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Approaches to Mitigate the Danger of Plastics to Marine Ecosystems

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Introduction

Over the past few decades, the demand for plastic products has grown dramatically due to their durability, mouldability and light weight properties and at the same time being affordable and having high production volume. The global annual production of plastic in the year 2019 alone reached 460 million tonnes, and in the same year, 353 million tonnes of plastic waste was also generated. Out of that plastic waste that gets generated 50% ends up in landfills (OECD 2022). The trend is similar in India too with the demand for plastics in the year 2021-2022 being about 20.89 million tonnes of which about 40% is generated as plastic waste (PlastIndia 2022). According to the Central Pollution Control Board (CPCB), about 3.46 million tonnes of plastic waste was generated in the year 2019-2020 from 35 states/UTs in India (CPCB 2021). In simple terms, the usage of plastic and its post-usage dumping has increased multitudinously.

A lot of plastic products are for single use and reach the ecosystem as waste in a short time span. Most of it is non-biodegradable and non-compostable and gets accumulated in the environmental ecosystem.

Recent years have seen a significant increase in the amount of plastic debris entering the marine ecosystem creating a variety of adverse impacts on the marine life. Our planet is considered a blue planet due to its vast oceans and seas, but it is becoming endangered due to unprecedented marine litter, caused by human activities. Every year, approximately 8 million tonnes of plastic waste ends up as litter in marine ecosystems, causing harm to the marine ecosystems that produce most of the oxygen necessary for life to exist. It has adversely affected coastal cities and habitats by causing environmental, economic, human health related problems along with posing cultural and aesthetic threats.

What is Marine Litter? Marine litter is any persistent, manufactured, or processed solid material discarded, disposed of, or abandoned in the marine and coastal environment.

Land-based source: Wastes from dumpsites located on the coast or banks of rivers; rivers and floodwaters; industrial outfalls; discharge from storm water drains; untreated municipal sewerage; littering of beaches and coastal picnic and recreation areas; tourism and recreational use of the coasts; fishing industry activities; ship-breaking yards; and natural storm-related events.

Sea-based sources: Waste from shipping (merchant, public transport, pleasure, naval, and research vessels) and fishing (vessels, angling, and fish farming) activities; offshore mining and extraction (vessels and oil and gas platforms); legal and illegal dumping at sea; abandoned, lost or otherwise discarded fishing gear; and natural disasters.

The issue is of great concern, especially to India as it is already one of the world's largest contributors to marine litter and the world's twelfth largest source of marine pollution owing to an increase in coastal populations, coastal urbanisation, and, more recently, the increased plastic use

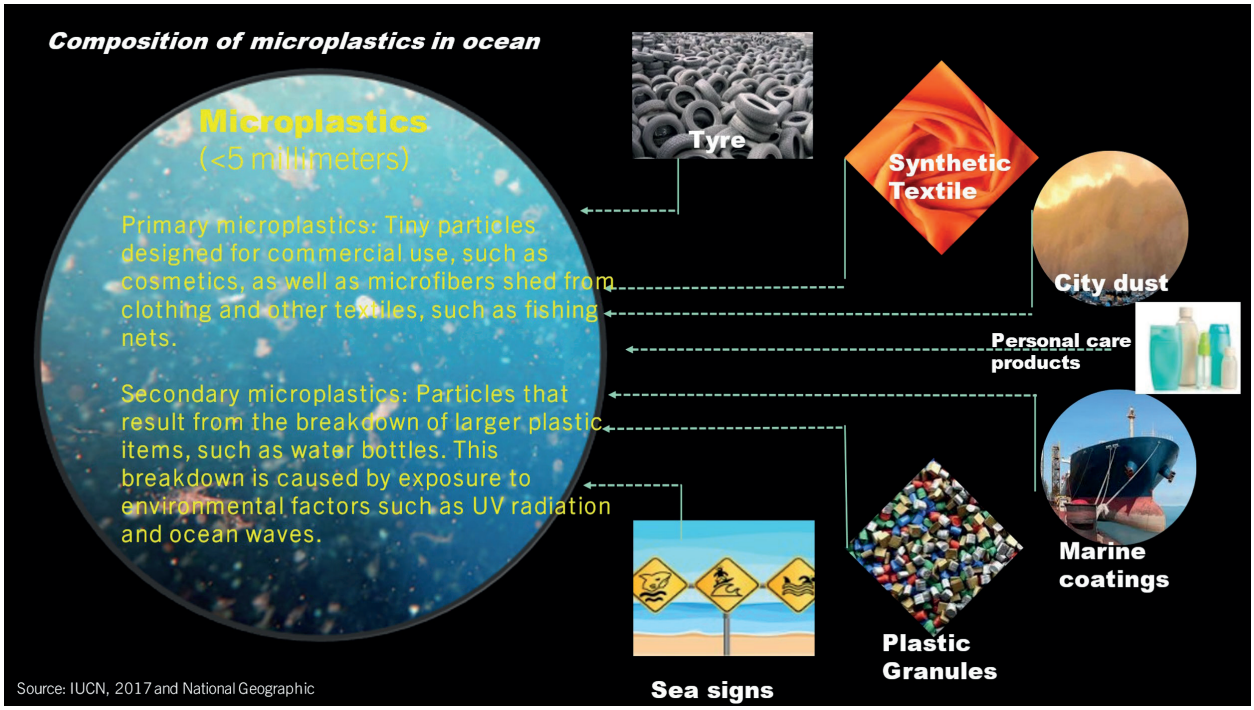

Figure-1: Type of microplastics

during the COVID-19 pandemic. Marine litter originates from multiple sources including land-based sources such as Single Use Plastics (SUP) in tourism clusters, and sea-based sources such as waste dumping, and discarded and abandoned fishing nets. Rivers also carry plastic debris into the sea and as per an estimate they account for 15-20% of all plastic entering the oceans. Ten rivers worldwide carry 90% of plastic debris into the sea, three of which, namely the Indus, Ganga, and the Brahmaputra, flow in India, further aggravating the situation. According to a report by the Ellen MacArthur Foundation, that quantity is equivalent to dumping one truckload of plastic waste every minute, and if the trend continues, there would be more plastic in the sea by 2050 than fish. The problem of marine litter has affected most of the oceans of the world irrespective of whether the ocean is situated in densely populated regions or in remote areas. Marine debris can transcend international borders and disperse across great distances from its point of origin. It also raises health issues since microplastics are consumed by marine life, and because of the related food supply chain, microplastics may eventually make their way to humans. Thus, marine litter is a complicated and multi-faceted problem that has a big impact on human activities and the marine and coastal environment around the world. These effects are cultural and cross-sectoral, and they are primarily caused by inadequate solid waste management practices, a lack of collection and recycling infrastructure, various human activities, lack of public awareness of the potential consequences of their actions, ineffective legal and enforcement frameworks, institutional barriers and a lack of financial resources.

It is thus important to understand various sources of marine litter and the approaches to be adopted to mitigate the danger of plastics reaching the marine ecosystem. That would also be important to contribute to United Nations Agenda 2030 for Sustainable Development that intends to "prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution" by 2025. (SDGs)

Sustainable Solid Waste Management

According to government estimates, India produces over 65 million tonnes of waste each year, of which over 62 million tonnes is Municipal Solid Waste (MSW), which includes organic waste and recyclables including paper, plastic, wood, and glass. Only around 75 – 80% of municipal waste is collected, and only 22 to 28 percent of this is processed and treated. The remaining MSW is mismanaged - littered

and dumped. The amount of MSW generated is expected to increase to 165 million metric tonnes by 2031, and then to 436 million metric tonnes by 2025 (Factly 2021). Selected key approaches to reduce the plastic waste leakage into waterways and the sea during various stages of solid waste management are discussed in subsequent paragraphs.

Segregation at Source

Generate awareness to educate households to segregate wastes as dry waste and wet waste at the household level. Dry waste may further be segregated as plastics, metals, papers, glass, etc. Segregation of waste is encouraged as per Solid Waste Management Rules (SWM) 2016. The other key highlights of the SWM 2016 rules includes segregation at source, collection, and disposal of sanitary waste, collect back schemes for packaging waste, user fees for collection, waste processing and treatment, promoting the use of compost, and promoting waste to energy. The new rules have given local bodies across India the power to decide and implement user fees. Municipal authorities will levy user fees for bulk generators' collection, disposal, and processing. As per the rules, the generator will have to pay a "User Fee" to the waste collector and a "Spot Fine" for littering and non-segregation, which the local bodies will decide.

Figure-2: Waste segregation

Sound Collection and Safe Transportation of Wastes

The door-to-door collection system to be introduced, and it needs to be ensured that the waste collectors are trained to segregate the waste into various types. Further, it needs to be ensured that the collected and segregated wastes are transported in a tidy and closed container to avoid leakages of plastics and wastes in the marine ecosystem.

Avoid Single-Use Plastics

Reducing consumption of single-use plastics is the quickest and simplest way to get started. Reusable or biodegradable containers made from environmentally friendly materials such as glass, food-grade stainless steel, bamboo, rice husk, and others can be used in place of plastic bags, water bottles, food containers, drinking cups, and containers for beverages. On the regulation side, the Government of India has banned the manufacture, sale, and use of identified single-use plastic items like plates, cups, straws, trays, and polystyrene from July 1, 2022. One of the single-use plastic items is the plastic carry bags, which despite a ban are rampantly available in all the cities and even in the villages of the country. Thus, there is a need to come up with innovative solutions in the form of alternatives to plastics to reduce single-use plastics related menace. Some examples are listed below

- Replace plastic glass and cutleries with refillable bottles, metallic or wooden cutleries.
- Replace toiletry (shampoo sachets, tea and coffee sachets, shaving kits) with refillable shampoo dispensers. Hospitality and tourism sector in particular, can avoid providing plastic kits unless demanded by the customer.
- Replace plastic bags with paper or textile bags. Provide bags on a returnable basis under suitable deposit schemes.

Figure-3: Use of refillable dispensers (PC: Prahlad)

Establish Resource-Efficient Plastic Processing Units

Resource-efficient waste and plastic processing units should be established for sorting, shredding, baling, compacting, and packing to encourage upcycling of plastics into high-quality recyclates for use as secondary raw materials. For example, PET bottles can be recycled back into PET bottles and are additionally used for manufacturing bags, pipes, construction materials, textiles, and furniture. These processing units have a high potential to develop into successful business models considering stringent regulations related to recycle of plastic waste to reduce its slippage to marine litter and other dumping sites.

Adoption of Waste Hierarchy by Individuals and Enterprises

Adopting a waste hierarchy of refusing, reducing, reusing, and recycling by individuals and enterprises would help reduce plastic in the waste streams and would also support the Plastic Waste Management rules of 2016 and their subsequent amendment in 2018.

Adopting Circular Economy and Resource Efficiency Approach

Adoption of resource efficiency would encourage waste minimisation during production, transportation, and usage in the value chain. Circular Economy approaches would support the design of products for reuse and recyclability as well as develop business models that enable reuse, repair, and sharing to ensure that the product remains within the value chain for extended life.

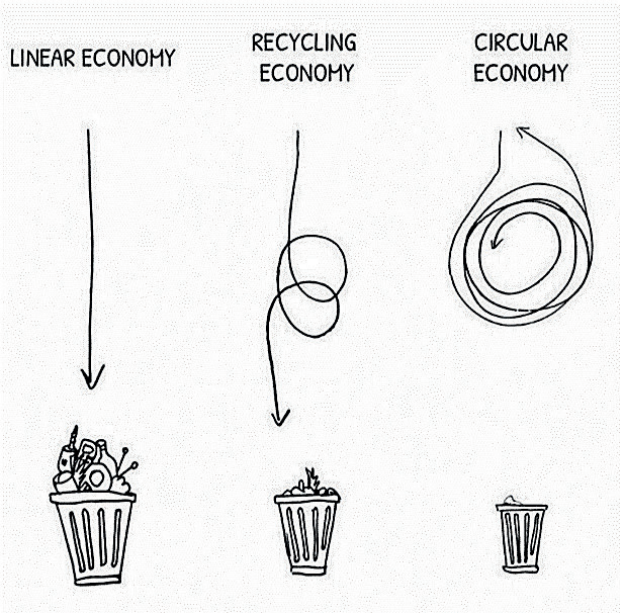

Figure-4: Linear, Recycling, and Circular Economy (Reference: Circular Flanders)

Bleach clean-ups: End-of-pipe approach to reduce ocean plastic pollution is to organize and/or participate in the beach or river clean-ups drives. During such clean-up drives, abandoned nets, plastics, glass bottles, slippers, thermoforms, etc are collected from the beaches. The waste collected needs to be segregated into various types and sent for further recycling and upcycling through an authorized waste recycler.

Figure-5: Beach clean-up in Kerala

Conclusions

It is evident that urgent steps as outlined are be taken and enforced to prevent the oceans turning into a sea of microplastics; they are necessary and essential for life on earth to sustain.

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Urbanisation going to be key, says NITI CEO

SECTIONS

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Synopsis

"Urbanisation is going to be the key. By 2047, 50 per cent of the population will live in urban areas, if you don't have basic services in urban areas, then it is going to be a big challenge," he noted

NITI Aayog CEO Parameswaran **Iyer** on Thursday said that urbanisation is going to be the key as 50 per cent of **India's** population **will** live in urban areas by 2047. Addressing an event organised by industry body **FICCI**, Iyer said many states have done wonderful work in solid waste management.

"Urbanisation is going to be the key. By 2047, 50 per cent of the population will live in urban areas, if you don't have basic services in urban areas, then it is going to be a big challenge," he noted.

He said the circular economy is now also becoming increasingly important.

Replying to a question on issues of cleanliness of India's tourist destinations, Iyer said," If you want to promote tourism in India aggressively, you better have clean places around, you better have better behaviour by tourists and by the locals."

Most beautiful tourist destinations in India are littered.

Source: https://economictimes.indiatimes.com/news/india/urbanisation-going-to-be-key-says-niti-ceo/printarticle/96079724.cms