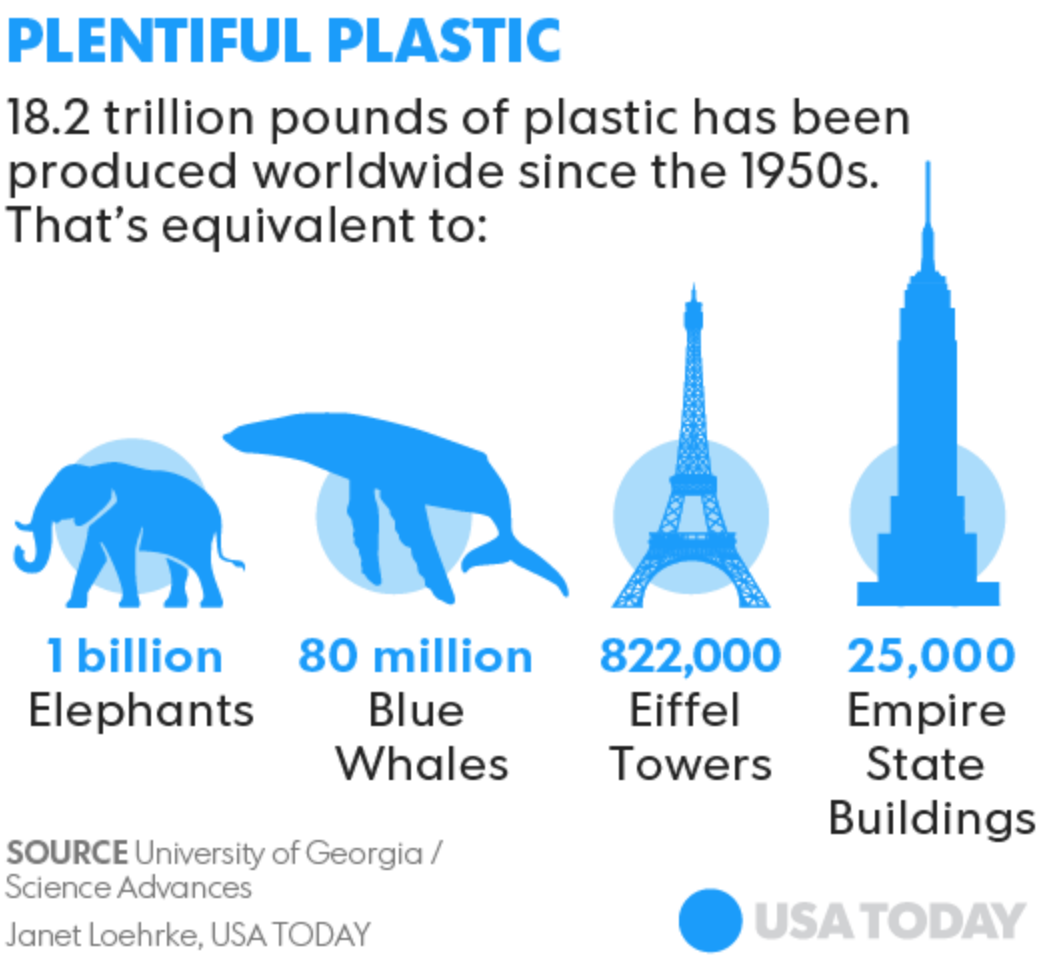
to single-use plastic products, "that take five seconds to produce, you use it for five minutes and it takes 500 years to break down again."

However the use of plastic bottles is alarming due to another factor: consumption by humans. That is to say that during the bottling and packing processes, microplastics entered the water. In one study, "93% of the bottled water from 11 different brands showed microplastic contamination. Per litre, researchers found an average of 325 microplastic particles. Of the tested brands, Nestlé Pure Life and Gerolsteiner bottles contained the most microplastic with 930 and 807 microplastic particles per litre, respectively. San Pellegrino products showed the least quantity of microplastic densities."

Regardless of their origin, microplastics can have severe effects both on our environment and us. The primary concern with human health in regards to microplastics is more directed towards the different toxic and carcinogenic chemicals used to make these plastics and what they carry. As microplastics enter the food chain, these chemicals can affect any consumer disregarding their position in the food chain.

Scientists are not sure yet what exact effects plastic contamination can cause to humans, but in case of animals they can damage the respiratory and digestion systems to the extent where the destruction is fatal.

"Because research on microplastics on land and in freshwater is still in its infancy, there are no accurate figures on the extent of the problem, but some studies have suggested there are more microplastics on land than there are in our oceans." stated Mark Tutton in an article by CNN. Microplastics are all around us and it is up to us whether we act and clean up the waste and debris or let them into ecosystems, and contaminate organizations including humankind.



Major Parties Involved

The issue of microplastics is a global issue. There are a few countries who believe that plastic production contributes to the economy therefore reject the whole idea of banning plastics, or even recycling plastics. On the other hand some countries have already taken huge steps in the right direction.

For instance, the Sweedish government have already banned the use of personal care products containing microbeads by 1 July 2018. Stocks purchased may continue to sell until 1 January 2019, when if not sold they will be withdrawn.

The Portuguese Government decided to ban the use of plastic bottles, bags, and plates, as to force departments to find alternative materials.

There are several initiatives and programmes as of 2018. Throughout the year awareness of the presence of microplastics in our food, in us and in our environment have drastically risen. Both private companies and countries have joined such programmes and taken steps toward a more natural, greener planet.

The Asian food chain, Wagamama has stated that starting on Earth Day, 22 April, they will no longer offer plastic straws, instead they will offer a biodegradable, paper alternative upon request.

As microplastics not only contaminate oceans, even if previous researches only focused on marine environments, but also land and air, it is a global issue that involves each and every state on Earth.

"Under the G7 Ocean Plastics Charter, the UK, Canada, France, Germany, Italy and the European Union (EU) have all agreed to increase plastic recycling by 50 per cent, while also working towards 100 per cent reusable, recyclable or recoverable plastics by 2030. The US and Japan were the only nations that refused to join.

It is unclear why the US has not signed the plastics agreement, but if President Trump's disdain for the Paris climate accord is anything to go by, it is probably because the agreement would require too much industry regulation." stated Carly Cassela on ScienceAlert.

"It's time for the world's largest economies to recognise that we cannot simply recycle our way out of this problem while we keep churning out so much throwaway plastic in the first place. Governments must move beyond voluntary agreements to legislate binding reduction targets and bans on single-use plastics, invest in new and reuse delivery models for products, and hold corporations accountable for the problem they have created.[...]

The newly proposed European Union single-use plastics law clearly recognises that it's necessary to go beyond recycling and move toward bans and producer responsibility.[...]

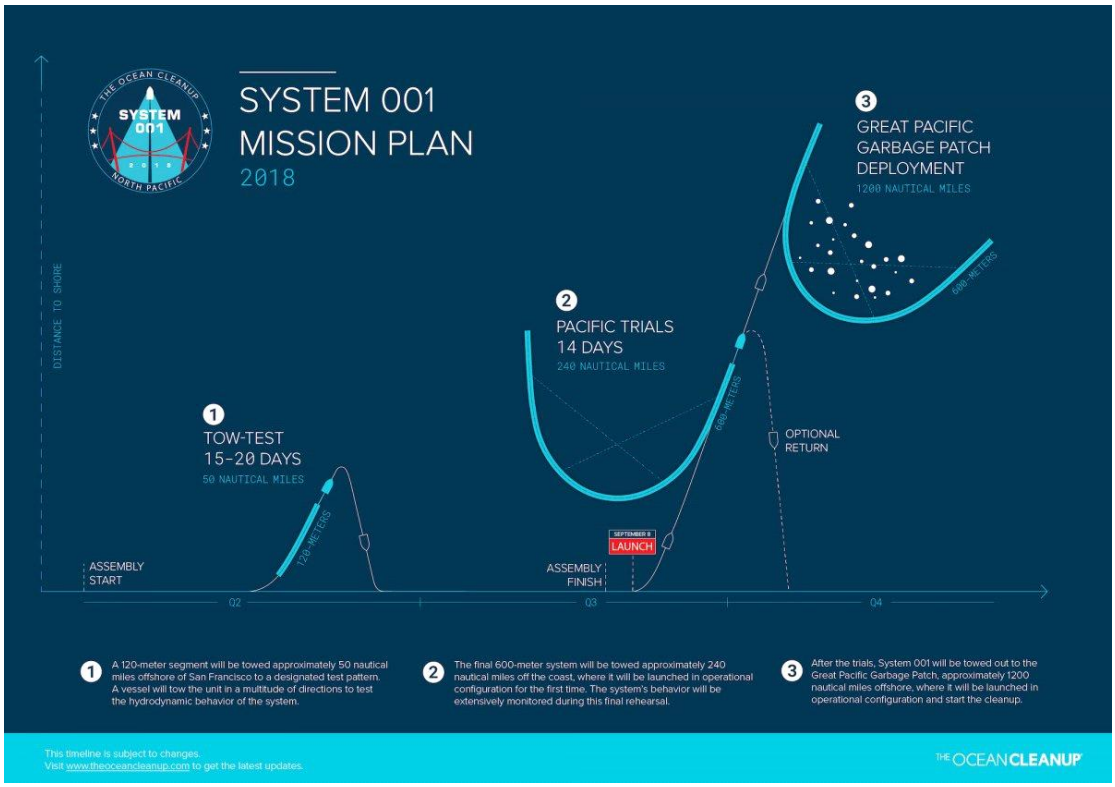
We need a global, binding treaty that regulates plastic pollution throughout its lifecycle, from wellhead production to ocean waste." said Greenpeace International Executive Director, Jennifer Morgan.

Timeline of Events

In December, 2017 nearly 200 countries signed a United Nations resolution to eliminate plastic pollution in the ocean.

Brussels has launched a plastics strategy that involves a €350 million (US$426 million) investment in plastics research.

The Ocean Cleanup, an organisation founded by 24-year-old Dutch innovator Boyan Slat, has been trying to create a system that can clean plastic out of the world's oceans. As of 10 Sep, 2018 it began its journey towards the Great Pacific Garbage Patch, where they hope that system 001, a 600-metre-long plastic cleaning array, will collect at least greater chunks of plastics, putting a stop to their further degradation and later on their ingestion into the food chain. However, their technology is still unproven, and has yet to show results in the first 3-5 months of its use.



On 12 Oct, 2018, President Trump called out other nations, including China and Japan, for "making our oceans into their landfills" when he signed legislation to improve efforts to clean up plastic trash from the world's oceans.

The European Parliament voted 571-53, October 26, 2018, to approve a measure to slash single-use plastic across the continent. The bill still needs to pass additional procedural measures before it can go into effect, but observers say its chances look good and could begin enforcement as early as 2021.

Previous attempts to solve the issue

As awareness regarding the issue has only risen this year, it is quite a fresh issue, and except for the recent initiatives as of the end of 2017 and 2018, there have not been previous attempts, but several propositions are undergoing debates and acts are in progress. There are still parts to the issue that have been disregarded by the proposals made, therefore there are several more proposals to make, and acts to be carried out.

The Future

The issue of microplastics still have many uncertainties, questions to be answered, thus there is a chance that further studies can discover the extent of the damage to the environment and humanity regarding the consumption of microplastics. Meaning that in the future the issue can become of utmost importance if consequences and effects are found severe. On the other hand it might just cause not so serious problems that we eat plastic.

Whichever case it is, the natural environment will suffer regardless, and as the exact effects are unknown and have the potential to be hazardous, it is important that we consider the issue and tackle the origin of the problem.

The possibilities are endless: we can cleanse the planet from plastic waste, and put an end to further contamination, leading to a greener and happier planet; but we can also not take action and suffer the consequences later, as scientists may discover that a few generations from now genetical diseases will be caused by our plastic consumption in the present, or it might turn out that some disorders can be formed in us, ourselves.

It can also happen that further studies will be deemed useless, and we will not even be aware of the hazards of the use and consumption of plastics in general, especially microplastics in the case of consumption.

Important Decisions a Resolution Must Take

For your resolution on the issue you might want to think about these questions, and what possible solutions and outcomes they can imply:

- What timeline or agenda would you propose for the removal of microplastics from the environment?
- Would you prioritize working on the removal of plastic debris or the banning/recycling to stop more plastic waste entering the environment?
- As many already existing organizations and also some governments are working on experiments and proposals regarding the issue, which one should take control and be the main supervisor? Or should it be a UN body?
- What is the least and what is the most your country is able to and willing to do?

For finding a solution:

- What can be done regarding the oceans? Freshwater ecosystems? Soil? The microplastic particles in the air?
- What can be done by raising awareness? What are its limits?
- Should there be more studies and experiments regarding either the sources of microplastics or their effects in different types of environments? Maybe both? In which order?
- How can you stop microplastics from entering the environment without or with minimal damage to the economic position of states?

Further Reading

If you have any questions regarding the flow of the debate, the resolutions and policy statements (sample policy statements and sample resolutions included):
https://www.lemun.org/wp-content/uploads/2014/10/Instruction_booklet.pdf

Regarding the issue:
https://www.researchgate.net/publication/311978071_Microplastics_pollution_and_reduction_strategies

See also: bibliography

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