

Toxic Plastic Waste: Situation of Disposal, Management and Trade of Bangladesh



A Country Situation Report By
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EXECUTIVE SUMMARY

The impressive financial development and ascend in degree of advancement, went with underlying changes in GDP, work and human settlements, are having a toll upon the climate of Bangladesh. For quite a while, the natural environment of Bangladesh has been rich water assets, ripe land, crop plenitude and lavish greenness. Interestingly, the natural degradation in the present Bangladesh is exemplified by the dark shade of the Buriganga river that has been the life-line of Dhaka inhabitants for quite a long time. Other than the commitment of emptying wastewater out of all around including that of the tanneries, found near the riverbank, it is the careless waste unloading that has severely degraded the situation of Buriganga today. The stream bed purportedly has aggregated loads of plastic sacks, a few feet high.

There is a dearth of scientific study in terms of investigating the premise of Bangladesh's plastic usage and waste generation. The gross production in the plastic industry, in the manner waste is being disposing of, the management of plastic waste and its impact on human health and environment- all of it are speculated and reviewed exclusively based on the existing literatures. Despite incorporating a colossal sum of plastic squanders, unfortunately, there is neither any viable data of the exact amount of waste it produces nor there is any specific plastic-waste disposal management guideline in Bangladesh. Worldwide several developed countries have adapted quite a few innovative ways to reduce their staggering stacks of plastic waste products as they have realized how much threatful the plastic is on their life and environment, as a whole on the country. As a solution, they have begun to export the plastic waste to developing countries to ensure their environmental safety from plastic pollution. Previously, china was receiving the greatest amount of plastic waste but in 2018, the Chinese government banned the import of 32 kinds of solid wastes including plastic waste. As a result of china's ban, from developed countries, a huge amount of mixed up, disorganized wastes blended with plastic waste were entering the countries of southeast Asia including Malaysia, Indonesia, Thailand, Vietnam, Taiwan and Bangladesh.

Hence, the reason for this desk-study is to look at the outside and inside components influencing the plastic waste industry of Bangladesh and to help to build the pavement to raise awareness by depicting the true scenario. Moreover, this report has also looked into adverse effects of waste imports on other sectors such as the destruction of the food chain and health impacts.

Once we've devoured anything that was plastic, it becomes 'waste'. As we proceed to utilize plastic items, we proceed to produce more plastic waste. In expansion to the usage of plastic product, more plastic waste is created from solid items, such as furniture, nondurable items, single use plastic bags. To lower the sum of created plastic waste, we must discover a way to decrease the sum of plastic waste by utilizing less or finding more productive ways of refusing plastic items. The benefits of plastic reduction will ensure saved energy, reduction in greenhouse gas emission and most importantly reduce the amount of waste to be recycled. Nevertheless, the wastes from plastic goods come to us as torment. The communities in Bangladesh have conventional and obsolete waste management practice. The waste does not get segregated at initial stage and dumped in mixed up manner.

We consume and discard the plastic products that is no longer of use without any responsible consideration of environmental damages and sustainability. On average, 3000 tonnes of plastic waste is generating everyday day in Bangladesh, which stays in mixed up form with other solid

waste and only 40% of total generated wastes get collected from the point of generation in unsegregated form and dumped in assigned location. Among the collected plastic waste only 70% recovered plastic waste claimed to be recycled. Some local collectors take away the plastic bags, bottles, cups and other recyclable things in informal manner but not all the recyclable waste are recovered due to this ill-sorted style of managing. So, a sizable portion of plastics remains in the dump sites and landfills which gradually takes their ways to sewerage, channels and eventually to main water streams which is unfortunately about 50% of total generated plastic waste.

Sadly, in Bangladesh, no different method exists for plastic waste collection and management. Plastic waste management is blended with solid waste administration here as there is no current practice of waste segregation at initial stage. Moreover, to make the circumstance troublesome, not all the created waste gets collected. Among two systems, in the conventional 'Formal System', the municipalities/city corporations are responsible for Solid Waste Management (SWM) whereas the 'Informal System' are represented by huge informal labor force involved in the solid waste recycling trade chain. In recycling sector, there are two groups known as formal and informal. Where the formal sector is industrialized and financially backed by government agencies, the informal groups, which act as front-line service provider and predominantly managed by the poor and less privileged people, stay out of the state control along with maintaining active links with the formal ones.

The plastic industry uses imported raw materials of polymer granules as there is no production of polymers in Bangladesh. According to Bangladesh Plastic Goods Manufacturers & Exporters Association (BPGMEA) around 14,09,094 million tonnes raw material has been imported in FY 2018-2019. The recycled plastic industry contributes around 2 billion (BDT) to the Bangladesh GDP and these industries export worth 4 billion (BDT)¹. Plastic waste has become a blessing to many developed countries because they use recycled plastic as a resource to produce new products. Bangladesh should adopt some guidelines along with technical advancement to manage the huge amount of plastic waste as high demand of plastic products inside and outside of our country is quite visible. However, in every step of management, considering environmental issues should be a top priority.

Developed countries have strict rules and regulations to manage their plastic waste. On the other hand, developing country like Bangladesh don't have such kind of adequate rules and policies for the management of regular and imported plastic waste. However, Bangladesh has already developed a legal framework for controlling transboundary movement of plastic waste. The Import Policy 2015-2018 has prohibited importation of any kind of waste into Bangladesh. Bangladesh is also a signatory to the Basel Convention that has restricted export of waste, and hazardous and plastic waste. However, illegal trading of plastic waste is occurring and mainly due to avoid external cost raised from the management of plastic waste in developed countries, and also to gain economic benefit by importer of developing countries.

This study is exclusively a desk assessment done by the Environment and Social Development Organization (ESDO) in light of IPEN- ESDO partnership under the IPEN Toxics- free SDGs Phase which have the primary objective to raise public awareness of the relationship between

¹ https://www.researchgate.net/publication/339566483_Export_Potential_of_Recycled_Plastic_A_Study_on_Bangladesh

plastic waste, toxic substances and pollutant impacts with the ultimate aim of minimizing such trade and its associated impacts on the environment and health.

BACKGROUND

The goal of this report is to recognize the current disposal system of vastly used plastic products (and their wastes) in Bangladesh and its contributing impact on human health and the environment. The demand for plastic items over the world is expanding day by day for its adaptability and low cost, Bangladesh is no exception here. Plastic pieces which are made from recycled plastic are amenable to duplicate into a diverse kind of items.

Plastics, as of now play an enormous part in our day to day lives. Plastic is utilized in every side of production. Tons and tons of plastic items are molded daily, indeed as the waste proceeds to pile up. From water bottles to credit cards, to the dashboard of a car, plastic is frequently an essential component. Due to the reality that most plastics are not biodegradable, a gigantic sum of plastic waste proceeds to construct up around the world, with industrialized countries contributing the biggest sum of plastic wastages. More particularly, the larger part of plastic waste comes from packaging and holders (e.g., shipping materials, cleanser bottles, refreshment bottles, etc.).

Numerous nations have embraced different innovative thoughts to dispose of plastic products and some of them, realizing the threat upon their own country, have begun to export plastic waste to other countries, for ensuring their environmental safety from plastic pollution. As a result, the waste products are being transported to other countries- which are mostly of developing status. Previously, China received the greatest amount of plastic squander. After the closing of China's entryways to import plastic waste in 2018, huge volumes of messy, blended plastic wastes from developed nations were redirected to Southeast Asia- Malaysia, Indonesia, Thailand, Vietnam, Taiwan and Bangladesh. This report also looks at the defilement of the food chain affected by waste imports and its associated health impact.

Bangladesh was one of the very first speakers against plastic and polythene. ESDO takes pride in its role as it was the first organization in 1990 to conduct comprehensive research into the adverse effects of the production and use of polythene in Bangladesh. Environmental consequences stemming from commercial production to the effects on soil, water (chemical contamination and drainage), atmosphere, plant and animals, agriculture, health, and the economy- have been successfully researched and documented and was employed as the basis for ESDO's nation-wide anti-polythene campaign.

ESDO, as a relentless vocal against Plastic, has fulfilled its duty even in the global pandemic. A study has been conducted by ESDO about how COVID-19 Pandemic influencing Single-Use Plastic Waste Outbreak (ESDO, 2020) from the beginning of lockdown, and the report has been published in July 2020². Prior to that, ESDO's other groundbreaking feature on plastic waste was on the use of Plastic Lamination in Posters and Leaflets. This desk assessment is another angle of light on this battle against plastic and plastic waste.

² https://esdo.org/wp-content/uploads/Summervy_Report_on_COVID-19-Pandemic-Pushes-Single-Use-Plastic-Waste-Outbreak_by_ESDO_2020-1.pdf

BANGLADESH: COUNTRY PROFILE

Bangladesh, formally the People's Republic of Bangladesh, is a country located in South Asia. It is the eighth-most populated country on the planet, with a populace surpassing 164 million people. As far as landmass, Bangladesh positions 92nd, spreading over 148,460 square kilometers (57,320 sq mi)³, making it quite possibly the most thickly populated nations on the planet. Bangladesh shares land borders with India toward the west, north, and east, Myanmar toward the southeast, and the Bay of Bengal toward the south. It is barely isolated from Nepal and Bhutan by the Siliguri Corridor, and from China by Sikkim, in the north, individually. Dhaka, the capital and biggest city, is the country's financial, political and social center (Ban).

Demographic, economic, market factors, urbanization and powers of globalization all have impact in waste generation rate and furthermore how are they managed – from practice of segregation at source, by any means, to sorting, assortment, transportation and disposal. The waste generation volume relies upon demographic and economic factors significantly. Population size and waste generation rate is firmly connected with level of financial turn of events, estimated by per capita income.

As a country at beginning phase of development, Bangladesh, being one of the populated nations of Asia and the Pacific, throughout quick financial development that is changing its well established provincial rural agricultural economy into an urban-industrial economy, is assailed with overwhelming nature of the environmental problems of all kinds. Of these issues most noticeable one is waste, especially in its metropolitan environment.



Figure 1: Map of Bangladesh

PRESENT STATE OF ENVIRONMENT AND WASTE

In Bangladesh, admittance to appropriate waste disposal services is limited, especially in metropolitan slum and low-income areas. Just about 42% of created squander is gathered in unsegregated way and unloaded at landfill destinations in totally mixed-up state, and the rest is left uncollected or undisposed. As much as 400 tonnes of waste are unloaded on the side of the road and in open spaces (Amin, 2017). Quite possibly the most unfriendly effects of poor waste administration, particularly municipal waste, is the rate and prevalence of sicknesses, for example, malaria and respiratory issues, just as different diseases through the pollution of ground water.

³ <https://en.wikipedia.org/wiki/Bangladesh>

Biomedical waste represents an incredible peril in Bangladesh as a report assessed that 20% of the biomedical waste is 'profoundly infectious' and is a danger since it is regularly discarded into the sewage frameworks or channels. Solid waste prompts blockages in the seepage framework which lead to flooding in the roads. Therefore, mosquitos and awful smell are likewise among the negative effects.

Much of the mechanical and a considerable bit of unmanaged municipal and urban waste of Dhaka city are flushed into the most polluted water body in Bangladesh which is Buriganga river. It is assessed that absolute organic waste load released into the waterway is around 250 metric tons for every day. According to Department of Environment, Government of Bangladesh, the Buriganga, close to Dhaka, shows Biochemical Oxygen Demand between 20-180 mg/l. Tanneries all over Bangladesh, especially those in the Hazaribagh territory of Dhaka, added to extreme water contamination. Around 250 distinctive harmful synthetic chemicals and heavy metals like cadmium, chromium, arsenic, zinc, and so on are utilized by the leather business. These substantial metals enter the water bodies causing serious results in the bodies of living organisms (Amin, 2017).

Discarding waste in present manner has tremendous environment effects and causing major issues. Some waste will ultimately compost, yet not all, and in the process, it smells, and producing methane gas, which is explosive and contributing to Greenhouse effect. Leachate created as waste deteriorates is causing contamination. Poorly managed landfill areas are drawing in vermin and causing litter.

The segregation of waste at initial level of generation is not practiced in Bangladesh. The wastes are dumped in unsorted manner and all the waste including compostable waste, non-biodegradable plastics, infectious medical waste as well as electronic waste make their way to the landfills in blended state. Some informal pickers pick up the valuables like plastic bottles from the dumpsites but due to the mixed-up state, it is not manually possible to recover and sort the waste categorically. There is a practice of burning waste exercised locally as a waste management procedure. Burning waste are causing issues, as plastics is delivering harmful substances, for example, dioxins, when they are being incinerated. Gases from burning is causing air pollution, while the debris from incinerators may contain heavy metals and different toxins. As a consequent, Bangladesh has been named the world's most polluted country for PM2.5 exposure while Dhaka has emerged as the second most polluted city in the 2019 World Air Quality Report.

The legal framework for environmental protection in general and waste management/3R strategy in particular got a big boost from the 2011 amendment of the constitution which for the first time has created a constitutional foundation to legislation for environmental protection and management⁴. All legislative development at national level is mutually reinforced for providing an essential legal basis for implementing the 3R strategy at sectoral and local levels.

⁴ https://www.researchgate.net/publication/322332160_Bangladesh_Country_Chapter_State_of_the_3Rs_in_Asia_and_the_Pacific

PLASTIC WASTE: BANGLADESH SCENARIO

Plastic came into presence in the 19th century but got recognition after the 1950s. From that period, scientists assume that nearly 9.2 billion tons of plastic have been created, and 6.9 billion tons have gotten to be squandered, and 6.3 billion can never be reused (PARKER, 2018). The circumstance is pulverizing the life of the creature in the ocean perilously, and 13,000,000 tons of plastic leak into ocean each year⁵ (Pla4). Since the origination of plastic, our whole planet is at risk. Most utilized plastic materials are non-biodegradable which is why the heavy load of plastic wastages is progressively getting to be a worldwide environmental and economic challenge. Plastic waste is a danger to public wellbeing as it enters our environmental food chain, makes clog issues in channels, causing flooding, winds up in waterway beds and seas, depleting ecosystems and marine biodiversity, makes solid waste management more expensive as landfills and open incineration do not provide an acceptable solution for disposal.

Unfortunately, because of the ever-increasing use of plastic in different industries, especially packaging, Bangladesh remains one of the top plastic polluted countries. Images of clogged rivers as a result of haphazard disposal of plastic bottles partly depict the gravity of the problem.

In the year of 2015, almost one-third of the total population of Bangladesh live in the urban areas, which was only 4.33% in the year 1951. This large migration of the people to the urban locality can be marked as the ambition to lead a better standard life, boost up economical level and eventually threatening the ecological balance through waste generation and among total generated waste plastic comprises 8% every year which is numerically 800,000 tons⁶. A remarkable amount of plastic waste is generated from the food manufacturer and an estimation revealed that the amount is close to 70,400 tons from 500 food processing industries of Bangladesh (Monjur Mourshed, 2017). In the FY 2010–2011 with a per capita consumption of 5 kg whereas the world's average per capita consumption was 30 kg. However, plastic and its impact on human health is poorly understood in Bangladesh as the cost-effective nature of it is highly focused here.

This desk assessment report exclusively studied the current scenario from various surveys and study reports done by ESDO and also acknowledges input from secondary sources cited in the reference. The chapter focuses on three major areas which are plastic waste disposal, plastic waste management, and health and environmental impact of plastic waste. It also considers the aspects of plastic waste trade, legal guidelines, and the implication of the Basel Amendment.

⁵ <https://www.un.org/pga/73/plastics/>

⁶ <https://tbsnews.net/environment/bangladesh-drowns-8-lakh-tones-plastic-waste-year>



Bangladesh Plastic Sector

- Domestic Market
Tk. 7,000 Crore (US \$950 million)
- Per Capita Consumption
5 kg/year
- Direct Export Earning
Tk. 500 Crore (US \$ 69 million)
- Deem Export: RMG Accesories
Tk. 2000 Crore (US \$286 million)
- Recycling Sectors
About 300
- Growth
20 percent per annum during the 1990s
- Employment
Half a million workers are employed in the sector

*Source: UN-ESCAP Report-2009



Overall Discarded Single Used Plastic

- Total discarded single-use plastic (82,824 tons annually) comes solely from food and personal care packaging (food wrappers and sachets)
- In 2014, the number of consumed plastic polybags were recorded as 10 million
- 14 million pieces of polythene bags are used every day in Dhaka city
- 33% of the total generated single-use plastic wastes are sachets



Discarded Plastic During COVID-19 Situation

- About 11.2% of plastic waste apparently coming from the use of surgical face masks
- 21.5% from polythene made normal hand gloves
- 20% from surgical hand gloves
- 40.9% from the single use polythene shopping bags used for carrying food items
- 6.4% from empty containers of hand sanitizers

*Source: (KG, 2016); (Markus Klar, 2014); (ESDO, 2020); (Islam, 2019)



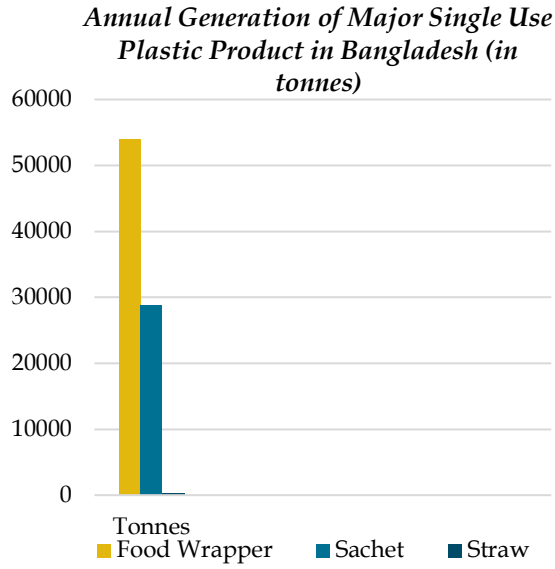
Figure 2: Bangladesh Plastic Scenario at a glance

*Source: (KG, 2016); (Markus Klar, 2014); (ESDO, 2020); (Islam, 2019)

In Bangladesh, food and personal care packaging are the largest contributor to single-use plastic waste. Sachets are also an emerging source of single-use plastic waste, which are used mostly for packaging food items and personal care products in small quantities such as – ketchup, coffee sachet, mini packs, and tetra packs of shampoo, conditioner, toothpaste, etc. The sachet is because of its growing popularity in both urban and rural areas. Sachets are completely non–recyclable and hence are considered as major sources of single-use plastic pollution around the globe.

It can also be deduced that plastic wastes are mostly generated in urban areas of the country with a certain portion from rural usage. Our previous study reveals that, of the total generated annual plastic waste, around 78% (68136 tons) is generated from urban areas whereas the rest of the 22% (18,571 tons) emerges from usage in rural areas.

The predominant consumer group in the capital city that has been identified as users fall within the age group of 15- 35 years contributing to 68% of the total usage- depicting the shocking statement of a vast amount of plastic usage among the young group and the degrading consciousness.



Single Use Plastic Food Packaging Consumption by Age Group In Dhaka

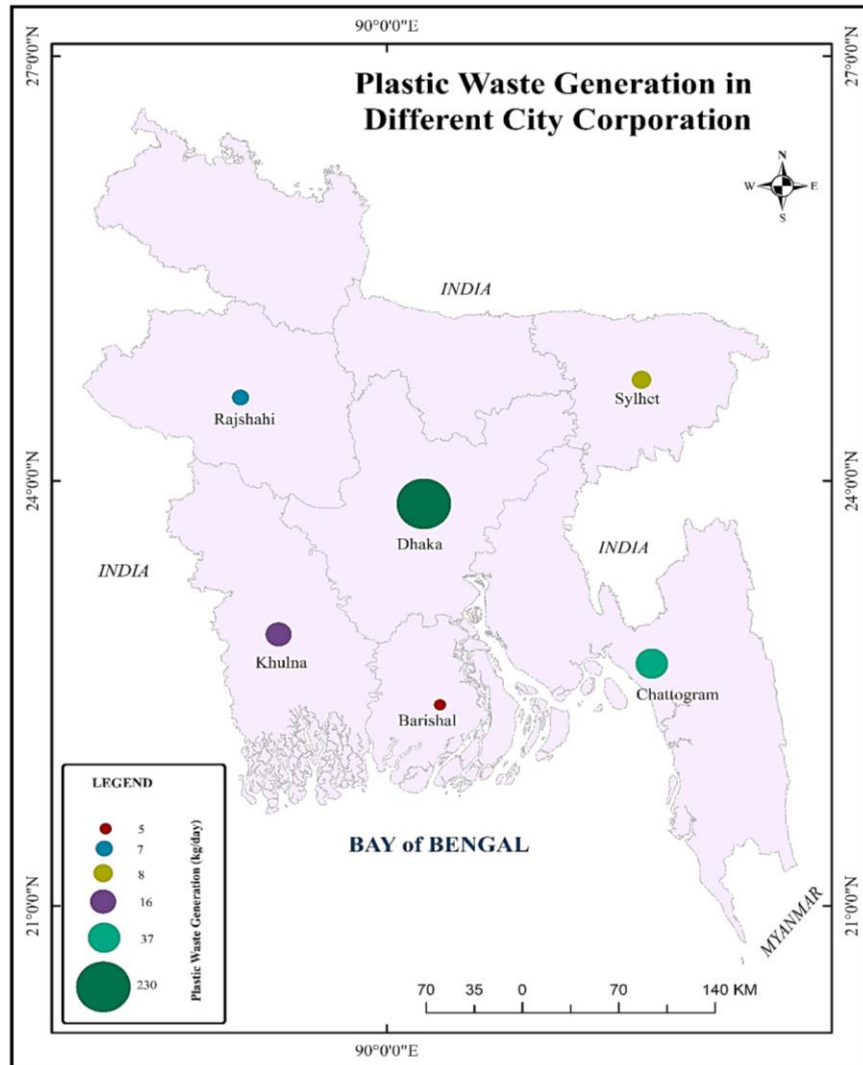
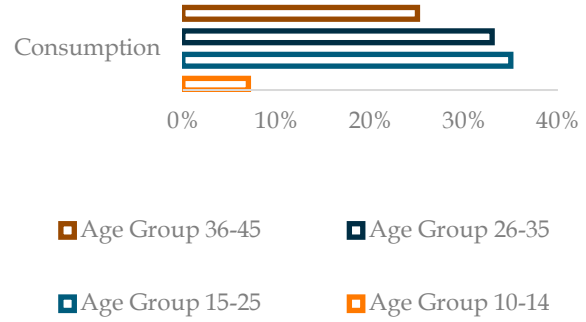


Figure 3: Plastic Waste Generation in Different City Corporations (kg/day) [Source: (M. Alamgir, 2007)]

Plastic Waste Disposal Scenario

Plastic products that cannot serve any more are used for landfilling, incineration even throwing to the water body such as pond, river and even sea in Bangladesh. Plastic packaging, being one of the highest contributors to plastic-waste in Bangladesh, is easily found in ponds, canals, and water bodies clogging the drainage system.

In 2017, a study was reported by Environment and Social Development Organization-ESDO, showing that most of the used plastic and polythene end up in landfills and water bodies across the country. There is no process to collect or recycle them. Among the high amount of plastic waste, about 50% of the plastic are dumped in the open places, canals, drains. The situation is worse in urban areas but not that different in rural area. In Dhaka city, 45 to 55% of the total waste (2,200 ton/day) are unmanaged waste (less than 4 m depth) and dumped in open space.

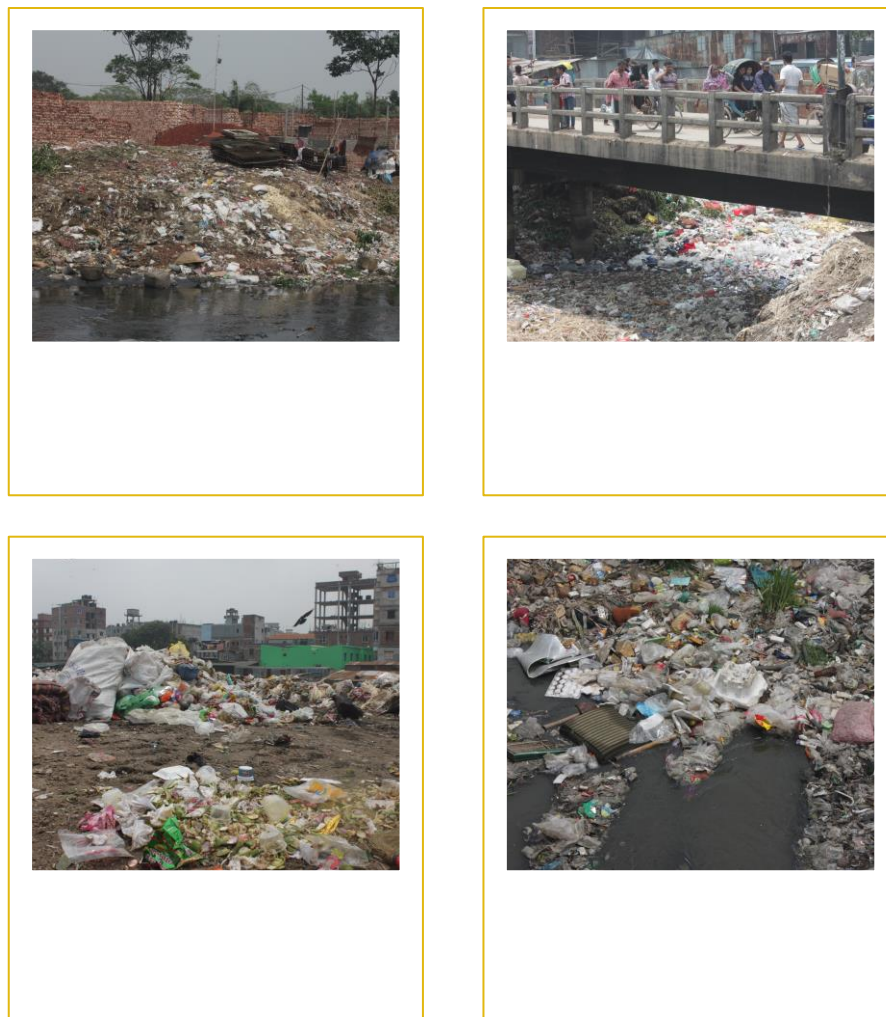


Figure 4: Plastic Waste Disposal Scenario Dhaka, Bangladesh (Source: ESDO)

The major problem with plastic waste disposal in Bangladesh is that people dispose their waste in unsorted way. Organic waste, solid waste including plastic, medical waste, e-waste all are dumped in one bin at the households and collected in the similar unsorted manner for disposal. It is not possible to recover all the recyclable materials from this blended waste even if advance

technologies for recycling are introduced. So, waste segregation at primary stage is of major concern if we wish to address the issues associated with plastic waste management.

Additionally, as the recycling practices in Bangladesh are still in grow up state, people find it simpler to dump the waste recklessly near roadside or in the river or sea shore rather than reuse through recycling. Recyclable waste segregation at initial stage, cost of recycling, lack of available technologies are the driving forces of landfilling or dumping of waste plastics in the water body such as channels, lakes, rivers and even to sea which consequently affects the infertility of soil and contamination of water to a greater extent. Moreover, open dumping of the unsorted solid waste combined with plastic waste is a common practice among mass people which causes adverse effect on the environment through the emission of greenhouse gas.

Despite desperate efforts, the authorities have failed to clean the sewers, and more importantly, to make people responsible about using and disposing plastic bags. From time to time, there have been government efforts to popularize organic packaging materials such as jute and cotton, but in vain. In spite of being aware of the detrimental effects of plastic, 61% of the people in the country use polythene bags.

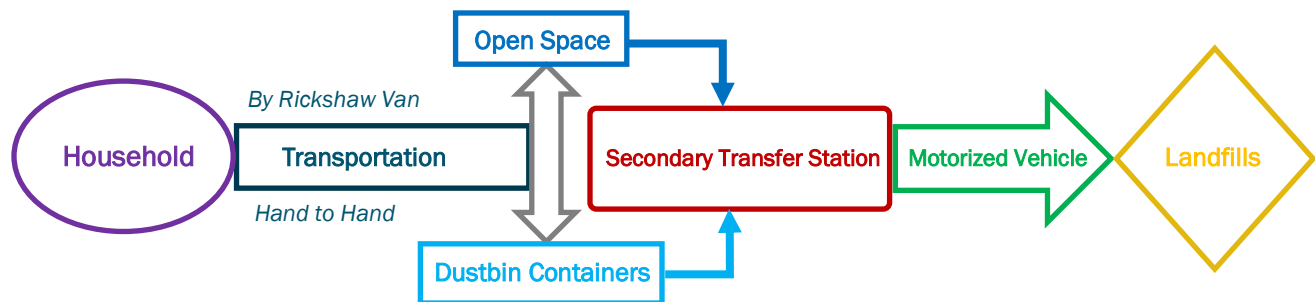


Figure 5: Conventional trend of plastic waste disposal in the household of Bangladesh



Bangladesh Plastic Waste Disposal Scenario

- 0.79 MMT plastics are openly dumped per year in the land without further processing
- 0.12–0.31 MMT per year finds their way in the sea
- 50% of the plastics is collected through the waste pickers
- 37% of Plastic waste in Dhaka city remains sprinkled at the open places, in drains or in the roadsides
- 36% of plastic waste is recycled in informal sector
- 39% of plastic waste dumped in landfills
- 25% of plastic waste is leaked to environment

*Source: (Castaldi, 2014); (Jenna R. Jambeck, 2015); (Tania, 2014)

Plastic Waste Management Scenario

The development of population, the norm of living, climatic condition, quick urbanization, and absence of specialized information and on top of those poor socio-economic conditions plays a vital role to transform Bangladesh into Least Developed Asian Countries (LDACs) and Bangladesh is paying an overwhelming toll due to impromptu and lacking waste management practices, especially those which begin in urban zones, experiencing serious difficulties for its organic and inorganic solid waste management in the recent years.

Hence, as discussed previously, waste management system in Bangladesh is not well organized and sustainable and woefully there is no different method for plastic waste collection and management. Plastic waste management is incorporated with solid waste management here as there is no existing practice of waste segregation so recyclable products like plastics get separated at source for further management. Additionally, to make the situation unfavorable, not all the generated waste gets collected. In Dhaka, the capital city of Bangladesh, practically 40% of total waste goes uncollected (Kabir, 2015) which does to dispose in safer way. Even among the collected waste, the plastic recycling industry in Bangladesh claim to be recovering about 70% of the plastic waste that is being generated in the country. Unfortunately, the remaining 30% still amounts to about 17,000 tonnes annually (Molla, 2018).

There are formal and informal systems associated with waste management in Bangladesh. In the 'Formal System', the municipalities/city corporations are responsible for Solid Waste Management (SWM) which is based on the conventional system of collection-transportation-disposal of waste carried out by the local authorities. Unfortunately, in this system the concept of waste segregation and recycling is absent. The 'Informal System' can be represented by the large informal labor force involved in the solid waste recycling trade chain.

In urban areas, large contingent of sweepers sweep the cities every day in Bangladesh in three different groups. The first group cleans the roads and streets and collects the rubbish onto manually drawn carts or bamboo baskets. This collected rubbish is then dumped in some intermediate collection points. The second group cleans the roadside drains and collects the silt and unsegregated solid wastes (which have fallen into the drains) and either carry them to the nearest intermediate dump site, garbage bin, or make another pile on the side of the roads. The third group of people collect the wastes from these sites and haul them to landfills. This system is not sustainable as all the placed waste are unsorted. Additionally, before they are collected by the trucks, the wastes swept from the roads are piled on the side of the roads. Moreover, animals and scavengers dig into the piles made-up of swept up wastes and scatter it. Besides, moving vehicles scatter overflowing garbage from the piles. This already collected waste then flows to the roadside drains. These wastes then have to be recollected by the second group of collectors. So, this repetition results in the waste of labor and money as well as loss of recyclable waste.

To guarantee better administrations to the resident, the Dhaka City Corporation (DCC) has been separated into two sections in particular Dhaka North City Corporation (DNCC) and Dhaka South City Corporation (DSCC) by the Local Government Act 2009. To smoothing the waste assortment measure, every one of the wards has been assembled into five zones with significant measure of strong waste administration workplaces and authorities.

Table 1: Waste management potentials of DSCC and DNCC [*Source: (M. Alamgir, 2007)]

	DNCC	DSCC
Total area (sq. km)	82.68	43.64
Number of wards	36	57
Number of zones	5	5
Waste generation rate (tons/day)	2700	3300
Waste disposal site	Aminbazar	Matuail
Number of SWM offices	7	10
Number of SWM officials	257	352
Cleaner	3586	5300
Waste management drivers	108	183
Numbers of waste carrying containers	180	270
Number of waste collection trucks (EGAP vehicles 4.05 ton/trip, former city corporation motor vehicles 2.75 ton/trip)	115	235

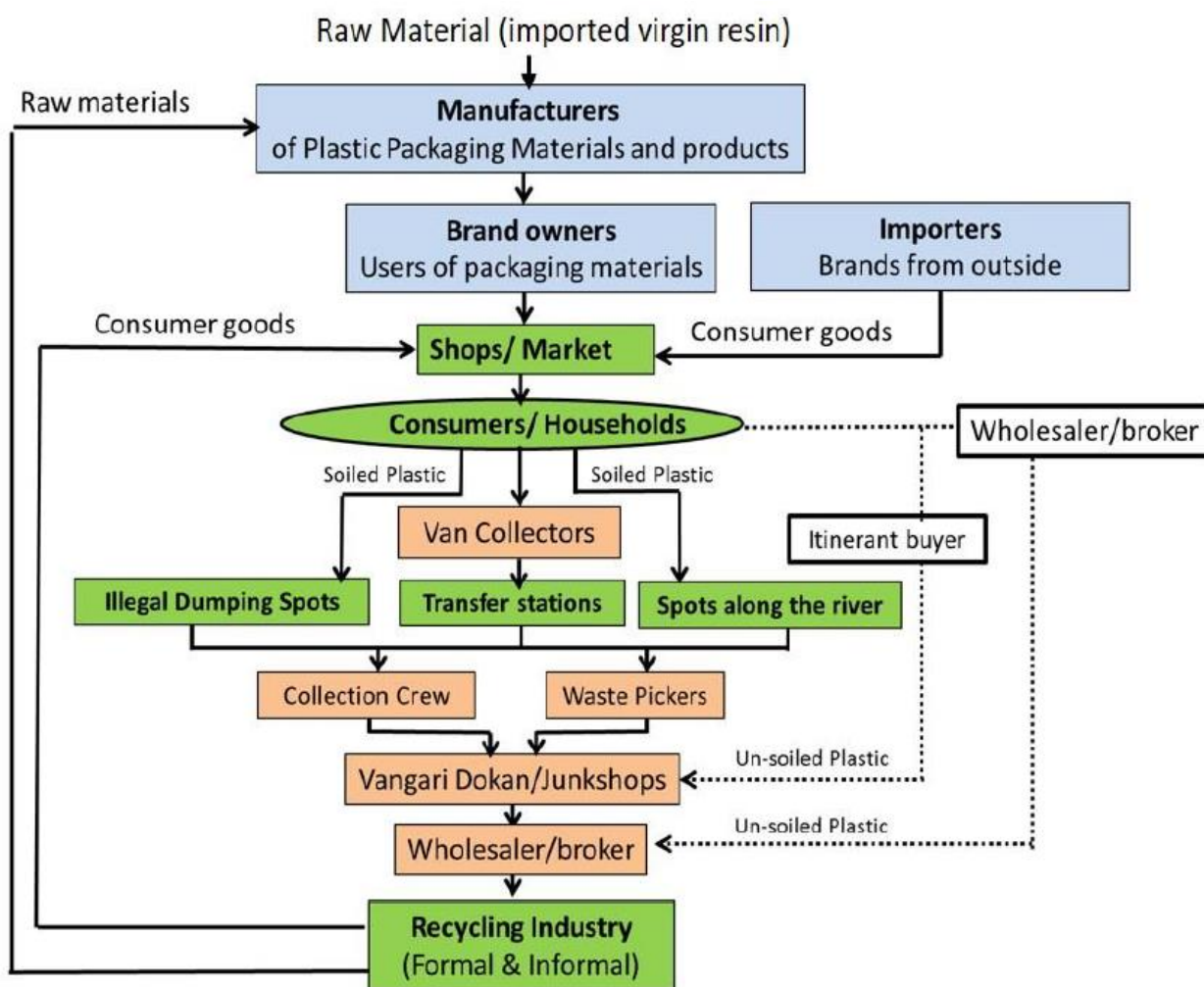


Figure 6: Plastic recycling trade chain in Bangladesh [*Source: (DoE, WasteConcern, The World Bank, 2020)]

In Bangladesh, there are two groups who are associated with the recycling of plastic known as formal and informal (H. Zia, 2009). Formal sector is industrialized and financially backed by government agencies. Whereas, informal groups stay out of the state control along with maintaining active links with the formal ones (Mesharch W.Katusiimeha, 2013). In addition, the informal groups act as a front-line service, in turn, put an impact on the whole system. In Bangladesh, informal recycling is mainly managed by the poor and less privileged people. They collect the plastic product and sold to the buyers in order to conduct the recycling process (Chukwunonye Ezeah, 2013).

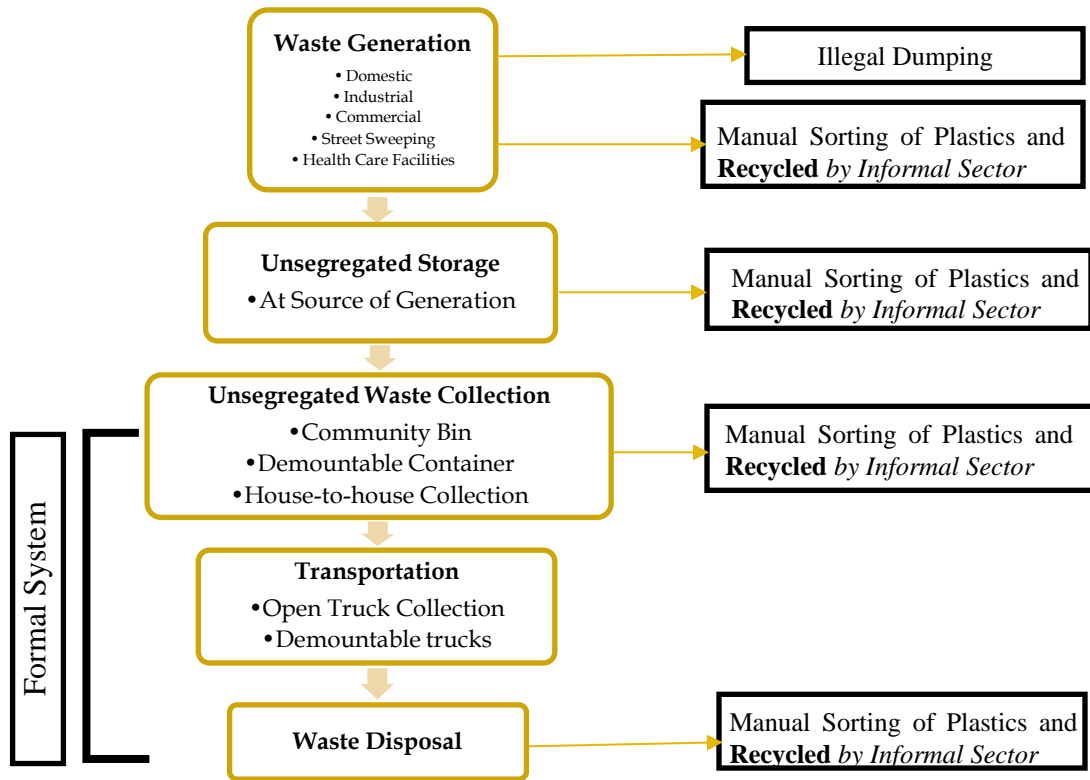


Figure 7: Solid Waste (Plastic) Management System of Bangladesh

To recapitulate, the most common plastic waste management follows the steps, which are the manual collection of plastic waste from the unsegregated solid waste, treatment of plastic waste like composting, incineration and disposal (landfills) of plastic waste. In Bangladesh, open dumps and open burning are the main procedure to dispose of plastic waste although the collection of plastic waste takes 80–90% of total plastic waste management budgets (Modak P).

IMPACT OF TOXIC PLASTIC WASTE

Plastic is made up of harmful chemical components that get released into the environment upon disposal. The chemicals eventually enter the food chain and reach the human body causing severe health impacts including – damage to the endocrine, nervous, respiratory, cardiovascular, renal, and immune system. Plastic waste also gives rise to the degradation of ecological components. This includes water quality degradation, soil fertility deteriorations, temperature increase, pollution, an increase in vector-borne diseases, etc. Wastes from plastic are also major sources of marine pollution and have been endangering the lives of thousands of marine organisms worldwide. In recent studies, there are reports on finding microplastic in bodies of fish and other marine animals.

A bulk of the plastic waste gets trapped in the sewers of the major cities. Trapped in the pipes and drains, especially of densely populated capital Dhaka and the second largest city Chittagong, this plastic waste has caused the sewerage systems to break down repeatedly. Also, to mention that Bangladesh has an annual rainfall of up to 5 meters and holds the world record for the highest rainfall in a single day (Wor) Which wash away improperly manage plastic waste into streams and drain ways inducing transboundary movement of plastic wastes.

Natural degradation of plastic begins with photodegradation, which leads to thermooxidative degradation. Ultraviolet light from the sun provides the activation energy required to initiate the incorporation of oxygen atoms into the polymer. This causes the plastic to become brittle and to break into smaller and smaller pieces, until the polymer chains reach sufficiently low molecular weight to be metabolized by microorganisms. These microbes either convert the carbon in the polymer chains to carbon dioxide or incorporate it into biomolecules. However, this entire process is very slow, and it can take 50 or more years for plastic to fully degrade.

Due to improper management and lack of reasonable consideration of people, the plastics goes down the drain and eventually it goes into our oceans which is the reason of transboundary movement of plastic wastes via waterways. Plastics from things like wet wipes, microbeads in cosmetic products and all manner of tiny plastic fragments escape to the ocean this way. If the Kalsi canal in Mirpur is visited, undoubtedly the trench will be confused with a landfill inferable from it being chock-a-block with a thick layer of plastic waste. Where the water can be seen, it gives off an impression of being dark in shading and defiled with waste. The malodor penetrates around the region making it difficult for a person to stroll without a face cover.

Incineration of plastic waste in an open field is a major source of air pollution. Most of the times, the Municipal Solid Waste containing about 12% of plastics is burnt, releasing toxic gases like Dioxins, Furans, Mercury and Polychlorinated Biphenyls into the atmosphere. Additionally, burning of Poly Vinyl Chloride liberates hazardous halogens and pollutes air, the impact of which is climate change. The toxic substances thus released are posing a threat to vegetation, human and animal health and environment as a whole. Polystyrene is harmful to Central Nervous System. The hazardous brominated compounds act as carcinogens and mutagens. Dioxins settle on the crops and in our waterways where they eventually enter into our food and hence the body system. These Dioxins are the lethal persistent organic pollutants (POPs) and its worst component, 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD), commonly known as agent orange is a toxic compound which causes cancer and neurological damage, disrupts reproductive thyroid and respiratory

systems. Thus, burning of plastic wastes increase the risk of heart disease, aggravates respiratory ailments such as asthma and emphysema and cause rashes, nausea or headaches, and damages the nervous system (Rinku Verma).

Environmental Pollution

Plastic has globally been recognized as one of the major environmental threats of recent times. Communities around the world are taking preventive measures to address the issue. However, In Bangladesh, the issue is yet to be addressed with greater priority owing to a lack of public awareness. ESDO's current study reveals that nearly half of the total SUP consumers (around 50%) from urban areas lack the knowledge on the adverse impacts of plastic pollution. The condition is worse in the case of village dwellers. Lack of appropriate awareness has led to undermining the importance of the issue in ensuring environmental health and safety. However, the majority of the study population (60%) has expressed their interest in adopting alternatives to single-use plastic. The major challenge, in this case, is the existing culture of production and consumption that is based upon the preference for plastic, particularly in the case of packaging. People have opined that the producers need to come forward and adopt sustainable solutions in this regard that will ultimately revolutionize the existing system.

Approximately more than 10% of household waste is plastics and mostly end up on the landfill (Jefferson Hopewell, 2009). Environmental pollution and risks to public health can be reduced if the landfills are well-managed, although there are possibilities of soil and groundwater contamination by disintegrated plastic byproducts and additives that can persist in the environment on long-term basis (Jörg Oehlmann, 2009).

An alternative to landfilling of plastic waste is incineration, but growing concerns exist about the potential atmospheric release of hazardous chemicals during the process. For instance, plastic waste fumes release halogenated additives and polyvinyl chloride, while furans, dioxins, and polychlorinated biphenyls (PCBs) are released from incineration of plastics into the environment. Incineration of plastics is usually accompanied with the formation of chark, and the coking extent is dependent on the conditions of incineration. In the process of incineration of plastics, soot, ashes and different powders are produced, which eventually settles on plants and soil, with the potential to migrate to the aquatic environment. Rainfall can make some of these toxic compounds to sink into the soil, contaminate the ground water or absorbed by plants growing on this soil, thus, becoming incorporated into the food chain. Some of these plastic incineration products can chemically react with water and the resulting compounds can alter the pH thereby change the functioning of aquatic ecosystems (Okunola A Alabi, 2019).



Air Pollution

• Carbon dioxide and methane are released into the air when plastic wastes which were landfilled finally decompose. During the decomposition of solid waste in landfills in 2008, an estimated CO₂ equivalent (eq CO₂) volume released into the atmosphere was 20 million tonnes. CO₂ is also released into the atmosphere during the burning of plastics and plastic products, and this CO₂ is capable of trapping radiant heat and hinder it from escaping from the earth causing global warming. Air pollution is one of the major environmental threats to public health, and it is responsible for more than 6 million deaths associated with environmental pollution. The role of plastics in air pollution in the developing and poor countries like Bangladesh of the world cannot be overemphasized, and the impact on the future generations may be massive.



Water Pollution

• Dredging work in the Karnaphuli River was slowed because of a deep layer of polyethylene in the riverbed. Approximately 165 million tonnes of plastic wastes were estimated to be present in the oceans of the world in 2012, while an average of 8 million tonnes of plastics are annually released into the ocean, with about 5 trillion plastic pieces floating on the ocean. During plastic degradation process, toxic chemicals like polystyrene and BPA can be released into the water causing water pollution. Wastes found in the oceans are made up of approximately 80% plastics. Around 73,000 tonnes of plastic waste end up in the sea every day through the Padma, Jamuna and Meghna rivers. In addition to the domestic waste, plastic waste from India, Nepal and China flowing down the Ganges, Yamuna and Brahmaputra end up in our waterbodies, including rivers and canals. The scale of the problem is as massive as it gets. The use of microbeads released from cosmetics and toiletries and has focused on the final sink (i.e., rivers and the Bay of Bengal) and the detrimental effects on aquatic animals.



Soil Pollution

• Dumping of plastics on land or landfilling plastics leads to abiotic and biotic degradation of the plastics, where plastic additives (e.g. stabilizers, harmful colorant moieties, plasticizers and heavy metals) can leach and eventually percolate into various aspects of the environment, thereby causing soil and water contamination. In Bangladesh, extensive use of single-use plastics and the indiscriminate management of these in suburban areas, accompanied by improperly managed landfills lacking waste separation procedures, have been reported as the primary and secondary sources of micro plastics in agricultural soil in the region. Some pilot-phase projects led by the United Nations Development Program and Environment and Social Development Organization (ESDO) have revealed the existence of MP pollution in both the terrestrial and marine ecosystems of Bangladesh.

Source: (Okunola A Alabi, 2019); (Islam, 2019); (ESDO, 2016); (Aniruddha Sarker, 2020)

Green House Gas Emission and Climate Change

The waste sector is a significant contributor to GHG emissions accountable for approximately 5 per cent of the global greenhouse budget with total emissions of approximately 1,300 metric tonnes of CO₂-equivalent as reported by the Intergovernmental Panel on Climate Change (IPCC).

The waste in Dhaka comprises mainly of organic waste which can produce landfill gas (methane) upon decomposition. Methane only stays in the atmosphere around 8-12 years while carbon dioxide can last for centuries. But methane (CH₄) has a bigger effect in its short time—methane is responsible for 75% as much warming as carbon dioxide measured over any given period of 20 years. This means methane reductions could have an immediate beneficial effect on our climate, faster than comparable reductions to CO₂ (S.M. Shamimur Rahman, 2010). To calculate methane emission the following expression from IPCC (Intergovernmental Panel on Climate Change) tier-1 can be considered:

$$\text{Methane Generation} = (A \times B \times C \times D \times E \times F \times G - R) \times (1 - OX)$$

Where,

A = Total Municipal Solid Waste (MSW) generated (Giga gram)

B = Fraction of MSW disposed at landfill sites (Giga gram)

C = Methane correction factor

D = Fraction of Degradable Organic Carbon (DOC) in MSW

E = Fraction of Degradable Organic Carbon (DOC) which actually degrades

F = Fraction of Carbon (C) as methane

G = Conversion factor from Carbon (C) to methane (CH₄)

R = Recovered methane (Gg/year - 0 in Dhaka city to consider)

OX = Oxidation factor (0 in in Dhaka city to consider)

[The methane correction factor can be considered as 0.4 due to unmanaged landfill site in Dhaka city based on Inter Governmental Panel of Climate Change IPCC 2006 guidelines. From the previous study of Bangladesh Centre for Advanced Studies (BCAS), Fraction of Degradable Organic Carbon (DOC) in MSW can be considered as 15%. Moreover, the fraction of actual Degradable Organic Carbon (DOC) in MSW is 77% which value is close to that in other South Asian Countries. Fraction of Carbon (C) as methane can be considered as 0.55 based on IPCC value (range 0.50 to 0.60). In Bangladesh, the recovered methane is considered zero. If considered that there is no burning in any landfill site, Oxidation factor can be taken as zero too]

It was found from the calculation that, there are about **26.89 Giga gram (Gg) methane (CH₄) emitted from municipal solid waste at Dhaka city 2010**. It is also found from the GHG emission calculation on the basis of IPCC Guideline tier-1 that there are 20.5 Gg and 16.96 Gg methane emitted from the landfill site at Dhaka City for 1670 ton and 1375 tonnes municipal solid waste in 2005 and 2001. Existing waste-management practices offer a fairly decent GHG emissions mitigation potential. Dumpsites are the largest GHG emitters in the waste sector.

The manufacture of one pound of PET can produce up to three pounds of carbon dioxide. Processing plastic resins and transporting plastic bottles contribute to a bottle's carbon footprint in a major way. On an average, 400 crore PET bottles are manufactured every year in Bangladesh and most of them are discarded after being used only once¹. Estimates show that one 500-milliliter (0.53 quarts) plastic bottle of water has a total carbon footprint equal to 82.8 grams (about 3 ounces) of CO₂ (Marie-Luise Blue). So, a minimum **16560000000 grams of Carbon footprint** is producing every year if considered the PET bottles are of minimum size (250 mL).

Health Hazards

Health impacts of the plastic waste management system is on inhalation, ingestion, and skin contact. Recycling plant and recycled products emit and leach various toxic chemicals. Among them are heavy metals, dioxins, and furans, PAHs, toxic recycled chemicals are significant. Also, toxins from emissions, fly ash, and slag in a burn pile can deposit in soil and water and can eventually get deposited in the tissues of plants and animals. In the long run, it creates impacts like skin disease, cancer, neurological damages, and also affects the immune system, reproductive system, and endocrine system.

Environmentalists state that plastic can exist in soil and water for quite a while as it isn't biodegradable and it might transform into leachate and, through heat, get blended in with the food chain and enter human body causing illnesses and, in the long run, death. It likewise step by step gets partitioned into little particles and return to animal body through their food chain. A total of 443 Micro Plastic items were recently identified in the intestines of marine fish species in the Bay of Bengal, supporting the idea that Micro Plastic in marine fish should be treated as a threat to public health. The quantification of Micro Plastic in shrimp from the Bay of Bengal was also documented, where diverse Micro Plastic were found in the range of a mean abundance of 3.40–3.87 items/g GI tract of shrimp. The most commonly identified Micro Plastic particles were black fibers and filaments. Some studies showed that the Micro Plastic could be transferred to humans if the shrimp were eaten without removing the intestines (Aniruddha Sarker, 2020).

In Bangladesh, exposure during the time of extraction and refining of plastic is relatively low. Most exposure occurs during the use, disposal, and recycling of plastic products. At the point when burned, plastic deliveries perilous synthetic compounds, for example, hydrochloric acid, sulfur dioxide, dioxins, furans and heavy metals just as particulates. Outflow of such components is known to cause respiratory afflictions and stress the human resistant framework.

The use of recycled plastic in food packaging is highly dangerous as producers use some additive chemicals for easy manufacturing of plastic containers or packets in suitable shapes and it may even cause cancer. Micro plastic can also enter human and animal body through breathing.

HEALTH HAZARDS RELATED TO CURRENT PLASTIC WASTE MANAGEMENT PRACTICE

Risks to Waste Pickers

Informal waste pickers, who most often operate without any protective measures, are exposed to a wide range of health risks such as:

- HIV (due to handling of hospital waste)
- Tetanus (due to handling of jagged metals of recycling industries)
- Respiratory problems (due to exposure to smoke when incinerate)
- Injuries
- Stress

Risks to Communities

- There is a significant increase in the incidence of sickness among children who live in households where plastic garbage is dumped or burned in the yard
- Uncollected plastic waste clogs drain and causes flooding and subsequent water-borne diseases.
- People living downwind of a burning dumpsite will likely suffer from respiratory diseases.
- Contaminated liquids or leachate, leaking from dumpsite could pollute city's drinking water supplies.
- Plastic waste dumps potentially serve as breeding ground for Malaria, thus having implications in achieving Sustainable Development Goals (SDGs).
- Skin and gastric problems

Source: (Gunn, 2009); (UN-HABITAT, 2009)

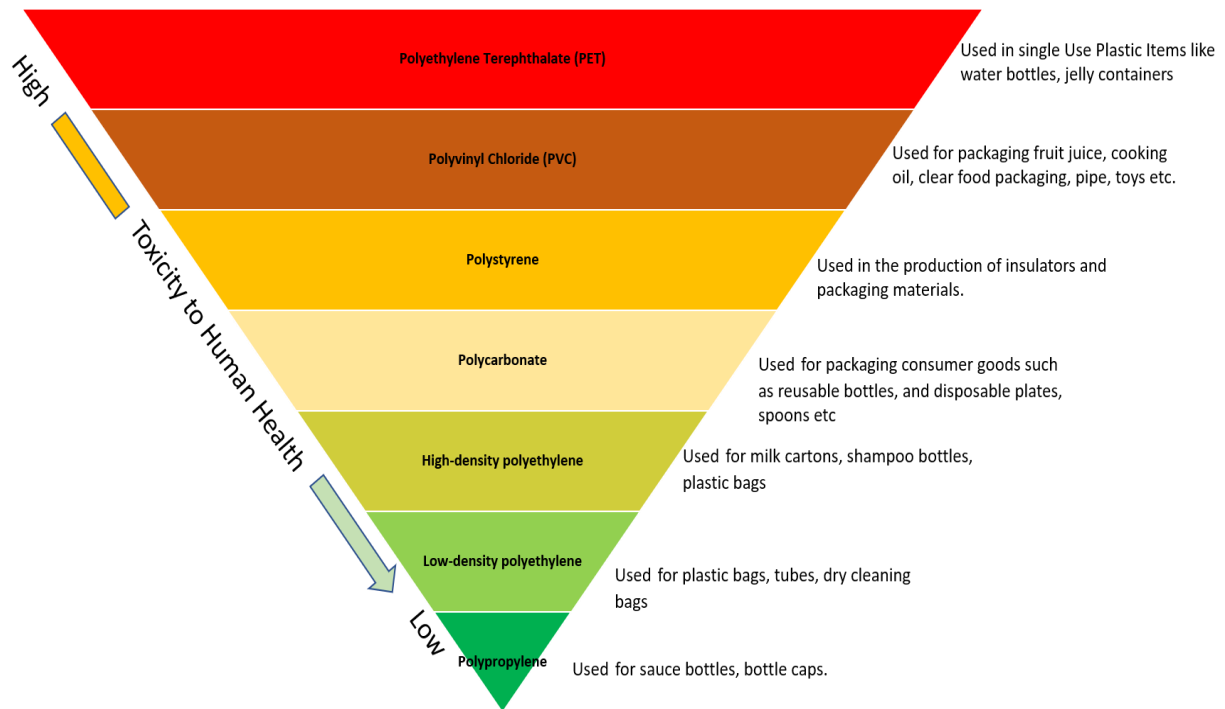
Epidemiologists’ censured plastic for spreading dengue as a result of plastic waste not oversaw appropriately. The first official outbreak of dengue fever in Bangladesh was in 2000, and since then the number of hospitalized patients has exceeded 3000 patients six times—6,232 in 2002, 3,934 in 2004, 3,162 in 2015, 6,060 in 2016, 10, 148 in 2018, and 1,00,107 as of Nov 30, 2019. Fire fighters said that huge quantities of plastic furniture and of plastic used in interior decoration in buildings in structures have impressively expanded the losses and harm in fire occurrences as it is an inflammable thing.

According to a World Bank report, published in September 2018, around 234,000 people died in Bangladesh, including 80,000 in urban areas, due to environmental pollution and pollution-related health risks in 2015. The economic cost of the deaths and disabilities in terms of labour output has been estimated at \$1.4 billion in all urban areas of Bangladesh and at 310 million in Dhaka city alone, which were equivalent to 0.6% and 0.1% respectively of the country’s GDP in 2015.

Table 2 Effect of Different Types of Plastic on Human Health

TYPE OF PLASTIC	SPECIFICATION	EFFECT ON HUMAN HEALTH
POLYETHYLENE TEREPHTHALATE (PET)	Generally, PET is manufactured for single use only. It is a type of plastic which is smooth, transparent and relatively thin.	Plastics made from PET must be prevented from high temperatures so as to prevent the leaching of some toxic additives such as acetaldehyde, antimony and phthalates. Antimony is a possible human carcinogen.
HIGH-DENSITY POLYETHYLENE	Worldwide, the most used plastic is polyethylene. High-density polyethylene is a heat-resistant plastic produced from petroleum	It has no reported health risk even though some studies showed that a long-time exposure of the plastics to sunlight can make it harmful.
POLYVINYL CHLORIDE (PVC)	Polyvinyl Chloride (PVC), a type of heat-resistant polymer, is used for packaging fruit juice, cooking oil, etc.	PVC is considered highly toxic due to the presence of chemical constituents like heavy metals, dioxins, BPA and phthalates. PVC have been reported to cause chronic bronchitis, birth defects, genetic changes, cancer, skin diseases, deafness, vision failure, ulcers, liver dysfunction and indigestion
LOW-DENSITY POLYETHYLENE	Low-density polyethylene is heat resistant, fragile, flexible and rigid.	the plastic does not have any component that is harmful to human body, its usage is termed safe for beverages and food
POLYPROPYLENE	Polypropylene, a type of plastics, is strong and semi-transparent. It is heavier and stronger than polyethylene	Plastics made of polypropylene have no harmful substances and like polyethylene, polypropylene containers are considered safe for humans as packages for food and beverages.
POLYSTYRENE	Polystyrene is a type of petroleum-based plastic. Polystyrene is commonly used in the production of insulators and packaging materials.	It contains benzene which is carcinogenic to human. Report showed that a long-term exposure to small quantity of styrene can be neurotoxic and causing cytogenetic, carcinogenic and hematological effects. The International Agency for Research on Cancer (IARC) has categorized styrene as a human carcinogen
POLYCARBONATE	Polycarbonates are used for packaging consumer goods such as reusable bottles. It contains BPA.	Studies reported that BPA has health risk.

*SOURCE: (OKUNOLA A ALABI, 2019)



Economic consequences

- Substantial public expenditure on health care
- Investments in complex and expensive environment remediation technologies
- Misuse of resources that can be recycled for re-use
- Opportunities for recycling industries and employment
- Ozone layer depletion which led to unpredictable weather conditions i.e., prolonged droughts and floods demand the use of resources which should be deployed for growth and development in other sectors

Social consequences

- Plastic waste affects human health
- Growth of informal waste disposal centers in the locality
- Illegal trade and informal management of e-waste

PLASTIC WASTE TRADE IN BANGLADESH

Plastic trade waste is limited and progressively hampered by trade restrictions. However, this flow can help to boost worldwide recycling rates, while also generating increased shared economic benefits and improving environmental outcomes.

As a raw material, Plastic flakes are important to produce a different kind of plastic products. The global plastic industry uses imported raw materials of polymer granules, and there is no enough production of polymers in Bangladesh. In 2013, the president of PET flakes exporter association stated that around 500,000 metric tons per year of flakes had been exported, and they earn around 1500-2000 million dollars in a year. The consumption of plastic per capita is 5 K.G in Bangladesh, where the average consumption of the world is 30 kg per capita. That underlines a huge demand for plastic inside and outside of the country.

Polyethylene Terephthalate (PET) is utilized as a crude fabric for making packaging materials such as bottles and containers for packaging a wide run of food items and other products which have an incredible demand. As of now, the plastic recycling companies in Bangladesh do not make any products with recycled plastic flakes. They only export it. A study found that some companies are directly involved with plastic recycling, but they recycle only PET bottles, and they used to export the chips (flakes and scrap) to China. According to the Department of Environment (DoE) of Bangladesh, Bangladesh imports plastic raw materials worth 2000 core which can be produced by recycling the plastic wastes in-country. Bangladesh generates 1700 tonnes of plastics wastes every day and only half of which is being recycled. Around 3 lakh tonnes of plastic wastes are dumped in the open. As mentioned, primary reason why recycling proved to be inefficient in Bangladesh is that the wastes are not dumped in an organized, segregated way. Different types of plastic products are often dumped together at the same place, thus making it difficult and time-consuming to sort the different types of plastic products and starting the recycling process. This also raises the cost of operation too, that creates few interests among the people to start this business.

The top importers of plastic waste are Hong Kong, the USA, Netherlands, and Belgium. India also has started taking plastic flakes from Bangladesh, which is made from recycling plastic waste, prior to that, China used to take it from Bangladesh. China's 2018 import ban on mixed 'recyclable' plastics snatched the veil off the global recycling system to uncover the wasteful and harmful nature of the recycling trade. Repercussions have been global. At present, plastic has no proper place to go. Two core trends emerged from China's ban:

1. The majority of the plastics redirected to less-regulated countries/regions -- especially Southeast Asia, but also other areas that lack adequate restrictions to stop outsized imports, or any real capacity to manage the waste.
2. Globally, total plastics exports dropped by about half from 2016 to 2018 (2019).

Among several ways, one of the techniques to turn plastic wastes into resources can possibly be turning plastics into oil by thermal cracking, which is a chemical process. Plastics are mainly petroleum-based polymers, which means, in the basic form, it is petroleum products. Any plastic wastes can be turned back to petroleum under conditions of certain temperature and pressure. The petroleum produced is in an amalgamated liquid form, which can then be separated into different products with specific uses. Bangladesh can follow this process to produce petroleum by recycling.

China, on the other hand, is producing thread and winter garment materials by using plastic flakes which were mainly imported from India and Bangladesh. Bangladesh should increase making threads from recycled plastics.

Administering plastic waste is challenging specifically for countries like us. The need of facilities, framework development, and insufficient budget for waste management are some of the prime causes of improper plastic management in Bangladesh. Bangladesh should follow neighboring countries and others to promote trade for recycled plastic waste.

Illegal Trading of Waste

Many countries around the world are currently facing huge problems with plastic waste. The developing countries in particular are thought to be in a lot of trouble with this waste. In addition to the huge amount of plastic waste they throw away, they also have to take the pressure of plastic waste from the developed world. Additionally, there has been continuous re-routing of illegal waste shipments to emerging import countries, primarily located in South and South-East Asia. With several requests from South and South East Asian countries to repatriate illegal containers of plastic waste have increased since 2018, but remain a long and challenging process. As a consequence, containers have been piling up in South-East Asian ports and sometimes re-exported illegally to neighbors in the region, transferring the burden of dealing with the illegal waste. (INTERPOL, 2020)

United States can be taken as an example which is known as the most developed country in the world. Plastic waste dumped by the Americans is shipped to various poor countries of the world including Bangladesh. A recent investigative report in Britain's influential Guardian newspaper revealed this information. Investigations by The Guardian journalists in 11 countries around the world have uncovered various secret news of this dirty trade in the United States⁷.

According to The Guardian's investigation, thousands of tons of plastic waste are shipped from the United States to various poor and developing countries around the world each year. In these countries, American plastic is the destination for recycling because the cost of labor is incredibly cheap. Since the China ban, America's plastic waste has become a global hot potato, ping-ponging from country to country. The Guardian's analysis of shipping records and US Census Bureau export data has found that America is still shipping more than 1m tons a year of its plastic waste overseas, much of it to places that are already virtually drowning in it.

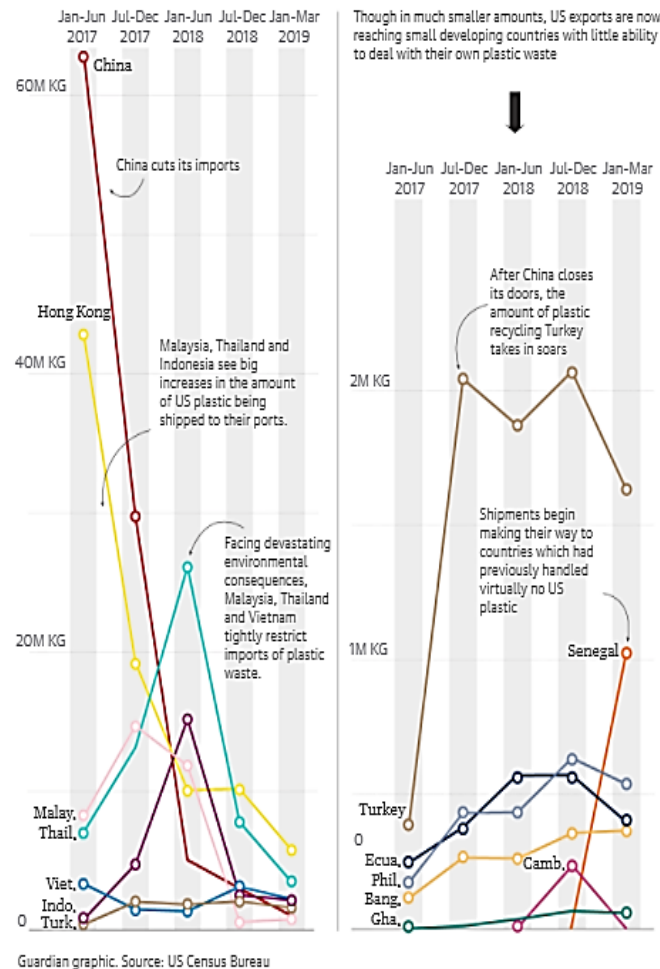


Figure 8: America Sending Plastic Waste to developing Countries (Source: the Guardian)

⁷ <https://www.theguardian.com/us-news/2019/jun/17/recycled-plastic-america-global-crisis#:~:text=A%20Guardian%20investigation%20has%20found,and%20the%20environment%20are%20grim.>

In 2018, an equivalent amount of 68,000 shipping containers of American plastic recycling were exported from the US to some developing countries that mismanage more than 70% of their own plastic waste. The newest hotspots for handling US plastic recycling are some of the poorest countries of this planet, including Bangladesh, Laos, Ethiopia and Senegal, offering cheap labor and limited environmental regulation (McCormick, et al., 2019).

Total US plastic exports
Monthly averages, in kilograms



Britain is exporting plastic waste to Bangladesh for recycling. These wastes are being collected in Kamrangirchar, Matuail and other parts of the capital. Children and adolescents are being engaged in all kinds of activities ranging from sorting and processing of collected plastic waste. In the first four months of 2018 (January-April), Britain sent 110,000 tons of plastic waste to Bangladesh⁸. Earlier, China accounted for two-thirds of Britain's plastic waste exports. But since China imposed import bans, Britain has increased exports to Bangladesh, Vietnam, Thailand and Malaysia. However, Poland and Vietnam are also going to impose restrictions on imports. A recent study found that Bangladesh, Vietnam, Thailand and Malaysia are among the worst sources of plastic pollution in the sea (Desk, 2018).

The Malaysian authorities sent back a total of 150 containers imported from 13 countries including Bangladesh as the consignment had non-recyclable plastic. Authorities discovered that compact discs (CDs) were hidden inside a container with clean recyclable scraps at the front⁹. Their press release stated that they were sending back those containers as they had been sent

to Malaysia in violation of the Basel Convention on Trans-boundary Movements of Hazardous Wastes and their Disposal (Desk, 2020). The plastic waste smuggled in was falsely declared as recyclable and the 450 tonnes of the illegal plastic waste was placed in 60 containers behind legal waste (2019).

⁸ <https://www.news24bd.tv/details/9257/%E0%A6%AC%E0%A7%8D%E0%A6%B0%E0%A6%BF%E0%A6%9F%E0%A7%87%E0%A6%A8%E0%A7%87%E0%A6%B0-%E0%A6%AA%E0%A7%8D%E0%A6%B2%E0%A6%BE%E0%A6%B8%E0%A7%8D%E0%A6%9F%E0%A6%BF%E0%A6%95-%E0%A6%AC%E0%A6%B0%E0%A7%8D%E0%A6%9C%E0%A7%8D%E0%A6%AF-%E0%A6%86%E0%A6%B8%E0%A6%9B%E0%A7%87-%E0%A6%AC%E0%A6%BE%E0%A6%82%E0%A6%B2%E0%A6%BE%E0%A6%A6%E0%A7%87%E0%A6%B6%E0%A7%87>

⁹ <https://www.thedailystar.net/environment/news/malaysia-sending-back-plastic-waste-bangladesh-1857142#:~:text=Malaysia%20is%20sending%20back%20a%20consignment%20had%20non%20recyclable%20plastic>

Bangladesh, being a signatory, needs to implement Basel Amendments to manage the movements of hazardous plastic waste. The Basel Convention is the broadest and most noteworthy universal settlement on hazardous and other wastes. It regulates the universal exchange of dangerous waste and aims to minimize their generation and Trans-boundary development. Bangladesh has joined the Basel convention on April 01, 1993. Under the system they concurred that any bringing in nation accepting waste reserve the right to refuse whenever discovered mis-announcement and resistance and exporting nation would be bound to reclaim the waste back (Ahmed, 2020).

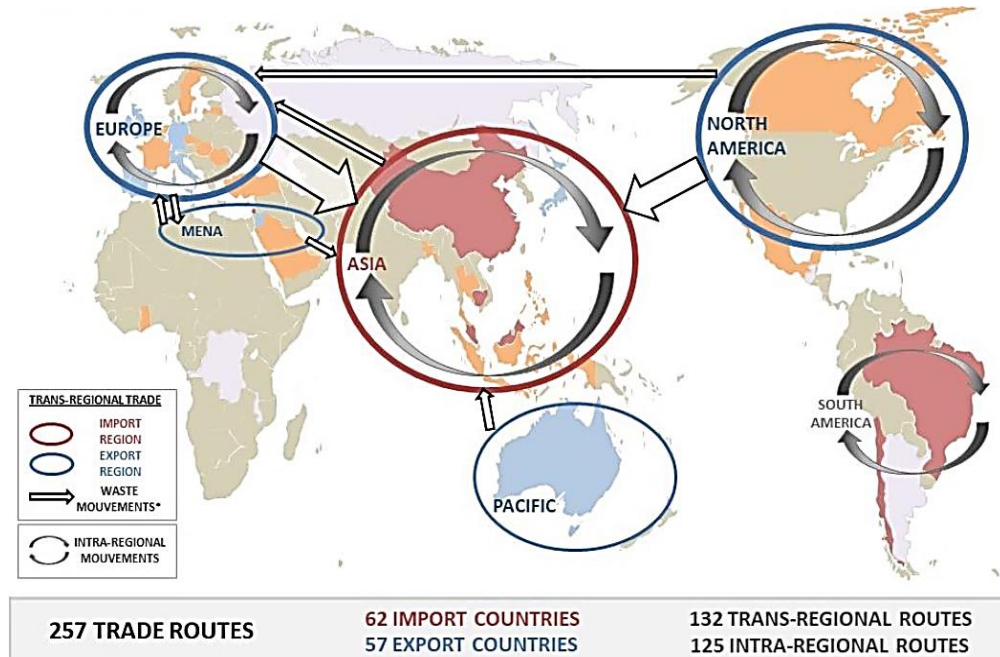


Figure 9: The global plastic waste market emerging from INTERPOL data collection on legal and illegal trade routes

[Source: (INTERPOL, 2020)]

LEGAL FRAMEWORK OF PLASTIC WASTE IN BANGLADESH

Since versatile products are created each second by using different kinds of plastic raw materials, the waste generated through these products as well as their management is likely to be different. Lack of waste management of these different kinds of plastic waste may cause different kinds of adverse impacts on the environment and public health. Unfortunately, the law of Bangladesh has not yet been structured in this regard.

Under Bangladesh Environmental Conservation Act (BECA) 1994, section 6(A) has a section entailing a ban on polythene bags, which only curtails polythene bags which are less than 55micron in thickness. The High Court recently directed the authorities concerned to ban single-use plastic products in coastal areas, hotels, motels and restaurants across the country as they are health and environmental hazards. Effective implementation of this law could not be implemented fully due to lack of manpower in the Department of Environment (DOE).

Compared to neighboring countries, Bangladesh lags far behind in waste administration. Most of these nations have a well-developed legitimate framework, organization structure and mechanical base for recycling to handle solid waste produced in civil regions. Bangladesh has just begun to comprehend the antagonistic results of plastic waste but has yet to set up proper legal system and organization structure in order to manage waste. There is a total absence of a holistic approach, particularly from the sustainable waste management point of view. In contrast to other developing countries, there are no specific laws, rules and guidelines for municipal solid waste management in Bangladesh.

Waste-related issues have been mentioned in the ‘Environment Law 1995’ which indicates types of industrial waste generated by industries that cause environmental pollution. In recent years, a number of initiatives have been taken in order to improve the waste management in urban areas. A national initiative called 3R (reduce, reuse and recycling) has been launched in 2010. Under this concept, a pilot project is currently being implemented in Dhaka and Chittagong cities. Besides, Bangladesh Bank has included plastic waste recycling plants under its green banking refinancing scheme. Development partners, particularly JICA and UNICEF, have been providing financial support for municipal solid waste management. Those initiatives are only starting point of a huge number of activities required to be taken over time.

Bangladesh is a signatory of Basel Convention. The Basel Ban Amendment does not create a ban of any kind for trade between Annex VII Parties. between non-Annex VII Parties (mostly developing and transition countries), or from non-Annex VII Parties to Annex VII Parties. So, according To Basel Amendments Any hazardous waste need to be managed within the country of its origin and any bringing in nation accepting waste reserve the right to refuse whenever discovered mis-announcement and resistance and exporting nation would be bound to reclaim the waste back.

Bangladesh has a Constitutional Mandate to protect the environment under **Article 18A** of the constitution which is to ‘Protection and improvement of environment and biodiversity’. Also, **Article 25** of the Constitution mentioned that ‘State should have respect for all international laws and legal principles.’ Furthermore, **Article 32** of the constitution established the ‘Right to

protection of life' includes environmental protection. Therefore Bangladesh Govt. should incorporate Basel Ban Amendment within their national jurisdiction.

According to Bangladesh Import Policy Order 2015-2018; Chapter 2-Section 3; Sub Section 1 (a) "unless or otherwise specified in this order, all kinds of waste" is in list of Prohibited goods for import in annexure 1 (Part B).

RECOMMENDATIONS

Plastic is so vastly wrapped around us that the precise amount of plastic waste created cannot be discovered as the data on trans-boundary contamination of plastics streaming from India to Bangladesh is not accessible. The plastic contamination of the Bay of Bengal should ideally incorporate both Bangladesh and India and the amount will be much higher than national estimates. Micro and Nano plastics have been found to enter tissues of creatures eventually getting into the food chain which is unsafe. ESDO strongly recommends that the government of Bangladesh should regulate a law regarding all types of plastic usage considering its environmental and health impacts. Nevertheless, there is lack of authentic data on plastic waste trade of Bangladesh. So detailed research is required to establish a roadmap that would cover all requisites for managing this waste trading in undisputed way.

Our primary focus should be on feasible waste management system to segregate and manage all sort of waste as well as plastic waste. Due to mismanagement our waterways are choking with plastics. Bangladesh must follow the example of India and other Asian nations in banning single-use plastics and act accordingly. It needs to impose a ban on the import of SUP on an urgent basis. Otherwise, plastic scraps from the neighboring nations will find their way to Bangladesh through trans-boundary movement worsening the situation even more.

The government also needs to promote cost-effective alternatives to single-use plastics available in Bangladesh. Straws made up of bamboo sticks are being used and manufactured in hilly regions of the country. In Kushtia district, compostable ice cream cups are being produced from leaves. Moreover, local production of plant-based alternatives can provide rich opportunities to increase local sustainable manufacturing and create jobs throughout Bangladesh while ensuring environmental and health protection.

Additionally, Basel amendment framework regarding trans-boundary movement of hazardous waste need to be implemented for proper management right away. Bangladesh should strictly follow the UNEA resolution adopted regarding Trans-boundary movement. We must update ourselves with waste trade policy framework to identify waste coming from within the country, make specific intervention of strategies, collaborate with originating countries (if exported to Bangladesh), give training to custom officers to identify waste, update knowledge of global waste movement, and cooperate with the environment ministry. Finally, plastic waste must be handled by the authorities who handle cargo at the port of entry.

To imply with all these, introduction of zero waste concept and building our communities a zero waste one is the only solution to upgrade current waste management situation. It is high time we understand the gravity of the situation and start living by zero waste concept to reduce the pressure of this huge waste and all the mismanagements associated with it. We should feel accountable personally for the waste we generate and take the responsibility on our own rather than to solely

feel depended on the authority. According to Zero Waste principle, we need to segregate our waste at initial level; refuse what cannot be reused or recycled and single use plastic items are in top of them. If we start composting our household organic waste a huge portion of waste will already get reduced and shall be converted into a resource (i.e.: organic fertilizer) which is the prime motto of building zero waste community.

This is also to state that there is a lack of knowledge on trading of hazardous wastes. So technical assistance is needed for strict control of TBM of hazardous plastic waste. So far, there is no space for disposal of hazardous waste and we lack logistic facilities for disposing.

Nonetheless, combined efforts need to be taken by all countries to face the situation and minimize wastage. Most of the developed countries must find ways to bring back a circular economy - reuse of wealth. More responsible for CO₂ emissions, than countries like Bangladesh, the developed countries should take liability and stop trans-boundary movement of plastic waste. However, most importantly, the first need to resolve the present situation and uplift it from polluting the environment is to create public consciousness which is highly needed.



Figure 10: Recommended Guideline for Plastic Waste Management and Surveillance Plastic Waste Trade

CONCLUSION

The economic growth has a profound effect on the production and composition of the solid waste for any region. One of the major components of waste in metropolitan zones is a plastic generated waste. Since there is a need for legitimate administration concerning the reusing and recycling of plastic items, this waste has caused long-term harm to the environment due to the non-biodegradable nature of plastic.

The waste generated by plastic each and every second is surpassing the previous benchmark. Considering the global pandemic, the usages of plastic- mostly the single-use ones, have taken a toll, which, in turn, making a huge amount of waste to be dumped into landfills and mostly in water bodies. Bangladesh, being a waterborne country, carries this waste to the Bay of Bengal and contaminating the marine environment. The marine plastic contamination in Bangladesh is of great concern as we are navigated by the three major waterway frameworks of Asia, to be specific- the Ganges, the Brahmaputra, and the Meghna waterway framework. Since we are at the lower part and are the lower riparian of both China and India, the most noteworthy contributors to marine contamination, the nation is confronting trans-boundary stream contamination counting plastic waste contamination. Bangladesh bears much of the marine contamination radiating from these two nations.

However, the plastic trash in the ocean and landfills in Bangladesh is far more than an aesthetic problem. However, the unmanaged plastic waste is not a problem where we do not know what the solution is. Straightly, all we have to do is to learn how to segregate and pick up our garbage and how to recycle it and refuse it on every possible occasion. It is basically a matter of building the necessary institutions and systems ideally before our ocean turns, irretrievably and for centuries to come, into a thin soup of plastic. The chemicals added to plastics to give them desirable properties, such as malleability, and the even tinier Nano-plastics that micro-plastics presumably degrade into are also matter of great concern as those might pass into the tissues of fish and humans.

The circumstance of recycling within the country may be a grim reflection of the degree of natural risks caused by the plastic industry all over Bangladesh. In spite of the fact that the Government of Bangladesh is providing tax exemption on account of recycling, companies are not concerned about the right recycling method which may cause severe environmental degradation in turn.

To imply with these, implementation of Basel Amendment is a prerequisite as the prime objectives of Basel Convention is to reduce transboundary movements of certain wastes to a minimum consistent with the environmentally sound and efficient management of such wastes. This convention also manifests to minimize the amount and toxicity of hazardous wastes generated and ensure their environmentally sound management as close as possible to the source of generation and to assist developing countries in environmentally sound management of the hazardous and other wastes they generate.

Nevertheless, no matter how developed or under developed our country is, we are all connected in broader aspect. We must stop pollution in our seas to protect our ocean. Hence, we need to act regionally, as well as globally to stop the trans-boundary movement of hazardous plastic waste. Additionally, we need to initiate building zero waste communities and start living a waste-free lifestyle as zero waste concept is the ultimate solution for all waste related problems.

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