

## **“The most Dangerous Pollutant on the Planet” – Plastic Pollution in Bangladesh: Causes, Effects & Solutions**

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### **Abstract**

*A synthetic material made from a wide range of organic polymers, such as polyethylene, PVC, nylon, etc., that can be molded into shape while soft, and then set into a rigid or slightly elastic form. Plastic pollution is the accumulation of plastic objects (e.g., plastic bags, plastic bottles, etc.) in the Earth's environment that adversely affects wildlife, marine life, and humans. Recycling is the best way to reduce plastic pollution: “Make sure that you are recycling the correct way and not adding to the plastic pollution in the environment”. One of the Bangladeshi Chemists has invented a new technique to produce petroleum oil and gas from plastic waste. 1 ton of plastic waste = 13 barrels of petroleum oil. Another best way for recycling plastic wastes (e.g., bags, bottles, etc.) is by using the Blest Machine, which produces 16 barrels of petroleum oil from 1 ton of plastic waste. Plastic bags less than 20 microns are dangerous for the environment because it is totally non-degradable and non-reusable. Another way to reduce plastic pollution is to use jute bags instead of plastic bags, which are highly degradable in the environment. Thick plastic bags (>20 micron), which are reusable, should be used. ‘Papcoat’ is a surface treatment technology for paper. Through a cellulose molecular coating, Papcoat™ provides a 100% paper solution to fully replace plastic films cost-effectively: fully biodegradable, fully compostable, and fully recyclable like any normal virgin paper. Ecobin is cheaper system which contributes to installing a sustainable way of sorting in waste management in developing countries. The Ecobin is a merging of artisanal knowledge and modern technology to build a contemporary solution to beat plastic pollution in Africa. ‘Stopping Toxic Plastic Waste Trade and its Trans boundary Movements’*

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## Introduction

World Environment Day is a UN Environment-led global event to boost worldwide awareness and action for the protection of our environment [1]. It takes place each year on June 5 and is widely celebrated since it began in 1972 [2]. World Environment day, 2022 “**Only one Earth**” is the campaign slogan, with the focus on “**Living Sustainably in Harmony with Nature**” “প্রকৃতির সাথে সামঞ্জস্য রেখে টেকসই জীবনযাপন করা” [3]. The theme of World Environment Day 2025 as “**Our Planet, Our Responsibility: Beat Plastic Pollution - If you cannot reuse it, refuse it**”. “আমাদের গ্রহ, আমাদের দায়িত্ব: প্লাস্টিক দূষণ বন্ধ করুন- আপনি যদি উহার পুঞ্জ ব্যবহার না করতে পারেন, তবে উহাকে বর্জন করুন”, এবং প্লাস্টিক বর্জ্য কমানোর জন্য সবাইকে উৎসাহিত করুন [4]. Plastic is an engineered material used to manufacture a wide variety of products to meet the domestic demand in Bangladesh as well as some products are exported. It urges governments, industry, communities and individuals to come together and urgently reduce the production and use of single-use plastic, explore and promote the use of sustainable alternatives, and develop more responsible behaviour on the use of plastic to save oceans, marine lives and human health from plastic pollution. Currently, 9.3 million plastic bags are dumped in the city every day, with only 10-15% put in dustbins [5]. The rest 80-85% are left go into drainage and sewage lines, causing blockages. In the floods of 1988, 1991 and 1998 this prevented drainage, prolonging the flooding, [6] Shahriar Hossain, a Bangladeshi ecologist and journalist from the Environment and Social Development Organization (ESDO) told *Edie* [7]. “It was discovered that due to the drainage congestion – by polythene shopping bags, water could not go down,” said Shahriar [8] “This was the cause of increasing water born diseases and air pollution-related environmental degradation.” The improper disposal of plastic bags is a public health threat in Bangladesh as they increase the incidence of mosquito borne diseases such as dengue and malaria. The blockage of drains by plastic waste increases the amount of standing water, which acts as a breeding ground for mosquitoes which is responsible for Dengue fever [9]. One of the major impacts of plastic pollution is its threat to public health as toxic chemicals find their way, through air, water, and food, into the bloodstream and cause respiratory diseases, cancer, hormone disruption, early puberty, infertility, birth defects, impaired immunity, to name just a few problems. The last few years has shown an alarming rise in the rate of such medical complaints. Furthermore, plastic wastes clogging drainage systems create water stagnation and proliferate breeding grounds for mosquitoes, giving rise to an increase in the incidence of mosquito-borne diseases such as dengue and malaria. Burning, sunlight and decomposition of

the plastic together produces toxic gases that can have *serious air pollution & health consequences* [10]. It was estimated that up to 90% of the city's water logging was caused by polyethylene blocking drain. The Karnafuly, the Buriganga and the Turag Rivers get mostly polluted by plastics and the lives of Marine Organisms are totally destroyed by plastic pollution. Mismanagement of plastic waste in Bangladesh is triggering "**Disasters**" [11]



**Figure-1.** Plastic shopping bags >20 micron thin and all colour plastic bags

UNOPS Bangladesh hosted the 8th episode of "SDG Café," a *monthly roundtable discussion series* dedicated to addressing pressing development challenges and co-creating innovative solutions. As part of UNOPS's commitment to getting Agenda 2030 back on track, this episode places the spotlight on the Sustainable Development Goals (SDG 12 & 14). This roundtable took place on March 05, 2024 with the theme, 'Plastic Pollution and Waste Management in the Marine Environment: Drivers, Impact and Solutions'. Plastic pollution remains a global threat, with South Asia being the second-largest contributor to global plastic waste. Bangladesh, ranking sixth in the world for plastic and polythene pollution in its water bodies, faces critical environmental challenges.

The roundtable emphasized the urgent need to address this issue to achieve Agenda 2030, particularly SDG 12 ("Responsible Consumption and Production") and SDG 14 ("Life Below Water"). Dr. Shahriar Hossain [12], Founder of ESDO (Eco-Social Development Organization), Member of the UNEP scientific advisory committee on marine litter and micro-plastic pollution and Executive Vice-President of the World

Alliance for Mercury-Free Dentistry, as the keynote speaker for the round-table discussion, brought decades of plastics experience to the discussion, highlighting the drivers, impact, and solutions to plastic waste management in Bangladesh. “The recent statistics underscore the severity of the plastic pollution crisis in Bangladesh. The Bay of Bengal would receive five times more plastic in 2025 than in 2010. “Through collective action and collaboration, we can address the root causes, reduce plastic leakage, and contribute to achieving SDGs 12 and 14. It is crucial to engage all stakeholders to ensure a sustainable and plastic-free future.”



**Figure-2.** Recent Round Table Meeting to Reduce Plastic Pollution in Bangladesh on 5 March 2024

### **What is Plastic Pollution?**

Plastic pollution is the accumulation of plastic objects (e.g., plastic bags, plastic bottles, etc.) in the Earth’s environment that adversely affects wildlife, marine life, and humans. As time goes on, so does the plastic pollution. The more the population grows, the garbage is produced. Plastic pollution is the accumulation of plastic products, and this causes a chain reaction. Plastic pollution affects the wildlife, their habitat, and humans. This includes killing plant life, constituting dangers to the wildlife and us, the humans. Plastic that acts as pollutants is categorized into micro (> 20 micron), meso, or macro debris [13]. Based on the size, plastics are inexpensive and durable, and as a result, levels of plastic production by humans are high.

### **Causes of Plastic Pollution:**

Plastic is made to last, and therefore, it is almost impossible to break down. Burning plastic- This is toxic and can lead to illness and *dangerous air pollution*. If the plastic is in a *landfill*, it will continuously release toxins into the soil in that area. *Plastic is also one of the most dangerous water pollutants and the top ocean polluters in the World.*

### **Effects of One-Time Plastic Shopping Bags in Bangladesh -- “The Most Dangerous Pollutant”:**

One of the major impacts of plastic bags in Bangladesh is their impact on the stormwater drainage system. Bangladesh has an annual rainfall of up to 5 meters and holds the world record for the highest rainfall in a single day. Providing sufficient drainage infrastructure is a major challenge for the Government of Bangladesh, and urban flooding is common. Plastic bags clog drains and waterways, threatening urban environments and creating severe safety hazards. Drainage systems blocked by plastic bags have been identified as a major cause of flooding in Bangladesh during the monsoon season. Following the 1998 flood it was estimated that polyethylene blocking drains caused up to 80% of the city’s water-logging. The improper disposal of plastic bags is a public health threat in Bangladesh, as they increase the incidence of mosquito-borne diseases such as dengue and malaria. The blockage of drains by plastic waste increases the amount of standing water, which acts as a breeding ground for mosquitoes. All these problems are exacerbated during flooding and waterlogging events, such as those in 1988 and 1998 in Bangladesh. In the 1990s, plastic bags of all sizes and colors spotted the city’s landscape due to the problems of misuse, overuse, and littering in Bangladesh [14]. In the year 1990, 9.3 million plastic bags were dumped in the city every day, with only 10-15% put in dustbins. The rest goes into drainage and sewage lines, causing blockages. Mismanagement of plastic waste is triggering disasters. Floods, aggravated by the blockage of the drainage system, are taking place at an accelerating rate, destroying houses, interrupting trains, disrupting traffic, and causing landslides and other disasters during the monsoon. After the flooding and waterlogging events in 1988 and 1998 in Bangladesh, it was estimated that polyethylene blocking drains caused up to 80% of the city’s water logging was caused by polyethylene blocking drains.



**Figure-3.** Recent Flood in Chittagong City (Agrabad, 15.10.2017). **Figure-4.** Recent Flood in Dhaka City (Mirpur, 17/12/2017)

As a result of all of these, soil, water, air, and the overall environment of Bangladesh are severely polluted, and we are already feeling the effects. Infested by plastic particles, arable soil is becoming barren, and crops and fruits are becoming contaminated; local water bodies and marine life in the Bangladesh coast are in danger, and local and sea fish are becoming toxic; the air is riddled with dangerous chemicals that lead to respiratory problems. Children are the most vulnerable group to such pollution. One of the major impacts of plastic pollution is its threat to public health as toxic chemicals find their way, through air, water, and food, into the bloodstream and cause respiratory diseases, cancer, hormone disruption, early puberty, infertility, birth defects, impaired immunity, to name just a few problems [15]. The last few years have shown an alarming rise in the rate of such medical complaints. Furthermore, plastic wastes clogging drainage systems create water stagnation and prolife rate breeding grounds for mosquitoes, giving rise to an increase in the incidence of mosquito-borne diseases such as dengue and malaria.

#### Global Plastic Pollution by the Numbers:

##### Plastic Waste – A Global Problem

- 500 billion plastic bags are used each year;
- 13 million tonnes of plastic leak into the ocean each year;
- 17 million barrels of oil used in plastic production;
- 1 million plastic bottles bought every minute;

- 1,00,000 marine animals killed by plastics each year;
- Plastic needs 1000 years to degrade in the environment;
- 90% of bottled water found to contain plastic particles;
- 83% of tap water found to contain plastic particles;
- 50% of consumer plastics are single-use;
- 10% of all human-generated waste is plastic



**Figure-5.** Global Plastic Pollution in Ocean

During 20-22 March, 1989, at Basel, Switzerland, actions to address Plastic Waste for the “Ad-Hoc” Working Group under UNEP, which is known as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

Rapidly increasing levels of plastic waste pose a serious global environmental problem. Plastic pollution can arise at all stages of the life cycle and may pose a threat to human health and the environment. In 2019, the Conference of the Parties to the Basel Convention adopted two important decisions to address plastic waste [16]. These steps have strengthened the Basel Convention as the only global legally binding instrument to specifically address plastic waste. Technical assistance is provided to assist Parties in fulfilling their obligations, including in relation to plastic waste.

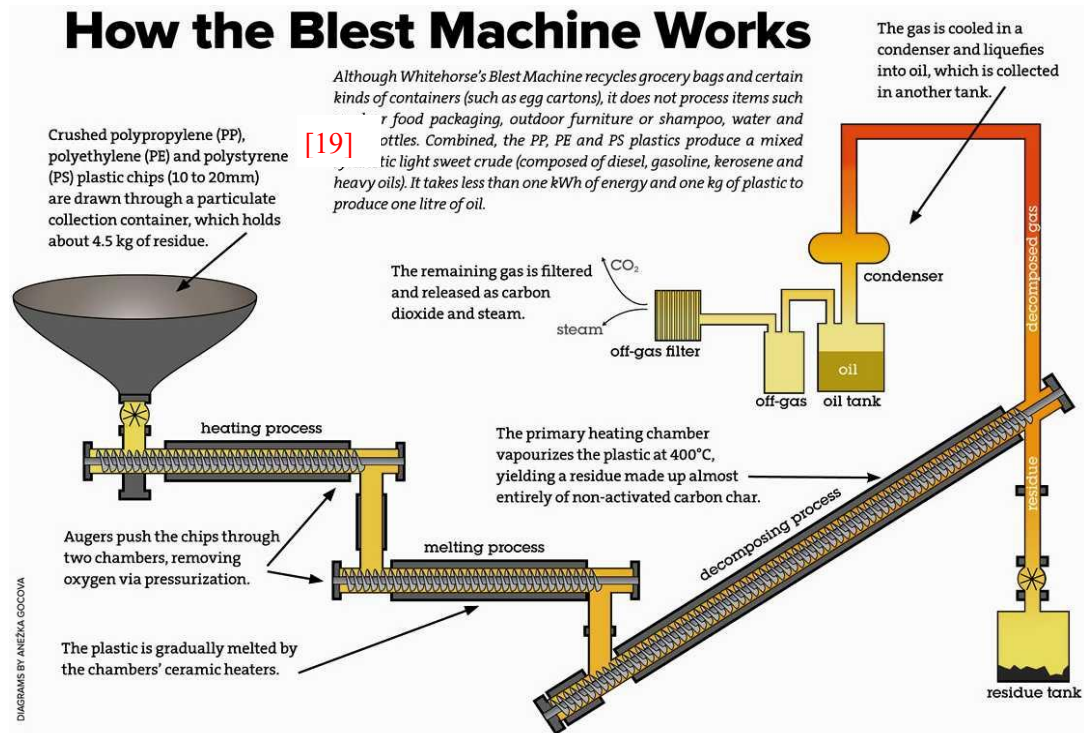
Solutions or Remedy:

2018 World Environment Day, under the theme ‘Beat Plastic Pollution, coordinated by UN Environment and celebrated by thousands of communities worldwide, is the UN’s most important day for encouraging worldwide awareness and action for the protection of our environment. *The World Environment Day 2018* website invites all interested actors to take part in the global movement to Beat Plastic Pollution [17]. Many ongoing initiatives presented on the official website show that the actions can be focused locally, nationally, or globally, encouraging a wide participation in the solution of global problems in our world.

Recycling is the best way to reduce plastic pollution:

“MAKE SURE THAT YOU ARE RECYCLING THE CORRECT WAY AND NOT ADDING ON TO THE PLASTIC POLLUTION IN THE ENVIRONMENT”

One of the Bangladeshi Chemists (Dr. Moin Uddin Sarker) has invented a new technique to produce petroleum oil and gas from plastic waste. One ton of plastic waste produces 13 barrels of petroleum oil. Another best way for recycling plastic wastes (e.g. bags, bottles, etc.) is by using the Blest Machine, which produces 16 barrels of petroleum oil from 1 ton of plastic waste [18].



**Figure-6.** Recycling of plastic wastes for petroleum

**Reducing Plastic Waste using Waste Cutting Machine:**

Plastic wastes could be reduced by using a composite or Waste Cutting Machine (Horizontal Cutting Bandsaw Machine) in the following way:



**Figure-7.** Reducing plastic using a waste cutting machine. **Figure-8.** Jute shopping bags

*Steps must be taken to tackle arguably one of the biggest environmental concerns of the century*

**Using Alternatives to Plastic Bags:**

Plastic bags less than 20 microns are dangerous for the environment because it is totally non-degradable and non-reusable. *Another way to reduce plastic pollution is to use jute bags instead of plastic bags, which are highly degradable in the environment* [20]. Thick plastic bags (>20 micron), which are reusable, should be used. Any other degradable bags that are also reusable should be used to reduce plastic pollution [21].

**Public Awareness, Acts, Rules, and Regulations to Reduce Plastic Pollution in Bangladesh:**

Bangladesh was the first country to ban plastic bags, and over a decade later, many developed countries are still struggling to emulate this success. With overwhelming support from users, manufacturers, and exporters, the Ministry of Environment and Forest (MoEF) placed a proposal before the Cabinet to ban the production and use of polyethylene shopping bags in Dhaka city from January 1, 2002. The Cabinet agreed with the MoEF proposal. The Ministry then started a vigorous campaign from market

to market for sensitization and motivation and announced that January 1, 2002 shall be the cutoff date for production and use of < 20-micron thin polyethylene shopping bags in Bangladesh under the leadership of the then Minister of Environment and Forest, Mr. Shahjahan Siraj, one of the four popular student leaders of Bhangabhandu Sheikh Mujibur Rahman during the *Liberation War of Bangladesh in 1971*. The author has a question for the government. of Bangladesh. If Mr. Shahjahan Siraj had done this great job in 2002, why not the present Minister of Environment and Forest do the same job to save the nation?"



**Figure-9.** Increasing Public Awareness by Slogan to “Raise Your Hands To End Plastic Pollution!”

The Bangladesh Environment Conservation Act was formulated in 1995. The law of section 1 under this act was revised in 2002. According to Rule 6ka of Clause 5 under Section 9, a restriction has been imposed on the production and use of polythene shopping bags. According to the rule, there is a restriction on the production and sale of environmentally harmful products. If it is proven that any kind of plastic bags or products made of polyethylene or polypropylene are detrimental to the environment, then the government could control/ ban the use of these products in any selected area or all over the country.

*According to rule 6ka, the penalty and punishment will be:*

- *for production, import, and marketing – 10 years ' imprisonment, or 1 million Taka fine, or both punishments together.*

- *for sale, exhibition for sale, store, distribution, transportation or use for commercial purpose – 6 months sentence of vigorous prison or 10 thousand Taka fine, or both punishments together.*

However, Bangladesh is still struggling with the issue of plastic bags and enforcing the ban. The Bangladesh government runs a number of mobile courts, which, a few times per year, set up at markets to target those breaking the ban by using plastic shopping bags. However, enforcement has been lacking and only a small number of fines have been enforced since 2006. In recent years, the government has taken a number of initiatives to improve waste management, especially plastic waste management, in urban areas. In 2010, a people-centric national initiative called *4R (Refuse, Reduce, Reuse and Recycle)* was launched. However, enforcement of the act and implementation of the initiatives have so far been largely ineffective so there is no restriction.

Bangladesh was the first country to ban plastic bags in 2002. China, Israel, South Africa, the Netherlands, Morocco, Kenya, Rwanda, Mauritania, some States of India, Sri Lanka, Papua New Guinea, Vanuatu, Albania and Georgia have since implemented similar bans.

### **Conclusions**

There are other major components of waste in Bangladesh, but plastic takes up a disproportionately large volume and many years to degrade, and hence poses a long-term challenge to tackle following the Basel Convention. Given this context, it's obvious that we need to produce and use less plastic, stop improper disposal of plastic waste, move towards sustainable and biodegradable products, promote the "zero waste" philosophy, come up with technology that recycles plastic more efficiently, and raise awareness among the masses about the serious consequences of plastic pollution. The conversion of waste plastics to liquid hydrocarbon fuel was carried out in a thermal pyrolysis unit. This method is superior in all respects (ecological and economical). By adopting this technology, it is possible to efficiently convert the weight of waste plastic into 75% of useful liquid hydrocarbon fuels without emitting any pollutants. It would also take care of hazardous plastic waste and reduce the import of crude oil. *Raising public Awareness should be the Starting Point for any approach to deal with Plastic Pollution. "Today we have to promise to our nation to save our environment from plastic pollution for our future generation."*



**Figure-10.** Use these Reusable Shopping Bags to Reduce Single-Use Plastics

### Recommendations

#### ► 14 Ways to Beat Plastic Pollution in Bangladesh:

1. Please use reusable shopping bags to reduce single-use plastic bags in your life.
2. Use paper bags, clothes bags, or Jute bags, i.e., carry *Reusable Shopping Bags*.
3. Fashion brands can make a trend out of the reusable clothes bags & jute bags and make it famous.
4. Do not buy single-use plastic container products like water bottles, ketchup sachets, plastic cutlery, thin plastic color bags < 20 micron, etc.
5. Governments should open places to buy or deposit used plastic from people, let people earn from plastic wastes, and Trade and its Trans boundary Movements following the Basel Convention.
6. The government should impose a “Zero Tolerance Rule” to ban plastic bags < 20 microns.

7. Like 2010, a people-centric national initiative called *4R (Refuse, Reduce, Reuse, and Recycle)* was launched. However, enforcement of the act and implementation of the initiatives have so far been largely ineffective, so there is no restriction.
8. Public Awareness should be increased by social & electronic media.
9. Use a reusable container like Tiffin boxes, thermos bottles, boxes, etc.
10. Help to recycle existing plastic waste into petroleum oil.
11. Teach children about the dangers of plastic pollution.
12. Last but not Least, simply, “Beat Plastic Pollution, if you can’t reuse it, refuse it”.
13. “Beat plastic pollution.” Please share this slogan with the public to promote their awareness.
14. “Recycle Right, keep our Planet Bright.”

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