

Marine Debris, a global problem

Marine Debris consists, according to the United Nations Environment, of “items that have been made or used by people and deliberately discarded into the sea or rivers or on beaches; brought indirectly to the sea with rivers, sewage, storm water or winds; accidentally lost, including material lost at sea in bad weather (fishing gear, cargo); or deliberately left by people on beaches and shores”. The problem of marine debris is one that not only persists, but is increasing, due to the slow degradation of marine litter materials and the increase in the quantity litter reaching the sea.

¹ According to a study from Marcus Eriksen et.al, there are a minimum of 5.25 trillion particles floating at sea, weighing around 268’940 tons.² UN Environment estimates that only 30% of all marine debris floats in the seas with around 15% on the surface, while the other 70% rests in the seabed.³

Although marine debris can be found everywhere in our oceans, there are regions where there is a higher concentration of debris. These regions are called garbage patches. The world's rotating currents create “gyres”, whirlpools of water that pull debris into their center. There are 5 known gyres in the ocean, each with their own garbage patch. There are two gyres in the Atlantic Ocean, two in the Pacific Ocean and one in the Indian Ocean. The formed garbage patches differ in size. The biggest one is known as “the Great Pacific Garbage Patch” and is located between Hawaii and California. In the patches, the debris is distributed between the surface and the seabed. Since the debris can have different sizes, it might even appear to the naked eye that the ocean is clean. This, along with the fact that the patches change shapes with the wind and the ocean currents, makes it hard to calculate the exact size of the patches.⁴

Plastic constitutes an important fraction of all marine debris. According to the OSPAR Commission, plastic accounts for around 90% of marine debris. As a durable material, plastic takes a lot of time to disintegrate, especially in the marine environment. Nevertheless, due to exposure to sunlight and the seawater, plastics deteriorate and break down into ever smaller pieces. When these

¹ Environment, U. N. (n.d.). *Marine litter*. UNEP. Retrieved June 13, 2022.

² Eriksen, M.,et.al,. (2014). Plastic pollution in the world's oceans: More than 5 trillion plastic pieces weighing over 250,000 tons afloat at sea. PLoS ONE, 9(12).

³ International Maritime Organization. (n.d.) .Marine litter. Retrieved June 13, 2022

⁴ Parker Dianna. (2013, July 11). Garbage patches: OR&R's Marine Debris Program. Retrieved June 13, 2022

fragments are smaller than 5 mm they are called microplastics. In some cases, microplastics are also produced for industrial or beauty uses, reaching the seas directly through the sewage.⁵

Marine litter represents a great threat to marine life and the marine environment. Marine animals can get entangled and injured, sometimes fatally, with the litter. Lost fishing nets are especially dangerous. Animals also ingest the plastics and microplastics, confusing them with food. This is not only dangerous due to the possibility of suffocation, but it makes the animals feel full without getting the necessary nutrients.⁶ Depending on the animal, the ingestion of microplastic may also affect the overall health of the animal. Humans by ingesting seafood and sea salt may also be in danger of consuming microplastics indirectly, but there is still not enough information on the impact of microplastics on human health.^{7,8}

The problem of marine debris is global, so there is a need for global effort and international cooperation. There are several ways to tackle the problem, including monitoring the litter, discovering its sources and the biggest deposits, as well as the current it travels from. Physically cleaning the oceans, by taking the biggest pieces in the surface one prevents them from turning into microplastics or them sinking into the seabed; and prevention, by stopping the litter from reaching the oceans. Prevention can be done by cleaning the beaches and rivers, by implementing laws that condemn industries and people that litter, and by informing the general population of the problem. Already many countries all around the world have implemented laws that restrict or prohibit single-use-plastics, as well as laws that encourage better trash management.⁹

Marine debris is a problem that not only affects marine life and the ocean environment, but also affects us humans all around the world. By reducing our plastic consumption and practicing a proper trash disposal, we, as individuals, can also help prevent the problem. If we all work together as a global community, we can improve our world.

⁵ OSPAR Commission. (n.d.) Marine litter. Retrieved June 13, 2022

⁶ Parker Dianna. (2013, July 11). Garbage patches: OR&R's Marine Debris Program. Retrieved June 13, 2022

⁷ *Ibidem*.

⁸ AWI. 10 questions and answers on Marine Litter. (n.d.). Retrieved June 13, 2022

⁹Environment, U. N. (n.d.). Marine litter. UNEP. Retrieved June 13, 2022

More information

If you are interested in the problem of Marine Debris and would like to have more information the AV recommends following sources and media.

Web Pages

- Alfred-Wegener-Institut – Focus: Marine Litter
<https://www.awi.de/en/focus/marine-litter.html>
- Marine Litter Solutions:
<https://www.marinelittersolutions.com/>
- The National Geographic Society - Marine Debris:
<https://education.nationalgeographic.org/resource/marine-debris>

Films and Videos

- 10 Engineering projects Tackling Ocean Pollution - The Engineering Mindset (Youtube)
<https://www.youtube.com/watch?v=Q9LgnPDJT3Y>
- A Plastic Ocean (2016) - Documentary by Craig Leeson

Literature

AWI. 10 questions and answers on Marine Litter. (n.d.). Retrieved June 13, 2022, from <https://www.awi.de/en/focus/marine-litter/10-questions-10-answers.html>

Environment, U. N. (n.d.). Marine litter. UNEP. Retrieved June 13, 2022, from <https://www.unep.org/explore-topics/oceans-seas/what-we-do/working-regional-seas/marine-litter>

Eriksen, M., Lebreton, L. C., Carson, H. S., Thiel, M., Moore, C. J., Borrorro, J. C., Galgani, F., Ryan, P. G., & Reisser, J. (2014). Plastic pollution in the world's oceans: More than 5 trillion plastic pieces weighing over 250,000 tons afloat at sea. *PLoS ONE*, 9(12). <https://doi.org/10.1371/journal.pone.0111913>

International Maritime Organization. (n.d.) .Marine litter. Retrieved June 13, 2022, from <https://www.imo.org/en/MediaCentre/HotTopics/Pages/marinelitter-default.aspx>

OSPAR Commission. (n.d.) Marine litter. Retrieved June 13, 2022, from <https://www.ospar.org/work-areas/eiha/marine-litter>

Parker Dianna. (2013, July 11). Garbage patches: OR&R's Marine Debris Program. Retrieved June 13, 2022, from <https://marinedebris.noaa.gov/info/patch.html>