

Marine Pollution by Plastic: Menace to the Marine Environment

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Introduction

The Bangladesh coast is threatened by various forms of pollutants, leaving the whole coastal and marine environment vulnerable. The dependency on the coast and sea is growing exponentially for Bangladesh. With a large population within a tiny land mass, Bangladesh will be more focused on the Bay of Bengal in the future for economic growth. However, Marine pollution is a cause of concern for Bangladesh and needs to be addressed right now before it goes beyond manageable threshold. Coastal and marine pollution arises from sea-based activities, including marine transportation and offshore mineral exploration. However, such pollution in this region is mainly due to the direct discharge from the rivers, ships, waste from drainage, open dumping of solid waste, industrial effluent etc. Most marine plastic pollution comes from the land. The ever-growing dependence of humans on plastic has filled the oceans and the land. It consists

of 80 percent of the debris found in the oceans. Plastic dumped in the oceans is dangerous for marine life. The rising level of plastic dumps in the oceans is suffocating, ingesting and entangling the life underwater and above it.

Marine plastic pollution has been a growing concern for decades. It is now abundant in the marine environment. Plastics have been reported as a problem in the marine environment since the 1970s. However, the issue of marine plastic pollution has become a significant environmental concern worldwide. The existence of plastic in the marine environment presents a number of challenges that hinder economic development associated with numerous impacts on ecological, social and human food safety, public health and many more. The impacts are colossal and have long detrimental effects that need immediate attention globally. The

contribution of plastic in manmade garbage is roughly 10%, and it is estimated that plastic debris accounts for 60-80% of marine litter, which may reach 90-95% in some areas. Due to its durability, the lifespan of plastic is estimated to be hundreds to thousands of years (Wang et al., 2016). The Bay of Bengal is not free from marine plastic pollution. It is learnt that the Bay of Bengal and the South China Sea are the new marine plastic hotspots in Asia. Hence, it is imperative to understand the plastic pollution in the Bay of Bengal, its impact on us and ecological imbalance as a whole.

Plastic in the Rivers and Oceans

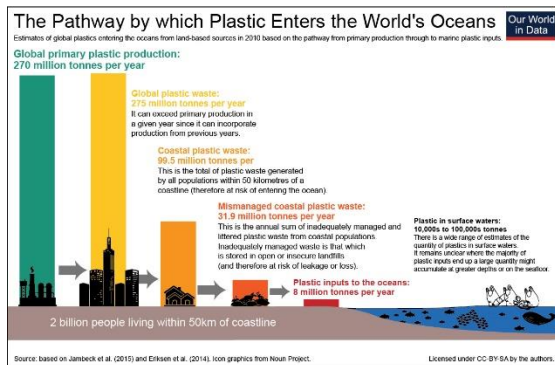


Figure 1: How Plastic Ends up in Oceans

The first synthetic plastic was made in 1907, marking the world's plastics industry's beginning. However, the rapid growth in global plastic production took place only in the 1950s. Over the next 65 years, the annual production of plastics increased nearly 200-fold to 459.75 million tons in 2019. This is roughly equivalent to the mass of two-thirds of the world's population. At the global level, best estimates suggest that approximately 80 percent of ocean plastics come from land-based sources and the remaining 20 percent from marine sources. Of the 20 percent from marine sources, it is estimated that around half originates from fishing fleets (such as nets, lines and abandoned vessels). It is supported by figures from the United

Nations Environment Programme (UNEP), which suggests abandoned, lost, or discarded fishing gear contributes approximately 10 percent to total ocean plastics.

There are multiple routes by which plastic can enter the ocean environment. One key input is through river systems. This can transport plastic waste from further inland to coastal areas where it can enter the ocean. In Bangladesh's case, most of our country's industries are situated near the major river systems such as the Buriganga, Shitalakkhya, Balu, Turag, Karnaphuli, Rupsha and Meghna etc. All these rivers end up in the Bay of Bengal. So, pollution of rivers is interconnected to the sea. Mentionable here, the Karnaphuli River is linked by 37 canals which dump wastes, including polyethene materials. All these dumped wastes' ultimate destination is the sea and Ocean. A study of BUET revealed that the riverbed of Karnaphuli is covered by polythene and plastic materials from 2 to 7 meters, and dredging is hampered due to plastic and polythene waste layers making it the worst victim of uncontrolled pollution and lack of proper waste management, posing a serious threat to the country and environment.

Plastic Degradation under Marine Environment

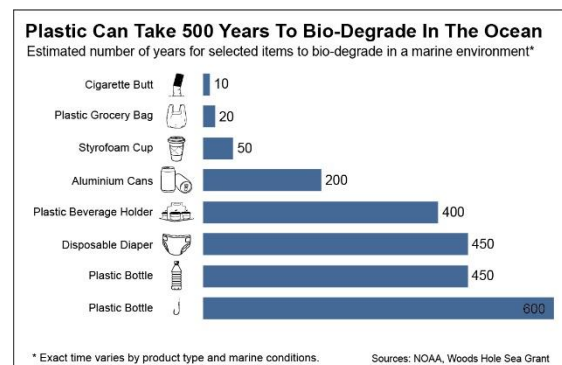


Figure 2: Plastic Degradation Timeframe

Now, what happens when plastic enters the Ocean? In contrast to other waste materials,

plastic does not decompose. Degradation of plastics is a chemical change that occurs over the years and becomes brittle enough to fall apart into fragments. Unlike larger fragments, microplastics are not readily visible to the naked eye. Microplastics, tiny pieces of plastic or fibres smaller than 5 mm, are even more dangerous forms of marine debris/litter. About 80% of marine litter is microplastics. Microplastics in the marine environment can travel vast distances floating in seawater or sediment to the seabed. A growing concern related to microplastic is that they enter the human food chain by ingesting fish and shellfish and causing potential human health impacts (UNEP, 2015). So, the hazardous impact of plastic in the marine environment can last many years, causing a prolonged effect on the marine environment. As an example, plastic shopping bags will take up to 20 years to break down, takeaway coffee cups take 50 years, and cigarette butts take 10. In a study by NOAA, it has been anticipated that some of the plastic material can take as long as 500 years to bio-degrade to the ocean.

Marine Plastic Waste Dumping in Bay of Bengal

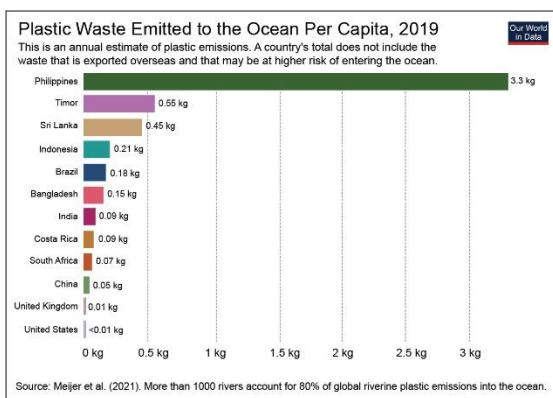


Figure 3: Plastic Waste Generated by Nations

Marine litter or debris, which includes plastic wastes; is the persistent, manufactured, processed solid material found in marine and coastal areas – predominantly the result of poor waste

management – is a fundamental problem due to its harmful effect on the environment, wildlife and human health in the Bay of Bengal, says a country report based on the reviews of scientific and policy documents together with a recent preliminary survey on marine litter along four beaches of Bangladesh (Dhaka Tribune, 16 Dec 2018). The Bay of Bengal and the South China Sea are the new plastic hotspots in Asia. Every year about 2 lakh tons of plastics enter the Bay of Bengal from Bangladesh. According to the Earth Day Network of USA (2018), Bangladesh is ranked 10th among most plastic-polluting countries in the world.

Plastic Found at Four Beaches of Cox's Bazar and Chattogram				
	Length of beach in sample (km)	Total waste found (pieces)	Plastic found (pieces)	Proportion of waste that is plastic (%)
Inani Beach, Cox's Bazar	5.5	3742	2619	70
Laboni Beach, Cox's Bazar	5.5	831	432	52
Ananda Bazar Beach, Chattogram	6	1918	997	52
Patenga Beach, Chattogram	1.5	214	126	59

Waste Collected from Four Sea Beaches of Cox's Bazar and Chattogram		
	NUMBER OF PIECES	PROPORTION OF TOTAL (APPROX %)
Plastic	4193	63
Foamed Plastic	860	13
Paper and Card-board	610	9
Rubber	237	3
Cloth	146	2
Glass and Ceramic	90	1
Metal	36	1
Wood	90	1
Others	443	7
Total	6705	100

Figure 4: Survey Results. Source: Mehdi Al Amin, Reckless Plastic Waste Dumping Greatly Endangering Bay of Bengal, Dhaka Tribune, 16 Dec 2018

The Department of Environment surveyed with SACEP and UNEPA about Marine litter. According to the report total of 6,705 pieces of waste products were found on an 18.5 km stretch of the four sea beaches – Laboni and Inani in Cox's Bazar, and Ananda Bazar and Patenga in Chattogram – in Bangladesh during the Survey. Among

the litter, 63% were plastic, 13% foamed plastic, 2% cloth, 1% glass and ceramic, 1% metal, 9% paper and cardboard, 3% rubber, 1% wood, and 7% other materials. Plastic bags were found to be the most common type of litter: at least 2,182 pieces of plastic bags were found on the beaches. The survey also found 589 pieces of insulation and packaging foam, 470 pieces of cigarette butts and filters, and 300 bottles. Around 80% of beach litter, including industrial products and waste, comes from the second source.

The Bay of Bengal stretches between India on the west and the Malay Peninsula on the east, measuring about 2,090 km long by about 1,600 km wide. The Bay of Bengal region includes selected coastal and EEZ areas of eight countries (Maldives, Sri Lanka, India, Bangladesh, Myanmar, Thailand, Malaysia and Indonesia) and the international waters between them. The Bay of Bengal occupies an area of 2,600,000 square km (1,000,000 sq mi). Several large rivers flow into the Bay of Bengal: the Ganges–Hooghly, the Padma, the Brahmaputra–Jamuna, the Barak–Surma–Meghna, the Irrawaddy, the Godavari, the Mahanadi, the Brahmani, the Baitarani, the Krishna and the Kaveri etc. There are 54 transboundary rivers in India and 3 in Myanmar. The overall marine pollution in Bangladesh is significantly larger as we are traversed by Asia's three major river systems, namely the Ganges, the Brahmaputra and the Meghna river system. Since we are at the lower end and are the lower riparian of both China and India, Bangladesh bears much marine

pollution from these two countries. There is an urgent need to develop a tripartite understanding and agreement on reducing marine plastic pollution and other types of pollution.

Conclusion

The BoB is the third neighbour of Bangladesh, and it has one of the largest marine ecosystems. The government of Bangladesh has conceived the concept of Blue Economy for the sustainable growth of Bangladesh centering on the Bay of Bengal. Marine pollution is not only destroying the ecosystem but is also harmful to the human body and animals. Plastic waste poses a significant threat to marine life and human health. The impact of plastic pollution on the Bay of Bengal ecosystem is significant. Plastic waste degrading into microplastics, ingested by smaller marine organisms are eventually entering the food chain, potentially affecting human health. The Bangladesh government has addressed plastic pollution by banning single-use plastic bags and promoting recycling initiatives. While implementing and enforcing these measures remain a challenge, public awareness can play a vital role in reducing plastic pollution. Considering the dangerous impacts of marine pollution, more needs to be done to effectively manage plastic waste in the country and prevent it from entering the Bay of Bengal.

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