

MARINE POLLUTION IN BANGLADESH: ITS CAUSES AND IMPACTS ON THE ENVIRONMENT

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ABSTRACT

The government of Bangladesh, after the maritime boundary has been demarcated permanently with India and Myanmar, has focused on the improvement of the resources concerned with the marine world to enrich its economy. But one of the multiple hurdles along the route to the development of the coastal region is the prevention of environmental pollution. The coastal and marine region is open to microbial pollution which is a collective form of pollution that occurs on sea and land due to the absence of proper control and systematic operations. This pollution includes industrial filth, unsystematic growth of habitation on the coastal region, unplanned sewage system, negligence of the travelers, and many more. The sea-side localities undoubtedly have an abundance of resources that contributes to our economy. But the huge pollution has clouded the productivity of the coastal and marine resources and continuously affecting the natural balance and thus the human health. No legal or written policy covers the protection of the coastal region currently. The focus of this paper, therefore, is to concretely mark pollution control policies in the marine regions of Bangladesh in reference to the national and international laws.

KEY WORDS: Bangladesh, Coastal area, Environment, Marine pollution, Shipping.

INTRODUCTION

Bangladesh is enriched in the sphere of the coastal and marine environment with the likes of a good amount of flora, fauna, hydrocarbon, mineral deposits, and an adequate reservoir of fishes and seafood which are commercially feasible. The Bay of Bengal is located on the southern side of the landscape and the coastal area is the habitat of 25% of the total population. The marine resources that include fisheries too, directly give a ray of hope to earn livelihoods for most of these coastal folks. There are around 230 rivers and rills that cross the heart of the country's geographical landscape and a coastline of 710 kilometers which is considered the largest. The country went through several maritime dispute settlements against Myanmar and India in 2012 and 2014 respectively and now stands tall with a sovereign ocean territory of about 118,813 sq. km. Marine contamination can be divided into two divisions in Bangladesh, land-based and sea-based

(Alam *et al.*, 2018). Municipal waste, Industrial waste along with shipwrecking activities as well as agricultural waste mostly pollutes the land-based sources. Among many contributors, Land-based Marine Pollution (LMP) has taken the central position in contributing to pollution and contamination in the marine environment. The Bay of Bengal reportedly gets contaminated every day. Almost all major rivers in Bangladesh bring billions of tons of sediments into it according to the report of the National Program of Action regarding Land-based marine pollution control of Bangladesh which was published in 2006. As per the current scenario, LMP is responsible for 75% or more pollution making itself the pivotal form of marine pollution. Generally, various substances and even energies get mixed with the ocean and coastal water by run-off from land, drain, rivers, channels which occur in LMP. Again, the pollutants from other outfall structures cause 44% of marine pollution. Surprisingly, ships and aircraft add to the cause of

being responsible for 33% of marine pollution worldwide (Alam and Faruk, 2014). Bangladesh is cursed with the problems of urbanization, industrialization, agriculture, siltation, etc. which hampers the waste-treatment facilities. The scarcity of this facility aggravates the pollution and makes LMP a preeminent presence in Bangladesh. The more LMP increases, the more de-escalation takes place in the marine and coastal resources. This event impacts the economic development of the country that consequently affects the vision to reach the 'Blue Economy or Blue Growth' including Millennium Development Goal. Furthermore, it is a must to protect marine environments from pollution including LMP in order to protect nearly 1/4 of the total population of Bangladesh who lives on the marine resources. As the protection and conservation of the environment and ecosystem is a global demand, the government of Bangladesh has also enacted some laws and regulations. However, it is impossible for the government to replicate the acts single-handedly. Hence, the legal authority as well as the domestic stakeholders should work hand in hand in order to protect the marine environment from land-based pollution in Bangladesh. The implementation of national comprehensive policies for the protection of the marine environment and their ecosystem can be conducted by the policymakers and stakeholders of the country. Thus, the problems of LMP can be brought under control.

The Main Causes of Marine Pollution in Bangladesh

There are a number of factors that are contributing

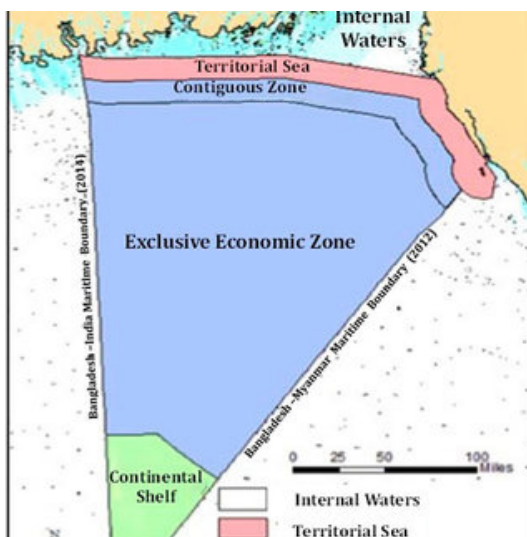


Fig. 1. Marine Area of Bangladesh (Source: Internet).

directly or indirectly to the marine environment pollution in Bangladesh. Among the vast number of causes, Uncontrolled activities of a large number of inland and merchant shipping vessels, poor enforcement of laws, and shortcomings in infrastructure by the governments concerned are major in contributing to the pollution. According to K. Hassan, the marine industry accounts for almost 3% of global emissions while the transportation system is responsible for a significant amount of gases (almost 28% of global emission). Generally, Nitrogen oxides, sulfur oxides, carbon dioxide, and HC, CO emission requirements are depleted by marine engines (Sands, 2018). Note that engine processes used for propulsion power in various vessels, such as cargo ships, oil tankers, bulk carriers, and cruise ships, are correlated with all gases. The pollution control technologies that can be used in these motors, however, are not so much. Also, around 3.5 million tons of crude and refined oil are imported by Bangladesh, which brings about six thousand tons to four thousand tons of annual oil emissions to the Bay of Bengal. While transferring the oil, some oil escapes into the waterways, and also the oil substances along with the ballast water are thrown into seawater from the engine room. These chemical wastages are likely to

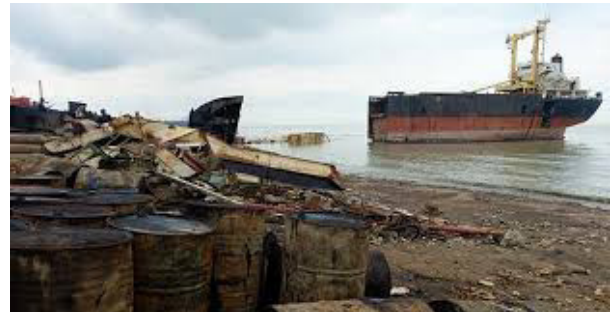


Fig. 2. Marine Pollution in Bangladesh (Source: Internet)

do more harm than oil for the marine environment.

The oil spill is another cause of water pollution. The Port of Mongla is witnessing several oil spills from foreign and local ships. As a result, the world's largest tidal mangrove forest, home of many salt-tolerant plants, the Sundarbans are in danger. On the other hand, dumping garbage and sewage from ships is another day to day activity that also takes part in polluting the water. It is risky for international and local ships to make the marine region of Bangladesh a safe place to throw away their waste and sewage. Bangladesh's coastal regions have different kinds of industries and the ship-breaking industry is one of them. Industrial units established in and around the urban corridor of Khulna-Jessore, Karnaphuli, and Bakkhali and in the Chittagong areas are frequently seen discharging enormous amounts of toxic substances containing solid and liquid waste that are responsible for water pollution. Generally, these chemicals are emitted as a result of industrial practices, effluent discharges, and accidental spills. These substances contain high levels of the chemical concentration of the water bodies which is harming the environmental system and polluting the surface water. Thus, threatening not only just the freshwater and marine ecosystem but also the lives of human civilization by creating severe health issues. The lack of proper sewage treatment facilities is another big reason for water pollution. In Bangladesh, almost 36 million people who have their abode in 19 coastal districts have their sewages going into the water system directly or indirectly which eventually ends up at the Bay of Bengal (Islam and Rahman, 2015). These sewage disposals are left untreated so the lack of a proper sewage system and also the increasing coastal population has its impact on Microbial contamination, food security, etc. Also, changes in the pattern of land usage have been noticed.

Many farmers in Cox's Bazar have left their traditional agriculture and shifted to salt production. Moreover, the ship-breaking activity is not only a threat to the marine environment but also to the whole earth and public health as this discharges liquid, metal, gaseous and solid pollutants. In spite of these, the ships also contain several toxic wastes, sealants which contain PCBs, different types of asbestos, and several thousand liters of oil like engine oil, bilge oil, hydraulic and lubricants oil, and grease (Ahmed, 2011). In Bangladesh, there is no consideration for safe and environmentally friendly waste management

practices as the scrapped ships containing toxic materials are being cut up by hand. The thrown substances often deposit on the river bed, underwater land, and beside the waterways. This pollutes the river bed as well as the underwater land and has dangerous effects on the environment.

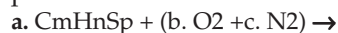
MARINE ENVIRONMENT POLLUTION BY SHIPPING

Shipping causes contamination that can damage the marine environment. There are various types of pollution that can come from ships. These include oil, chemicals, waste, emissions, and anti-fouling paint on the body of a ship. The pests that live in the ballast water of the ship or cling to the body of the ship are also harmful to the environment (Ka³duński and Wasilewski, 2014). Bangladesh's break yards are mainly on the beaches. So the breaking and scrapping of old ships can cause pollution if necessary steps are not taken. One of the major causes of marine environmental pollution is the unsupervised operation of a large number of vessels operating for inland and merchant shipping. Since the laws and resource deficiencies of the authorized government departments are negligently applied by Bangladesh, pollution from shipping at ports and other marine areas is now omnipresent news. In the marine environment, these vessel operations have exposed the country to immense pollution. In Bangladesh, the most harmful and unexpected source of marine pollution is the vessels that can pollute the atmosphere but cannot be blamed because they are unregistered, allowing them to stay out of the polluting action count. Looking at the contaminated areas, pollution is assumed to occur in three ways. Air pollution, water pollution, and land pollution are what they are:

(i) Air pollution from ships by exhaust gases and its consequences

Air pollution is primarily caused by the hazardous gaseous matter generated by automobiles, manufacturing sectors, construction, and unsupervised open disposal of waste. Asian economies have been growing fast with continuous urbanization. This has increased the demand for mobility and energy in the region, as a result, there are high levels of air pollution in cities from transport, industry, and other sources. As the demand for transport, electricity, and other

infrastructure rises, high pollution will result, ultimately polluting the environment. Marine Vehicle Emissions: Emissions can take place naturally or unnaturally. As industrial activities, electricity infrastructure, transportation, etc. developed rapidly, it caused unnatural emissions to increase as well. The transportation system produces an alarming rate of emission gases. Almost about 28% of the global emissions come from there and almost 3% of it comes from the shipping sector (Hossain, 2001). The marine engines exhaust emissions contain the following groups: NO_x-nitrogen oxides, Sox-Sulphur oxides, CO₂-carbon dioxide and HC, CO, particulates. CO₂ emissions are equal to the amount of fuel burned. These gases are connected to the engine processes. The chemical reaction of how emission gas is produced is stated below:



Here, C_mH_nS_p is an equivalent diesel a composition that has been established by PETROBRAS (Brazilian Oil Company) and a, e, f, g, h, k, s, t, and y are determined from chemical reaction mass balance as well as b and c even though they are air compositions.

(ii) Water pollution by exhausts from ships

Ships are the main source of oil that pollutes the water in Bangladesh. The key reason behind this form of water pollution in the marine areas is the tankers and other vessels that pass through the busy sea transportation routes of the southern Bay of Bengal. Bangladesh imports about 3.5 million tons of crude and refined oil and contributes six thousand tons of oil to the Bay of Bengal's overall annual oil emission of four hundred thousand tons (Hossain *et al.*, 2009). Some oil escapes into the rivers when moving the oil, and oil substances are also thrown from the engine room along with the ballast water into seawater. The chemical waste generated from toxic liquid substances is carried in enormous quantities. Such chemical waste is likely to affect the aquatic ecosystem more than oil. Another source of water contamination is oil spillage. Several oil spills from international and local ships are happening in the Port of Mongla. As a result, the Sundarbans are in danger of becoming the world's largest coastal mangrove forest, home to many salt-tolerant species. The biodiversity of the Sundarbans is enriched by so many marine animals,

including prawns and fish, which are commercially sold due to their high demand. In August 1994, a Panamanian flag vessel was knocked down near the Sundarbans, causing an oil spill in the Bay of Bengal. This oil spill has caused a lot of damage to a large number of faunas and floras in the Sundarbans mangrove forest as well as the surrounding sea area.

(iii) Land pollution

Sometimes when the old ships are repaired in the shipyard the wastage from it pollutes the yard environment. Moreover, such activities like the open-air sandblasting, the painting works also pollute the air and land of the shipyard. These shipyards and ship breaking yards pollute both their lands and the lands around them. In ship breaking yards while scrapping ships, different kinds of waste and disposable goods are discharged and spilled which often gets mixed with the land of the yard area. These activities are dangerous for the environment on land and marine eventually causing threats to public health as well. Different kinds of pollutants are discharged from ship breaking yards like liquid, metallic, solid, and gaseous contaminants. Empty scrapped ships have a weight of around 95% of which is steel, depending on their size and purpose, as well as other items such as paint covered with lead, cadmium, organotin, arsenic, zinc, and chromium-containing paint (Chowdhury *et al.*, 2017). Other than this, ships often carry other hazardous waste, PCB-containing sealants, different forms of asbestos, and several thousand liters of oil, such as engine oil, bilge oil, hydraulic and lubricating oils, and grease oils. On the other hand, tankers hold the leftover oils. In Bangladesh, there is no consideration for safe and environmentally friendly waste management practices as the scrapped ships containing toxic materials are being cut up by hand. The thrown substances often deposit on the river bed, underwater land, and beside the waterways. This pollutes not just the river bed, but also the underwater land and has dangerous environmental impacts.

(iv) Impacts of marine ecosystem contamination

There are different types of harmful effects of this pollution. This makes the ecosystem lose its balance and puts a bizarre impact on the climate or environment. In Bangladesh, a large number of people have fishing as their profession but due to

pollution, the fishes are losing their breeding places which are at the end causing unemployment for many people. In the end, the global temperature and sea level are rising day by day because of these impacts. The unbalanced ecosystem disturbs natural activities (Brubaker, 1993). As a result, there is a rise to frequent flooding, storm occurrences, low-level lands submerge under water, sometimes the emissions cause acid rains. According to the World Health Organization, the surrounding air pollution is the reason behind over half a million premature deaths per year (Afroz and Alam, 2013). This leaves the urban poor people most vulnerable as they live in air pollution hotspots. Having low respiratory resistance due to bad nutrition and not being able to afford quality health care puts them at high risk.

PREVENTION FROM SHIPPING EMISSIONS

The wastage and sewage that comes from the ships play a vital role in polluting the environment in Bangladesh's coastal and marine areas. There needs to be a way to manage the wastages in order to lessen and ultimately decrease pollution. State, non-governmental shipping organizations, intergovernmental shipping agencies should come forward to solve this problem and form a cohesive coalition to adopt sustainable techniques and activities. The most important factor is the awareness of the crew to reduce pollutions that occur when pollutants are thrown from ships. Training the crew properly can increase this awareness. Another way to reduce pollution could be the promotion of awareness among the crews and applying strict marine rules. To prevent oil spills and oil leakage, the unfit vessels must be banned which can save the marine environment from unnoticed pollution. The unregistered vessels are found to have higher rates of pollution than the registered ones. Hence, there should be strict laws for these unregistered vessels and the breaker of these laws is bound to have punishments that have to be applicable in the field.

OVERALL RECOMMENDATIONS

Bangladesh needs to incorporate the global post-2015 development agenda (SDGs) and all those incomplete targets of MDGs to its Vision-2021, a five-year plan (2016-2020). To get the desired development there has to be an agreement of

different policies which needs to be consistent with one another so that one comprehensive single document can be produced. The following recommendations can be considered and included in the policy framework in order to manage and govern coastal and marine resources and the environment.

- To meet future demands and to increase current production levels, traditional methods should be replaced with advanced technology. By introducing sophisticated fishing boats that can expand fishing areas further toward the deep sea.
- Certain coastal and ocean-based economic activities like ports and shipping, shipbuilding and ship recycling can be renewed and made eco-friendly.
- Bangladesh has huge potential for eco-tourism which can help the coastal communities to find alternative job opportunities rather than depending on just natural resources and fisheries for their livelihood.
- Through extensive coastal afforestation programs (as currently done by the Forest Department) natural disasters and climate change can be brought under control. Also reclaiming the land toward the sea using the sediment that flows through river channels from upstream can be helpful.
- Initiating Marine Biotechnology research as early as possible can harvest natural products effectively. Considering the economies minerals and other resources should be explored, extracted, and utilized.

CONCLUSION

The maritime sector in Bangladesh is still at the primary stage and still has a long way to go. So, if tried from the start, it is possible to assure proper development that can bring decent results. As the maritime sector and blue economy is a global subject matter, the Bangladesh government must realize that it is not something to compromise. Consulting with scholars is a must to prepare proper legislation. In Bangladesh, it is really important for the people and the staff to be aware of the effects of the pollution and the proper way to manage the pollutants that have been emitted from the inland vessels. Awareness can be created among the people and staff by applying strict marine laws which can help achieve a significant reduction of

pollution in Bangladesh. For the low-speed ships such as the inland vessels, only the improvement of ship design cannot help much for reduction of the fuel consumption or the emissions that the burning fuel produces. But if proper maintenance is followed the vessels and hull surface a huge 4% of fuel consumption and also the burning fuel emissions can be reduced. The fuel cost is about half of the total operating cost. So, to save fuel the reduction in operating cost for vessel designing is about 2% of the total operating cost. To survive, Bangladesh needs to stop destroying the normal habitat and biodiversity which is harming the ecosystem. In conclusion, it is really important to adopt extensive legislation to comply with the international standards to prevent, reduce, and control marine pollution and to make a substantial change. Different initiatives must be taken by the government to create public awareness of marine environment pollution and its consequences.

REFERENCES

- Alam, M. W., Qayum, S., Hasan, M. M. and Xiangmin, X. 2018. Land-based marine pollution control in Bangladesh: A Suggested framework with a critical analysis of national legal issues. *Indian Journal of Geo-Marine Sciences*. 47 (1) : 1909-1917.
- Alam, S. and Faruk, A. 2014. Legal regulation of the ship breaking industry in Bangladesh: The international regulatory framework and domestic implementation challenges. *Pollution*. 47 (1) : 46-56.
- Afroz, T. and Alam, S. 2013. Sustainable shrimp farming in Bangladesh: A quest for an Integrated Coastal Zone Management. *Ocean and Coastal Management*. 71(1) : 275 - 283.
- Ahmed, A. 2011. Some of the major environmental problems relating to land use changes in the coastal areas of Bangladesh: A review, *Journal of Geography and Regional Planning*. 4 (1) : 1- 8.
- Brubaker, D. 1993. *Marine Pollution, and International Law: Principles and Practice*, London: Belhaven Press. pp. 1-485.
- Chowdhury, K. M. A., Mili, M. I. J., Akhter, S. and Ahmed, M. K. 2017. Pollution by shipping industry in the Northern Bay of Bengal: a review study. *Imperial Journal of Interdisciplinary Research*. 3 (3) : 1352-1362.
- Hossain, M. I. 2004. *International Environmental Law: Bangladesh Perspective*, Dhaka: Ain Prokashan. pp. 1-497.
- Hossain, M. M., Sultana, R., Ormond, R. and Siddiqui, P. J. A. 2009. Diversity of coral associated fishes in the St. Martin's islands, Bangladesh. *Journal of Taxonomy & Biodiversity Research*. 3 (1) : 21-28.
- Hossain, M. S. 2001. Biological aspects of the coastal and marine environment of Bangladesh. *Ocean & Coastal Management*. 44 (3-4) : 261-282.
- Islam, S. A. and Rahman, M. 2015. Coastal afforestation in Bangladesh to combat climate change induced hazards. *Journal of Science Technology Environment Informatics*. 2(1) : 13-25.
- Ka³duński, M. and Wasilewski, T. 2014. The International Tribunal for the law of the sea on maritime delimitation: the Bangladesh v. Myanmar case, *Ocean Development & International Law*. 45 (1) : 123-170.
- Sands, P. 2018. *Principles of International Environmental Law*. Cambridge: Cambridge University Press. pp. 1-988.