

WHAT ARE MARINE LITTER AND PLASTIC POLLUTION?

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THIS INFORMATION-SHEET INTRODUCES:

- The problem of ocean plastics, including negative impacts on biodiversity and on the climate
- The current search for solutions internationally

THE PROBLEM:

Ocean plastics are by far the biggest component of global marine litter/debris and pose a threat to biodiversity

- The volume of plastics in the oceans is estimated to be between 75 and 199 million metric tons, and without meaningful action, emissions of plastic waste into aquatic ecosystems are projected to nearly triple by 2040.¹
- There are two main categories of plastic: thermoset and thermoplastic, the former used in the production of long-lasting “hard plastic” products, and the latter in the production of more “disposable” plastic, including plastic packaging. The most common types of plastic include polyethylene (PE), polypropylene (PP), polystyrene (PS), polyvinylchloride (PVC), polyethylene terephthalate (PET), and polyurethane (PUR) resins; and polyester, polyamide, and acrylic (PP&A) fibres.² An estimated 42% of all non-fibre plastics are used in packaging which is predominantly composed of PE, PP, and PET.

¹ UNEP, 2021. From Pollution to Solution – A global assessment of marine litter and plastic pollution. Synthesis.

² Geyer, R.; Jambeck, J. R.; Law, K. L. (2017). Production, Use, and Fate of All Plastics Ever Made. *Sci. Adv.* 2017, 3 (7), <https://www.science.org/doi/10.1126/sciadv.1700782>.



Photo: Screenshot, The Menace of Ocean Plastics film

- The concern around marine plastics stems from their persistence and accumulation in the environment, as well as their effects on the oceans, wildlife, and, potentially, human beings,³ many of which are still unknown. Marine plastics also have the potential to introduce invasive species⁴, with the capacity to have a detrimental impact upon biodiversity.
- Marine plastic debris poses a variety of risks to marine life, including mammals, birds, turtles and fish, through ingestion, suffocation and entanglement.⁵ Ingested plastics can obstruct digestive pathways leading to starvation of marine species, but can also result in an accumulation of microplastics that can be passed down the food chain.⁶ The accumulation of marine plastics across the marine environment can also impact habitats of marine species, undermining their capability to support life.⁷

³ Jambeck, J. R., et.al. (2015). Plastic waste inputs from land into the ocean. *Science*, 347(6223), 768-771. <https://www.science.org/lookup/doi/10.1126/science.1260352>.

⁴ Mendenhall, E. “Oceans of plastic: A research agenda to propel policy development” (2018) 96 *Marine Policy* 291 – 298.

⁵ Prabhakar Pawar, Sanket Shirgaonkar and Rahul Patil, 'Plastic marine debris: Sources, distribution and impacts on coastal and ocean biodiversity' (2016) 3(1) *PENCIL Publication of Biological Sciences* 40, p. 44; Michael N. Moore and others, *Linking Oceans and Human Health: A Strategic Research Priority for Europe*. European Marine Board Position Paper 19, 2013), pp. 31 – 34.

⁶ Pawar et al (n 50 p. 49).

⁷ Ibid, p. 44.

Ocean plastics are mainly a problem of land-based marine pollution

Studies suggest that 80% of marine plastic litter comes from land-based sources, estimating that between 8-12MT of plastic waste enters the marine environment each year.⁸ Therefore, efforts to address marine litter should focus primarily on its prevention at source, on land:

- limiting and/or phasing out plastic production through the regulation of petro-chemicals and products containing plastics – cosmetics.
- regulating the design for plastic products – packaging, fishing nets.

Ocean plastics also have a negative impact on fishing activities

- The remaining 20% of marine litter is ocean-based and comes from ocean fisheries, nautical activities and aquaculture.⁹
- The fishing industry is responsible for 500,000-1 million tons of plastic fishing nets polluting the ocean.¹⁰
- Fishing gear is a particular issue with abandoned, lost and discarded nets continuing to pose enormous ecological (i.e. continuing to catch valuable fish; endangered fauna e.g. sharks, marine turtles) and socioeconomic problems.¹¹

Ocean plastics are an equity issue for the Global South

The amount of plastic waste generated by many Global South Countries is often relatively low. However, many of these same countries are unable to adequately manage their waste let alone plastic waste shipped from Global North Countries.¹² [see info-sheet

⁸ Jambeck, et al (n 3).

⁹ Thevenon, F., Carroll C., Sousa J. (Eds). (2014). Plastic Debris in the Ocean: The Characterization of Marine Plastics and their Environmental Impacts, Situation Analysis Report. Gland, Switzerland: IUCN.

¹⁰ UN Doc A/76/207, para 24.

¹¹ Gilman E. 2015. Status of international monitoring and management of abandoned, lost and discarded fishing gear and ghost fishing. 60: 225-239

¹² Our world in data. <https://ourworldindata.org/plastic->

on environmental justice]

Fifteen countries account for 73.9% of the plastic waste that is exported.¹³ Plastic production is mainly based in the Global North contributing >35% of the total production.¹⁴ Mounting concern regarding marine plastic

pollution. Accessed 20/3/2021

¹³ UN Doc A/76/207, para 25.

¹⁴ Plastic materials production by world region 2020 | Statista. accessed 26/05/2022.

Figure X: The distribution of global plastic materials production by region in 2020

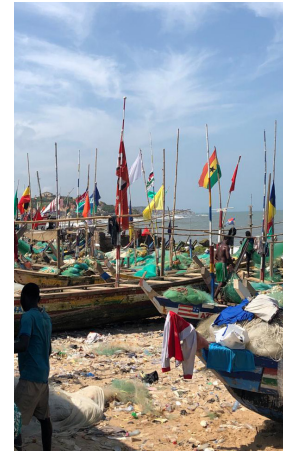
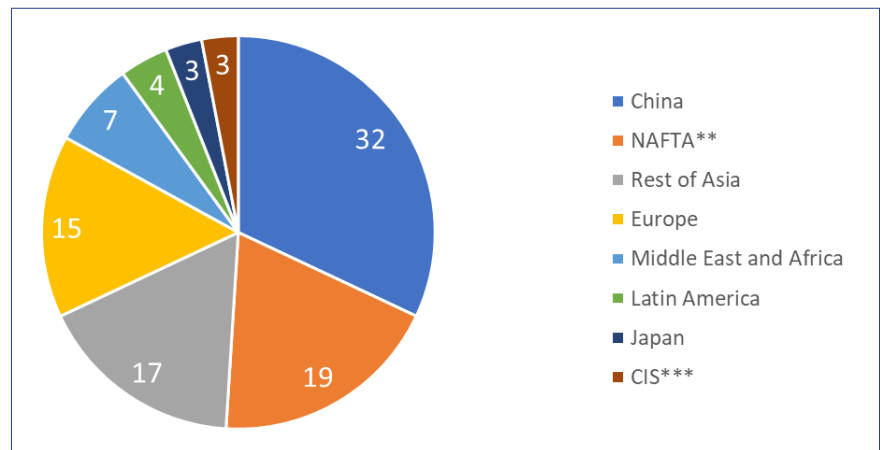


Photo: Georgina Yaa Oduro

THE SEARCH FOR SOLUTIONS

pollution, as well as plastic pollution more generally, resulted in a resolution being taken at the second part of the 5th United Nations Environment Assembly (UNEA 5.2) held in early March 2022 to begin negotiations on a legally binding international instrument on plastic pollution.¹⁵ Negotiations on the international instrument are set to launch formally in 2022 and conclude by 2024.

- The Resolution notes that the instrument will be, 'based on a comprehensive approach that addresses the full lifecycle of plastic' including marine plastics.
- In taking a lifecycle approach, the instrument will aim to address the production, design and disposal of plastics, including existing pollution such as ocean plastic.



¹⁵ UNEP/EA.5/Res.14



- The need to foster capacity building, technology transfer and technical assistance is mentioned in the text of the UNEA resolution, as is the need to build research in this area.
- In full, the clear intent of the Resolution is to promote, 'diverse alternatives to address the full lifecycle of plastics, the design of reusable and recyclable products and materials, and the need for enhanced international collaboration to facilitate access to technology, capacity building and scientific and technical cooperation.'¹⁶

As identified in the UNEA Resolution, ocean plastics should be addressed as part of the full life cycle of plastic. Focus should be on protecting the ocean from plastic as part of the global chemicals and waste regulation



- As of 2015, approximately **6,300MT** of plastic waste had been generated, and of this, approximately **9%** had been recycled, **12%** was incinerated, and **79%** accumulated in landfills or the natural environment.¹⁷ Sound waste management that is equitable in consideration of production and trade is crucial to manage and reduce plastic waste.
- Plastic products often contain dangerous chemicals in the form of additives designed to imbue the plastic with the desired characteristics (e.g. flexibility, fire resistance, transparency, among others) and plastic marine litter can also attract chemicals from the surrounding seawater.¹⁸
- However, the fraction of chemicals contained in plastic or sorbed¹⁹ to plastic in the ocean, is currently considered to be small compared to the chemicals found in seawater and organic particles that originate from other land-based sources of pollution.²⁰

¹⁶ <https://www.unep.org/news-and-stories/press-release/historic-day-campaign-beat-plastic-pollution-nations-commit-develop>

¹⁷ Geyer et al (n 2).

¹⁸ UNEP 2016; UNEP and GRID-Arendal 2016.

¹⁹ Sorption refers to the binding of ions and some neutral molecules to charged surfaces of minerals or colloids in sediment in contact with an aqueous solution.

²⁰ Koelmans et al. 2016.



Photos above:
Georgina Yaa Oduro

Ocean plastics should be included in climate change mitigation action because:

1. **Plastics originate from fossil fuel production.** By and large, plastic is made from non-renewable petrochemicals, sourced from fossil fuels like oil, natural gas and coal,²¹ with a small quantity coming from biodegradable sources like cellulose.²² It has been estimated that 8.3 million metric tonnes (MT) (or 8.3 billion tonnes) of virgin plastic have been produced since mass production began in the 1950s.²³
2. **The plastic life cycle contributes to climate change.** "Using a life cycle analysis, in 2015 greenhouse gas emissions from plastics were 1.7 gigatonnes of CO² equivalent (GtCO₂e), and are projected to increase to approximately 6.5 GtCO₂e by 2050, or 15 per cent of the global carbon budget."²⁴ (UNEP report 2021)
3. **Ocean plastics undermine the marine ecosystem services that can support climate change mitigation.** Plastics can alter the global carbon cycling through effects on plankton and primary production in marine systems (notably, mangroves, seagrasses, corals and salt marshes that sequester carbon).²⁵

²¹ Chamas, A., Moon, H., et.al. (2020) Degradation Rates of Plastics in the Environment. ACS Sustainable Chemistry & Engineering 2020 8 (9), 3494-3511 DOI: 10.1021/acssuschemeng.9b06635 <https://pubs.acs.org/doi/10.1021/acssuschemeng.9b06635>

²² Gilbert, M. (2017). Chapter 22 - Cellulose Plastics, Editor(s): Marianne Gilbert, Brydson's Plastics Materials (Eighth Edition), Butterworth-Heinemann, <https://www.sciencedirect.com/science/article/pii/B9780323358248000220>

²³ Geyer et al (n 2).

²⁴ UNEP (2021) From Pollution to Solution – A global assessment of marine litter and plastic pollution. Synthesis.

²⁵ Ibid.

Recycling ocean plastics is not “the” solution; we need to focus on production

The UN Special Rapporteur on Human Rights and Toxics concluded that

- “There is currently no commercially available waste management method capable of solving the global plastic pollution crisis. Toxics additives and micro-plastics contained in...oceans...cannot be eliminated by recycling, landfilling or incineration”
- “Only about 9% of all plastic waste ever produced, has been recycled”
- “Existing plastic practices pose health threats from volatile organic compounds and they concentrate toxic additives in plastics, generating new hazardous products” so “recycling practices implemented to date are ...an optical illusion that perpetuates the severe human rights impacts of plastics”
- There is a need to move beyond the “take-make-waste” approach’ and towards a chemically safe circular economy in all stages of the plastics lifecycle
- “Only legally binding limits on global plastic production for essential uses can make a difference”.²⁶

The UNEA Resolution on an international legally binding resolution on plastics pollution recognises the need to focus on production, directing negotiations to, ‘promote sustainable production and consumption of plastics, including, among others, product design, and environmentally sound waste management, including through resource efficiency and circular economy approaches.’ Legally binding limits on virgin plastics are not, however, mentioned in the UNEA Resolution and it remains to be seen whether they will be included in any resultant international instrument.

Clean-up is not a solution and the costs are mainly borne by the Global South

Cleaning up coasts and beaches can provide environmental and economic benefits.

²⁶ UN Doc A/76/207, para 21-22. See also https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwave_summary.pdf.



Photos above: Georgina Yaa Oduro

However, cleaning up the open ocean does not currently appear to be a practical solution to marine litter. For instance, the cost of the ship-time alone needed to clean the litter concentrated in just 1% (approximately one million km²) of the Central Pacific Gyre is estimated to be between US\$122 million and US\$489 million.²⁷

Large-scale booms may be effective at trapping surface litter in small areas. The trail of a 600 m long boom by the NGO Ocean Cleanup recently began offshore California. If successful, the boom will be deployed in the open ocean of the North Pacific gyre.²⁸

The March 2022 UNEA Resolution mentions the need, ‘to promote national and international cooperative measures to reduce plastic pollution in the marine environment, including existing plastic pollution,’ thereby pointing to the potential inclusion of clean-up efforts in the proposed international instrument on plastics pollution. Given the costs of clean-up activities, further funding will be required to deal effectively with existing marine plastics pollution.

²⁷ NOAA Office of Response and Restoration 2012.

²⁸ Stokstad 2018.

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