

Pollutants from Inland Vessels of Bangladesh -A Threat to the Environment

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Abstract

Bangladeshi rivers are polluting day by day which has a devastating effect on the environment and the aquatic life. In concern of river pollution, the inland shipping operation can be a major part as because of riverine country like Bangladesh where approximately 13 thousand of registered and unregistered vessels plying through our country waterways for the purposes of carrying goods or passengers. Hence, Rivers are losing their sustainability & water integrity which can lead terrible consequences to us and the marine life as well. However, our transportation system will be more ship based considering the cost and road-traffic. So, deeming the circumstances this is high time to scrutinize the ship-based pollution that we are having from our vessels. The main intention is to evoke the leaders to concentrate on this critical issue by modeling the infrastructure of the pollution that have been emitting from day to day operation of inland vessels. Moreover, some effective measures are discussed followed by impact analysis which may help the industry to perform smoothly keeping the environment less affected.

Keywords:Inland vessels, Pollutants, Bilge, Fuel consumption, Carbon dioxide (CO₂) emission.

1. Introduction

Rivers of Bangladesh contribute a major part in transportations. Significant numbers of vessels are plying in our water route and thus polluting our environment by throwing waste, burning fuels and breaking the rules of navigation. Many of the aquatic species are moribund leading the ecological imbalance which makes the situation more gruesome. Due to over population and low cost of water transportation, number of vessels are increasing which in turns threatens the environment. It is assumed that Bangladesh with many other countries will be severely suffered due to upcoming degraded climate, hence it's the burning question for all over the world to keep the environment safe. Its irrefutable that once marine pollution was not considered as a major issue but as because of industrialization and technological advancement the effect of this sorts of pollution is no longer confined in a subtle condition, most of the developed and developing countries focused on the amelioration of the water transportation system for reducing the greenhouse effect and making the world withstand against the climate change.

2. Methodology

There are four types of vessels which are highlighted in concern of pollution (oil tankers, passenger vessels, sand carrier, cargo vessel) which should be taken into consideration for comprehending the severity of pollution. Data are collected by visiting regional offices and consumption and pollution are estimated through field study consulting with responsible engineers onboard. Not to mention the major pollutants (Bilge and CO₂ emission) are quantified which indicates the contribution of this industry in pollution and environmental degradation.

3. Discussion

3.1 Inland vessels of Bangladesh: Water transportation system is the cheapest medium of transportation in Bangladesh encompassed by 24000 km of waterways. The vessels plying in water ways not only confined in transporting interurban freight but also in the international import/export business connecting regional ports to the worldwide. The number of vessels as shown in Table 1., registered under inland shipping ordinance-1976 depicts the wide range of activities related to the country's water network. However, there approximately more than thousands of inland vessels without registration and thousands of steamers, speedboats, tugboat, dump barge are plying in the inland waterways and polluting the environment enormously.

Table 1. Number of inland vessels plying in country's waterways (source: Department of shipping, website).

Serial No	Vessel type	number of Vessel (up to 2018)
1	Oil Tanker	204
2	Fishing Boat	249
3	Passenger Vessels	832
4	Cargo Vessels	3728
5	Ferry	40
6	Sand Carrier	4814
7	Others	2534
	Total	12401

3.2 Pollutants from inland shipping operations: Four types of ships (Tanker, cargo, passenger and sand carrier) are the major contributors of pollutants. However, the pollutants can be categorized into three following categories:

- a. Solid: Dunnage, Sewage, Garbage (neglected).
- b. Liquid: Ballast, Tankwashing, Oil Spill, Bilge Water.
- c. Emission: Vaporization of oil/chemicals, burning fuel.

3.3 Tanker vessel: The main pollutants come from the burning fuel and the bilge throwing to the water. Tanker's operation is highly associated with bilge. Because of absent OWS (oily water separator) and inadequate facilities of port reception the bilge is to be thrown at sea. Table 2. illustrates the amount fuel consumption and bilge that are thrown by inland tanker vessel each year. [1]

Table 2. Amount of fuel consumption and bilge thrown by different categories of tanker ship.

Category	Fuel consumption tone/yr	Bilge Thrown tone/yr
Within 1000MT	7000	900
1050~1750MT	25000	250
>1750MT	8000	300
Total:	40000	1450

In addition to these pollutants' tanker ship contributes ballasts and tanker washing disposal at sea. As the main cargo of tanker is oil when the types of cargo changed which is to be carried by the vessel, the tank needs to wash and due to the inadequate shore facility, most of ships discharge the washed water at sea. Another important source of pollution is oil spill which may occur accidentally and let the solid cargo to mix with the river/sea. Recently at Karnafully River an accident took place which results 10 tons of diesel discharged at the river. This is just a recent example whereas throughout the year such accidents are being happened in many corners of our waterways which is an unmitigated threat to the aquatic life.

3.4 Cargoship: Currently 3728 cargo ship are plying in our country’s waterways. The highest portion of fuel consumption and bilge throwing are occurred on this sector. Although there is various source of pollution from cargo vessel but waste like solid and sewage are trivial can’t be identified, hence ignored. Table 3.Shows the overall fuel consumption and bilge thrown by cargo vessels yearly.

Table 3.Overall fuel consumption and bilge thrown by cargo vessels yearly.[2]

Length	Fuel consumption tone/yr.	Bilge Thrown tone/yr.
30m	35542	6068571
30~50m	258363	3001491
>50m	59397	8056871
Total:	3,53,302	17,126,933

3.5 Passenger vessel: It’s been considered that yearly near about 97 million people are being carried by passenger ships[2].Due to the cheapest media of transportation and moderate traffic, this is an uprising sector of Bangladesh and in near future this sector will going to be a major contributor of pollution. Consequently, the fuel consumption and bilge are increasing simultaneously as shown in Table 4.

Table4.Fuel consumption and bilge thrown by passenger vessels yearly[2].

Length	Fuel consumption tone/yr.	Bilge Thrown tone/yr.
30m	61429	4089
30~50m	115602	2529
>50m	50202	899
Total:	2,27,233	7517

Apart from these types of pollutants, passenger vessels are responsible for other solid wastes. This is because of several activities associated with millions of passengers. The waste management system on board is not adequate in Bangladeshi vessels where most people prefer to throw the disposal instead of accumulating it for shore discharge.

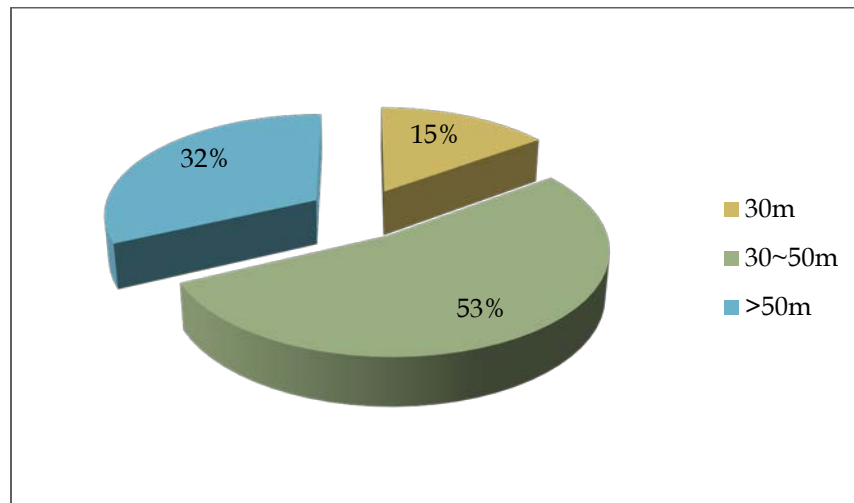


Figure1. Percentage of waste thrown by different types of passenger vessels.

3.6 Sand carrier: Sand carriers ply throughout out the country some of them are for building construction and rest of all are for filling lands. The main source of pollutants is bilge and emission. Table 5. Shows the Fuel consumption and bilge thrown by passenger vessels yearly.

Table 5. Fuel consumption and bilge thrown by sand carrier yearly.

Length	Fuel consumption tone/yr.	Bilge Thrown tone/yr.
30m	3,05,913	49,274
>30m	2,18,317	52,139
Total	5,24,230	1,01,413

3.7 CO₂ emission: The transportation system is responsible for 28% of global emission and shipping operations contributed 3% of this emission[3]. The main fuel for Inland vessels operation is diesel which contains 85.56% carbon[3] and 1 ton of diesel produce around .0026 ton of carbon dioxide[4]. Thus, the yearly total production of CO₂ from aforementioned vessels can be recapitulate as bellow:

- a. Tanker ship: $4,000(\text{tone/year}) \times 0.002626 \text{ tone CO}_2 = 10.4 \text{ tone CO}_2$.
 - b. Cargo ship: $353,302(\text{tone/year}) \times 0.002626 \text{ tone CO}_2 = 918.58 \text{ tone CO}_2$.
 - c. Sand carrier: $5,24,230(\text{tone/year}) \times 0.002626 \text{ tone CO}_2 = 1,363 \text{ tone CO}_2$.
 - d. Passenger vessel: $2,27,233 (\text{tone/year}) \times 0.002626 \text{ tone CO}_2 = 591 \text{ tone CO}_2$.
- Total:** 2,882.98 tone of CO₂.

This is an assumption of yearly CO₂ emission from our inland vessels which can be considered as a minimum quantity of pollution.

3.8 Effect: Inland shipping operation directly involved in polluting the air, water and aquatic life and overall it has a devastating impact on sea level rise, global warming and coastal degradation. Some of these are described below:

1. As because of huge co2 emission it is responsible for greenhouse effect.
2. Throwing waste and bilge contaminating the water integrity thus becomes a threat to the marine life
3. Coastal zones' environment become unhealthy which leads emerging of Several types of infectious diseases are the associated with this sort of pollution, for instance :Cancer and respiratory diseases because of consuming food and chemicals.
4. Inland vessel operations are responsible for damaging natural resources which indicate in future it will be arduous for us to survive.
5. As because of extinction of several species the consequence is directly connected to our ecosystem.
6. Fishing industry will be severely affected due to the oil spill or the toxic substances mixed with water cause the death of fishes, consequently, our economy will be indirectly affected.

4. Recommendation: Action must be taken as early as possible for ameliorating such situation. Number of effective actions remarked during the investigation which are:

1. Ship's operation needs to be monitored under efficient authorities, like Navy.
2. Port storage facilities can prevent throwing of waste at sea. Besides the special fleet can be introduced for the facilities to collect the waste.
3. Department of shipping must ensure proper maintenance and obligation of rules that are embodied in merchant vessel ordinance.
4. Public awareness must be created which can influence and create cooperation between government and the shipping industry.
5. In many countries the industries are paid for depositing the waste which can be very effecting while struggling hard to eradicate such pollutants.
6. More energy efficient engine can reduce the emission and fuel consumption.
7. The more the roughness of ship more the fuel consumption and CO₂ Emission. Ship's hull cleaning can bring effacing result. The friction can be minimized applying the paint which is anti-fouling. Tanker ship, Cargo ship & Ferry's fuel consumption can be reduced by 3%, 2% and 2%, respectively by cleaning the ship's hull.

5. Conclusion

As Bangladesh is dependent on inland vessel for its economy and in future this industry will rule our country in any aspects. The number of ships will be twice within a few decades. As the world is more conscious about the climate change and the environment pollution, our country must pay attention to the inland vessel's activities. It is considered that the existing rules and regulations are adequate for carrying out such industry smoothly but the situation still beyond our control because of lack of implementation. However, government's initiatives on this issue and the public awareness can play a vital role for mitigating such pollution and for keeping our water safe for the marine life.

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