Plastics and microplastics

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Pastics have become a valuable commodity and an important part of everyday life, more so that global plastic production has increased from 5 million tons in the 1950's to approximately 400 million tons in 2020 [7,14].But the high volume and the quality which makes this material so useful, is also harmful for the environment , especially our marine environment.

What are plastics?

Plastics are polymers which are a chain of molecules that are derived from small molecules of monomers that are extracted from oil or gas [1, 3, 5].

PLASTIC FACTS

663 species of marine wildlife are affected by plastic pollution [10].

A single plastic particle can absorb up to **1,000,000** times more toxic chemicals than the water around it [10].

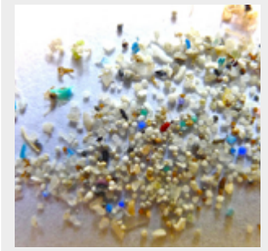
Studies of marine beach litter found that 84% consists of single use plastic like drink bottle, crisp packet and fishing gear like nets, ropes.

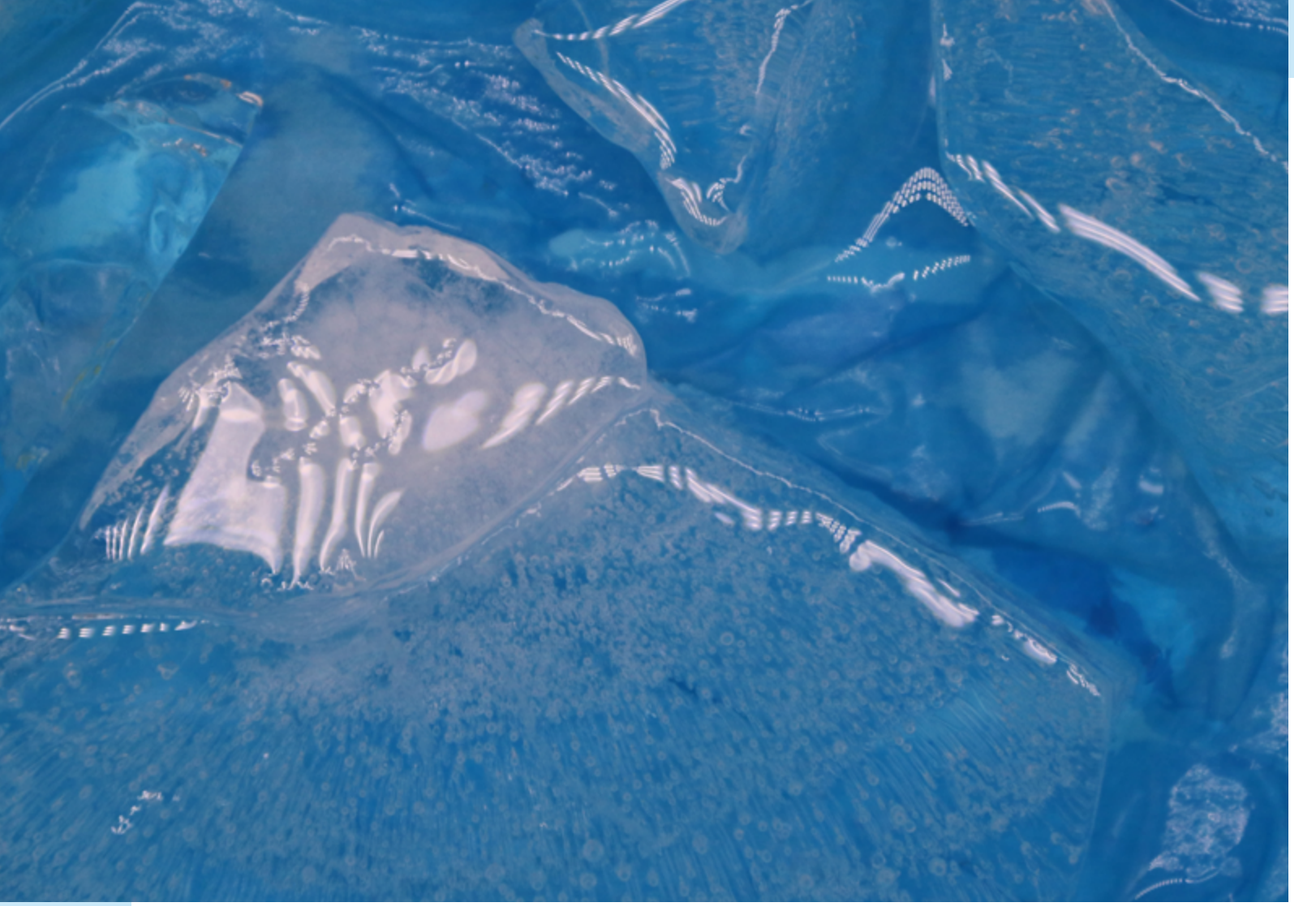
Personal cleansing products contain **+1,147** micro beads [10].

Today, plastic represent roughly **80%** of all marine litter [8].

An estimated **5 Tn** pieces of plastic currently float in the world's oceans [13].

Plastic Terminologies

Macroplastics are large (>20 mm) plastic debris such as plastic bottles [1].	
Mesoplastics are large plastic particles such as virgin resin pellets and are usually defined as 5–10 mm in range [4].	
Microplastics are small plastic fragments typically less than (<5mm) that are derived from the breakdown of macroplastics [1].	
Nanoplastic are small microplastic particles defined in the range 0.2–2 mm [3].	
Microbeads/microexfoliates are small plastic granules commonly manufactured and used in personal care products such as toothpaste and facial cleansers [10].	



Sources of plastics and micro plastics in the Wider Caribbean Region (WCR)

- The effluent from sewage and storm water generated in urban areas contains a significant amount of plastic. This pose some difficulties for treatment because many sewage treatment plants are unable to capture and treat plastic materials less than .5mm in diameter [3,5]. With approximately 63% of direct discharge of untreated wastewater from the WCR into the Caribbean Sea [12], plastics and microplastics become an even greater threat to the marine environment.
- Coastal tourism and commercial fishing industries generates approximately 20% of plastics found within the marine environment [11]. The economic dependence of countries within the WCR on these industries has resulted in the continued spread of this problem in the marine environment.
- Packaging is the dominant sector for plastic use (39.9%) and packaging waste for single and short-term use has generated a significant amount of plastic marine litter.
- Personal care items such as facial cleansers, toothpaste among other items that are used daily are laden with more than a 1000 plastic micro beads per item. This eventually become a part of the effluent from household waste and sewage.
- The number of floating microplastic and microplastic in the WCR is about 82,000 and 5,000 pieces/km², respectively making this region as among those with the highest plastic concentration in the world.

The impact of plastics and micro plastics pollution in the Wider Caribbean Region

- Microplastics have the potential to move up through the food web and the potential to move onto our dinner plate. A study on fishes we consume like Red Snapper, Red Hind, Barracuda, Yellowfish Tuna etc. showed that only 1 out of 34 fish had no microplastic.
- Studies have shown that micro plastic particles consumed by zooplanktons were found in salmons and whales and other species. Some studies suggest that adult salmon can ingest up to 91 particles per day [6].
- Plastic resin pellets (2 to 4 mm) adsorb and concentrate persistent organic pollutants (POPs) from surrounding seawater. A single microplastic can also absorb up to 1,000,000 more toxic chemicals as compared to the water around it making them deadly.
- The consumption of plastics and microplastics by marine animals can leads to false satiation, starvation and death [1,6]. Marine animals can become entangled in plastics derived from fishing net and trawlers which can be fatal.
- Plastics and microplastics are composed of harmful substances such as antimicrobials, hydrocarbons and flame retardants which can cause significant changes in marine and biodiversity health [4,5].
- Plastics can serve as a substrate for transporting invasive and harmful species which can threaten marine diversity of the region [1].
- Floating and submerged plastics can destroy important nursery habitats by interfering with or smothering its inhabitants [8].
- Marine debris such as plastics can result in loss in aesthetic value of tourist attraction which in turn causes substantial economic loss [2].

What can be done to reduce the use of plastics and microplastics pollution in the WCR?

- Scale up best practices and technologies around storm and wastewater management to capture micro plastics before they enter the marine environment.
- Enact stricter legislation to curtail the use of plastic and transition to prohibiting the use and importation of single use plastic.
- Strengthen monitoring activities for cruise ships and other vessels docking and traversing the Caribbean Sea.
- Provide incentives to manufacturers to reformulate products and find innovative ways to design packaging that can be fully recovered by recycling processes or those which are more easily degradable and less toxic.
- Forge partnerships with manufacturing companies to incentivize plastic recycling programs.
- Intensify public awareness and communication campaigns geared towards reducing, reusing and recycling plastics.

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