ISBN: 978-93-94570-38-2

12. Anthropogenic Pressure-Induced Micro plastic Pollution in the World Longest Sea Beach

Sonjib Chakraborty

Research Associate,
Center for Atmospheric Pollution Studies,
Ramna, Dhaka, Bangladesh.

Tropa Chakraborty

Post Graduate Student,
Stamford University,
Dhaka, Bangladesh.

Abstract:

Plastic is banned in Bangladesh, but it poses a significant threat to the environment, particularly maritime beaches. Cox's Bazar is the world's longest unbroken sandy beach, measuring 155 kilometers in length and habitat to numerous marine species. Bangladesh has one of the world's largest river networks, with over 700 rivers and watercourses, including tributaries, totaling around 24,140 kilometers. Pollution from domestic and international sources accumulates in Bangladesh's coastal zones, eventually ending up in the ocean. In the oceans, rivers are a significant source of plastic garbage. Tourism in inland areas and urban areas also add to the problem of marine plastic pollution. Vast quantities of trash made of plastic end up in rivers, where it is then carried further afield until it reaches the ocean. Tourists to Cox's Bazar throw away plastic bags, bottles, and a variety of other potentially hazardous items carelessly into the sea after using them, which contributes to ocean pollution. Even Microplastic (MP) detected in the dried fish sample, which is traffic transfer to the human body, and the presence of plastic in Bangladeshi salt has just recently been identified.

Keywords: *Pollution, Bay of Bangel, Transboundary, Human health.*

12.1 Introduction:

Bangladesh was the first country in the world to ban plastic bags in 2002 (Chowdhury et al, 2021). Micro plastic (MPs) is a major threat to the marine environment and has been identified as a growing problem in Bangladesh. MPs have already been widely found on the world's longest natural sandy beach, Cox's Bazar, Bangladesh. MPs accumulating in marine environments, measuring less than 5 mm in diameter, have now become a global concern with potentially negative consequences for ecosystems, food security, and human health.

Plastic is consumed by fish, seabirds, marine reptiles, and mammals and gets entangled in plastic waste (Tajwar et al., 2021; Crew et al., 2020; Islam et al., 2020).

Pollution Overview: Bangladesh has one of the world's largest river networks, with over 700 rivers and watercourses, including tributaries, totaling around 24,140 kilometers (Chowdhury et al., 2021). Pollution from domestic and international sources accumulates in Bangladesh's coastal zones, eventually ending up in the ocean. In the oceans, rivers are a significant source of plastic garbage. Almost 1000 rivers are responsible for roughly 80% of global annual riverine plastic emissions, ranging from 0.8 to 2.7 million metric tonnes per year, with small urban rivers being among the most polluted (The Ocean Cleanup, 2022). Approximately 73,000 tonnes per day of plastic waste are transported to the Bay of Bengal from China, India, Nepal, and Bangladesh via the principal rivers of Bangladesh. This is one of the most significant problems that contaminate seas and manipulate aquatic life and clog drainage systems in many areas (UNEP, 2018; Biswas et al., 2021). Tourism in inland and urban areas can also add to the problem of marine plastic pollution. Vast quantities of trash made of plastic end up in rivers, where it is carried further afield until it reaches the ocean. If things keep going the way they are, by 2050, there may be more plastic than fish in our oceans. Tourists to Cox's Bazar throw away plastic bags, bottles, and a variety of other potentially hazardous items carelessly into the sea after using them, which contributes to ocean pollution. Consequently, marine life washes up on the shore, and people do not notice them, they eventually contribute to the pollution in the environment around them (Daily Sun, 2018; One Planet Network, 2022).

MP was found on the beach of the world's longest natural beach. The Bombay duck (Harpadon nehrius) and tape fish (Trichiurus lepturus), both commercially important dried fish collected from two places in the Bay of Bengal (Cox's Bazar and Kuakata), were tested for micro plastics (MP) and found to contain plastic. The existence of significant MP loads on dried fish from the Bay of Bengal, where there is a high probability of MP traffic transfer to the human body, is confirmed by the number of MPs present in the samples taken from Cox's Bazar (41.33 g 1 and 46.00 g 1, respectively (Hasan, et al., 2012). Transboundary plastics is another source of plastic pollution in the Bay of Bengal and its beaches. The exact amount of plastic garbage generated cannot be determined since data on transboundary pollution of single-use plastics moving from India to Bangladesh is unavailable. The Bay of Bengal's plastic pollution should ideally include both Bangladesh and India, and the total amount will be substantially higher than national estimates. These micro and nano plastics have been identified in animal cells, eventually making their way into the food chain, which is dangerous (Rahman, 2020).

Plastic pollution is one of the leading causes of marine pollution, claiming the lives of a million sea birds each year. When exposed to ultraviolet radiation, plastic degrades slowly. However, the rate of disintegration is so slow that it could take years to reach the half-life of a single plastic disposable cup. Furthermore, to extend the life of plastic, manufacturers are adding ultraviolet stabilizers, exacerbating the problem. Aquatic species frequently consume plastic bags. Plastic containers break down into micro plastic, a major hazard of untreated plastic trash. According to research, hazardous chemicals introduced to plastics during manufacture are absorbed by animal tissues, eventually contaminating the human food chain (UNEP, 2018; Mc Keen, 2013). Plastic trash is one of the impediments that negatively impact the marine ecosystem—ingestion and entanglement of plastic debris by fish, sea birds, marine reptiles, and marine mammals. Plastic trash is known to injure and kill many marine species, putting their survival in danger, especially since other forms of anthropogenic activity already threaten many.

Every year, tourists travel to Cox's Bazar, the world's largest sea beach, to see these sights. People use plastic items like bottles, polythene, chips packets, plastic bags, balloons, cigarette lighters, beer, juice, fishing nets, clean containers, and many more while passing a nice mausoleum. This type of plastic ends up in the ocean, harming both the ecology and marine life (Hossain et al., 2019).

Marine Species and Human Health: Micro plastics in five commercially important marine fish species has been identified, prompting public health concerns. Pink Bombay-duck (locally called loitta), white Bombay-duck, gold stripe sardinella, brown shrimp, and tiger shrimp are the public health concern. In the intestines of pink Bombay-duck, white Bombay-duck, and gold stripe sardinella, 443 MP objects were detected.

Because the entrails of Bombay-duck are not removed during cooking, MP remains in the fish and enters the human body when eaten. MP found in shrimp shells, for example, enters the human body when eaten. In the gastrointestinal tracts of 50 tiger shrimps and 100 brown shrimps, a total of 33 and 39 MP items were discovered in the tiger shrimp and brown shrimp. Micro plastics are plastic trash with a length of fewer than five millimeters. Micro plastics harm aquatic species and turtles and birds by obstructing digestive systems, reducing the desire to eat, and changing eating behavior, all of which impair growth and reproductive production. MP intake causes starvation and death in some species. Micro plastics in marine fish may pose a health risk to humans through the food chain.

Bombay-duck and sardinella are important fish species in Bangladesh that support millions of people's employment, economics, food, and nutrition. In 2015–16, the total annual landings of Bombay duck and sardinella were 58,545 and 44,386 tonnes, respectively. Because Bombay-duck is normally dried without being processed, the digestive tract is unlikely to be removed when swallowed. As a result, micro plastics could end up in humans.

According to the study, around 150 million tonnes of plastic have already been deposited in the ocean at an annual pace of 8 million tonnes, or nearly 15 tonnes of plastic every minute. Ingestion of micro plastics has been documented in cetaceans, seabirds, bivalves, crustaceans, echinoderms, lugworms, zooplankton, sea cucumbers, and corals, among other marine creatures. In a short period, micro plastics could hurt organs, including the liver and kidney. Micro plastics have the potential to cause cancer in humans in the long exposure (Hossain et al., 2020; Hossain et al., 2020). Plastic pollution has recently been identified in Bangladeshi sea salt. According to This salt contains on average 2,006 micro plastics per kilogram; e whereas, A person consumes 13,006 micro plastics per year at the current rate of salt consumption in the country (Rakib *et al.,* 2021; Parvin *et al*., 2022).

12.2 Conclusion:

The use of plastic and plastic items is becoming pretty widespread. While the rest of the world is attempting to limit its use of plastic, plastic consumption here is increasing here. Bangladesh has seen a threefold surge in plastic consumption in the last 15 years (World Bank Group, 2021)! Several research shows that plastic pollution of Cox’s Bazar is expanding, anthropogenic pressure is one of the causes; as a result, local species and human health are under threat and it will be an issue for the next generation.

12.3 References:

1. Biswas, J. C., Haque, M. M., Maniruzzaman, M., & Kalra, N. (2021). Coastal and Marine Pollution in Bangladesh: Pathways, Hotspots and Adaptation Strategies. European Journal of Environment and Earth Sciences, 2(4), 26-34.
2. Chowdhury, G. W., Koldewey, H. J., Duncan, E., Napper, I. E., Niloy, M. N. H., Nelms, S. E., Sarker, S., Bhola, S., & Nishat, B. (2021). Plastic pollution in aquatic systems in Bangladesh: A review of current knowledge. Science of The Total Environment, 761, 143285. https://doi.org/10.1016/j.scitotenv.2020.143285
3. Crew, A., Gregory-Eaves, I., & Ricciardi, A. (2020). Distribution, abundance, and diversity of microplastics in the upper St. Lawrence River. Environmental Pollution, 260, 113994. https://doi.org/10.1016/j.envpol.2020.113994
4. Hasan, J., Islam, S. M., Alam, M. S., Johnson, D., Belton, B., Hossain, M. A. R., & Shahjahan, M. (2022). Presence of microplastics in two common dried marine fish species from Bangladesh. Marine Pollution Bulletin, 176, 113430. https://doi.org/10.1016/j.marpolbul.2022.113430
5. Hossain, M. S., Sobhan, F., Uddin, M. N., Sharifuzzaman, S., Chowdhury, S. R., Sarker, S., & Chowdhury, M. S. N. (2019). Microplastics in fishes from the Northern Bay of Bengal. Science of The Total Environment, 690, 821–830. https://doi.org/10.1016/j.scitotenv.2019.07.065
6. Hossain, M. S., Rahman, M. S., Uddin, M. N., Sharifuzzaman, S., Chowdhury, S. R., Sarker, S., & Nawaz Chowdhury, M. S. (2020). Microplastic contamination in Penaeid shrimp from the Northern Bay of Bengal. Chemosphere, 238, 124688. https://doi.org/10.1016/j.chemosphere.2019.124688
7. Islam, S. M. I., Islam, M. Z., Raihan, M., & Iqbal, M. IMPACT OF PLASTIC DEBRIS ON MARINE ENVIRONMENT OF BANGLADESH: A REVIEW.
8. McKeen, L. W. (2013). The Effect of UV Light and Weather on Plastics and Elastomers. William Andrew.
9. Parvin, F., Nath, J., Hannan, T., & Tareq, S. M. (2022). Proliferation of microplastics in commercial sea salts from the world longest sea beach of Bangladesh. Environmental Advances, 7, 100173. https://doi.org/10.1016/j.envadv.2022.100173.
10. Rakib, M. R. J., al Nahian, S., Alfonso, M. B., Khandaker, M. U., Enyoh, C. E., Hamid, F. S., Alsubaie, A., Almalki, A. S. A., Bradley, D. A., Mohafez, H., & Islam, M. A. (2021). Microplastics pollution in salt pans from the Maheshkhali Channel, Bangladesh. Scientific Reports, 11(1). https://doi.org/10.1038/s41598-021-02457-y
11. Rahman, D. (2020, February 12). Challenges and opportunities of plastic pollution management. The Daily Star. https://www.thedailystar.net/supplements/29th-anniversary-supplements/governance-development-and-sustainable-Bangladesh/news/challenges-and-opportunities-plastic-pollution
12. Sun, D. (2022, April 10). Adverse Impacts of Over tourism in Cox's Bazar | Daily Sun .Daily Sun. https://www.daily-sun.com/printversion/details/614871/Adverse-Impacts-of-Overtourism-in-Cox%E2%80%99s-Bazar
13. Tajwar, M., Yousuf Gazi, M., & Saha, S. K. (2021). Characterization and Spatial Abundance of Micro plastics in the Coastal Regions of Cox's Bazar, Bangladesh: An Integration of Field, Laboratory, and GIS Techniques. Soil and Sediment Contamination: An International Journal, 31(1), 57–80. https://doi.org/10.1080/15320383.2021.1910622.

14. The Ocean Cleanup. (2022, April 13). River Plastic Pollution Sources •. https://theoceancleanup.com/sources/
15. Tourism's Plastic Pollution Problem. (2022). One Planet Network. https://www.oneplanetnetwork.org/programmes/sustainable-tourism/global-tourism-plastics-initiative/tourisms-plastic-pollution-problem
16. UNEP, "United Nations Environment Program", Single-Use Plastic: A roadmap for sustainability. 89pp, 2018.
17. United Nations Environment Program (2018). The State of Plastics: World Environment Day Outlook 2018. https://wedocs.unep.org/20.500.11822/25513.
18. World Bank Group. (2021, December 23). Meeting Bangladesh's Plastic Challenge through a Multisectoral Approach. World Bank. https://www.worldbank.org/en/news/feature/2021/12/23/meeting-bangladesh-s-plastic-challenge-through-a-multisectoral-approach.