

# TOWARDS A MULTISECTORAL ACTION PLAN FOR SUSTAINABLE PLASTIC MANAGEMENT IN BANGLADESH

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# TOWARDS A MULTISECTORAL ACTION PLAN FOR SUSTAINABLE PLASTIC MANAGEMENT IN BANGLADESH





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## GLOSSARY

**Biodegradable:** Capable of being reduced to finer particles (degraded or decomposed) by microbiological organisms.

**Brand owners:** Companies that produce branded consumer products and use packaging material for them. These companies also produce several types of plastic products and commodities.

**Feriwalla:** A person who purchases or barter for waste and old materials from different sources by using their own capital or taking loans from the owner of the shop to which they sell the materials. They usually carry a cane basket on their head to carry the load.

**Hot spot:** A place where plastics leak into the environment (including land, air, water, and marine environment). Actions to address hot spots are considered in terms of interventions and instruments (Boucher et al. 2020). Hot spots for the current study are locations along the waste management value chain where waste accumulates regularly and is not collected and transported to a landfill for proper disposal.

**Informal sector:** Extensive economic activity that is usually small-scale, labor-intensive, unregulated, and competitive.

**Khal:** River tidal channels.

**Nonorganic material:** Material that microorganisms cannot degrade.

**Organic material:** Material derived from animal or vegetable sources that microorganisms can generally degrade.

**Recycling:** The process by which waste materials are transformed into new products in such a manner that the original products may lose their identity.

**Recyclable:** Able to be collected, separated, and processed to be used as raw material in the manufacture of a new product.

**Tokais (means "I pick"):** Individuals who collect waste from waste bins, roadsides, and dump sites.

**Solid waste management:** Systematic control of generation, storage, collection, transport, separation, processing, recycling, recovery, and final disposal of solid waste.

**Vangari dokan (Vangari = scrap; dokan = shop):** Small shops that buy and sell recyclable waste and old and scrap items.

## ■ ABBREVIATIONS AND ACRONYMS

BDT	Bangladeshi taka
BPGMEA	Bangladesh Plastic Goods Manufacturers & Exporters Association
CSR	corporate social responsibility
DCC	Dhaka Corporation
DNCC	Dhaka North City Corporation
DoE	Department of Environment
DSCC	Dhaka South City Corporation
DWASA	Dhaka Water Supply and Sewerage Authority
EPR	Extended producer responsibility
FMCG	Fast-moving consumer goods
GHG	Greenhouse gas
HDPE	High-density polyethylene
INR	Indian rupee
LDPE	Low-density polyethylene
MLP	Multilayer plastic
MoEFCC	Ministry of Environment, Forest and Climate Change
NCC	Narayanganj City Corporation
PE	Polyethylene
PET	Polyethylene terephthalate
PP	Polypropylene
PPP	Public-private partnership
PS	Polystyrene
PVC	Polyvinyl chloride
RDF	Refuse-derived fuel
SDG	Sustainable Development Goal
SUP	Single-use plastic
3R	Reduce, reuse, recycle
TPY	Tons per year
UNDP	United Nations Development Programme
VAT	Value added tax

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## ■ PLASTIC TYPES

Symbol	Abbreviation	Type	Use
	<b>PETE, PET</b>	Polyethylene terephthalate	Water bottles, drink bottles, cooking oil containers
	<b>HDPE</b>	High-density polyethylene	Buckets (pails), detergent bottles, food containers
	<b>PVC</b>	Polyvinyl chloride	Food trays, pipes, chairs
	<b>LDPE</b>	Low-density polyethylene	Carrier bags, bread bags, food storage containers
	<b>PP</b>	Polypropylene	Straws, shampoo bottles, bottle caps
	<b>PS</b>	Polystyrene	Vending cups, packing peanuts, CD cases
	<b>Other</b>	Any other plastics	Melamine, packaging made from mixed plastics

## ■ EXECUTIVE SUMMARY

**As Bangladesh's economy grows and the country becomes rapidly urbanized, plastic pollution has become an escalating problem, especially from single-use plastic (SUP) packaging material**

The rapid pace of urbanization and development has increased the consumption of plastic products and the amount of waste generated, especially because of the convenience, light weight, and durability of plastic. This plastic waste and packaging often end up clogging rivers and other water bodies. Plastic also degrades over time into small particles called microplastics (commonly defined as less than 5 mm in diameter) that are released into the environment and pose a significant risk to humans and ecosystems. Bangladesh's annual per capita plastic consumption in urban areas rose from 3.0 kg in 2005<sup>1</sup> to 9.0 kg in 2020<sup>2</sup>. The annual per capita consumption of plastic in Dhaka is even higher (24 kg). According to detailed analysis based on data collected from a field survey done in 2020 on the waste composition at landfills in Dhaka North City Corporation and Dhaka South City Corporation, single-use thin shopping bags account for most of the waste. Multilayer plastic (MLP) was ranked third after soiled flour, pulse, grain, and rice packs. MLP includes all kinds of food and non-food wraps and packaging materials (e.g., mini packs).

**COVID-19 has increased the use of SUP** by increasing reliance on single-use personal protective equipment and by significantly affecting lifestyles, resulting in consumption changes that have generated even more plastic waste. The plastic industry noted this and has exploited the opportunity to push for greater use of SUP as the most hygienic, safest option to combat the virus. Simultaneously, current low oil prices make plastic waste recycling less economically favourable. The plastic builds up in waste piles that, if not burned openly, block drains, pollute waterways, and threaten marine life. Informal sector workers who collect waste and recyclables are exposed to the virus while the demand for recyclables plummets, affecting them financially. Furthermore, because COVID-19-contaminated plastic waste is generally incinerated, costs of treatment are high. COVID-19 has thus increased plastic pollution, necessitating urgent action to prevent and reduce plastic waste.

### **NEED FOR A MULTISTAKEHOLDER, MULTISECTORAL APPROACH**

In accordance, the government of Bangladesh has responded to the challenges by issuing bans and regulations focused mainly on production and consumption. The

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<sup>1</sup> Consumption figure based on waste composition figures detailed in Enayetullah, I, Sinha, A, H M, M & Khan, S, S, A 2005, *Urban Solid Waste Management Scenario of Bangladesh: Problems and Prospects*, Waste Concern, Dhaka, Bangladesh.

<sup>2</sup> Based on detailed survey on waste composition of households and landfills in Dhaka city in 2020. This data has been extrapolated based on projections of urban waste compositions of 2005 and 2014 to estimate the overall urban plastic consumption in Bangladesh. It should be noted, 2005 report was based on detailed field survey in Dhaka and 2014 report used filed data from 271 urban localities in Bangladesh.

## Lessons from the 2002 Plastic Shopping Bag Ban

Bangladesh was the world's first country to ban plastic shopping bags through a regulatory order in 2002 under the 1995 Environment Act. The initial response of this pioneering effort was positive but use of plastics bags has increased over time. The causes were identified by a study done by United Nations Environment Programme (UNEP) in 2018. The study assessed extensively the effect of SUP bans in over 100 countries that introduced full or partial bans on single-use plastic (SUP) bags, including Bangladesh. Results show selective banning and frequent changes in the policies, no control at the manufacturing end, and lack of incentives to adopt alternatives are among the primary reasons for the bans' lack of success (UNEP, 2018).

On the other hand, Bangladesh has been successful in promoting alternatives to plastic by implementing the Jute Packaging Act 2010 for six essential items (paddy, rice, wheat, maize, fertilizer, sugar) and extending to eleven more commodities with the support of Bangladesh Bank.

More recently, DoE and the MoEFCC prepared a work plan to ban SUPs in the coastal towns of Bangladesh in response to Bangladesh's high court order. The government has identified various problematic SUPs that should be covered under the ban.

The 8th Five Year Plan mentions phasing out SUPs (e.g., single-use cups and plates, lollipop wrappers, sachets, extruded polystyrene, plastic cutlery, cigarette filters, cotton swabs, coffee stirrers, water and juice bottles, plastic bags) and multilayer plastic packaging.

Ministry of Environment, Forest, and Climate Change (MoEFCC) banned the use of plastic shopping bags in 2002, but this had limited results. In 2020, a High Court order was issued to ban SUP in coastal areas and all hotels and motels across the country. The 8th Five Year Plan (2020–2025) acknowledges that the dumping of household waste into water bodies and neighborhoods is a major source of air and water pollution. The plan now takes a holistic approach, in addition to production and consumption, and includes management of waste streams and regeneration acknowledging the importance of collaboration among manufacturers, brand owners (producers of consumer products), city authorities, and other stakeholders in their efforts to collect and dispose of problematic packaging materials and emphasizes extended producer responsibility (EPR). The Solid Waste Management Rules (SWMR) drawn up under the Environmental Conservation Act 1995 will be the overarching regulatory framework for plastic waste management in the country.

**Solutions require a multistakeholder, multisectoral approach that focuses on a circular economy — an economic system aimed at eliminating waste and the promoting of circular use of resources.**

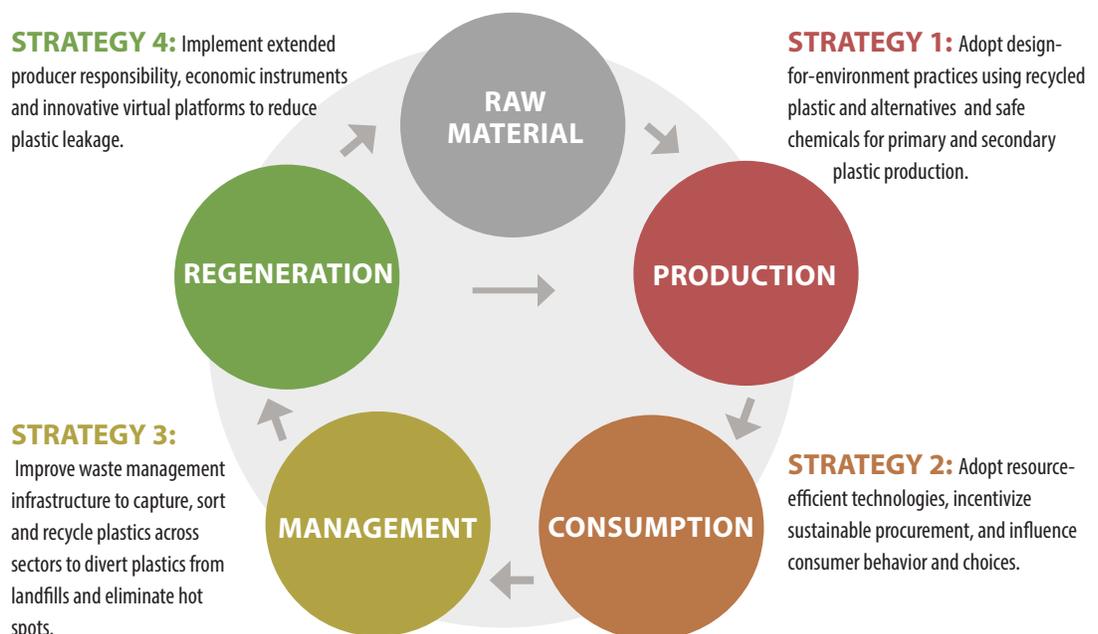
Many initiatives need more interagency coordination. Challenges regarding plastics should be addressed over the life cycle of a product, considering upstream and downstream pathways. Circularity in the plastic economy with strategies focusing on bans and as well as waste recycling. Options such as changing packaging design and materials to minimize plastic waste, promoting alternatives to plastic, and using more efficient technologies to convert plastic waste to recycled products need

to be sufficiently considered. Although policy frameworks address some of these interventions, the absence of a multistakeholder, multisectoral plan developed on the principles of a circular economy makes it difficult for the government to address problems with plastics in a holistic and sustainable manner. To address the life cycle of plastic materials, industry associations (e.g., Bangladesh Plastic Goods Manufacturers Association, Packaging Industries Association of Bangladesh) must be much more involved. MoEFCC will need to coordinate with other ministries (such as Ministry of Local Government, Rural Development and Cooperatives, Ministry of Industries, Ministry of Housing and Public Works, Ministry of Textiles and Jute, Ministry of Education and Ministry of Posts, Telecommunications and Information Technology) to facilitate the active participation of relevant agencies at the national and local level. The informal sector also plays an important role in plastic waste management in Bangladesh, so attention must be paid to socioeconomic effects on this sector when developing an action plan.

### A FOCUS ON CIRCULAR ECONOMY

A clear vision, strategies addressing the plastic life cycle, and an enabling framework for formulating a sustainable plastic management plan are necessary. Towards that end, a vision statement has been developed: to achieve circular economy leveraging the 3R strategy (reduce, reuse, recycle) to avoid, intercept, and redesign plastics to promote a green growth pathway for Bangladesh. Sustainable plastic management is visualized on a life cycle basis as the foundation for such a plan to ensure that a circular economy approach is used to derive strategies and actions.

**FIGURE I: Road map for sustainable plastic management indicating strategies**



Strategies identified at each stage of the plastic life cycle ensure an integrated approach built on circular principles: Production (Design and Manufacturing); Consumption, Management (of Waste Streams), and Regeneration (see figure I). By closing the loop, the circular economy has the potential to be an engine for green growth by creating new value chains, green skills, employment, and innovative products while addressing social and environmental challenges.

## SHORT, MEDIUM, AND LONG-TERM TARGETS

A progressive approach is required to achieve the targets. An action plan for sustainable plastic management in Bangladesh is proposed for implementation in phases such as short term (2022–2023), medium term (2024–2026), and long term (2027–2030), allowing for priorities and limitations on financial resources and institutional capacities. The action plan provides a blueprint to achieve four interlinked and complementary targets, which, in turn, help realize the strategies addressing the plastic life cycle.

**Vision: To achieve circular economy re-enforcing the 3R strategy (reduce, reuse, recycle) to avoid, intercept, and redesign plastics to achieve a green growth pathway for Bangladesh**



*\*Note: Targets are cross-cutting and apply to more than 1 strategy. Detailed actions related to each target are presented in Chapter 4.*

**FIGURE II: Summary of action plan for sustainable plastic management indicating strategies and key actions**

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)
<b>PRODUCTION</b> (Target 1)	Support research and development of alternatives and reduction of plastics, starting with LDPE.	Introduce incentives (tax rebates) national and local funds and subsidies to support research and development of new designs and materials as alternatives to plastic.	Require all packaging to be 100% reusable, recyclable, or compostable by certain date.
		Set charges for plastics that have viable alternatives in stores and supermarkets.	Support industry-led phaseout of problematic packaging materials.
		Establish standard and policy for labelling hazardous materials.	Implement policy to eliminate hazardous additives from plastic products and packaging.
		Establish standard and policy for labelling biodegradable materials.	
<b>CONSUMPTION</b> Target 2)	Develop strategy to ban SUP items (product chains, instruments, timelines).	Enforce ban on single-use plastics (SUPs) starting with coastal region. Scale up ban to national level.	
	Draft guidelines and rules to minimize plastic packaging.	Develop public-private partnership to share technologies to minimize plastic in products and packaging.	Set incentives for brand owners, manufacturers, and importers to follow guidelines for sustainable packaging.
	Create consumer facing campaigns to promote reuse, recycling and reduce plastic consumption.	Introduce infrastructure to provide access to safe drinking water in public spaces.	Create behaviour change toolkits to address barriers for adopting plastic alternatives.
<b>MANAGEMENT</b> (Target 3)	Through collaboration between various agencies, implement policies and rules including the Solid Waste Management Rules (SWR).	Introduce separate bins for organic, inorganic, toxic waste, hazardous, biomedical waste and multilayer plastic waste.	
	Create monitoring system for targets of the action plan from baseline.	Track the targets throughout the value chain including recycling facilities.	Revise targets, methodologies based on monitoring.
	Draft anti-litter regulations.	Initiate awareness programs on 3Rs across the country and develop curriculum for schools and colleges.	Initiate awareness programs on 3Rs across the country and develop curriculum for schools and colleges.
		Initiate environmental certification for product manufacturers who adopt environmental practices.	Raise awareness on environmental-certification.
		Establish target on waste diversion from landfills through composting, recycling and incineration.	Create a plastic management fund to support initiatives and projects.
<b>REGENERATION</b> (Target 4)	Finalise and pilot EPR to enable industry co-funding of plastic-waste collection and recycling systems.	Through EPR, ensure environmentally sound management of SUPs and other plastics for producer or manufacturer or importer.	Introduce buyback or deposit refund scheme.
	Establish producer responsibility organizations.		
	Expand 3R strategy to include circular economy (e.g. via inclusion of minimum recycled content for construction, textiles and packaging materials).	Create waste exchange marketplace.	Formalise the plastic sorting and recycling capacity.
	Develop nationwide plastic material flow maps to inform policy and enhance government capacity to facilitate circular material flows across various sectors.	Standardize labeling of plastic products and materials so that different types of plastic waste can be identified in the waste stream and enable more efficient plastic recycling.	

Note: EPR = extended producer responsibility; SUP = single-use plastic.

Structured to identify key elements of the enabling framework (Policy and regulatory reforms; use of economic instruments, technology, and infrastructure; and capacity building), the action plan lists activities that build on each other.

Implementation of the action plan thus identifies policy and regulatory reforms and economic instruments, technology and infrastructure, and capacity building necessary to design sustainable products, promote circular economy processes, encourage sustainable consumption, and ensure that waste mismanagement is prevented. To avoid duplication and ensure linkages with in-progress measures by the government of Bangladesh, the proposed actions have been harmonized with existing work plans and regulations. Figure II prioritizes actions of the proposed action plan. The detailed action plan with phase wise activities is shown in chapter 4 and Appendix A.

## **ALIGNING WITH SUSTAINABLE DEVELOPMENT GOALS**

The Action Plan is aligned to the Sustainable Development Goals (SDGs). The recommended action plan is aligned with the government's commitment to Sustainable Development Goal (SDG) 14 (conserve and sustainably use the oceans, seas, and marine resources for sustainable development), particularly SDG target 14.1 (prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution, by 2025). Although the project is focused on SDG target 14.1, the project has co-benefits linked to SDG 3 (good health and well-being), SDG 11 (sustainable cities and communities), SDG 12 (sustainable consumption and production), and SDG 13 (climate action).

## **KEY FACTORS TO BE CONSIDERED**

Several key factors must be considered for the recommended action plan to be implemented successfully. Raising stakeholder awareness is important, and behavioral changes will be critical, so sustained communication with all key stakeholders and the use of economic instruments is necessary. Supporting innovative plastic waste reduction and recycling technologies, and inclusive business models with financial assistance, will help greatly. Given the multistakeholder and multisectoral features of the action plan, it is important that implementation is carried out by DoE in coordination with and supported by relevant ministries and involving local bodies. Robust institutional mechanisms and multisectoral implementation arrangements need to be identified through consultations and established to translate the identified interventions to support a circular plastic economy. Implementation of the action plan also requires the allocation of budget and resources leveraging both public and private finance. It is hoped that this plan will help the government achieve its vision and become a role model for other countries. Actions in the action plan will be updated as new challenges arise and more information becomes available.

# ■ CHAPTER 1: INTRODUCTION

## 1.1 BACKGROUND

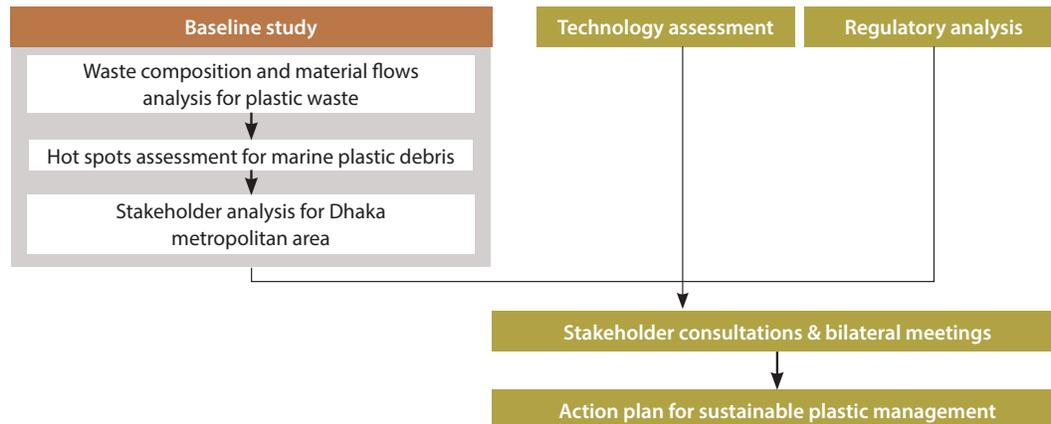
In close collaboration with the government of Bangladesh, the World Bank developed two analytical reports in 2018: the *Country Environmental Analysis* (World Bank 2018) and *Toward a Blue Economy* (Patil et al. 2018). Based on their results and recommendations, the government requested further support from the World Bank to identify and help implement concrete solutions to address pollution and waste management. Given the rising consumption of plastic and the need for environmentally sound management of plastic waste, the government of Bangladesh requested that such technical assistance be focused on plastic. Accordingly, the Bank provided technical assistance, namely *Leveraging the Circular Economy to Reduce Industrial and Marine Pollution in Bangladesh*, in 2018 to support Bangladesh in developing a strategy and action plan to reduce plastic pollution. The current report was prepared based on needs collectively identified with the Ministry of Environment, Forest and Climate Change (MoEFCC); the Department of Environment (DoE); and relevant stakeholders at the Workshop on Sustainable Management of Plastics to Leverage the Circular Economy and Achieve Sustainable Development Goals (SDGs) held in Bangladesh in February 2019. Following the recommendations from this workshop, the DoE established a multisectoral technical committee that worked as a coordination body to facilitate collaboration. The report analyzes the current policy and regulatory landscape in Bangladesh and makes recommendations for a multisectoral action plan for sustainable management of plastic that Bangladesh can finalize and implement in close consultation with the multisectoral technical committee.

## 1.2 METHODOLOGY FOR DEVELOPING A SUSTAINABLE ACTION PLAN

Figure 1.1 and the following sections describe the methodology used in developing the action plan. A baseline study was conducted to map material flows across the life cycle of plastics (including raw material sourcing, production, consumption, resource recovery stages), identify plastic waste hot spots, and identify the stakeholders.

The baseline study outcomes were used to identify the priority sectors and types of plastic waste requiring management, considering the life cycle. Existing policies and policies in the draft stages were reviewed. Gaps and opportunities were identified and reflected in the formulation of the action plan.

The proposed road map and action plan were strengthened with stakeholder consultations to understand the current challenges and opportunities for sustainable management of plastic. Bilateral discussions with manufacturers and brand owners were held to understand the role of multiple stakeholders in the proposed action plan.

**FIGURE 1.1: Methodology for developing a sustainable action plan**

## Baseline Study

Field surveys were conducted in Dhaka, Chattogram, and Cox’s Bazar between November 2019 and November 2020 to measure the quantity and composition of plastic waste. The surveys identified hot spots where waste is indiscriminately disposed of and waste collection services are not provided. These hot spots are also key leakage points for solid waste to enter rivers and the ocean. As a starting point, field surveys were conducted in and around Dhaka because it is the focal urban centre for plastic waste generation and marine and land pollution. The intention is to gradually expand the scope of analysis and generate baseline data at national and subnational levels.

A stakeholder analysis was performed to identify key actors along the supply chain of plastic materials and products (upstream) and the material recovery chain inside and outside Dhaka (downstream). The status of these individuals and organizations was carefully analyzed and reviewed to understand their relative power and influence and the resulting effect of promoting the circulation of plastic waste.

### Waste Composition and Material Flow Analysis for Plastic Waste

Waste composition and material flow for waste were analyzed in the two city corporation areas in Dhaka: Dhaka North City Corporation (DNCC) and Dhaka South City Corporation (DSCC). A field survey was conducted along the banks of the Karnaphuli River, the Patenga Beach area of Chattogram metropolitan area, and the beach areas of the Cox’s Bazar municipal area to analyze the composition of plastic waste (e.g., percentage of wet weight) at the source (households) and landfill sites, focusing on the types of plastic and gaps in volume between source and landfill sites. The analysis resulted in four main findings:

- The city corporations generated a large quantity of low-density polyethylene (LDPE), found in flexible packing waste, mainly multilayer plastic (MLP) and single-use plastic (SUP). The waste is not collected because it has little market value and is therefore unattractive to informal waste collectors.
- Low-value materials such as flexible SUP packaging and MLP are ignored because

they do not melt well and are time-consuming to collect. As a result, they end up at illegal and legal waste disposal points and in landfills.

- Informal waste collectors worked in extremely hazardous environments and under unhealthy work conditions.
- Informal waste collectors also collect high-value, marketable (easy to sell) materials such as polyvinyl chloride (PVC), polypropylene (PP), high-density polyethylene (HDPE), and polyethylene terephthalate (PET) bottles.

A literature review and interview surveys were undertaken to determine the material flow of plastic waste for consumption (by type), end-use application (by sector), and at the end of life (recycling and treatment). The material flows were mapped based on the following:

- Current and projected domestic production of major types of polymers
- Trade balance (volume of imports and exports) of the polymer market
- Domestic demand for different polymer types
- Estimated plastic consumption according to end-use application sector
- Breakdown of polymer application in packaging segment according to type
- Collection and recycling of plastic waste attributed to the presence of informal sector actors
- Estimated quantity of recycled materials fed back into a production system

### **Hot spot Identification and Assessment for Marine Plastic Debris**

The study also identified areas where the municipal government did not regularly collect municipal solid waste (household and street waste). The main waste leakage points into waterways were identified and mapped, including areas along the major rivers surrounding Dhaka (Buriganga, Turag, Balu, Tongi *Khal*, and Shitalakshya Rivers) and the Meghna River.

A rapid assessment (not a detailed survey) was performed along the banks of the Karnaphuli River, Chaktai *Khal*, the Patenga Beach area of the Chattogram metropolitan area, and the beach area of the Cox's Bazar municipal area to identify major hot spots where city authorities were not collecting municipal solid waste regularly.

### **Stakeholder Analysis for Dhaka Metropolitan Area**

The stakeholder analysis focused on large formal entities and often vulnerable small and medium enterprises and informal players (the list of participants is given in appendix C). For the stakeholder analysis, an interview survey was undertaken that included but was not limited to producers such as plastic manufacturers, brand owners, importers, retailers, recyclers, processors, and informal players. Key stakeholders were selected for interviews, which covered the following topics:

- Reduction of the use of plastic in products, quantities and types of plastic production, and import, current and future plastic reduction measures, quantities, and types of plastics recycled, recycling technologies in operation, challenges with plastic waste recycling, the need for inputs (e.g., quality, quantity), and possible areas where plastic recycling could be improved and upgraded.

- Willingness to participate in an extended producer responsibility (EPR) program, with a focus on
  - willingness to pay an advance based on the weight of production or sales,
  - willingness to join a producer responsibility organization; and
  - willingness to adopt targets for plastic waste collection based on their volume of products introduced in the market
- Average prices of recyclable plastics transacted between collectors, junk shops, and recyclers, categorized according to type, in the current downstream market.

Potential recycling technology providers and investors in recycling technologies were identified.

## **Stakeholder Consultations and Bilateral Meetings**

A stakeholder consultation workshop was held to understand the current challenges and opportunities for the development of the sustainable plastic management plan framework. Bi-lateral meetings with manufacturers and brand owners were conducted to understand the role of multiple stakeholders in the plan being formulated.

A decision-making consultation workshop was held in February 2021 to discuss the findings of the analysis and development of the sustainable plastic management plan (see appendix C). The comments, suggestions, and feedback received from the workshop were used to improve the action plan.

## **Development of an Action Plan for Sustainable Plastic Management**

Findings from the baseline study, stakeholder consultation, and policy review were used to prepare a multisectoral strategic road map consisting of a vision and targets. Each target was defined based on actions over short-, medium-, and long-term time frames. These actions were further supported with interventions and improvement in policy, regulatory, and economic instruments and on technology and infrastructure available for waste management and by building stakeholder capacity.

# CHAPTER 2: RESULTS OF THE BASELINE STUDY

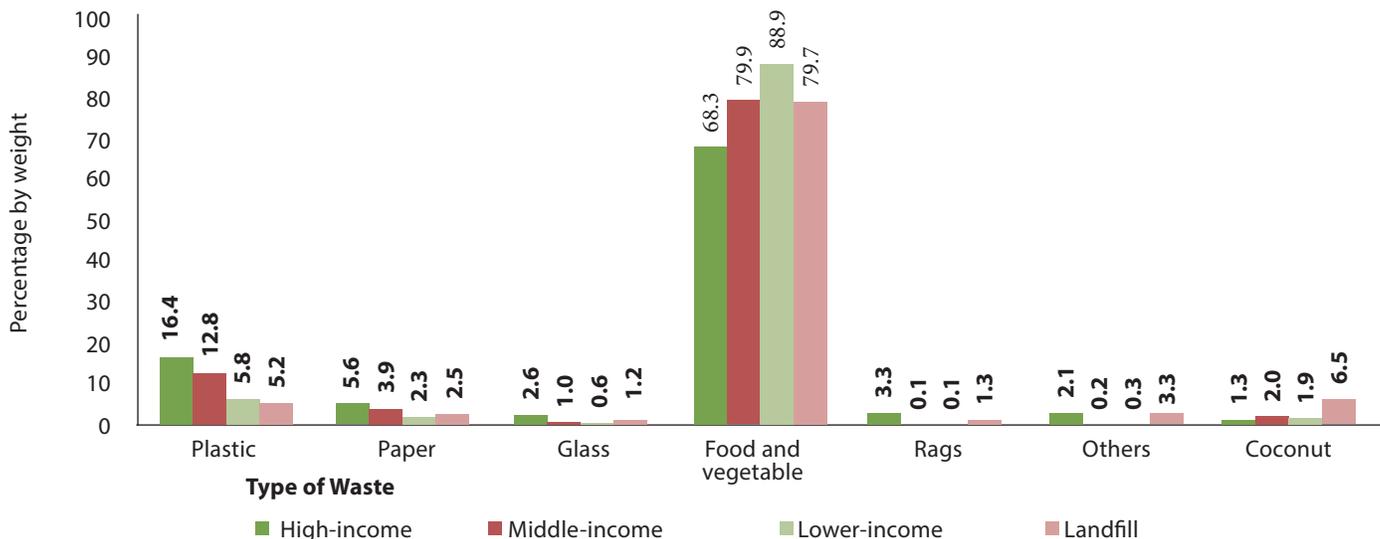
The primary objective of this baseline study is to provide an information base against which to monitor and assess the effectiveness of the activities and progress of targets of the action plan during implementation. Using robust field sampling and stakeholder analysis, the baseline documented the current waste management system, including hotspots for marine plastic debris, waste composition, and material flow of waste plastics.

## 2.1 WASTE COMPOSITION CHARACTERISTICS

### Waste Composition Analysis at the Household Level and Landfills in the DNCC

Composition of household waste according to income and in landfills in the DNCC is shown in figure 2.1. Low-income areas had the highest percentage by weight of organic matter in household waste (88.9 percent), followed by middle- (79.9 percent) and high-income areas (68.3 percent), whereas high-income areas had the highest percentage by weight of plastic (16.4 percent), followed by middle- (12.8 percent) and low-income areas (5.8 percent). High-income areas generated the most paper waste (5.5 percent) and low-income areas the least (2.3 percent). Organic matter accounted for 79.7 percent of waste in the Amin Bazar landfill site, and plastic waste accounted for 5.1 percent.

FIGURE 2.1: Household and landfill waste composition in the DNCC, 2020



Source: Field Survey, Waste Concern Consultants, 2020

## Summary of findings from baseline study

### Baseline on plastic use

- Rapid urbanization and development have increased the consumption of plastic.
- In 2020, daily per capita waste generation in both Dhaka North and South city corporations was 0.61 kilograms (kg), with a population of 10,596,475 in the Dhaka metropolitan area, the estimated waste generated per day is 6,464 tons. Analysis of waste composition shows that 10% of this waste is plastic waste.
- Consumption of LDPE packaging materials increased fivefold in 2020 compared to 2005. At the household level, 40.6 percent of LDPE in waste comes from single-use thin shopping bags and 7.0 percent from MLP. The COVID-19 pandemic has increased the consumption of packaging and shopping bags made of LDPE. In addition, a lot of LDPE, mainly SUP and MLP (e.g., potato chips bags, polythene bags, packaging materials) was found in tourist spots.
- LDPE and PP polymers account for most plastic consumed.

### Baseline on plastic waste

- Only 30 percent of postconsumer packaging waste is collected.
- Ten percent of municipal waste consists of plastic (646 tons collected per day), of which 48 percent goes to landfills, 37 percent is recycled, 12 percent ends up in *khals* and rivers, and 3 percent is dumped in drains and unserved areas of the city corporations. Secondary transfer stations cover only a few waste collection points, which limits the recovery of plastic from municipal waste before it is sent to landfills.
- An estimated 24,032–36,047 tons of plastic waste are disposed of per year in 1,212 hot spots around *khals* and rivers, all of which are connected to the river system.
- Most plastic waste in landfills consists of single-use thin shopping bags, packs, and wrappers and MLP for all kinds of food and nonfood wraps and packaging materials.

### Baseline on plastic recycling

- PET and PS are attractive for the recycling industry and have the highest recycling rate, predominantly because they can be collected in bulk and offer a high price; a very small quantity of PET and PS waste was found at the landfills.
- LDPE is less attractive for recycling because it is lightweight, thick, and easily soiled.
- The recycling industry does not have the capacity to recycle MLP. Packs and wrappers are unattractive to recyclers because they are small, laminated, and printed with ink.
- Informal workers collect and recycle clean, semisoiled, and soiled plastics for the production of pellets.
- PET is recycled in 300 facilities in Dhaka. The number of such units was increasing rapidly because exporters can sell PET pellets on the international market at a price of BDT 80–120/ kg, higher than the value in the domestic market, but recent reductions in oil prices have made PET recycling less attractive.
- The textile industry in Bangladesh can create huge market demand for recycled PET and play an important role in bringing circularity in the plastic life cycle.
- Granules generated from PP, HDPE, LDPE, and PS waste are used to manufacture such items as furniture, hangers, nonfood items, pellets, crates, and boxes.

## Waste Composition Analysis at the Household Level and Landfills in the DSCC

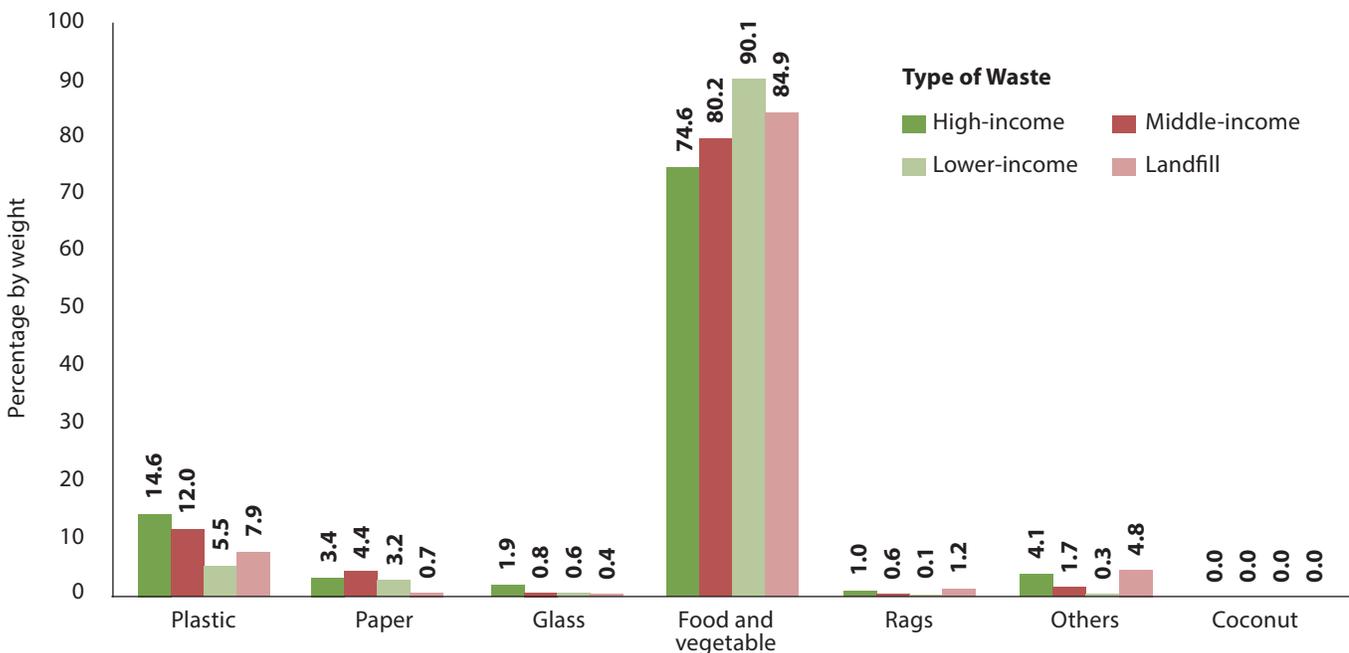
Composition of household waste according to income and in landfills in the DSCC is shown in figure 2.2. Low-income areas had the highest percentage by weight of organic matter in household waste (90.1 percent), followed by middle- (80.2 percent) and high-income areas (74.6 percent), whereas high-income areas had the highest percentage by weight of plastic waste (14.6 percent), followed by middle- (11.9 percent) and low-income areas (5.5 percent).

Figure 2.2 shows that middle-income areas generated the most paper waste (4.4 percent), with high- and low- income areas generating less (3.2 percent). Organic matter accounted for 84.9 percent of waste at the Matuail landfill site, and plastic waste accounted for 7.9 percent. The waste composition analysis revealed that LDPE was the most widely used and disposed of plastic waste by all income groups and that lower-income households generated less packaging and plastic waste than higher-income households.

Some of the key inferences from the waste composition analysis are described below:

- Analysis showed that LDPE was the most widely used and discarded plastic waste in the DSCC and DNCC across different income groups.
- Households with lower income generate less packaging materials and plastic waste compared to high-income households

**FIGURE 2.2: Composition of landfill waste in the DSCC, 2020**

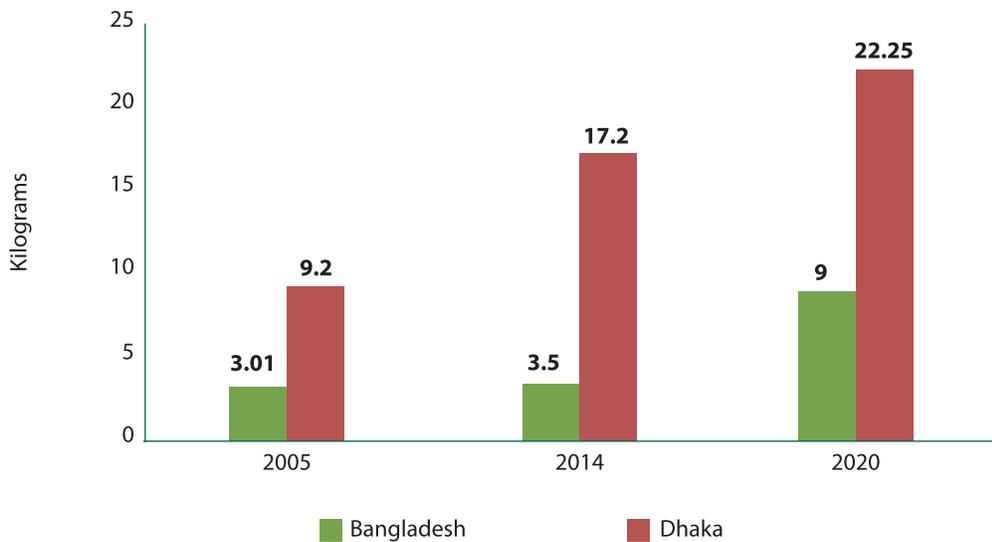


Source: Field Survey, Waste Concern Consultants, 2020

## Per Capita Plastic Consumption

The rapid pace of urbanization and development has led to increased consumption of plastic products and plastic waste generation in Bangladesh. It was observed that the per capita consumption of plastic was increasing with time. Annual per capita consumption of plastic of 3.0 kg in 2005 (Enayetullah et al., 2005) increased to 9.0 kg in 2020 in urban areas. It should be noted that the 2020 consumption figure is based on a detailed survey on the waste composition of households and landfills in Dhaka city in 2020, which was extrapolated based on projections of urban waste compositions of 2005 and 2014 to estimate the overall urban plastic consumption in Bangladesh. In 2005, a detailed survey was done in Dhaka city, while 2014 data collection covered 271 urban localities in Bangladesh (Waste Concern, 2015). The annual per capita consumption of plastic in Dhaka in 2020 was 22.25 kg (figure 2.3). The rapid pace of urbanization and development has increased the consumption of plastic products and the generation of plastic waste in Bangladesh.

**FIGURE 2.3: Per capita plastic consumption, 2005, 2014 and 2020**

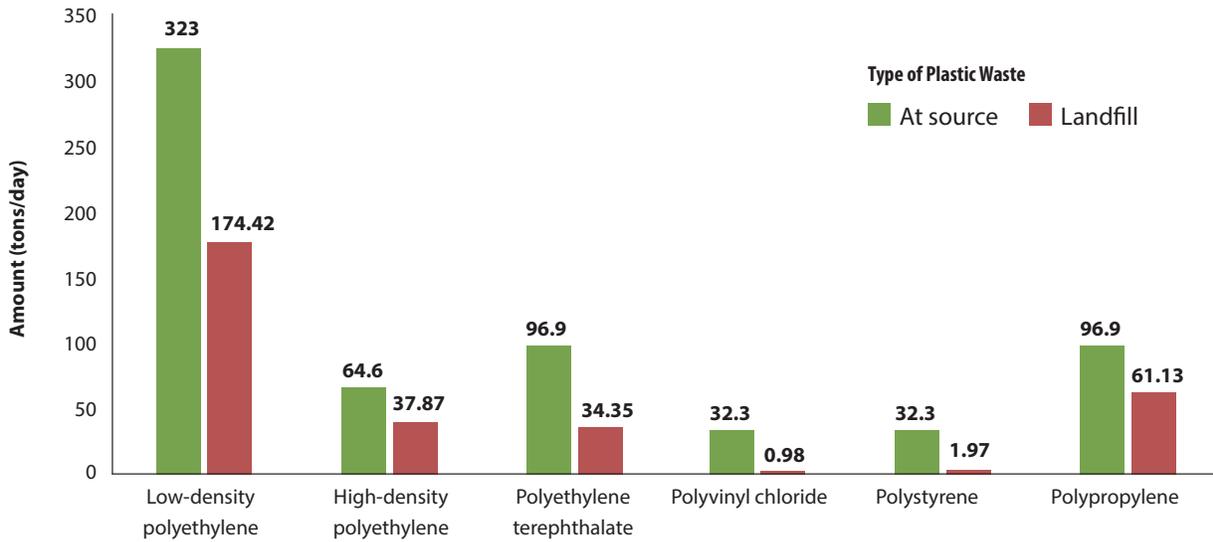


Source: Enayetullah et al, 2005, Waste Concern 2015 and Field Survey, Waste Concern Consultants, 2020

## Plastic Waste Composition in Households and Landfills

Households generated more LDPE waste than any other type of plastic in the DNCC and DSCC (323 tons per day), but only 174.4 tons per day reached landfills (figure 2.4); 96.9 tons of PET waste was generated daily, but only 34.3 tons per day reached landfills. LDPE is less likely to be recycled because of its light weight and thickness and its ability to easily become soiled, resulting in a large portion of LDPE reaching landfills. PVC and PS are very attractive to the recycling industry because of their high price, so a very small quantity of PVC and PS waste was found in landfills.

**FIGURE 2.4: Household and landfill plastic waste composition in the DNCC and DSCC**

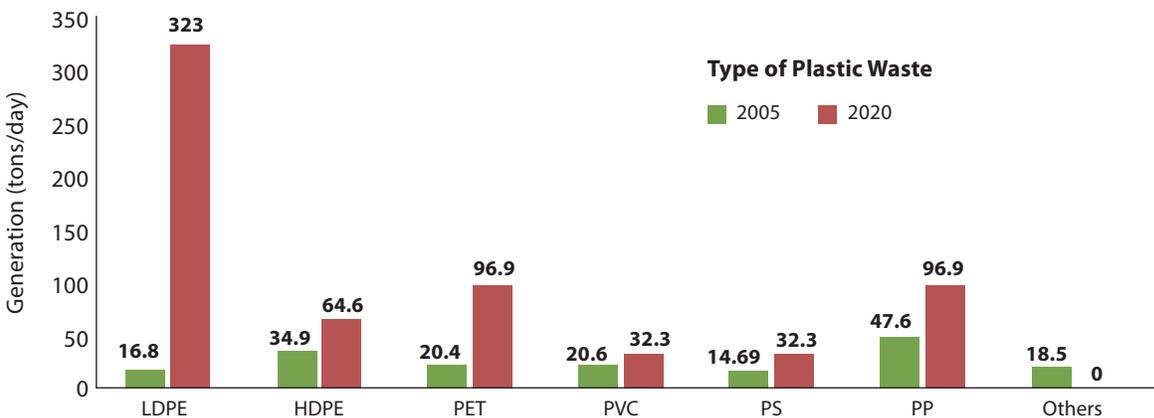


Source: Field Survey, Waste Concern Consultants, 2020

### Household Plastic Waste Composition

Households generated almost nine times as much LDPE (mainly used for MLP and SUP) in 2020 (323 tons per day) as they had in 2005 (16.8 tons per day) (figure 2.5). The amount of PET generated was 20.4 tons per day, which increased by fivefold in 2020. Analysis from the field survey also revealed that LDPE packaging materials accounted for 10 percent of plastic waste in 2005 but increased to 50 percent by 2020. COVID-19 is a possible cause of the increase in LDPE use. The proportion of PP increased from 27 percent in 2005 to 15 percent in 2020. The amount of HDPE increased in 2020 because of the increase in the use of consumer products (bottles, tubes, boxes for food and nonfood items, toys) that required HDPE bottles for packaging.

**FIGURE 2.5: Composition of household plastic waste, 2005 and 2020**



Source: Enayetullah et al, 2005 and Field Survey, Waste Concern Consultants, 2020



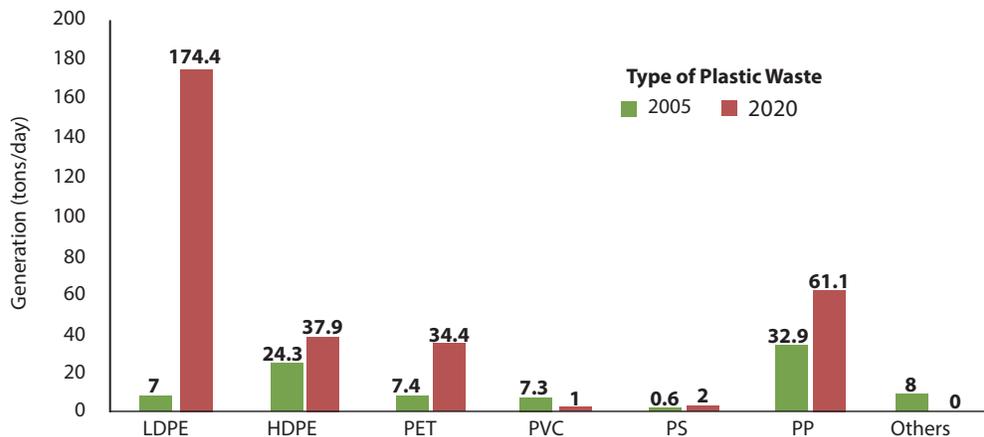
PHOTO CREDIT: WASTE CONCERN

### Landfill Plastic Waste Composition

Figure 2.6 shows the composition of plastic waste in two landfills (Amin Bazar in the DNCC and Matuail in the DSCC) in 2005 and 2020. The landfills (Amin Bazar and Matuail) were surveyed before the onset of and during the COVID-19 pandemic in 2020. The average percentage of LDPE increased from 8 percent in 2005 to 56 percent in 2020. The quantity of PVC fell from 8 percent in 2005 to 1 percent in 2020.

People have recycled less waste during the COVID-19 pandemic, with many appearing to throw most of their plastic waste in the trash. City corporations did not permit waste to be sorted for recycling inside the secondary transfer station, loading it directly onto trucks for disposal in landfills. A major reason for the increased amount of LDPE reaching landfills was the increased use of packaging materials made of LDPE. A decrease in the quantity of PVC in landfills could be attributed to its higher demand for recycling.

**FIGURE 2.6: Waste composition in landfills, 2005 and 2020**



Source: Enayetullah et al, 2005 and Field Survey, Waste Concern Consultants, 2020

## Household Plastic Waste according to Category

More than 18 groups of items were identified under the six categories of plastic resin. Single-use thin shopping bags (40.6 percent) were the source of most LDPE (table 2.1). MLP waste (7.0 percent) was also identified as a problem; it ends up in landfills because of the difficulty in recycling the multiple layers of materials. The majority of items containing HDPE were consumer products such as medicine and soap bottles and tubes (e.g., toothpaste). Water bottles were the most common source of PET.

**TABLE 2.1: Composition of plastic waste items in DNCC and DSCC households, according to category of plastic**

Examples according to category	Plastic waste generation (tonnes/day)	Percentage of total plastic waste	Percentage of plastic items in category	Percentage of plastic items in total plastic waste
<b>Low-density polyethylene</b>	<b>323.0</b>	<b>50</b>		
Single-use thin shopping bags	261.6		81.0	40.6
Multilayer plastic packaging waste: food and nonfood wraps and packaging materials (e.g., mini packs)	45.2		14.0	7.0
Thicker bags and wrappers	16.1		5.0	2.5
<b>High-density polyethylene</b>	<b>64.6</b>	<b>10</b>		
Medicine and soap bottles, tubes (e.g., toothpaste)	27.8		43.0	4.3
Ice cream tubs, milk bottles, boxes for food and nonfood items	19.4		30.0	3.0
Toys	17.4		27.0	2.7
<b>Polyethylene terephthalate</b>	<b>96.9</b>	<b>15</b>		
Water bottles	65.9		68.0	10.2
Soft drink bottles	20.3		21.0	3.2
Medicine bottles	10.7		11.0	1.6
<b>Polyvinyl chloride</b>	<b>32.3</b>	<b>5</b>		
Water pipes, electrical conduits	24.9		77.0	39.0
Toys	4.5		14.0	0.7
Shampoo bottles	2.9		9.0	0.4
<b>Polystyrene</b>	<b>32.3</b>	<b>5</b>		
Food takeaway containers, plastic cutlery, egg cartons	25.3		78.4	3.9
Single-use plates and cups	6.96		21.5	1.1
<b>Polypropylene</b>	<b>96.9</b>	<b>15</b>		
Water and paint buckets	49.01		50.6	7.6
Boxes, bottle caps, ice cream tubs	25.1		25.9	3.9
Packing covers	13.61		14.0	2.1
Flour, pulse, grain, rice packs (not recycling)	9.4		9.6	1.4
<b>Total</b>	<b>646</b>	<b>100</b>		<b>100</b>

Source: Field survey, Waste Concern Consultants 2020.

## Landfill Plastic Waste according to Category

Most of the plastic found in landfills was LDPE (66.1 percent) because it has no economic value (table 2.2), and the greatest percentage of this was single-use thin shopping bags (31.4 percent). MLP waste (18 percent) also ends up in the landfill because the recycling industry does not have the capacity to recycle the multiple layers. Flour, pulse, grain, and rice packs (made of PP) were also found in landfills (19 percent) because they become dirty and soiled.

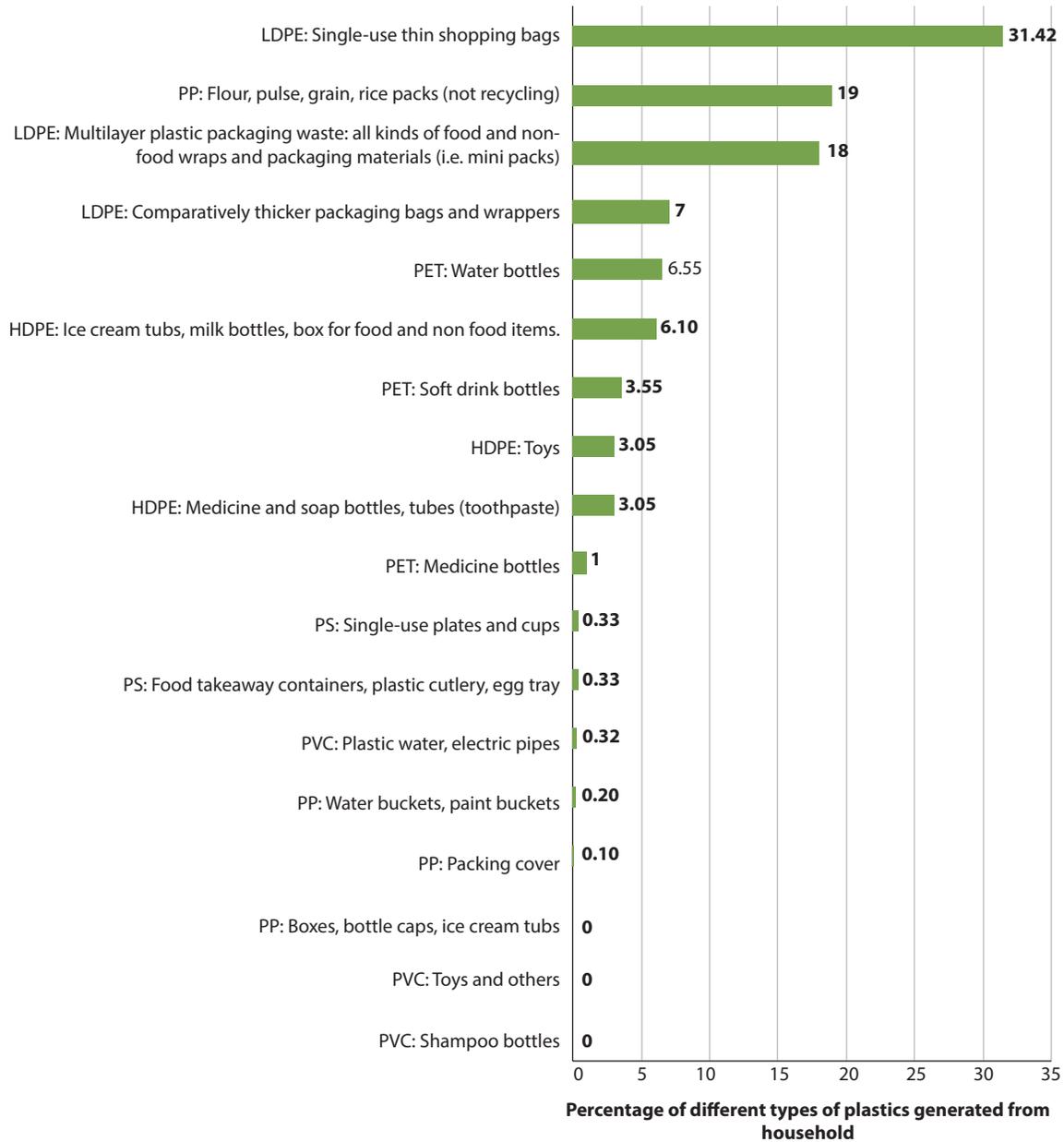
**TABLE 2.2: Composition of plastic waste items in DNCC and DSCC landfills, according to category of plastic**

Examples according to category	Plastic waste generation (tons/day)	Percentage of total plastic waste	Percentage of plastic items in category	Percentage of plastic items in total plastic waste
<b>Low-density polyethylene</b>	<b>174.4</b>	<b>56.1</b>		
Multilayer plastic packaging waste: food and nonfood wraps and packaging materials (e.g., mini packs)	55.8		32.0	18.0
Single-use thin shopping bags	97.6		56.0	31.4
Thicker bags and wrappers	21.0		12.0	7.0
<b>High-density polyethylene</b>	<b>37.9</b>	<b>12.2</b>		
Ice cream tubs, milk bottles, boxes for food and nonfood items	18.9		50.0	6.1
Medicine and soap bottles, tubes (e.g., toothpaste)	9.5		25.0	3.0
Toys	9.5		25.0	3.0
<b>Polyethylene terephthalate</b>	<b>34.3</b>	<b>11.0</b>		
Water bottles	20.3		59.0	6.5
Soft drink bottles	11		3.02	3.5
Medicine bottles	3		9.0	1.0
<b>Polyvinyl chloride</b>	<b>1.0</b>	<b>0.3</b>		
Water pipes, electrical conduits	1.0		100.0	0.3
Shampoo bottles	0.0		0.0	0.0
Toys and others	0.0		0.0	0.0
<b>Polystyrene</b>	<b>1.2</b>	<b>0.6</b>		
Food takeaway containers, plastic cutlery, egg cartons	1.0		50.0	0.3
Single-use plates and cups	1.0		50.0	0.3
<b>Polypropylene</b>	<b>61.1</b>	<b>16.7</b>		
Water and paint buckets	0.6		1.0	0.2
Boxes, bottle caps, ice cream tubs	0.0		0.0	0.0
Packing covers	0.3		0.5	0.1
Flour, pulse, grain, rice packs (not recycling)	60.2		98.5	19.0
<b>Total</b>	<b>310.7</b>	<b>100</b>		<b>100</b>

Source: Field survey, Waste Concern Consultants 2020.

Figure 2.7 shows the category-wise ranking of plastic waste at the landfill level. Single-use thin shopping bags (in the LDPE category) are ranked first. Flour, pulse, grain, and rice packs and wrappers (in the PP category) are ranked second because their smaller size, lamination, and surface ink make them unattractive for the recycling market. MLP waste, all kinds of food and nonfood wraps, and packaging materials such as mini packs (in the LDPE category) are ranked third.

**FIGURE 2.7: Ranking of household plastic waste in the DNCC and DSCC according to category**



Note: HDPE = high-density polyethylene; LDPE = low-density polyethylene; PET = polyethylene terephthalate; PP = polypropylene; PS = polystyrene; PVC = polyvinyl chloride.

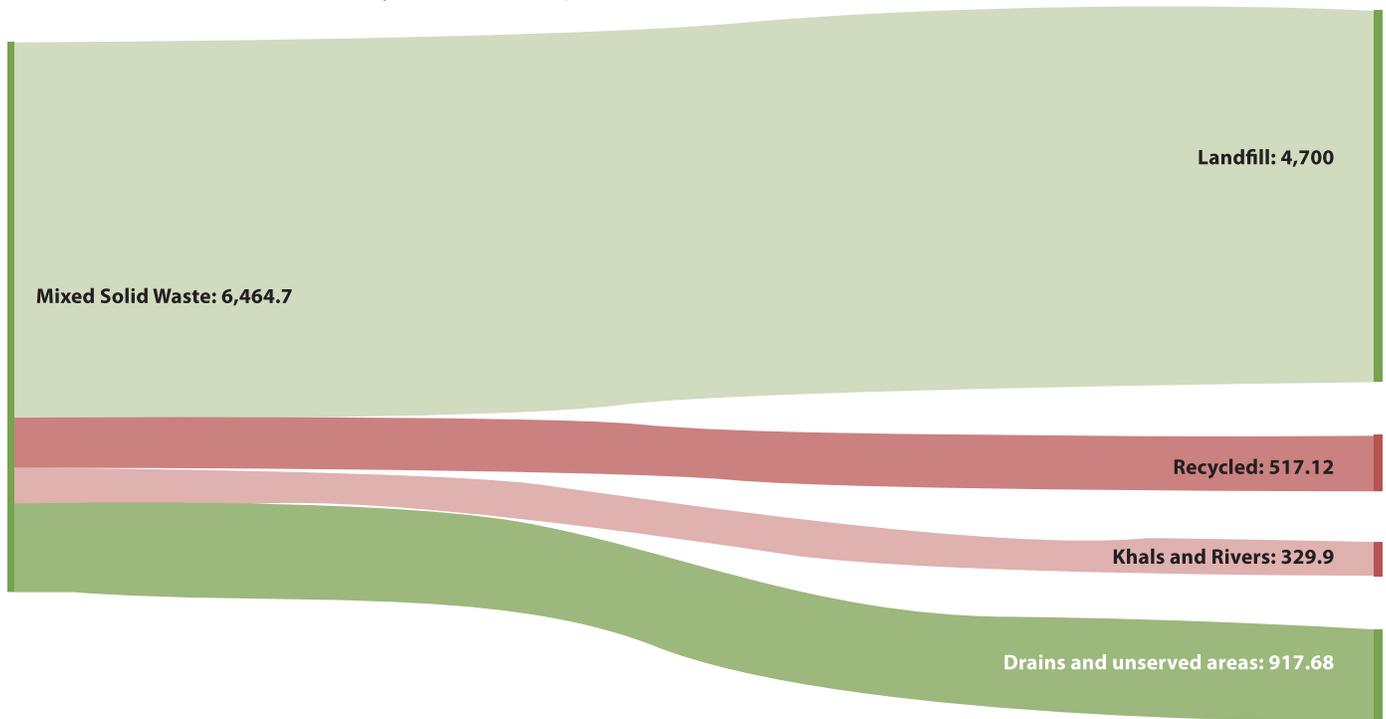
Source: Field Survey, Waste Concern Consultants, 2020 All data is 2020

## 2.2 MATERIAL FLOW ANALYSIS FOR WASTE

### Material Flow Analysis for Mixed Solid Waste in the DNCC and DSCC

A detailed material flow analysis for municipal waste in the DNCC and DSCC is shown in figure 2.8. The two landfills in Dhaka for the disposal of waste have almost reached capacity, so the government has allocated funds to expand them. Dhaka’s city corporations are pursuing waste-to-energy projects using incineration technology to reduce the amount of waste being landfilled.

FIGURE 2.8: Material flow analysis for municipal waste in the DNCC and DSCC 2020



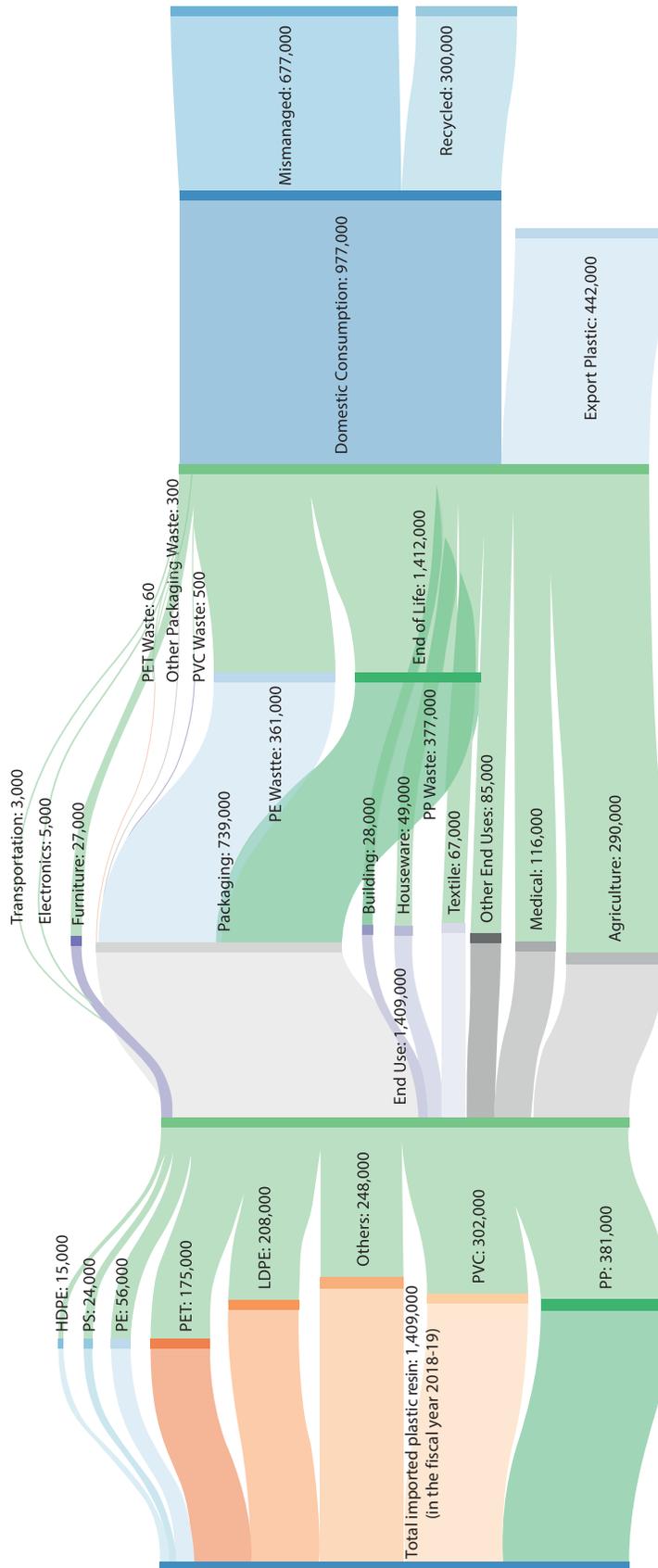
Note: All values in the figure are in tons per day.

Source: Field survey, Waste Concern Consultants 2020.

### Material Flow Analysis for Plastics in Bangladesh

Figure 2.9 shows how different categories of plastic are used in various sectors in Bangladesh. Of the total 1,409,094 tons of imported plastic resin annually, 69 percent is used in Bangladesh as raw material for domestic goods, and 31 percent is used to produce export items. The packaging industry is the largest user of plastics. The last column of this chart shows that, of the 977,000 tons per year of plastic waste, 70 percent is mismanaged, and 30 percent is collected for recycling.

FIGURE 2.9: Material flow diagram for plastics in Bangladesh



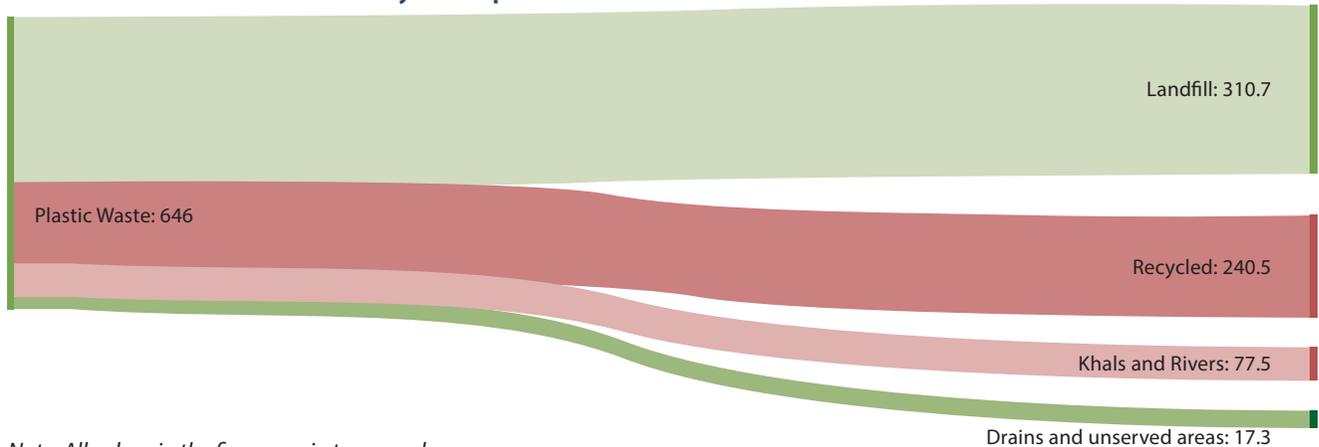
Note: HDPE = high-density polyethylene; LDPE = low-density polyethylene; PE = polyethylene; PET = polyethylene terephthalate; PP = polypropylene; PS = polystyrene; PVC = polyvinyl chloride.  
All values in the figure are in tons per year.

Source: Field Survey, Waste Concern Consultants, 2020

## Material Flow Analysis for Plastic Waste in Dhaka

Of the 6,464 tons per day of municipal waste generated, an estimated 73 percent reached landfills, 8 percent was recycled, 5 percent made its way into *khals* and rivers, and 14 percent reached drains and unserved areas of the city corporations. Of the 6,464 tons per day of waste collected, 10 percent was plastic (646 tons per day), of which 48 percent reached landfills, 37 percent was recycled, 12 percent made its way into *khals* and rivers, and 3 percent reached drains and unserved areas of the city corporations (figure 2.10).

**FIGURE 2.10: Material flow analysis for plastic waste in the DNCC and DSCC 2020**



Note: All values in the figure are in tons per day.

Source: Field Survey, Waste Concern Consultants, 2020

### 2.3 HOT SPOT ASSESSMENT FOR MARINE PLASTIC DEBRIS

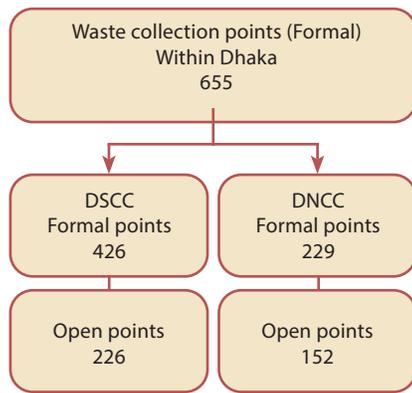
To identify leakage points, hot spots for marine plastic debris were assessed for Dhaka, Chattogram, and Cox's Bazar. For Chattogram and Cox's Bazar, a rapid survey was conducted at selected locations; for Dhaka, the study was conducted in a more detailed manner. The survey consisted of various campaigns before and during the COVID-19 pandemic. However, due to multiple constraints, the surveys could not map the entire period of the year to capture the seasonality. This limitation may be noted in the interpretation of the survey data.

A hot spot is where plastics leak into the environment (including land, air, water, and marine environment). Actions to address hot spots were considered in terms of interventions and instruments. In addition, locations along the waste management value chain where local government bodies do not collect waste were identified, and locations where waste accumulates regularly and is not collected or transported to a landfill for proper disposal were mapped. The majority of this waste washes away during the monsoon season and ends up in the rivers and seas.

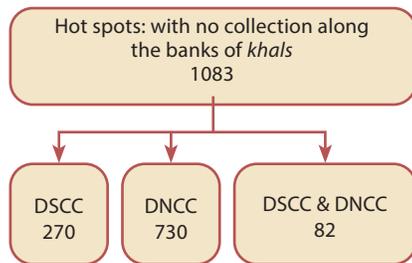
The study area comprised the DNCC and DSCC and hot spot near four rivers in Dhaka: Turag, Buriganga, Balu, and Shitalakshya. Some of the hot spots on the riverbanks

are situated in the greater Dhaka area, outside DNCC and DSCC, and hot spots on the four rivers in Dhaka: Turag, Buriganga, Balu, and Shitalakshya. In Chattogram, areas near Chaktai *Khal* and some of the hot spot on the rivers are situated in the greater Dhaka area, outside of DNCC and DSCC. Karnaphuli River, Laboni Beach in Cox’s Bazar, Shugondha Beach, Inani Beach, and the landfill at Kostorighat, close to the sea, were considered. A rapid assessment was conducted in the aforementioned sites (appendix B). The hot spot assessment in Dhaka is summarized in figure 2.11.

**FIGURE 2.11: Hot spots in Dhaka**

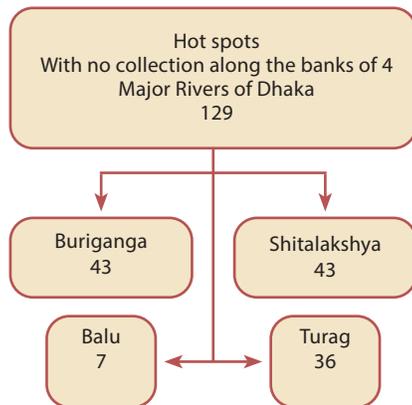


Waste collection point	DSCC	DNCC
STS = Secondary Transfer Station	23	52
Open truck	212	129
Dump truck	5	5
Compactor	9	18
Container carrier	177	25
<b>Total</b>	<b>426</b>	<b>229</b>



Particulars (for khals + 4 rivers)	Illegal hot spots
Total hot spots along the banks	1212 nos.
Waste already accumulated	106,143.99 tons

Total Accumulated Waste: 33,612 tons out of which 30% (10,083.6) tons directly discharged into the water.  
Waste Generation: 216.60 tons/day



Particulars	Buriganga	Balu	Shitalakshya	Turag	Total
Hot spots	43	7	43	36	129
Accumulated Waste (tons)	11564.9	2012.03	43183.38	15771.46	72531.77
Daily Generation (tons/day)	9.18	0.93	45.38	57.08	112.57

Total Accumulated Waste: 72,531.8 tons  
Waste Generation: 112.6 tons/day

Source: Field survey, Waste Concern Consultants 2020.

Note: DNCC = Dhaka North City Corporation; DSCC = Dhaka South City Corporation.

## Hot spots in Dhaka

There are 426 designated waste collection points in the DSCC area and 229 in the DNCC area. Waste collected through the primary collection system is brought to designated collection points for transportation to landfills. Only 6 percent of the waste collection points in the DSCC area are covered by secondary transfer stations, whereas 23 percent of the waste collection points in the DNCC area are covered by secondary transfer stations. Waste is not segregated before reaching the landfills. There are six designated waste collection points per ward in the DSCC and four per ward in the DNCC. Fifty-three percent of collection points in the DSCC area and 66 percent in the DNCC area are uncovered.

In 2020, the estimated population was 4,490,811 for the DSCC area and 6,105,664 for the DNCC area. In the DSCC area, 0.948 waste collection points per 10,000 population are covered, whereas 0.375 per 10,000 population are covered in the DNCC area.

In addition to 655 designated waste collection points in Dhaka, the study identified 1,083 hot spots near the 39 *khals* of Dhaka where waste was not collected, 30 of which are in the DNCC, seven are in the DSCC, and two are in the DSCC and DNCC. Based on the field survey, 33,612 tons of waste accumulated at these collection points; an estimated 216.60 tons of waste is illegally disposed of at these locations per day.

The DNCC and the Narayanganj City Corporation (NCC) have obtained approval from the Cabinet Committee on Public Purchase to establish a 42.5-megawatt (MW) waste-to-energy plant in the DNCC and a 5 MW waste-to-energy plant in the NCC. Both projects are expected to be operational in 24–36 months. According to the agreement, the DNCC will provide 3,000 tons of solid waste per day to its plant, and the NCC will provide 500 tons to its plant. It is expected that the DNCC will increase its waste collection efficiency to meet the target supply, which will reduce the amount of waste being dumped in the hot spots.

Incoming waste could be sorted in secondary transfer stations. Covered collection points are larger and serve larger populations than open waste collection points, where trucks collect waste from open bins or demountable containers. Sorting at available waste collection points is difficult because of space constraints, and they are sources of leakage during the monsoon period. According to best practice guidelines, there should be at least one container or covered collection point per 5,000 to 10,000 population. The number of covered collection points in Dhaka, especially the DSCC, does not meet these best practice guidelines.

## Hot spots around the Four Rivers of Dhaka

Based on the field survey, an estimated 72,532 tons of waste accumulated at 129 points around the four rivers of Dhaka, and an estimated 112.6 tons of waste is disposed of at

these hot spots per day. Detailed maps with global positioning system locations were identified (appendix B).

Based on the field survey, it was estimated that 216.6 tons of solid waste were disposed of per day in 1,083 hot spots near the *khals* of Dhaka (79,059 tons per year), all of which are connected to the four major rivers around Dhaka. The study also established that there are 129 hot spots where 112.6 tons of waste was disposed of every day around the four major rivers (41,099 tons per year). Combining the quantity of waste disposed of around the hot spots of the *khals* and rivers, it was estimated that 120,158 tons of waste is disposed of per year at the 1,212 hot spots (appendix B).

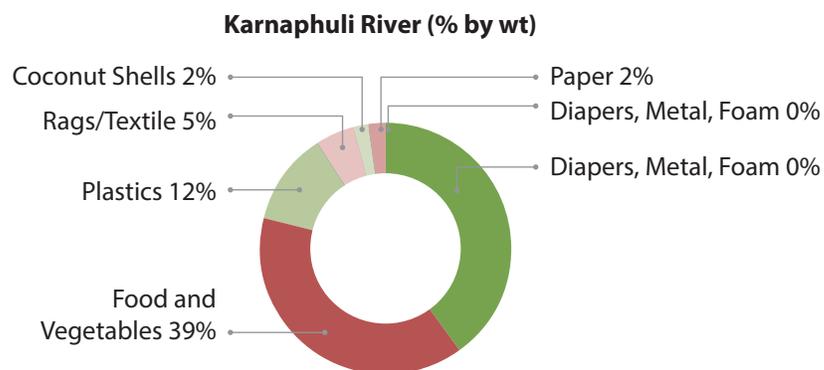
The study also found that the percentage of plastic in the solid waste at hot spots varies from 20 percent to 30 percent, so the cumulative amount of plastic in the hot spots varies from 24,032 tons to 36,047 tons per year. Because all of the hot spots are connected to the river system, there is strong potential for this plastic waste to end up in rivers (appendix B).

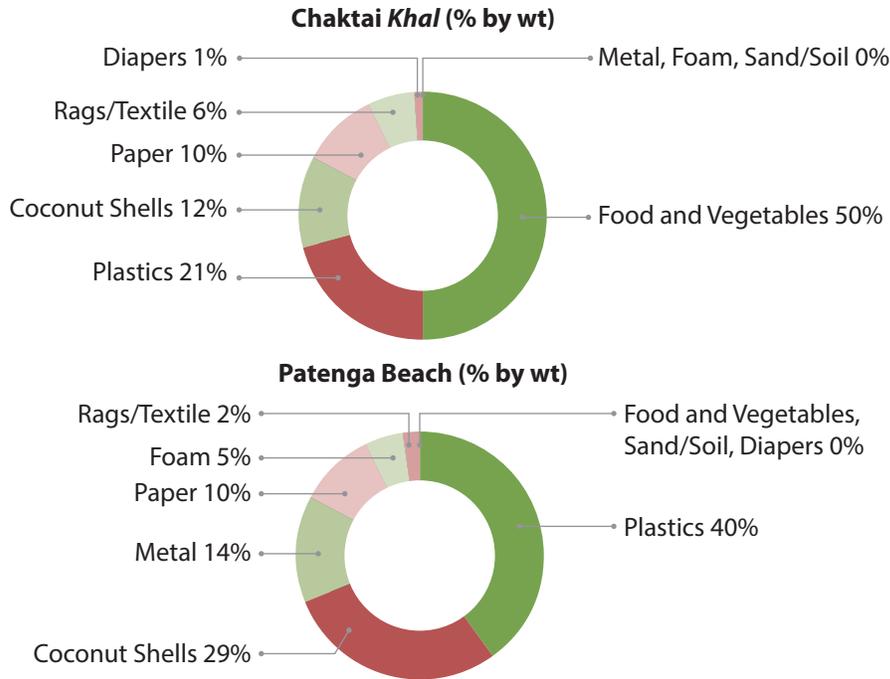
### Hot spots in Chattogram City

The study area in Chattogram comprises Chaktai *Khal* and the Karnaphuli River. The study examined 97 locations by Chaktai *Khal* and two locations on the Karnaphuli River where waste was dumped. Based on the field survey, an estimated 1,428.8 tons of waste had accumulated at these points. A large amount of LDPE, mainly SUP and MLP (e.g., potato chip bags, polyethylene bags, packaging materials), was found in locations that attract tourists. Details about the hot spots, along with global positioning system coordinates and site details, are shown in appendix B.

The most plastic was found in Patenga Beach (40.5 percent), with 20.7 percent found in Chaktai *Khal* hot spots and 12.5 percent in Karrabul River hot spots (figure 2.12). A high amount of LDPE category plastics mainly SUP and MLP (potato chip packets, polythene bags, packaging materials, etc.) were found in locations that attract a lot of tourists.

**FIGURE 2.12: Composition of solid waste in Chattogram**





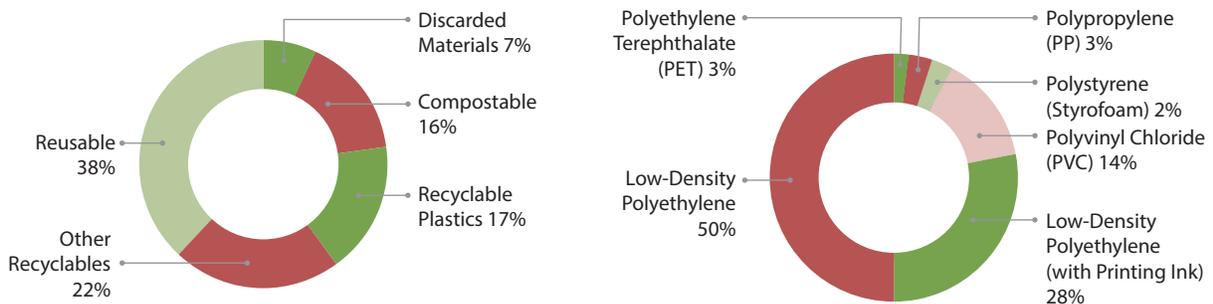
Source: Field survey, Waste Concern Consultants 2020

### Hot Spots in Cox’s Bazar

The study area in Cox’s Bazar included Laboni Beach, Shugondha Beach, Inani Beach, and the landfill at Kostorigat, which is close to the sea. The landfill site is flooded during high tide because there is no embankment around it. Details of the hot spots, along with global positioning system coordinates and site details, are shown in appendix B of this report.

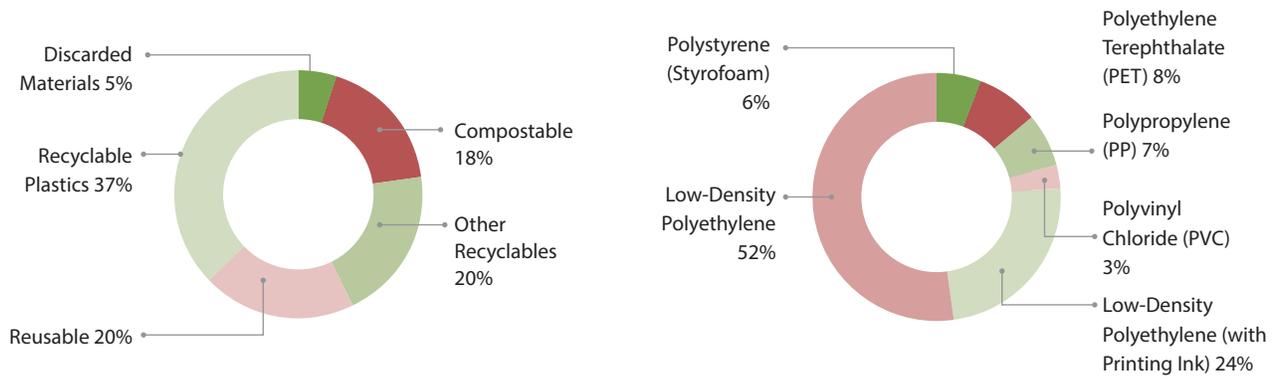
Physical analysis of the incoming waste delivered by truck to the landfill at Kostori Para, Cox’s Bazar, showed that 16 percent is organic, which is compostable; 38 percent is reusable (e.g., coconut shells); and 17 percent is recyclable plastics. These are represented in figures 2.13.

**FIGURE 2.13: Composition of waste disposed of at Kostori Para landfill, Cox’s Bazar**

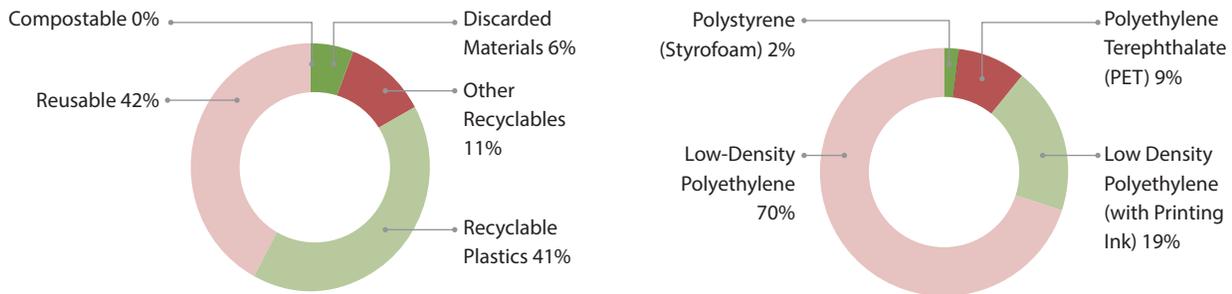


Source: Field survey, Waste Concern Consultants 2020

**FIGURE 2.14: Composition of waste disposed at Laboni Beach, Cox’s Bazar**



Source: Field survey, Waste Concern Consultants 2020



Source: Field survey, Waste Concern Consultants 2020

The waste analyzed at Laboni Beach, Cox’s Bazar, came from the beach only, so its composition differs from the typical composition of household waste. Only 18 percent of the waste is compostable, and about 37 percent is recyclable plastics, which are collected and burned (figure 2.14); there is no recycling activity near the beach. Local businesses provide bins for disposal of waste and hire local workers to collect the waste regularly. These are represented in figure 2.14.

The waste analyzed from Inani Beach, Cox’s Bazar, was from the beach, so its composition differs from the typical composition of household waste. Local businesses provide bins for disposal of waste and engage workers to collect the waste regularly. Forty-two percent of the waste was found to be reusable (coconut shells), and 41 percent were recyclable plastics. These are represented in figure 2.14.

## 2.4 STAKEHOLDER ANALYSIS OF THE DHAKA METROPOLITAN AREA

A stakeholder analysis was conducted to identify key stakeholders or actors and understand their socioeconomic status. Actors involved in the recycling network of Dhaka were divided into four categories:

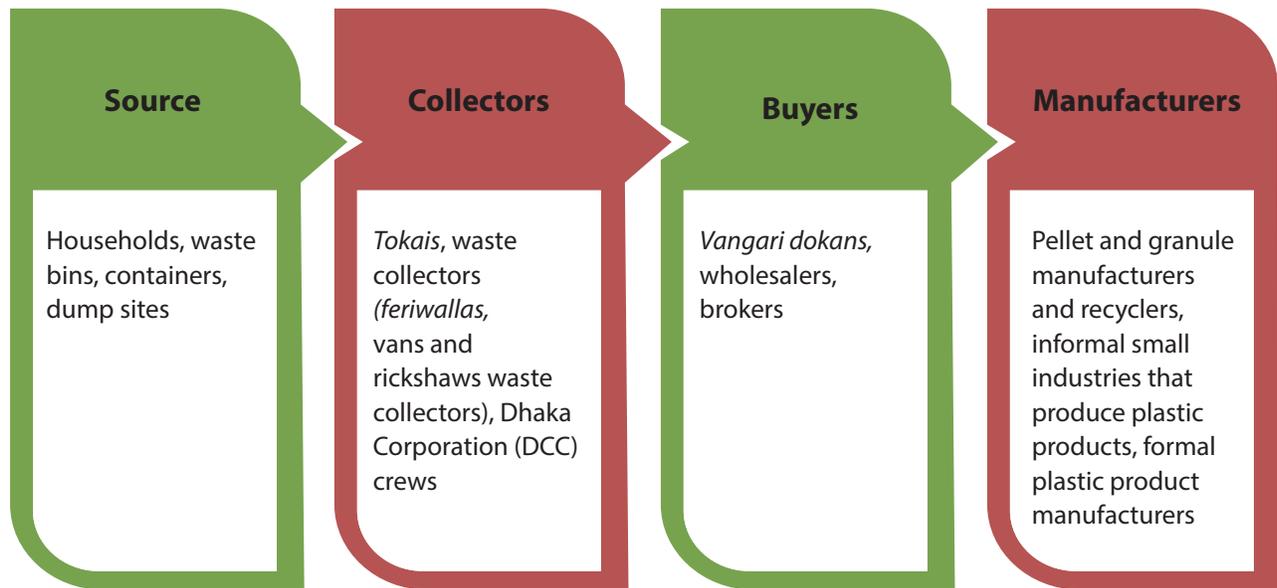
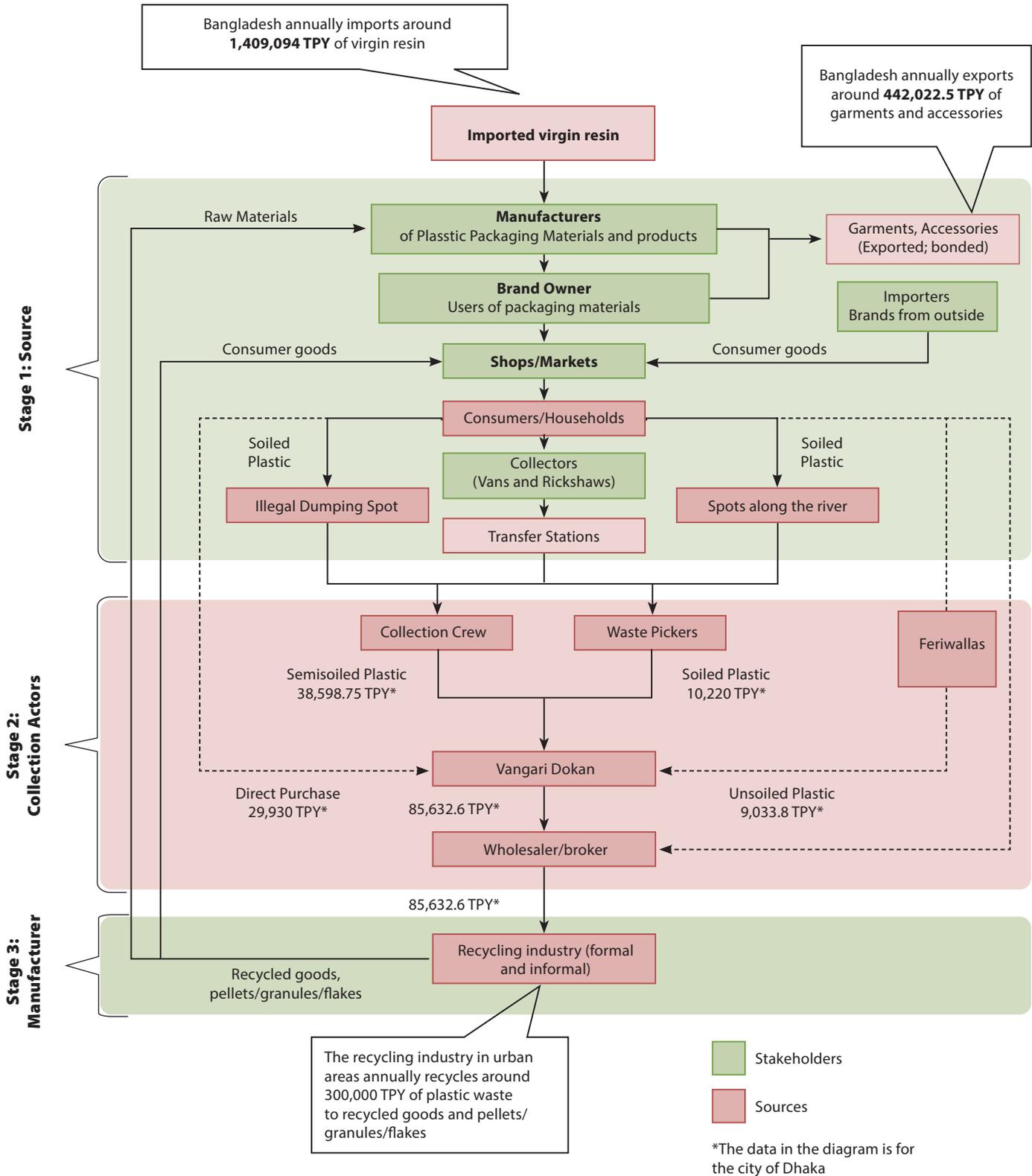
**FIGURE 2.15: Supply chain of plastic materials and products**

Figure 2.15 illustrates the supply chain of plastic materials and products (upstream) and stakeholders engaged in waste recycling and recovery (downstream). Special attention was paid to small and medium enterprises and vulnerable informal actors. Twenty participants from each stakeholder group were interviewed, and a household sample survey based on income levels was conducted.

Manufacturers produce plastic goods and plastic packaging materials using imported virgin and recycled resins as raw materials. Some importers import plastic goods. Brand owners use packaging materials that manufacturers supply in their production of branded consumer products. Brand owners also produce several types of plastic products and commodities for consumption. Shops and markets sell these products. Consumers and households purchase goods from shops and markets and produce postconsumer plastic waste. After this, the role of actors responsible for collecting, recycling, and recovering plastic wastes begins.

Waste collectors (vans and rickshaws) were responsible for collection from households and other sources, bringing the collected waste to nearby secondary transfer stations and waste collection points within the DNCC and DSCC areas. Some people dump their waste in illegal spots within the city and on riverbanks. Rickshaw and van waste collectors mainly collect soiled plastic waste. Another group of stakeholders (wholesalers, brokers, itinerant buyers) buys unsoiled waste from households. *Vangari dokans* are mainly neighbourhood based and buy recyclable (soiled and unsoiled) plastic waste from all stakeholders and sell it to wholesalers and brokers that buy waste on a large scale, directing a large volume of plastic waste to the recycling companies that clean and process it into products and secondary raw materials (recycled plastic waste or flake from PET).

FIGURE 2.16: Plastic recycling value chain in Bangladesh and plastic recycling system in Dhaka



Note: DCC = Dhaka City Corporation; TPY = tons per year.

Source: Field survey, Waste Concern Consultants 2020.

The study highlights the importance of the informal sector in the collection and recycling of plastic waste. All buyers and manufacturers of plastic waste-based pellets or granules are in the informal sector. However, both formal and informal manufacturers use these pellets and granules as raw materials to manufacture products because of their availability. Based on the field survey, organic waste forms almost 78 percent of total waste and has no significant value for actors involved in the recycling value chain.

During the plastic waste recycling process, different types of plastic materials are discarded (disposed), sold, collected, recycled, and manufactured through the hierarchical system of sources, collectors, buyers, and manufacturers (figure 2.19). Informal sector actors play a key role in the labour-intensive recovery and recycling practice. Plastic waste is collected from different points and sent to pellet, granule, and plastic product manufacturers in other parts of Bangladesh. The process involves three stages (figure 2.19):

1. In stage 1, brand owners, manufacturers, and importers import and domestically purchase plastic resins and granules (virgin materials and recycled). In the post-consumer stage, the plastic reaches waste bins, drains, and roadside ditches. The unsoiled economically valuable plastic is generally separated by consumers and sold to *feriwallas*.
2. In stage 2, in the house-to-house waste collection system in Dhaka, van collectors pick up soiled plastic waste and dispose of it in waste bins or at secondary collection points. From there, DCC crews transport soiled plastic to designated dump sites. The *tokais* collect soiled plastic that has some value from waste bins, secondary collection points, and dump sites. The informal waste pickers sell the plastic to *vangari dokans* (wholesale shops).
3. In stage 3, *vangari dokans* and wholesalers sort and clean (washing, drying) the plastic and sell it to small and large recyclers (formal and informal sectors). The recyclers convert plastic into pellets and granules of different quality grades. The pellets and granules are then used to make new plastic goods by manufacturers of plastic products and sold to consumers.

This cycle of plastic circulating between manufacturers, consumers, waste collectors, and recyclers continues until the plastic is no longer recyclable and, hence, has no market value for the waste pickers and recyclers.

Figure 2.19 shows that imported virgin plastic resin is an important raw material for the manufacturers of plastic products and packaging materials. The imported resin is used to manufacture plastic goods and packaging material for the local market and a part of it is exported after certain value addition, mainly by export-oriented garments and textile-based accessories manufacturers.

Three types of waste are processed in the informal recycling system: clean, semisoiled, and soiled (figure 2.19). If the waste is mixed with organic and other waste, it is soiled. If semisoiled waste can be separated from other waste and cleaned and dried, it

becomes clean. Clean PP, HDPE, and LDPE waste and PS-related waste are used as raw material for production of pellets and granules and to manufacture such things as furniture, hangers, nonfood items, crates, and boxes.

*Tokais*, rickshaw and van waste collectors, and DCC crews collect semisoiled and soiled plastic waste. *Feriwallas* mainly collect unsoiled plastic waste. *Vangari dokans* purchase clean, semisoiled, and soiled plastic waste. There are some 1,100 *feriwallas* working in Dhaka who buy 24.75 tons per day of clean waste from households. There are around 1,800 DCC crews.

**Tokais.** In the inorganic waste recycling value chain, *tokais* are important in the primary collection of recyclable materials. They are socioeconomically the most vulnerable group, with a lower standard of living than other recycling actors. They are the youngest and have low literacy rates and earnings. They do not take any protective measures when collecting waste from bins and dump sites. They operate in almost every neighbourhood of the city, coming from nearby slums or squatter settlements, moving through the community, carrying sacks on their backs and going through heaps of raw and mixed waste in community wastebins and at secondary transfer stations and dump sites with their bare hands or sometimes a stick. There are 200 *tokais* at the dump sites in Dhaka. They take anything with any value in the recycling market and sell it to *feriwallas* or *vangari dokans* in small quantities. Almost none of them have any kind of registration. Their income varies from BDT 2,000 to BDT 5,000 per month, with the majority earning only BDT 2000–3000 per month.

**DCC crews, rickshaw, and van collectors.** Van collectors have emerged as new actors in the inorganic waste collection process since house-to-house waste collection began in almost all the wards of the DNCC and DSCC area. They collect partially soiled recyclables and sell them to local *vangari dokans* without cleaning them. They are not registered, and almost all of them lack any insurance for work-related health problems. Their income varies from BDT 5,000 to BDT 8,000 per month, with the majority earning BDT 6,000 per month. Approximately 5,800 rickshaw and van collectors in both city corporations collect 105.75 tons per day of semisoiled waste from houses. DCC crews and waste pickers in dump sites recover plastic and sell it to junk shops.

**Vangari dokans.** There are 1,070 *vangari dokans* in Dhaka that receive 28 tons of soiled plastic waste every day. *Vangari dokans* purchase 157.75 tons per day of plastic waste from *feriwallas*, rickshaw and van collectors, DCC crews, *tokais*, and another 82.75 tons per day of waste from other sources, and sell it to wholesalers, who resell it to local manufacturers. There are 737 wholesalers in Dhaka.

**Manufacturers (informal).** More than 15 percent of plastic waste collected is PET. Of the 110,000 tons of PET waste generated every year, 37,550 tons are recycled. In Dhaka, 16,000 tons per day of PET is recycled—approximately 40 percent of PET waste generated. According to interviews conducted with local recyclers, approximately 4 billion PET bottles are thrown away. There are almost 300 plastic recycling or

manufacturing facilities in Dhaka producing plastic pellets, granules, flakes, and other plastic products and employing almost 5,400 people. The number of these informal recycling units is increasing rapidly.

Currently, the Bangladesh PET Flakes Manufacturers & Exporters Association has 82 members, approximately 10 percent of whom have the capability of hot washing in their facilities; the remaining 90 percent have only cold washing facilities, which are less expensive. Large PET flake exporters purchase plastic flakes from small processing units all over the country and export them to other countries after sorting and processing. Most of the small factories are located along the Buriganga River, using the river water for cleaning. The various actors involved in the plastic collection are described in table 2.3.

## 2.5 DOWNSTREAM PLASTIC WASTE VALUE CHAIN

Table 2.4 illustrates the per-kilogram value of different types of plastic waste that actors along the plastic value chain collect. Depending on the quality, type, and condition of the waste, the price varies. Table 2.4 also shows how the price of plastic differs along the value chain. PET commands a higher price because there is a ready export market, and LDPE (including linear low-density polyethylene, which are lightweight, thin, flexible items) has the lowest price (BDT 2–3/ kg) at the waste picker level because it is neither attractive nor feasible for them to collect. LDPE and PP dominated plastic

**TABLE 2.3: Collection of plastic waste by different actors**

	<i>Feriwallas</i>	Rickshaw and Van Collectors	Waste pickers	DCC Crews	<i>Vangariwalas</i>
Total Number	1,100	5,800	200	1,800	1,070
Tons of plastic collected per day	24.75	104.40	1.50	26.50	234.61

Source: Field survey, Waste Concern Consultants 2020.

**TABLE 2.4: Per-kilogram value (in BDT) of plastic waste in Dhaka**

Type of plastic	<i>Tokais</i>	Van driver	DCC crew	<i>Feriwallas</i>	<i>Vangari dokan</i>	Wholesale
Polyethylene terephthalate	12–15	12–15	13–14	18–20	24–25	35–55
High-density polyethylene	10–12	12–14	12–15	18–22	24–25	35–40
Polyvinyl chloride	14–15	12–13	12–13	20–22	25–26	30–35
Polypropylene	15–17	15–16	14–15	20–22	27–28	35–40
Polystyrene	15–16	16–17	15–16	18–20	22–23	30–35
Low-density polyethylene						
High gross	n.a.	n.a.	n.a.	n.a.	12–14	40–45
Unsoiled	n.a.	2–3	n.a.	n.a.	6–7	12–14

Source: Field survey, Waste Concern Consultants, 2020.

consumption, but collection of these two polymers is lower than collection of PS, PVC, or PET. PS products have the highest recycling rate, predominantly because they can be collected in bulk. Exporters sell PET on the international market at a price of BDT 80-120/kg, much higher than other plastics (see table 2.4). The market value of each kind of plastic increases as it moves from *tokais* to wholesalers due to progressive sorting, cleaning, and aggregation with every stage.

PET recyclers export different types of products, such as PET straps, PET palettes, and shredded PET, to India, China, Thailand, Vietnam, Austria, Ukraine, Philippines, Taiwan, and some European countries. The falling price of oil has lowered the price of virgin PET flakes, making PET recycling less lucrative in Bangladesh. The global shift in the textile industry—from agro-based to recycled-plastic-based yarns—provides a unique opportunity for Bangladesh to transition to recycled PET-based textile manufacturing. Creating a market for recycled PET will help the plastic waste economy contribute to sectors such as textiles, which play an important role in Bangladesh's economy.

## **2.6 EMPLOYMENT GENERATED BY PLASTIC WASTE RECYCLING IN DHAKA**

In the Dhaka metropolitan area, 9,970 people collect plastic waste for the recycling sector. Plastic recycling and manufacturing companies in Dhaka employ almost 5,400 workers. According to the Bangladesh Bureau of Statistics, total employment in the DCC was 5.26 million, indicating that 0.3 percent of the employed labor force was working in the plastic waste recycling sector (Bangladesh Bureau of Statistics 2018).

## ■ CHAPTER 3: REGULATORY ANALYSIS FOR PLASTIC MANAGEMENT

**B**angladesh is proactively tackling plastic pollution, with initiatives set in motion by government agencies, plastic manufacturers, plastic recyclers, local governments and non-profit organisations. This section focuses on the policy and regulatory analysis to identify the gaps and recommend solutions to be included as part of the action plan.

### 3.1 POLICIES AND REGULATIONS ON PLASTIC

The following text summarizes key milestones of the policies and initiatives developed by the government of Bangladesh and key stakeholders to address plastic issues.

**2002 : Notification ban on polyethylene bags.** Bangladesh was the first country to ban plastic shopping bags through a regulatory order (under the 1995 Environment Act), but the ban had limited results, mainly because of the lack of institutional resources and the high cost of alternative materials, which made the policy challenging to enforce. The Solid Waste Management Rules (SWMR), recently drawn up under the Environmental Conservation Act 1995, will be an important milestone towards setting down appropriate policies and becoming the overarching regulatory framework for plastic waste management in the country.

**2005 : Composition of Plastic Waste and Market Assessment of the Plastic Recycling Sector in Dhaka.** This study, supported by Katalyst (the Agri-Business for Trade Competitiveness Project, branded as Katalyst, is a market development project implemented by Swisscontact in Bangladesh), was the first comprehensive study in the country to assess plastic waste. Its main goal was to learn about Dhaka's waste composition, focusing on recycling. The findings have been used for baseline data to compare against 2020 data.

**2008 : The Medical Waste Management Rules, 2008.** The Medical Waste (Management and Treatment) Rules 2008 form the base management of all medical waste in the country. The rules are applicable only to waste management facilities/operators i.e. those involved in transportation, treatment, and disposal of medical waste.

**2010 : National 3R Strategy for Waste Management.** The national 3R (reduce, reuse, and recycle) goal for waste management was to eliminate waste disposal in

open dumps, rivers, and floodplains by 2015; promote recycling through mandatory segregation of waste at the source; create a market for recycled products; and provide incentives for recycling waste. Under this strategy, a 3R wing at MoEFCC was established to promote and implement 3R strategies, with MoEFCC as the 3R focal point. The DoE is the 3R secretariat.

**2010 : Mandatory Jute Packaging Act, 2010.** Mandatory Jute Packaging Act, 2010 and Mandatory Jute Packaging Rules, 2013 was enacted to promote the jute industry and reduce reliance on plastic. Initially, the government had mandated six agricultural commodities be packaged in jute. These are paddy, rice, wheat, maize, sugar, and fertilizer. The Act has been amended to include 11 more commodities. At present, compulsory use of jute packaging for 17 products has been ensured.

**2012 : Implementation of 3R pilot initiative in Dhaka and Chattogram to reduce (GHG) emissions (phase 1; 2012).** The Climate Change Trust Fund has funded this project, which aims to promote the concepts and practices of the 3Rs to raise public awareness of the benefits of source segregation of waste and recycling.

**2014–15 : Baseline study of refuse-derived fuel (RDF) from municipal waste in Dhaka.** The study was supported by the ICCO Cooperation, Bangladesh, a faith-based nongovernmental organization for development cooperation. The main objective was to conduct a baseline study and prepare a business plan to produce RDF for Dhaka and establish sustainable recycling initiatives and businesses involving the urban poor in the collection, production, and marketing process of RDF.

**2015 : Plastic Park Project to relocate old plastic factories.** To improve the working environment and sustainable growth of the plastics industry, the Bangladesh Small and Cottage Industries Corporation relocated the old Dhaka plastic factories to a new park in 2018. This is a BDT 500 million project with an allocation of 50 acres of land.

**2015 : Survey on soiled packaging waste and existing management practice for recycling project.** This survey estimated the amount of soiled plastic packaging waste and its composition arriving at landfill sites, informal cleaning and recycling facilities located in landfill sites, and older parts of Dhaka. The project analyzed the existing value chain of soiled packaging and assessed existing formal and informal facilities located in Kamrangir Char, the Matuail dump site area, Amin Bazar, and the Tongi area of Dhaka.

**2018 : Clean Dhaka Master Plan (2018–2032).** This plan, prepared for the DNCC and DSCC, emphasized the necessity of an integrated approach to addressing the growing population and increase in solid waste in Dhaka. The goal is to achieve proper waste collection, proper disposal, and waste reduction with recycling and incineration. The master plan targets a combination of 3R and the establishment of intermediate treatment plants (compost, recycle facilities, e-waste, and industrial waste management) and incineration plants.

**2018 : National Environment Policy.** The National Environment Policy envisaged environment conservation, pollution control, biodiversity conservation, and mitigation of the adverse effect of climate change to ensure sustainable development.

**2019 : National workshop.** On February 13, 2019, a one-day national workshop—titled the Sustainable Management of Plastic to Leverage Circular Economy and Achieve the Sustainable Development Goals in Bangladesh—was organized to develop a sustainable plastic waste management system. The DoE and MoEFCC brought together policy makers and stakeholders involved with plastic product production and consumption, waste management, and recycling. Rather than focusing solely on downstream management of plastic waste, it was determined that upstream management of plastic packaging waste involving manufacturers of packaging materials, brand users, and importers could be part of the solution. A technical advisory committee was set up to develop sustainable management of plastic goods and plastic waste.

**2019 : Public-private partnership (PPP) regulatory framework.** Provides guidelines on how to implement PPP projects and the roles and responsibilities of various line ministries. PPPs will help develop innovative technologies and skilled manpower to promote investments in the recycling of plastic.

**2020 : National Plastic Industry Development Policy 2020 (7th Draft).** The Ministry of Industries developed this policy. Waste-related policy aims include:

- achieving zero waste for plastic and packaging consumption by 2030;
- management, standardization, and quality control of recycling; and
- recollecting waste from products or packaging to be recycled (this strategy is related to the ongoing EPR initiative in Bangladesh that the World Bank prepared).

**2020 : Waste-to-energy projects using incineration technology to reduce the amount of landfilled waste.** The DNCC and NCC have obtained approval from the Cabinet Committee on Public Purchase to establish a 42.5 MW waste-to-energy plant in the DNCC and a 5 MW waste-to-energy plant in the NCC. Both projects are expected to be operational in 24–36 months.

**2020 : Piloting of EPR.** The World Bank is providing technical support to develop a pilot project on EPR in Dhaka with the active participation of local stakeholders (DoE, large brand owners, Bangladesh Plastic Goods Manufacturers & Exporters Association, city corporations, research bodies).

Table 3.1 lists ongoing and planned projects related to plastic waste management, initiated since 2018.

**TABLE 3.1: Ongoing and planned projects**

Project Title	Partner	Status
Baseline Survey for the Material Flow Analysis for Waste Plastics and Hot spots Assessment for Marine Plastic Debris in Bangladesh	World Bank	Completed
Integrated Approach Toward Sustainable Plastics Use and (Marine) Litter Prevention in Bangladesh	Department of Environment (DoE)	Ongoing
Water Quality Monitoring System for Greater Dhaka Watershed Area	Department of Environment	Planned
Bangladesh Environmental Sustainability and Transformation Project	Department of Environment	Under preparation
Sea to Source: Ganges Expedition	U.S. Embassy, Dhaka	Completed
Coastal Towns Environmental Infrastructure Project	Asian Development Bank	Ongoing and planned (phase 2)
Sustainable Management of Marine Plastic Pollution and Elimination of Releases of PBDEs [polybrominated diphenyl ethers] and UPOPs [unintentional persistent organic pollutants] from Manufacturing, Recycling, and Unsound Waste Management of Plastics	United Nations Development Programme (UNDP)	Planned
Reduction of Plastics and Polythene Pollution in Bangladesh	United Nations Development Programme	Planned
Public-Private Partnership on Management of Plastic Waste in Three Cities (Dhaka, Chattogram, and Cox's Bazaar)	United Nations Development Programme	Planned
A Comprehensive Assessment of Marine Litter and Microplastics and its Possible Impacts on the Marine Ecosystem of the Northern Bay of Bengal	Dhaka University	Planned
Program on Climate Change and Environment	Department for International Development	Under preparation
Determination of Marine Pollution by Assessing Seasonal Seawater Quality and Marine Organisms in the Coastal Area of Cox's Bazaar, Bangladesh	Bangladesh Oceanographic Research Institute	Ongoing

Note: PBDE= polybrominated diphenyl ether; UPOP = unintentional persistent organic pollutant.

Source: Royal Norwegian Embassy 2019.

**2020 : High Court order to ban use of SUP.** On January 6, 2020, the High Court directed the government to ban SUP products (e.g., drinking straws, cotton swabs, food packaging, food containers, bottles, plates, plastic cutlery, plastic bags) in coastal areas and in all hotels and motels across the country in the next year. The High Court also issued an order to enforce a ban on polyethylene through strict monitoring.

**2020 : Unilever's initiative with plastic waste in Bangladesh.** In partnership with the United Nations Development Programme in Bangladesh, Unilever initiated the Create a Circular Economy Model for Plastic Waste program, which focuses on HDPE and LDPE and is planned for the NCC. Activities will be planned to increase citizen awareness of the need to strengthen the informal recycling system and increase the collection of HDPE and LDPE waste in an efficient, environmentally friendly way. The project will also enable stakeholders to share knowledge for policy advocacy. This initiative shows how large brand owner organizations can address their upstream waste.

**2021 : Solid Waste Management Rules.** These rules will require plastic waste, along with all municipal waste, be properly segregated, collected, and disposed of. The draft handling rules were finalized in 2021 and require proper segregation of organic, inorganic, and toxic components of waste. The rules emphasize the obligations of local governments and the public at large for source segregation of biodegradable and nonbiodegradable waste. The rules advocate the adoption of a 3R strategy by the local governments and other stakeholders having a direct stake in plastic waste.

**2020: Eighth Five Year Plan, July 2020–June 2025** (Bangladesh Planning Commission 2020). To improve management of solid waste in urban areas of Bangladesh, the following strategies are recommended:

- Provide incentives for firms to provide door-to-door waste collection where it is not currently available
- Increase sorting and recycling and promote 3R (provide easy access to financing)
- Promote waste-to-energy projects where appropriate
- Encourage composting given the high organic content of the municipal solid waste

In addition to the aforementioned strategies, the government of Bangladesh has recommended the following measures to increase private sector participation in waste management and control illegal disposal of solid waste:

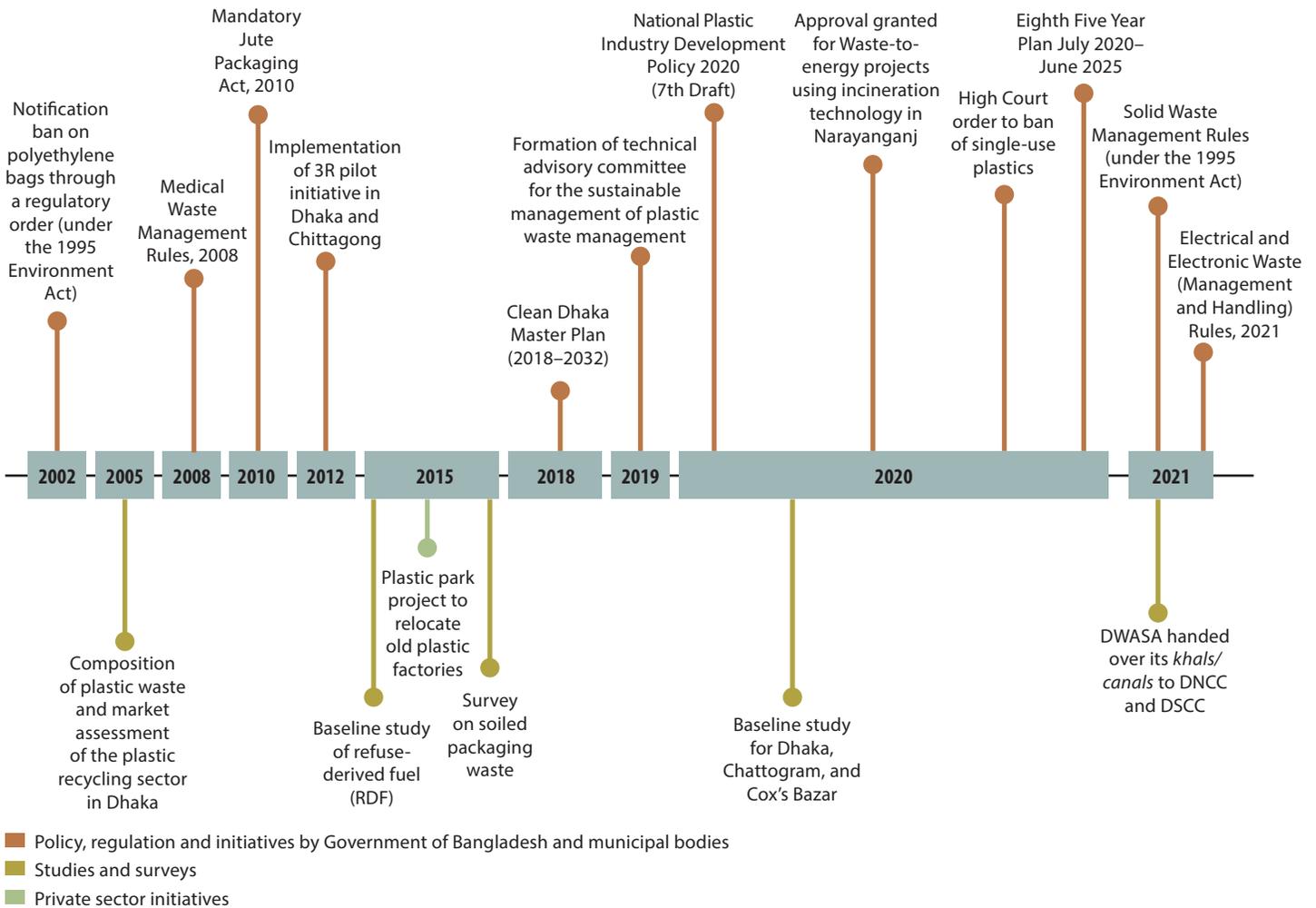
- *Pricing Policies for Water, Sanitation, and Solid Waste Management:* Under the Eighth Five Year Plan, the government will develop pricing policies to encourage sound management of solid waste. The “beneficiary pays” principle will be used to develop criteria for setting prices for providing waste collection services—especially for the urban middle class, which now has the income to bear such costs.
- *Introduction of Illegal Household Waste Dumping Charges:* A system of pollution charges for illegal disposal of household waste will be introduced that will increase household cooperation and compliance. The government will initially undertake a pilot scheme in high-income urban neighbourhoods.
- *Exploring Private Financing Options:* The public sector will enter into co-financing arrangements for a range of environmental services through PPPs, including partnerships with communities.
- *Introduction of EPR Policy in Plastic Management:* The Eighth Five Year Plan will focus on managing plastic pollution through EPR. The Plan recommends developing guidelines that must be functional, and collection, reduction, and recycling targets should be fixed. Along with EPR, a fee system and benchmark for percentage of product recyclability, and the proportion of recycled material in products, should be established for the betterment of the environment.

**2021 : Handover of khals/canals to the DNCC and DSCC** (Daily Star 2021). To address the long-standing waterlogging and environmental problems of Dhaka, on December 31, 2020, the Dhaka Water Supply and Sewerage Authority formally handed over the obligation to maintain and manage 26 canals (84.5 kilometers [km]), and 10 km of box culverts to the DSCC and DNCC, along with the necessary manpower, equipment, and technical documents. Although the two city corporations have taken responsibility for the canals, they did not become their custodians with full authority. The deputy commissioner’s office remains their custodian. Representatives from the DWASA, DNCC, DSCC, Capital Development Authority of the Government of Bangladesh, Bangladesh Inland Water Transport Authority, and Deputy Commissioner Office of Dhaka will assist in the survey. The national task force on protecting the country’s rivers and navigability decided to take back the canals from illegal encroachment in September 2020 (Shawon 2020).

**2021 : Electrical and Electronic Waste (Management and Handling) Rules.**

Mandates extended producer responsibility for manufacturers and assemblers, with five-year e-waste collection targets; these rules are applicable to all producers, traders, shopkeepers, stores, collectors, transporters, repairers, collection centers, crushers, grinders, refurbishers, recyclers, auction dealers, exporters, distributors, and large users involved in the production, marketing, purchase, sale, or distribution of electrical and electronic products.

**FIGURE 3.1: Key milestones for sustainable plastic management in Bangladesh**



Note: DWASA = Dhaka Water Supply and Sewerage Authority;

The box below highlights circular economy–related legislation in other countries. The government of Bangladesh can consider developing a national circular economy plan by supporting amendments and introducing economic instruments.

## The Circular Economy in Legislation

**Australia.** The Australian Senate passed the Recycling Waste Reduction Bill 2020, which permanently banned the export of waste, including plastic, paper, and tires, beginning January 1, 2021.

**China.** In 2008, China passed the Circular Economy Promotion Law, which mandates reduction, reuse, and recycling in the production, circulation, and consumption of products.

**Japan.** The goal of the Sound Material Society Act is to create a society where the consumption of natural resources will be limited and the adverse environmental impact will be reduced to the extent possible by preventing or reducing the generation of waste, promoting cyclical use of products, and ensuring proper disposal of residues not put into cyclical use.

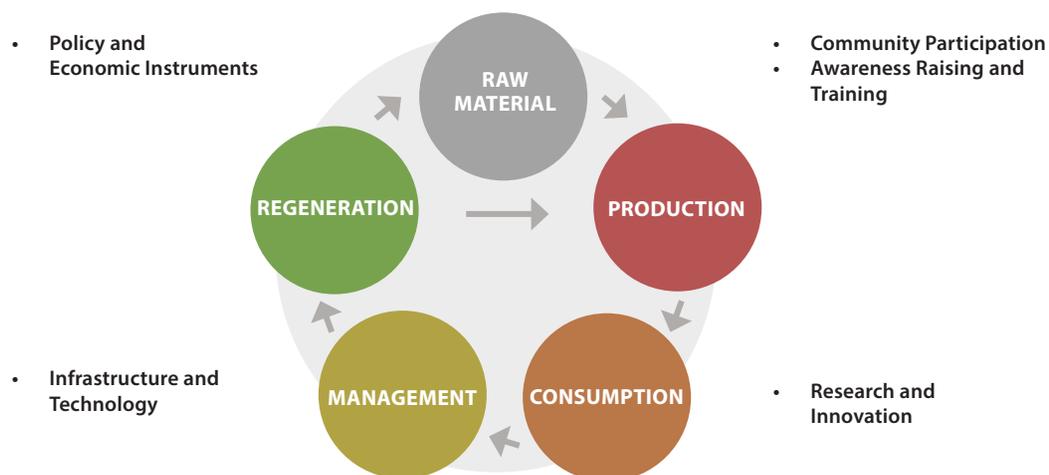
**Germany.** The Closed Substance Cycle and Waste Management Act of 1996 was enhanced and transformed into the Circular Economy Act in 2012. The goal of the act is to prevent and recover waste, including hazardous waste. Thus, prevention takes precedence over recovery, which comes before disposal.

**Korea.** South Korea's approach to legislating waste management shows resource recovery at centre stage. The Promotion of Saving and Recycling of Resources Act (Recycling Act) 2018 provides guidelines on the recyclability of packaging materials for the design and for packaging materials that are difficult to recycle and bans the usage of plastic materials that are difficult to recycle such as PVC and colored PET bottles.

# CHAPTER 4: ACTION PLAN FOR SUSTAINABLE PLASTIC MANAGEMENT IN BANGLADESH

Worldwide growing concern over plastics, proliferating demand for closed-loop materials flows, combined with the increase in regulatory and economic instruments underpin plastic management. Potential solutions and transformative opportunities exist in the entire value chain of plastics: avoid, intercept and redesign. Life cycle thinking has been used as the foundation to chart a circular economy–based approach. Policy and regulatory reforms; use of economic instruments, technology, and infrastructure; and capacity building are key elements of the enabling framework (figure 4.1).

**FIGURE 4.1: Enabling framework for sustainable plastic management**



This approach can contribute to the promotion of a green growth pathway in Bangladesh, delivering economic gains that are both environmentally sustainable, and socially inclusive. When natural resources are used efficiently, minimizing pollution and environmental impacts, opportunities can be created for everyone: new value chains can foster economic growth, new green jobs can be created, and innovative products may help to address environmental challenges. An action plan for the sustainable management of plastic in Bangladesh can create a virtuous circle of shared prosperity.

Figure 4.2: Circular Economy contributing to Green Growth



## 4.1 OPPORTUNITIES FOR POLICY DEVELOPMENT

Assessment of plastic pollution prevention measures in Bangladesh shows that plastic management is one of the most complex challenges. There is not one single solution, rather a more holistic integrated approach based on a mixture of legal, financial as well as communication instruments is needed. The activities in the action plan take into account the following considerations:

### Policy & economic instruments

- **Enforce existing rules.** The Solid Waste Management Rules (SWMR) provide the basis of waste management, including plastic waste and recycling in Bangladesh. Actions proposed in the Clean Dhaka Master Plan (2018–2030), emphasize an integrated approach to address the challenge of a growing population and the resultant increase in solid waste in Dhaka. Regulatory frameworks built on public-private partnerships (PPPs) will be required.
- **Hold manufacturers responsible.** The proposed EPR regulation can play an important role to build a market that finances recycling systems and boost innovative products to help advance towards a circular economy.
- **Clarify definitions and labels.** The National Plastic Industry Development Policy 2020 (7th Draft) will support the sustainable growth of the plastic industry in Bangladesh, especially the use of bioplastic and biodegradable plastic. Clear definitions of biodegradable, recyclable, and compostable are required, and laboratory infrastructure will be required for testing and certification.
- **Allocate funding.** A budget planning exercise including cost-benefit analysis and detailed

financial analysis is recommended in order to implement the policies.

- **Promote alternatives before bans.** Bans are not effective unless economically viable alternatives are available. Environmentally friendly alternatives to plastic, such as jute, paper, and biodegradable plastic, are essential. The government must develop a regulatory environment that promotes the production of such alternatives by levying taxes on virgin plastic materials and providing tax breaks for alternatives. The Jute Packaging Act of 2010 mandates jute packaging for all commodities; a comprehensive directive for packaging for other commodities and consumer goods is required.
- **Avoid single-use plastics.** The government needs to immediately enforce the ban on SUP in commercial establishments and coastal areas, including on passenger vessels. A successful nationwide ban of SUP requires a number of awareness-raising programs and development and demonstration of affordable alternatives, which will play an important role.
- **Be inclusive.** Policy and regulatory intervention must be inclusive and have a coordinated approach because challenges with plastic are multisectoral (industries, tourism, urban, marine, and water resources). In addition, the informal sector plays an important role in the recycling value chain. Working conditions are poor, and efficiency is low, so there is room for improvement. Because women fill the many informal roles in Bangladesh's waste sector, a gender-inclusive approach to plastics waste management must be in line with strategies to integrate the informal sector. Similarly, integration of informal workers must take an intersectional and gender-based approach in order to reach the most vulnerable. Unless the most vulnerable workers are included, formalization processes risk displacing those who cannot match the demands of new systems and economies. Private sector engagement is key to creating a market for recycled plastic and alternatives to plastic.
- **Boost public procurement.** Public sector procurement policies can be used to create demand for recycled products produced from plastic waste, for example, plastic waste used to produce RDF, roads, carpeting, and plastic boards.

## Infrastructure & technology

- **Upgrade factories.** Facilitate follow-up of the Plastic Park Project to relocate the old plastic recycling factories in Dhaka and upgrade them with more efficient and safe processing technologies.
- **Invest in infrastructure for collection, sorting, and processing.** Efficient waste management and proper disposal remain the key solution to address the plastic pollution problem. This requires investment in infrastructure, combination of all three waste management options that is landfills, recycling and incineration or suitable thermo-chemical processes based on waste streams can reduce plastic waste scientifically and sustainably.
- **Fund research and innovation.** A plastic management fund can be established to support research and development, demonstration, and piloting of upstream and downstream technologies for sustainable plastic management. Research to determine the allowable recycled content for various classes of products is also necessary. The fund may also support beach cleaning and marine debris management projects. Innovation and demonstration are key elements to ensure that new technologies both upstream and downstream are validated in the context of Bangladesh so that upscaling and replication are possible. This can best be achieved by setting up a plastic management fund to support entrepreneurs and technology developers.

The fund may offer both technical and financial assistance and create knowledge products such as technology fact sheets and case studies, which will help in further facilitation.

- **Build circular solutions.** The 2010 National 3R Strategy for Waste Management was formulated to promote reducing, reusing, and recycling. This strategy should be strengthened to include actions over the life cycle of plastic, especially in the upstream stages. There is a need for a circular approach to product design.

## Research & innovation

- **Regulate plastic design, labelling, and take back.** Specific plastic packaging guidelines (design, format, content) are needed for Bangladesh to address overall packaging waste, especially to minimize waste containing MLP. To allow safe, economical recycling, an industry-led phaseout program should be facilitated to eliminate the use of hazardous additives in primary plastics. Labelling of plastic products and materials must be standardized so that different types of plastic waste can be identified in the waste stream and plastic recycling can be made more efficient. Policy needs to be introduced to enforce manufacturers to label 'to be recycled' on all plastics that can be recycled. Implementation of EPR is critical for improving the collection and processing of packaging waste.
- **Seek PPP solutions.** The plastic value chain touches most businesses sectors; therefore, industrial portfolios are exposed to an array of risks and opportunities associated with plastic. Innovation in plastic design and manufacturing, especially packaging, need to be supported and driven by industry, involving major players along the entire value chain.
- **Research on alternatives:** In the last decade, the increasing awareness to plastic pollution has resulted in the demand for substitutes to plastic. Alternatives such as biodegradable and compostable plastics have been developed and introduced to consumers. For example, the Sonali Bag or Golden Bag which is a biodegradable bag and can be an environment friendly alternative to polythene bags. The cellulose used in Sonali Bags is extracted from jute (BJMC, 2019). However, cost of production of bioplastics is a major constraint for the expansion of bioplastics. As more industries and commercial enterprises are converting to bio-based products and packaging, production capacities are rising, supply chains and processes are becoming more efficient, reducing the cost of bioplastics. With appropriate policy support, prices of bioplastics can further come to a competitive level with other alternatives.

## Community engagement

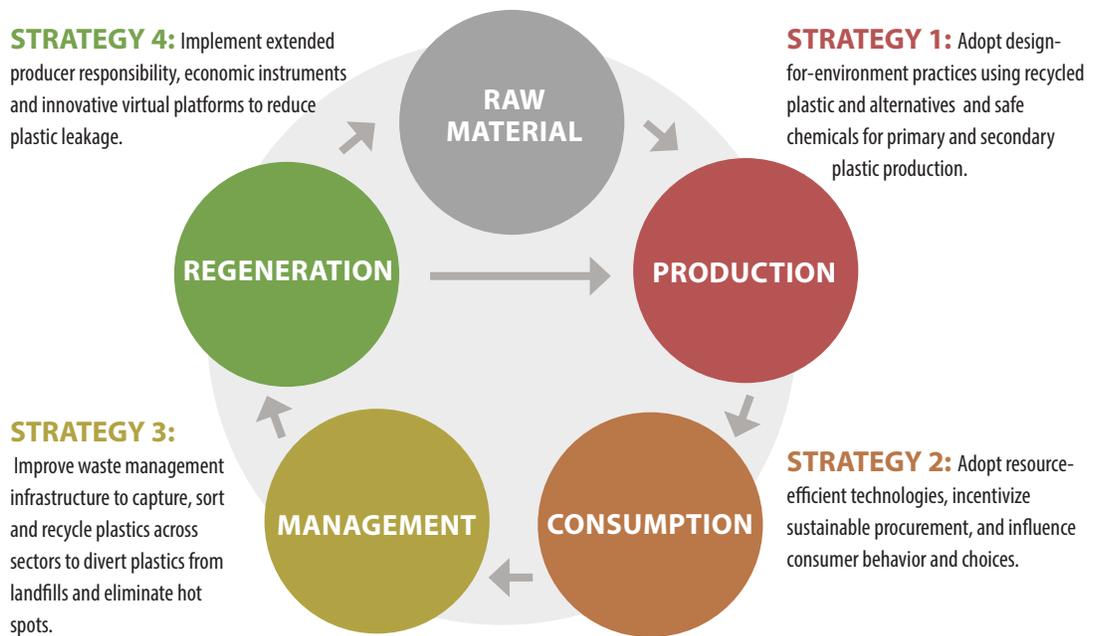
- **Generate a buzz.** Create a national campaign utilizing principles of behavioural change to raise awareness and empower citizens to make more informed decisions. However, to ensure success, the infrastructure and alternative products need to be available.
- **Education, awareness raising programs, and social mobilization** aimed at behavioural change towards using less plastic, littering, and waste management (including source separation) are important to introduce in tandem with legal instruments. Eliminating plastics with practical alternatives, challenging the current throw away culture, and making calculated phasedowns where possible are important steps to reduce plastic overuse. A systematic approach built on a large range of materials and methods including drives, campaigns, awareness raising programmes, creation of educational material, and curriculum development for schools and colleges.

## 4.2 ACTION PLAN FOR SUSTAINABLE PLASTIC MANAGEMENT

An action plan for sustainable plastic management in Bangladesh is proposed for implementation in phases such as short term (2022–23), medium term (2024–26), and long term (2027–30), allowing for priorities and limitations on financial resources and institutional capacities. The action plan provides a blueprint to achieve four interlinked and complementary targets, which, in turn, help realize the strategies addressing the plastic life cycle. Structured to identify key elements of the enabling framework (Policy and regulatory reforms; use of economic instruments, technology, and infrastructure; and capacity building), the action plan lists activities that build on each other.

The four strategies focus action at each step of the plastic life cycle to ensure a holistic approach built on circular principles and provide the road map for action (figure 4.3).

**FIGURE 4.3: Road map for sustainable plastic management indicating strategies and key actions**



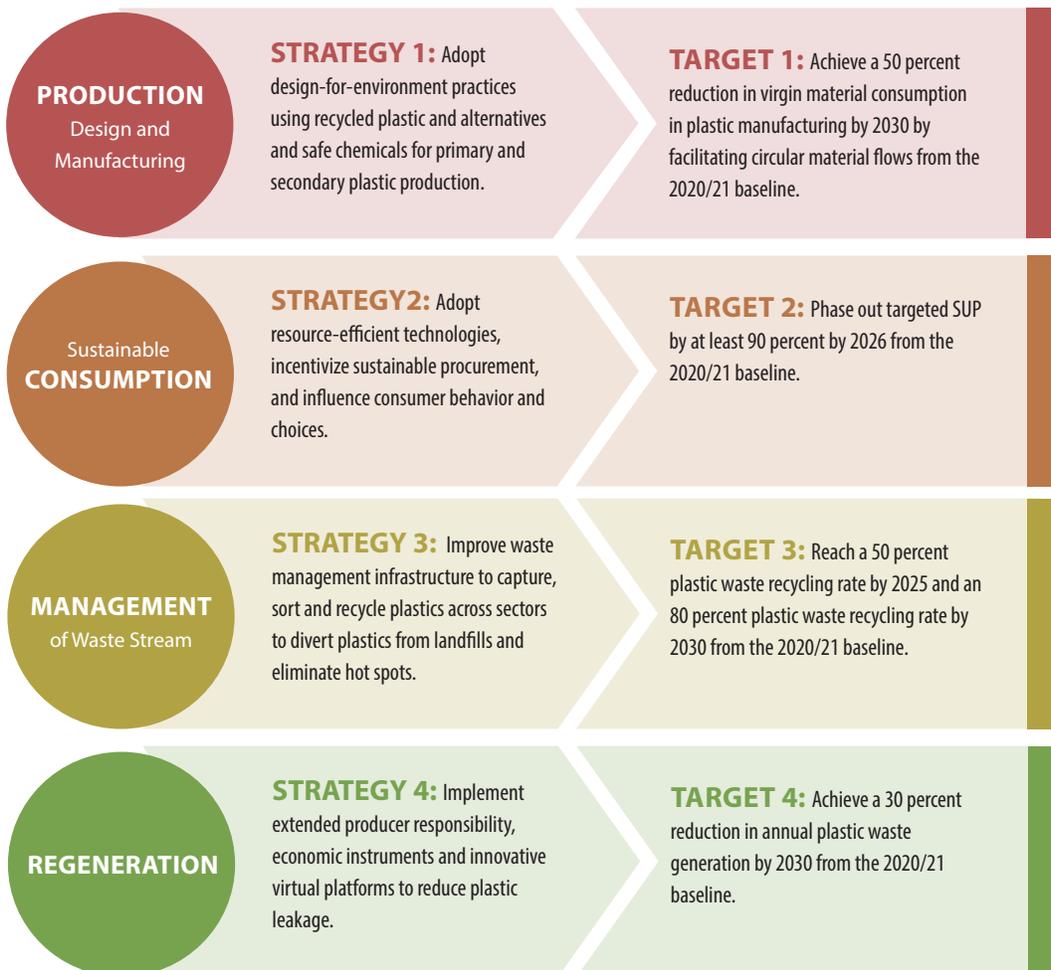
- **Strategy 1 addresses the production of plastics:** Adopt design-for-environment practices using recycled plastic and alternatives and safe chemicals for primary (virgin polymers) and secondary (recycled polymers) plastic production
- **Strategy 2 targets consumption patterns:** Adopt resource-efficient technologies, incentivize sustainable procurement, and influence consumer behavior and choices.
- **Strategy 3 aims to strengthen management of plastic waste streams:** Improve waste management infrastructure to capture, sort and recycle plastics across sectors (e.g., textiles, building materials, construction) to divert plastics from landfills and eliminate hot spots.

- **Strategy 4 enables regeneration:** Implement extended producer responsibility, economic instruments (e.g., deposit refund scheme) and innovative virtual platforms to reduce plastic leakage.

To avoid duplication and ensure linkages with in-progress measures by the government of Bangladesh, the proposed actions have been harmonized with existing work plans and regulations. Challenges and opportunities from Production (Design and Manufacturing), Consumption, Management (of waste streams), and potential for Regeneration provide a sound foundation for a blueprint centered around a vision and four interlinked and complementary targets. All targets will be monitored from the 2020-2021 baseline.

**FIGURE 4.4: Road map for sustainable plastic management indicating strategies and targets**

**Vision: To achieve circular economy re-enforcing the 3R strategy (reduce, reuse, recycle) to avoid, intercept, and redesign plastics to achieve a green growth pathway for Bangladesh**



*\*Note: All targets will be monitored from the 2020-2021 baseline. The current annual plastic waste generation is 1,409,094 tons, and the plastic waste recycling rate is 21.3 percent; see the material flow analysis in section 2.2.*

Policy and regulatory reforms; use of economic instruments, technology, and infrastructure; and capacity building are key elements of the enabling framework. Each target can be achieved by implementing the actions categorized as strategic interventions and improvements in policy, regulatory, and economic instruments; technology and infrastructure available for waste management; and stakeholder capacity to support the actions over the short, medium, and long term.

To achieve the targets, a detailed action plan has been prepared in consultation with key stakeholders. Stakeholder consultations and bilateral meetings were held to identify challenges and opportunities for sustainable plastic management in Bangladesh. The road map and action plan align well with the 10-step road map that the United Nations Environment Programme developed for governments (UNEP, 2018). The 2020 solid waste management rules, when approved, will promote source segregation (organic, inorganic, toxic), EPR, participation of all stakeholders, and technology for recycling. City corporations and municipalities will be able to participate in proper segregation, collection, transportation, disposal, and recycling of waste generated in urban areas of Bangladesh.

Potential solutions and transformative opportunities exist in the entire value chain of plastics: design, reduced use, improved waste management, behavioural change, reuse, repair and recycling. Upstream management of plastic is given special attention and includes reduction of plastic waste at the source, reduction of plastic during production, reduction of consumption of problematic plastic, and innovative materials and product design for consumers. To avoid duplication and ensure linkages with in-progress measures by the government of Bangladesh, the proposed actions have been harmonized with existing work plans and draft regulations. Due to the COVID-19 pandemic, unavoidable circumstances may cause a delay in the implementation of short-term actions. Such delayed or deferred short-term actions can be completed in the medium term.

Promotion of technology throughout the life cycle of plastic to increase circularity requires policy guidance and technical assistance, including technology transfer, financing support, and capacity building. Plastic and packaging associations can readily adopt some technological interventions, although entrepreneurs and municipal bodies may need to promote downstream interventions. Digitization, web applications, and virtual marketplaces will play a significant role in connecting stakeholders within the plastic value chain. To implement the above recommendations, market creation and adequate policy support and standards setting will be required. The informal recycling sector has the potential to provide the base for a strong and inclusive circular economy. Technical and financial support to improve the reliability, scale, structure and build linkages with regional and global markets need to be in place to further develop this sector.

The combination of multiple waste management options that is landfills, recycling and incineration or suitable thermo-chemical processes based on waste streams can only reduce plastic waste scientifically and sustainably. While recycling is the preferred approach to managing plastic waste, it is prudent to use coprocessing and incineration in the short term to prevent plastic from being dumped, especially when well-managed landfills are not available. Programs can be developed to support the demonstration of technologies and innovations based on effectiveness, viability, and replication potential.

Although these targets may appear ambitious, they serve the purpose of setting a direction and lending a focus. A midterm progress review will help to assess the practical feasibility and implementation progress of the proposed actions using a monitoring framework described in section 4.5. Based on the findings, the targets may be adjusted, and actions can then be revised. Actions in the National Action Plan will be updated as new challenges arise and more information becomes available (table 4.1).

**TABLE 4.1: Proposed action plan for sustainable plastic management**

**TARGET 1: Achieve a 30 percent reduction in virgin material consumption in plastic manufacturing by 2030 by facilitating circular material flows from the 2020/21 baseline**

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)
<b>POLICY &amp; ECONOMIC INSTRUMENTS</b>		Implement sustainable public procurement in government organizations, city corporations, and municipal bodies.	
	Draft a clear regulatory framework for plastics with biodegradable properties.	<ul style="list-style-type: none"> <li>Establish standard and policy for labelling hazardous materials.</li> <li>Set charges for plastics that have viable alternatives in stores and supermarkets.</li> </ul>	<ul style="list-style-type: none"> <li>Implement policy to eliminate hazardous additives from plastic products and packaging.</li> <li>Support industry-led phaseout of problematic packaging materials.</li> </ul>
	Create common platform (coordinating body) to implement plastic policies.	Establish guidelines on eco-labelling of plastic products and packaging.	Use financial market mechanisms to increase resilience from fluctuations in prices of plastic and recycled plastic.
	Expand 3R strategy to include circular economy (e.g. via inclusion of minimum recycled content for construction, textiles and packaging materials).	Standardize labelling of plastic products and materials so that different types of plastic waste can be identified in the waste stream and enable more efficient plastic recycling.	Adopt a certification for design of products to minimize virgin plastic in products.
		Use financial drivers (e.g. tax reduction/ subsidies) to incentivise increased use of recycled content in product designs.	Mandate requirements for recycled content in key products and packaging.
		Use financial drivers to incentivise manufacture of sustainable alternative materials e.g. removal of regulatory blocks.	Phase out microbeads from cosmetic and personal care products.
	<b>INFRASTRUCTURE &amp; TECHNOLOGY</b>		Showcase best practices for product design to minimize virgin plastic in products.
Promote public-private partnerships to share technologies designing products made of recycled plastic and other alternatives to virgin plastic.		Create platform for plastic product manufacturers to discuss, share and implement end-of-life management and collection, and recycling.	Set up testing facilities to certify biodegradable and compostable plastic and recycled content.
<b>RESEARCH AND INNOVATION</b>	Design standards for ecolabelling of plastic products and packaging.	Showcase best practices for product design to minimize virgin plastic in products.	Reassess regional plastic material flows.
	Study appropriate treatment options within waste hierarchy and circular economy concepts in plastic waste management.		
<b>COMMUNITY PARTICIPATION, AWARENESS RAISING AND TRAINING</b>	Initiate awareness programs to promote products made from recycled plastic.	Train waste recyclers in efficient plastic recovery from multiple waste streams (e.g., e-waste, end-of-life vehicles).	Create awareness on sustainable procurement procedures across public and private organizations.
	Raise awareness of and share information on reuse, repair and reuse.	Raise awareness of eco-labelling.	
	Promote voluntary actions to choose products that contain low volumes of plastic.		

**TARGET 2: Phase out targeted SUP by at least 90 percent by 2026 from the 2020/21 baseline**

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)
<b>POLICY &amp; ECONOMIC INSTRUMENTS</b>	Develop strategy to ban SUP items (product chains, instruments, roles, timelines).	▶ Enforce ban on single-use plastics (SUPs) starting with coastal region. Scale up ban to national level.	
		Impose fees on production of SUP/polluter pays.	▶ Impose higher tax and value added tax on SUP item (especially plastic bottles) to discourage their use.
	Phase out unnecessary and problematic SUPs and in government offices (ex: straws) and on cargo and passenger vessels.	▶ Establish environmental certification for product manufacturers who adopt design for re-using plastic and reduce SUP.	▶ Require all packaging 100% reusable, recyclable, or compostable by certain date.
	Explore affordable alternatives to SUP, including packaging.	▶ Use financial drivers to incentivise manufacture of sustainable alternative materials e.g. removal of regulatory blocks, technology/ commercial incentives and establishing taxes (including on imports).	
	Draft guidelines and rules to minimize plastic packaging.	▶ Develop public-private partnership to share technologies to minimize plastic in products and packaging.	▶ Set incentives for brand owners, manufacturers, and importers to follow guidelines for sustainable packaging.
	Establish charges for plastics that have viable alternatives in stores and supermarkets.	▶ Scale up charge setting for plastics that have viable alternatives.	
<b>INFRASTRUCTURE &amp; TECHNOLOGY</b>		Introduce water coolers to provide access to safe drinking water in public spaces.	▶ Establish product design labs to demonstrate innovations for plastic waste reduction including biodegradable.
	Demonstrate alternative packaging materials.	▶ Create system labeling for biodegradable plastic as per guidelines.	▶ Scale-up industry-led phaseout of problematic packaging materials.
	Create monitoring system for tracking manufacturing and distribution of SUP.	▶ Track the targets of the monitoring system for manufacturing and distribution of SUP and update as necessary.	▶ Revise targets, methodologies based on monitoring.
<b>RESEARCH AND INNOVATION</b>	Conduct baseline study, including best practices, on SUP waste in coastal towns.	▶ Transfer and promote technology for affordable alternatives to SUP.	
	Build communication resources on environmental, economic, and social costs of SUP pollution.	▶ Host contests and challenges to support innovations in SUP waste reduction.	
		▶ Build knowledge platform to map regional SUP material flows.	Develop public-private partnership to share technologies to minimize plastic in products and packaging and for marine operations (e.g., fishing gear).
	Fund, through incentives (tax rebates) and national and local funds, research and development of new designs and materials as alternatives to plastic.		
<b>COMMUNITY PARTICIPATION, AWARENESS RAISING AND TRAINING</b>	Promote citizen initiatives such as bring your own bag, bottle, or box.	▶ Drives & campaigns roll out actions to reduce consumption of SUP including educational materials for children.	▶ Promote best practices for citizens, institutions, and event organizers to reduce use of SUP.
	Promote consumer facing campaigns to promote reuse, reduce plastic consumption, and recycling.	▶ Create behaviour change toolkits to address barriers for adopting plastic alternatives.	▶ Create behaviour change toolkits to address barriers for adopting plastic alternatives.
	Train product manufacturers on design for-environment practices.		Raise awareness on environmental-certification.

**TARGET 3: Reach a 50 percent plastic waste recycling rate by 2025 and an 80 percent plastic waste recycling rate by 2030 from the 2020/21 baseline**

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)
<b>POLICY &amp; ECONOMIC INSTRUMENTS</b>	Through collaboration between various agencies, implement the Solid Waste Management Rules.	Standardize labelling of plastic products and materials to enable more efficient plastic recycling.	
		Establish target on waste diversion from landfills through composting, recycling and incineration.	Ban landfill of recyclable plastics (ex: PET, HDPE).
	Draft anti-litter regulations and laws.		Create finance and budget planning for implementation of anti-litter regulations.
			Implement Basel Convention to eliminate illegal waste trafficking.  Establish policies to drive demand for locally produced recycled feedstocks (e.g. via inclusion of minimum recycled content) via financial incentives/disincentives.
<b>INFRASTRUCTURE &amp; TECHNOLOGY</b>	Introduce separate bins for organic, inorganic, toxic waste, hazardous, biomedical waste and multilayer plastic waste.		Implement stormwater and storm drain filtration and river mouth trash collection to prevent marine litter.
		Enforce anti-litter regulations and laws by having city corporations and municipalities provide infrastructure to replace illegal waste disposal hot spots.	
		Implement compost collection to divert waste from landfill to minimize contamination in recycling.	Adopt municipal targets, aligned with national targets for plastic waste recycling.
	Establish formal infrastructure to store and deliver segregated waste for disposal and recycling.	Modernize recycling capacity for plastic waste.	Relocate plastic factories from older sites in Dhaka (to ex: Plastic Park Project, a plastic industrial park).
	Create monitoring system for targets through the value chain from baseline.	Track the targets through the value chain including recycling facilities utilizing technologies.	Revise targets, methodologies based on monitoring.
	Promote LEED (or equivalent) standards in units within the plastic value chain to drive resource efficiency.		
<b>RESEARCH AND INNOVATION</b>	Use geographic information system mapping to monitor illegal hot spots.	Estimate extent of marine plastic pollution.	Explore technology to collect macro- and microplastics (e.g., microbeads).
	Facilitate partnerships between private sectors in Bangladesh and other countries for research, technology transfer, and capacity building.	Demonstrate cost-effective technologies for sorting plastic waste, cleaning and recycling mixed- and low-value plastic, waste to fuel, and plastic recycling.	
	Develop a baseline and methodology for assessing and monitoring the extent of plastic litter.		Incorporate appropriate local standards and testing to create an affordable level playing field locally to produce high-quality, certified recycled plastic.
	Explore mobile apps and digitization to connect informal waste pickers to plastic waste value chain.	Promote virtual marketplaces to connect waste generators, aggregators, and recyclers.	
	Study and demonstrate efficient recovery of plastic from products at end of life (e.g., removal of nonplastic parts from plastic products, dismantling, physical conversion).	Study on waste to energy plants and processes/incinerators.	
<b>COMMUNITY PARTICIPATION, AWARENESS RAISING AND TRAINING</b>	Promote voluntary actions in neighborhoods and communities for public cleaning (e.g., streets, beaches).	Introduce recycling campaigns in school.	Develop web resources such as communication toolkits on best practices for source segregation and plastic recycling.
	Train citizens, and municipal and district officials on best practices for source segregation, plastic reuse, and recycling.	Initiate awareness programs on 3Rs across the country and develop curriculum for schools and colleges.	Continue drives, campaigns and development of educational materials and curriculum for schools and colleges.
	Include representation from informal sector and consumer groups in NPIDP to ensure policy is grounded in reality.	Provide training and/or education and a living wage to waste management and recycling sector workers to build capacity in its people.	Train waste entrepreneurs on technology choices for plastic recycling.

**TARGET 4: Achieve a 30 percent reduction in annual plastic waste generation by 2030 from the 2020/21 baseline**

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)
<b>POLICY &amp; ECONOMIC INSTRUMENTS</b>	Draft guidelines and rules for sustainable packaging to minimize plastic consumption.	Draft guidelines of labelling for biodegradable plastic.	Scale up charge setting for plastics that have viable alternatives.
	Finalize and pilot EPR to enable industry co-funding of plastic-waste collection and recycling systems.	Through EPR, ensure environmentally sound management of SUPs and other plastics for producer or manufacturer or importer.	Introduce buyback or deposit refund scheme.
	Establish producer responsibility organizations.		
	Expand 3R strategy to include circular economy (e.g. via inclusion of minimum recycled content for construction, textiles and packaging materials).	Create waste exchange marketplace.	Formalize the plastic sorting and recycling capacity.
		Standardize labelling of plastic products and materials so that different types of plastic waste can be identified in the waste stream and enable more efficient plastic recycling.	
	Enforce fishing net bans to reduce marine waste.	Incentivize use of alternate materials for marine operations (e.g., fishing gear).	
		Create regulations to prohibit and ban import of plastic waste.	
<b>INFRASTRUCTURE &amp; TECHNOLOGY</b>	Demonstrate alternative packaging materials.	Continue to demonstrate best practices in design for environment for products and packaging.	Create system labelling for biodegradable plastic as per guidelines.
	Establish product design labs to demonstrate innovations for plastic waste reduction including biodegradable.		Support industry-led phaseout of problematic packaging materials.
<b>RESEARCH AND INNOVATION</b>		Develop best practices for plastic waste reduction in fast-moving consumer goods.	Host contests and challenges to support innovations in plastic waste reduction.
		Develop public-private partnership to share technologies to minimize plastic in products and packaging.	
	Build knowledge platform to map regional plastic material flows		
<b>COMMUNITY PARTICIPATION, AWARENESS RAISING AND TRAINING</b>	Initiate awareness programs on reducing use of plastics across the country and encourage sustainable consumer behavior and choices.	Initiate awareness programs on 3Rs across the country and develop curriculum for schools and colleges.	Continue drives, campaigns and development of educational materials and curriculum for schools and colleges.
	Train product manufacturers on design for-environment practices.		Support community-based reuse and repair centres, enabling communities to avoid creating waste.
	Align community education efforts to reduce waste and to maximize impact.	Develop and launch a recyclability app to support community participation and reduce contamination rates in municipal solid waste.	
		Remove illegal hot spots through community clean-ups.	

### 4.3 INSTITUTIONAL FRAMEWORK FOR SUSTAINABLE PLASTIC MANAGEMENT

Given the multi-stakeholder and multi-sectoral features of the action plan, it is important that implementation is carried out by the DoE in coordination with and supported by relevant ministries and involves local bodies. The Solid Waste Management Rules (SWMR) drawn up under the Environmental Conservation Act 1995 will be the overarching regulatory framework for plastic waste management in the country. As per the SWMR the DoE will promote the circulation of resources by setting short to long term and phase by phase resource circulation goals concerning waste collection, final waste disposal, resource circulation rates, and by taking actions accordingly (shown in Figure 4.5).

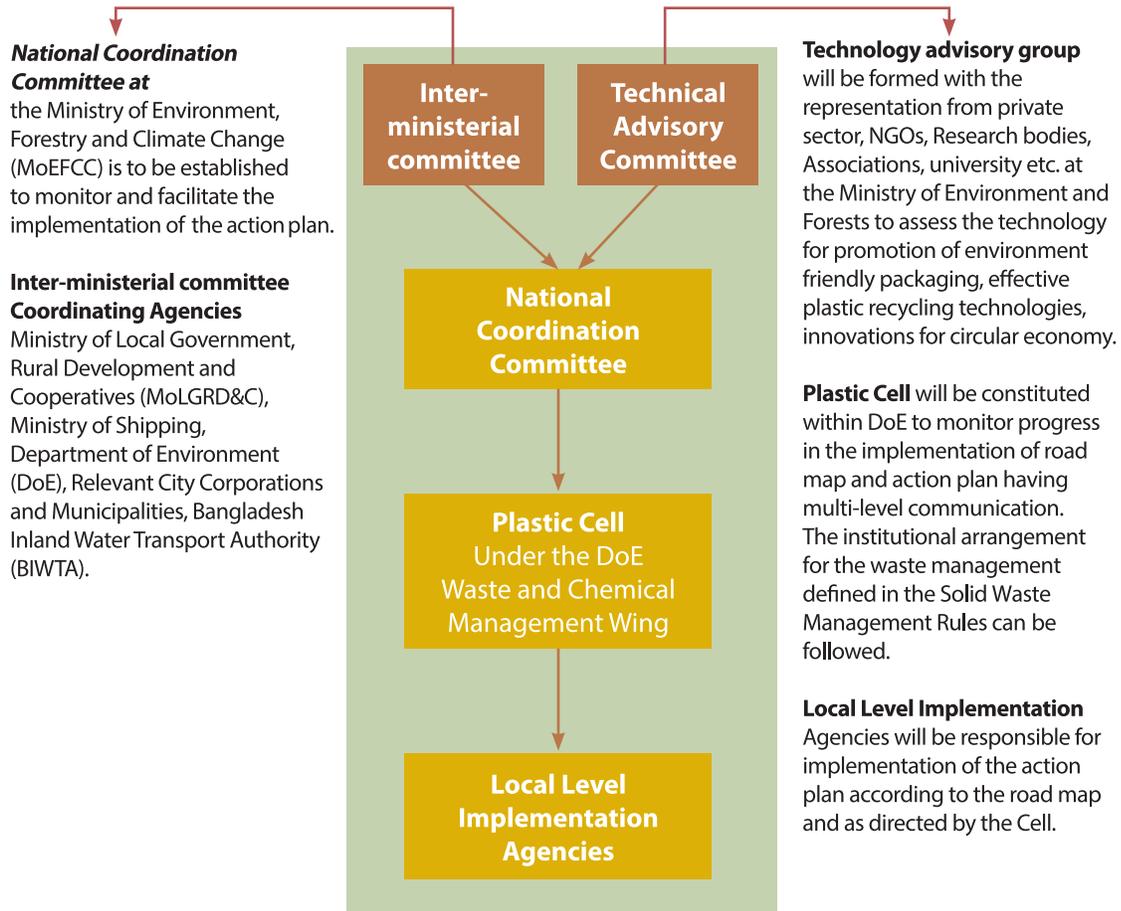
Plastic waste management provides an opportunity to facilitate plastic material flow across various sectors. The action plan, therefore, seeks a multisectoral involvement that will be guided by the DOE to achieve a coordinated, and synergistic approach in drawing the sector-specific interventions.

Several stakeholders play a role in sustainable plastic management. These include plastic manufacturers, consumers, waste collectors and processors, technology developers, and investors, as well as the market players and regulators. It is, therefore, necessary to follow a multistakeholder approach to draw in a wider stakeholder involvement to realize sustained and effective outcomes. Thus, elements such as awareness raising, holding cleanup campaigns, training, and developing the capacity of professionals have been considered in the action plan.

Municipalities under the guidance of the Ministry of Local Government, Rural Development, and Cooperatives need to strengthen and improve final waste disposal and resource circulation rates. While Ministry of Industries, Ministry of Housing and Public Works, Ministry of Textiles and Jute, Ministry of Shipping, and relevant agencies under these ministries need to set up goals to encourage businesses to strengthen and improve recycling performances by setting resource circulation goals for different types of businesses and providing financial and technological incentives for the subject businesses to strive to achieve those goals. The detailed action plan, added in Appendix A, includes identified responsible organizations which need to work together on common policy and systems approaches for sustainable plastics management. The identified lead and responsible organizations shown in Appendix A are based on extensive stakeholder consultations. However, further engagement and discussions are required with identified ministries and agencies to build ownership and agreement on responsibility and a way forward.

To effectively implement the action plan, a 'National Coordination Committee' has been proposed to coordinate, monitor, and facilitate the implementation of the road map. The MoEFCC can be the leading agency chaired by the Secretary of the MoEFCC. Inter-Ministerial Committee is also needed to coordinate with key stakeholders as plastic management is a multi-sectoral agenda.

**FIGURE 4.5: Proposed institutional mechanism to implement plastic action plan**



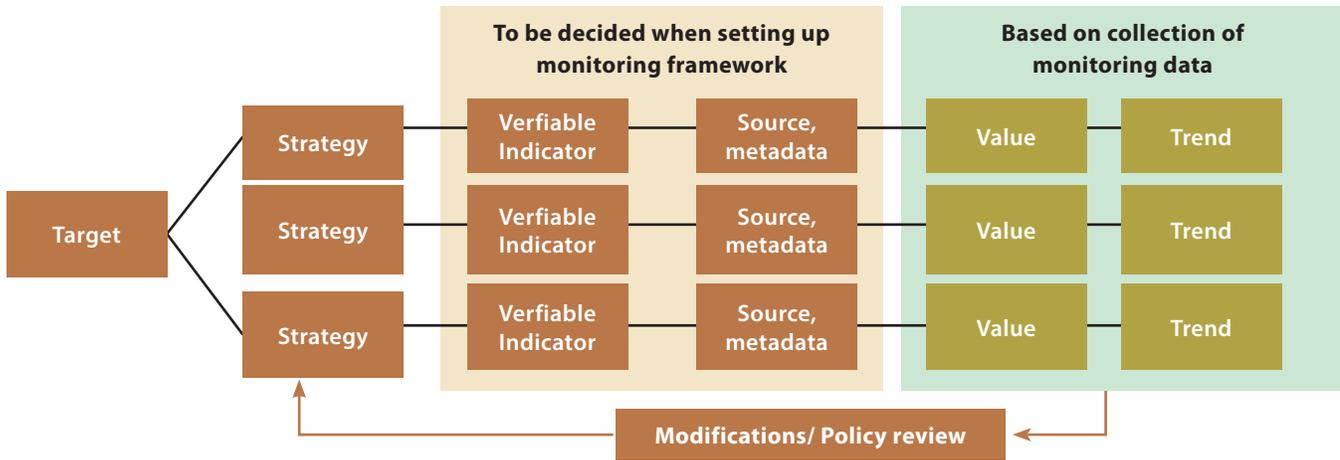
## 4.5 MONITORING OF PROPOSED ACTION PLAN

Implementation of the proposed action plan must be monitored to assess its progress and adjust the targets and actions as needed. The baseline study can be used as the basis to monitor the targets on plastic consumption, plastic waste generation, and collection and recycling rates.

A ministry-level monitoring committee shall be set up at the MoEFCC to coordinate with the plastic cell at the DoE to monitor and facilitate the implementation of the road map. The monitoring committee shall include representatives from the Ministry of Local Government, Rural Development and Cooperatives, the Ministry of Industries; the Ministry of Housing and Public Works; the Ministry of Textiles and Jute; and the Ministry of Posts, Telecommunications, and Information Technology to review and facilitate actions across multiple sectors (i.e., plastics, construction, textiles, and electronics).

The following framework will be used for monitoring of the proposed action plan:

**FIGURE 4.6: Monitoring framework for proposed Action Plan**



The following output indicators can be used to assess implementation:

- Number of technology demonstration projects conducted
- Number of research and development projects funded
- Number of participants in awareness programs conducted
- Number of training programs conducted, and participants trained
- Number of hot spots remediated out of number remaining
  - Beach area cleaned
  - Number of participants in beach cleanups
  - Amount of plastic waste entering landfills

Studies may be conducted to arrive at outcome indicators such as the following:

- Ratio of annual plastic imports to total plastic consumption (in percentage)
- Ratio of annual plastic produced from virgin materials and plastic produced from recycled plastic in overall plastic production (in percentage)
- Annual plastic and packaging waste collection rates (in percentage)
- Annual plastic and packaging waste recycling rates (in percentage)
- Ratio of annual production of SUP in total plastic production (in percentage)
- Ratio of plastic waste in total waste generation (in percentage)
- Ratio of packaging waste in total plastic waste generation (in percentage)

The implementation agency shall report on the above indicators. A midterm review may be conducted in 2025 to evaluate the implementation of the action plan and add and modify actions if needed. As the program coordinator, the DoE shall make provisions for data collection, set formats for collecting the data for both output and outcome indicators on a biannual basis, and consolidate the information in an annual report to compare with the targets that have been set. The DoE will have to set up a budget with formats for monitoring activity, including the conduct of studies. The monitoring will have to be coordinated with key stakeholders, sector institutions, and concerned ministries.

## 4.5 DISSEMINATION OF THE ACTION PLAN

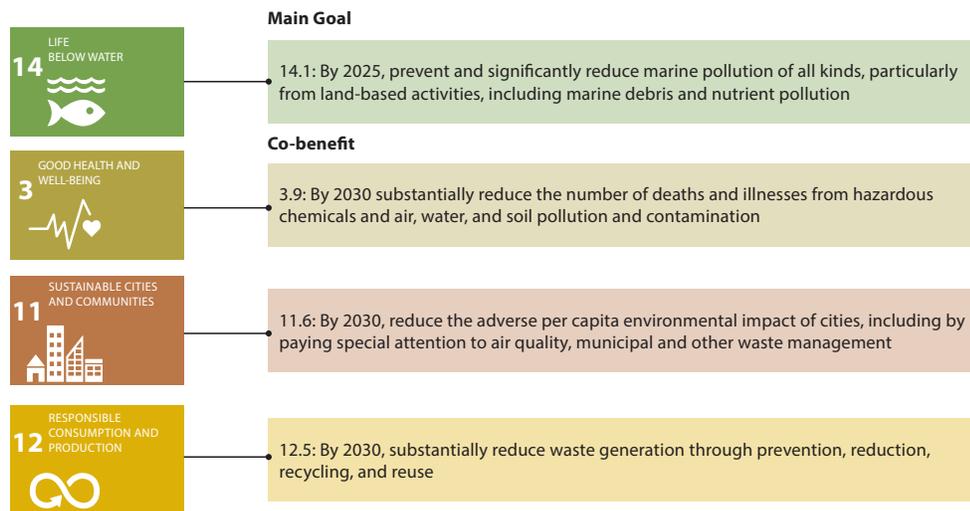
Dissemination of the action plan to key stakeholders is crucial. This may be done by distributing brochures in local languages, using both print and social media, holding events, and conducting webinars. Stakeholders should include industry associations, municipal officials, regulators, research and academia, and non-governmental and community-based organizations engaged with informal workers. Short video clips giving the context, objectives, and proposed actions will also help.

## 4.6 LINKAGE WITH THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

The project is aligned with the government’s commitment to Sustainable Development Goal (SDG) 14 (conserve and sustainably use the oceans, seas, and marine resources for sustainable development), especially SDG target 14.1, which seeks to prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution, by 2025. Although the project is focused on SDG target 14.1, the project has other co-benefits that address SDGs 3, 11, and 12. Figure 4.7 shows the different SDGs linked with this project.

Raising stakeholder awareness through sustained communication and the use of economic instruments are vital to ensure successful implementation of the proposed sustainable action plan. It is essential to support innovations in plastic waste reduction and recycling technologies backed by financial assistance to catalyze inclusive business models. These interventions across stakeholders will fast-track the transition to a circular plastics economy and enable the government to achieve its vision and become a role model for other countries.

**FIGURE 4.7: SDGs directly and indirectly linked to plastic management**



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# Appendices - A

## Detailed action plan for sustainable plastic management in Bangladesh

**TARGET 1:** Achieve a 30 percent reduction in virgin material consumption in plastic manufacturing by 2030 by facilitating circular material flows from the 2020/21 baseline

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)	Responsible Organizations
<b>POLICY &amp; ECONOMIC INSTRUMENTS</b>		Implement sustainable public procurement in government organizations, city corporations, and municipal bodies.		<b>Lead institutions and Agencies</b> <ul style="list-style-type: none"> <li>Ministry of Environment, Forest and Climate Change</li> <li>Ministry of Local Government, Rural Development and Cooperatives</li> <li>Ministry of Commerce</li> <li>Ministry of Industries</li> <li>Ministry of Fisheries and Livestock</li> <li>Department of Environment</li> <li>Department of Fisheries</li> </ul> <b>Relevant institutions and agencies</b> <ul style="list-style-type: none"> <li>Bangladesh Standards and Testing Institution</li> <li>National Board of Revenue</li> <li>Ministry of Agriculture</li> <li>Ministry of Housing and Public Works</li> <li>City corporations and Municipalities</li> <li>Informal sector</li> <li>Community-based organizations</li> <li>Brand owners</li> <li>Manufacturers</li> <li>Technical extended professional responsibility committee</li> <li>Consumer Association of Bangladesh</li> </ul>
	Draft a clear regulatory framework for plastics with biodegradable properties.	Establish standard and policy for labelling hazardous materials.	Implement policy to eliminate hazardous additives from plastic products and packaging.	
		Set charges for plastics that have viable alternatives in stores and supermarkets.	Support industry-led phaseout of problematic packaging materials.	
	Create common platform (coordinating body) to implement plastic policies.	Establish guidelines on eco-labelling of plastic products and packaging.	Use financial market mechanisms to increase resilience from fluctuations in prices of plastic and recycled plastic.	
	Expand 3R strategy to include circular economy (e.g. via inclusion of minimum recycled content for construction, textiles and packaging materials).	Standardize labelling of plastic products and materials so that different types of plastic waste can be identified in the waste stream and enable more efficient plastic recycling.	Adopt a certification for design of products to minimize virgin plastic in products.	
		Use financial drivers (e.g. tax reduction/subsidies) to incentivise increased use of recycled content in product designs.	Mandate requirements for recycled content in key products and packaging.	
Use financial drivers to incentivise manufacture of sustainable alternative materials e.g. removal of regulatory blocks.		Phase out microbeads from cosmetic and personal care products.		
<b>INFRASTRUCTURE &amp; TECHNOLOGY</b>		Showcase best practices for product design to minimize virgin plastic in products.	Demonstrate monomaterialization (products made of single type of plastic polymers) as alternatives to mixed plastic products.	
	Promote public-private partnerships to share technologies designing products made of recycled plastic and other alternatives to virgin plastic.	Create platform for plastic product manufacturers to discuss, share and implement end-of-life management and collection, and recycling.		
			Set up testing facilities to certify biodegradable and compostable plastic and recycled content.	
<b>RESEARCH AND INNOVATION</b>	Design standards for ecolabelling of plastic products and packaging.	Showcase best practices for product design to minimize virgin plastic in products.	Reassess regional plastic material flows.	<b>Lead institutions and agencies</b> <ul style="list-style-type: none"> <li>Ministry of Commerce</li> <li>Ministry of Industries</li> <li>Ministry of Science and Technology</li> <li>Bangladesh Standards and Testing Institution</li> <li>Universities and research organizations</li> </ul>
	Study appropriate treatment options within waste hierarchy and circular economy concepts in plastic waste management.			
<b>COMMUNITY PARTICIPATION, AWARENESS RAISING AND TRAINING</b>	Initiate awareness programs to promote products made from recycled plastic.	Train waste recyclers in efficient plastic recovery from multiple waste streams (e.g., e-waste, end-of-life vehicles).		<b>Lead institutions and agencies</b> <ul style="list-style-type: none"> <li>Ministry of Environment, Forest and Climate Change</li> <li>Ministry of Local Government, Rural Development and Cooperatives</li> <li>Ministry of Science and Technology</li> <li>Ministry of Education and relevant government agencies and education boards</li> <li>Universities, schools and colleges</li> <li>Media</li> </ul>
	Raise awareness of and share information on reuse, repair and reuse.	Raise awareness of eco-labelling.	Create awareness on sustainable procurement procedures across public and private organizations.	
	Promote voluntary actions to choose products that contain low volumes of plastic.			

**TARGET 2: Phase out targeted SUP by at least 90 percent by 2026 from the 2020/21 baseline**

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)	Responsible Organizations
<b>POLICY &amp; ECONOMIC INSTRUMENTS</b>	Develop strategy to ban SUP items (product chains, instruments, roles, timelines).	Enforce ban on single-use plastics (SUPs) starting with coastal region. Scale up ban to national level.		<b>Lead institutions and Agencies</b> <ul style="list-style-type: none"> <li>Ministry of Environment, Forest and Climate Change</li> <li>Ministry of Local Government, Rural Development and Cooperatives</li> <li>Ministry of Commerce</li> <li>Ministry of Industries</li> <li>Ministry of Shipping</li> <li>Department of Environment</li> <li>Bangladesh Inland Water Transport Authority</li> <li>City Corporations and Municipalities</li> </ul> <b>Relevant institutions and agencies</b> <ul style="list-style-type: none"> <li>National Board of Revenue</li> <li>Informal sector</li> <li>Community-based organizations</li> <li>Brand owners</li> <li>Manufacturers</li> <li>Importers</li> <li>Media</li> </ul>
		Impose fees on production of SUP/polluter pays.	Impose higher tax and value added tax on SUP item (especially plastic bottles) to discourage their use.	
	Phase out unnecessary and problematic SUPs and in government offices (ex: straws) and on cargo and passenger vessels.	Establish environmental certification for product manufacturers who adopt design for re-using plastic and reduce SUP.	Require all packaging 100% reusable, recyclable, or compostable by certain date.	
	Explore affordable alternatives to SUP, including packaging.	Use financial drivers to incentivise manufacture of sustainable alternative materials e.g. removal of regulatory blocks, technology/ commercial incentives and establishing taxes (including on imports).		
	Draft guidelines and rules to minimize plastic packaging.	Develop public-private partnership to share technologies to minimize plastic in products and packaging.	Set incentives for brand owners, manufacturers, and importers to follow guidelines for sustainable packaging.	
	Establish charges for plastics that have viable alternatives in stores and supermarkets.	Scale up charge setting for plastics that have viable alternatives.		
<b>INFRASTRUCTURE &amp; TECHNOLOGY</b>		Introduce water coolers to provide access to safe drinking water in public spaces.	Establish product design labs to demonstrate innovations for plastic waste reduction including biodegradable.	<b>Relevant institutions and agencies</b> <ul style="list-style-type: none"> <li>Ministry of Civil Aviation and Tourism</li> <li>Ministry of Industries</li> <li>Ministry of Education</li> <li>Port Authority</li> <li>Bangladesh Hotel and Guest House Owners</li> <li>Informal sector</li> <li>Nongovernmental organizations and community-based organizations</li> <li>Brand owners, manufacturers, importers</li> </ul>
	Demonstrate alternative packaging materials.	Create system labelling for biodegradable plastic as per guidelines.	Scale-up industry-led phaseout of problematic packaging materials.	
	Create monitoring system for tracking manufacturing and distribution of SUP.	Track the targets of the monitoring system for manufacturing and distribution of SUP and update as necessary.	Revise targets, methodologies based on monitoring.	
<b>RESEARCH AND INNOVATION</b>	Conduct baseline study, including best practices, on SUP waste in coastal towns.	Transfer and promote technology for affordable alternatives to SUP.		<ul style="list-style-type: none"> <li>Bangladesh Plastic Goods Manufacturers &amp; Exporters Association</li> <li>Technical extended producer responsibility committee</li> <li>International development agencies</li> <li>Bangladesh Standards and Testing Institution</li> <li>Media</li> </ul>
	Build communication resources on environmental, economic, and social costs of SUP pollution.	Host contests and challenges to support innovations in SUP waste reduction.		
	Fund, through incentives (tax rebates) and national and local funds, research and development of new designs and materials as alternatives to plastic.	Build knowledge platform to map regional SUP material flows.	Develop public-private partnership to share technologies to minimize plastic in products and packaging and for marine operations (e.g., fishing gear).	
<b>COMMUNITY PARTICIPATION, AWARENESS RAISING AND TRAINING</b>	Promote citizen initiatives such as bring your own bag, bottle, or box.	Drives & campaigns roll out actions to reduce consumption of SUP including educational materials for children.	Promote best practices for citizens, institutions, and event organizers to reduce use of SUP.	<ul style="list-style-type: none"> <li>Bangladesh Hotel and Guest House Owners</li> <li>Informal sector</li> <li>Nongovernmental organizations and community-based organizations</li> <li>Brand owners, manufacturers, importers</li> <li>Bangladesh Plastic Goods Manufacturers &amp; Exporters Association</li> <li>Technical extended producer responsibility committee</li> <li>International development agencies</li> <li>Bangladesh Standards and Testing Institution</li> <li>Media</li> </ul>
	Promote consumer facing campaigns to promote reuse, reduce plastic consumption, and recycling.	Create behaviour change toolkits to address barriers for adopting plastic alternatives.	Create behaviour change toolkits to address barriers for adopting plastic alternatives.	
	Train product manufacturers on design-for-environment practices.		Raise awareness on environmental-certification.	

**TARGET 3: Reach a 50 percent plastic waste recycling rate by 2025 and an 80 percent plastic waste recycling rate by 2030 from the 2020/21 baseline**

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)	Responsible Organizations
<b>POLICY &amp; ECONOMIC INSTRUMENTS</b>	Through collaboration between various agencies, implement the Solid Waste Management Rules.	Standardize labelling of plastic products and materials to enable more efficient plastic recycling.		<b>Lead institutions and Agencies</b> <ul style="list-style-type: none"> <li>Ministry of Environment, Forest and Climate Change</li> <li>Ministry of Local Government, Rural Development and Co-operatives</li> <li>Ministry of Commerce</li> <li>Ministry of Industries</li> </ul> <b>Relevant institutions and agencies</b> <ul style="list-style-type: none"> <li>Bangladesh Standards and Testing Institution</li> <li>National Board of Revenue</li> <li>Ministry of Agriculture</li> <li>Ministry of Housing and Public Works</li> <li>City corporations and Municipalities</li> <li>Informal sector</li> </ul>
		Establish target on waste diversion from landfills through composting, recycling and incineration.	Ban landfill of recyclable plastics (ex: PET, HDPE).	
	Draft anti-litter regulations and laws.		Create finance and budget planning for implementation of anti-litter regulations.	
			Implement Basel Convention to eliminate illegal waste trafficking.  Establish policies to drive demand for locally produced recycled feedstocks (e.g. via inclusion of minimum recycled content) via financial incentives/ disincentives.	
<b>INFRASTRUCTURE &amp; TECHNOLOGY</b>	Introduce separate bins for organic, inorganic, toxic waste, hazardous, biomedical waste and multilayer plastic waste.		Implement stormwater and storm drain filtration and river mouth trash collection to prevent marine litter.	<ul style="list-style-type: none"> <li>Community-based organizations</li> <li>Brand owners</li> <li>Manufacturers</li> <li>Importers</li> <li>Technical extended producer responsibility committee</li> <li>Consumer Association of Bangladesh</li> </ul>
		Enforce anti-litter regulations and laws by having city corporations and municipalities provide infrastructure to replace illegal waste disposal hot spots.		
		Implement compost collection to divert waste from landfill to minimize contamination in recycling.	Adopt municipal targets, aligned with national targets for plastic waste recycling.	
	Establish formal infrastructure to store and deliver segregated waste for disposal and recycling.	Modernize recycling capacity for plastic waste.	Relocate plastic factories from older sites in Dhaka (to ex: Plastic Park Project, a plastic industrial park).	
	Create monitoring system for targets through the value chain from baseline.	Track the targets through the value chain including recycling facilities utilizing technologies.	Revise targets, methodologies based on monitoring.	
	Promote LEED (or equivalent) standards in units within the plastic value chain to drive resource efficiency.			
<b>RESEARCH AND INNOVATION</b>	Use geographic information system mapping to monitor illegal hot spots.	Estimate extent of marine plastic pollution.	Explore technology to collect macro- and microplastics (e.g., microbeads).	<ul style="list-style-type: none"> <li>Community-based organizations</li> <li>Brand owners</li> <li>Manufacturers</li> <li>Importers</li> <li>Technical extended producer responsibility committee</li> <li>Consumer Association of Bangladesh</li> <li>Media</li> </ul>
	Facilitate partnerships between private sectors in Bangladesh and other countries for research, technology transfer, and capacity building.	Demonstrate cost-effective technologies for sorting plastic waste, cleaning and recycling mixed- and low-value plastic, waste to fuel, and plastic recycling.		
	Develop a baseline and methodology for assessing and monitoring the extent of plastic litter.		Incorporate appropriate local standards and testing to create an affordable level playing field locally to produce high-quality, certified recycled plastic.	
	Explore mobile apps and digitization to connect informal waste pickers to plastic waste value chain.	Promote virtual marketplaces to connect waste generators, aggregators, and recyclers.		
	Study and demonstrate efficient recovery of plastic from products at end of life (e.g., removal of nonplastic parts from plastic products, dismantling, physical conversion).	Study on waste to energy plants and processes/incinerators.		
<b>COMMUNITY PARTICIPATION, AWARENESS RAISING AND TRAINING</b>	Promote voluntary actions in neighborhoods and communities for public cleaning (e.g., streets, beaches).	Introduce recycling campaigns in school.	Develop web resources such as communication toolkits on best practices for source segregation and plastic recycling.	<ul style="list-style-type: none"> <li>Community-based organizations</li> <li>Brand owners</li> <li>Manufacturers</li> <li>Importers</li> <li>Technical extended producer responsibility committee</li> <li>Consumer Association of Bangladesh</li> </ul>
	Train citizens, and municipal and district officials on best practices for source segregation, plastic reuse, and recycling.	Initiate awareness programs on 3Rs across the country and develop curriculum for schools and colleges.	Continue drives, campaigns and development of educational materials and curriculum for schools and colleges.	
	Include representation from informal sector and consumer groups in NPIDP to ensure policy is grounded in reality.	Provide training and/or education and a living wage to waste management and recycling sector workers to build capacity in its people.	Train waste entrepreneurs on technology choices for plastic recycling.	

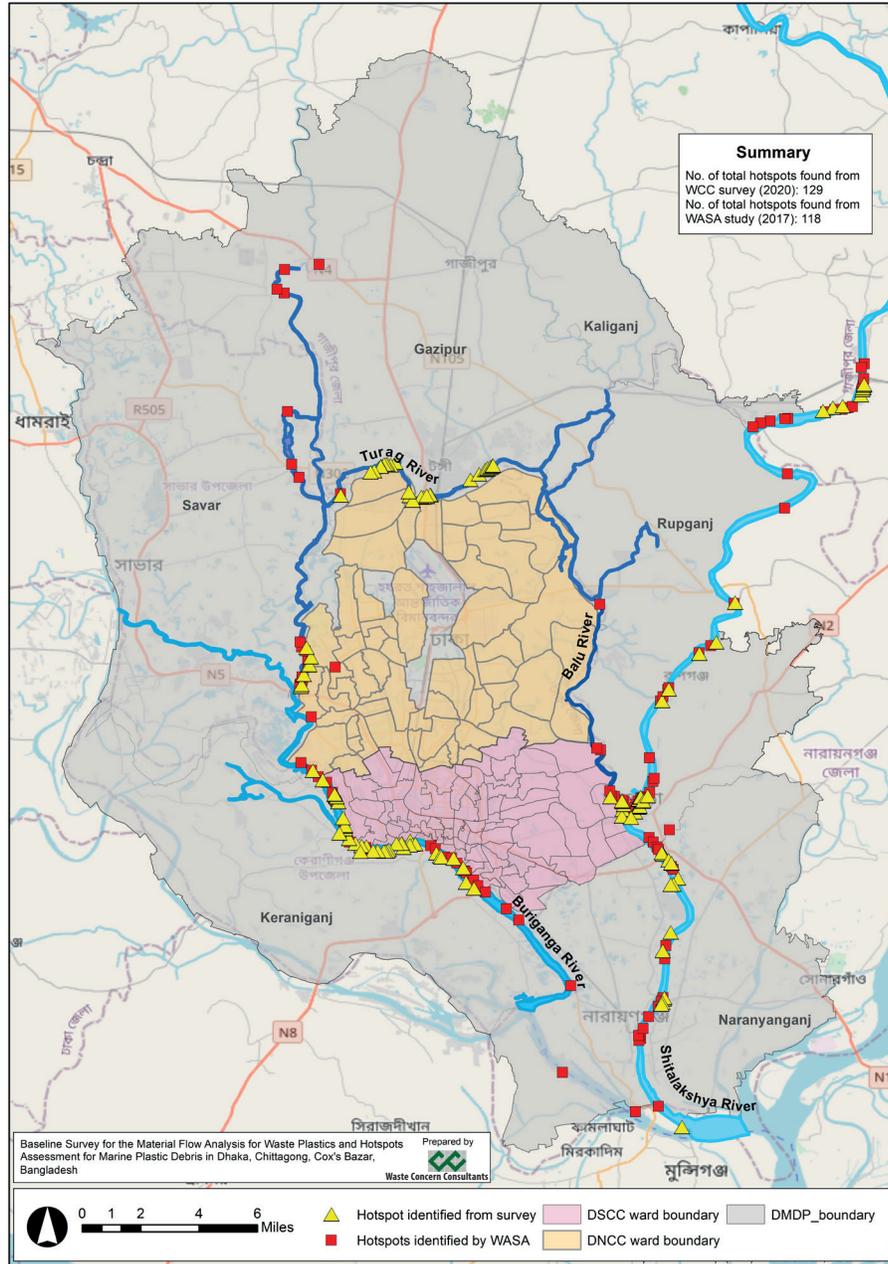
**TARGET 4: Achieve a 30 percent reduction in annual plastic waste generation by 2030 from the 2020/21 baseline**

	Short Term (2022-2023)	Medium Term (2024-2026)	Long Term (2027-2030)	Responsible Organizations
<b>POLICY &amp; ECONOMIC INSTRUMENTS</b>	Draft guidelines and rules for sustainable packaging to minimize plastic consumption.	Draft guidelines of labelling for biodegradable plastic.	Scale up charge setting for plastics that have viable alternatives.	<b>Lead institutions and Agencies</b> <ul style="list-style-type: none"> <li>Ministry of Environment, Forest and Climate Change</li> <li>Ministry of Local Government, Rural Development and Cooperatives</li> <li>Ministry of Commerce</li> <li>Ministry of Industries</li> <li>Ministry of Fisheries and Livestock</li> <li>Department of Environment</li> <li>Department of Fisheries</li> </ul> <b>Relevant institutions and agencies</b> <ul style="list-style-type: none"> <li>Bangladesh Standards and Testing Institution</li> <li>National Board of Revenue</li> <li>Ministry of Agriculture</li> <li>Ministry of Housing and Public Works</li> <li>City corporations and Municipalities</li> <li>Informal sector</li> <li>Community-based organizations</li> <li>Brand owners</li> <li>Manufacturers</li> <li>Technical extended professional responsibility committee</li> <li>Consumer Association of Bangladesh</li> </ul>
	Finalize and pilot EPR to enable industry co-funding of plastic-waste collection and recycling systems.	Through EPR, ensure environmentally sound management of SUPs and other plastics for producer or manufacturer or importer.	Introduce buyback or deposit refund scheme.	
	Establish producer responsibility organizations.			
	Expand 3R strategy to include circular economy (e.g. via inclusion of minimum recycled content for construction, textiles and packaging materials).	Create waste exchange marketplace.	Formalize the plastic sorting and recycling capacity.	
		Standardize labeling of plastic products and materials so that different types of plastic waste can be identified in the waste stream and enable more efficient plastic recycling.		
	Enforce fishing net bans to reduce marine waste.	Incentivize use of alternate materials for marine operations (e.g., fishing gear).		
			Continue drives, campaigns and development of educational materials and curriculum for schools and colleges.	
<b>INFRASTRUCTURE &amp; TECHNOLOGY</b>	Demonstrate alternative packaging materials.	Continue to demonstrate best practices in design for environment for products and packaging.	Create system labelling for biodegradable plastic as per guidelines.	<b>Lead institutions and agencies</b> <ul style="list-style-type: none"> <li>Ministry of Environment, Forest and Climate Change</li> <li>Ministry of Commerce</li> <li>Ministry of Industries</li> <li>Ministry of Science and Technology</li> <li>Department of Environment</li> <li>Bangladesh Standards and Testing Institution</li> <li>Universities and research organizations</li> </ul>
	Establish product design labs to demonstrate innovations for plastic waste reduction including biodegradable.		Support industry-led phaseout of problematic packaging materials.	
<b>RESEARCH AND INNOVATION</b>		Develop best practices for plastic waste reduction in fast-moving consumer goods.	Host contests and challenges to support innovations in plastic waste reduction.	<b>Lead institutions and agencies</b> <ul style="list-style-type: none"> <li>Ministry of Commerce</li> <li>Ministry of Industries</li> <li>Ministry of Science and Technology</li> <li>Bangladesh Standards and Testing Institution</li> <li>Universities and research organizations</li> </ul>
		Develop public-private partnership to share technologies to minimize plastic in products and packaging.		
	Build knowledge platform to map regional plastic material flows.			
<b>COMMUNITY PARTICIPATION, AWARENESS RAISING AND TRAINING</b>	Initiate awareness programs on reducing use of plastics across the country and encourage sustainable consumer behavior and choices.	Initiate awareness programs on 3Rs across the country and develop curriculum for schools and colleges.	Continue drives, campaigns and development of educational materials and curriculum for schools and colleges.	<b>Lead institutions and agencies</b> <ul style="list-style-type: none"> <li>Ministry of Environment, Forest and Climate Change</li> <li>Ministry of Local Government, Rural Development and Cooperatives</li> <li>Ministry of Science and Technology</li> <li>Ministry of Education and relevant government agencies and education boards</li> <li>Universities, schools and colleges</li> <li>Media</li> </ul>
	Train product manufacturers on design for-environment practices.		Support community-based reuse and repair centres, enabling communities to avoid creating waste.	
	Align community education efforts to reduce waste and to maximize impact.	Develop and launch a recyclability app to support community participation and reduce contamination rates in municipal solid waste.		
		Remove illegal hot spots through community clean-ups.		

# Appendices - B

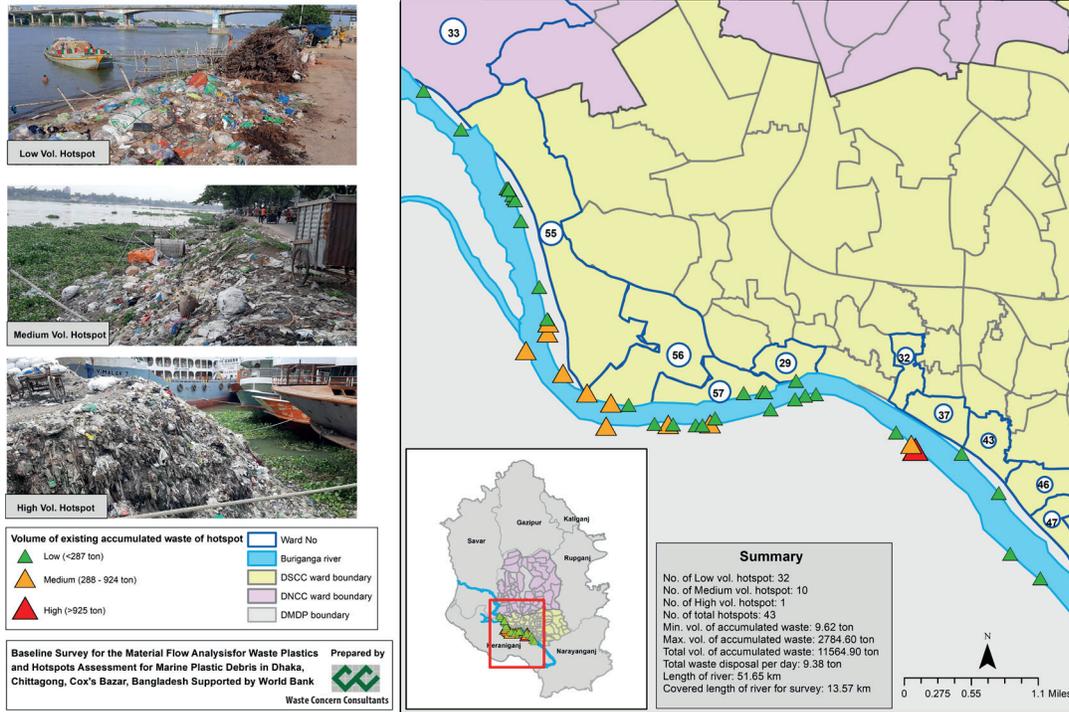
## Maps showing location of hot spots

1. Map showing hot spots along the Four Major Rivers of Dhaka



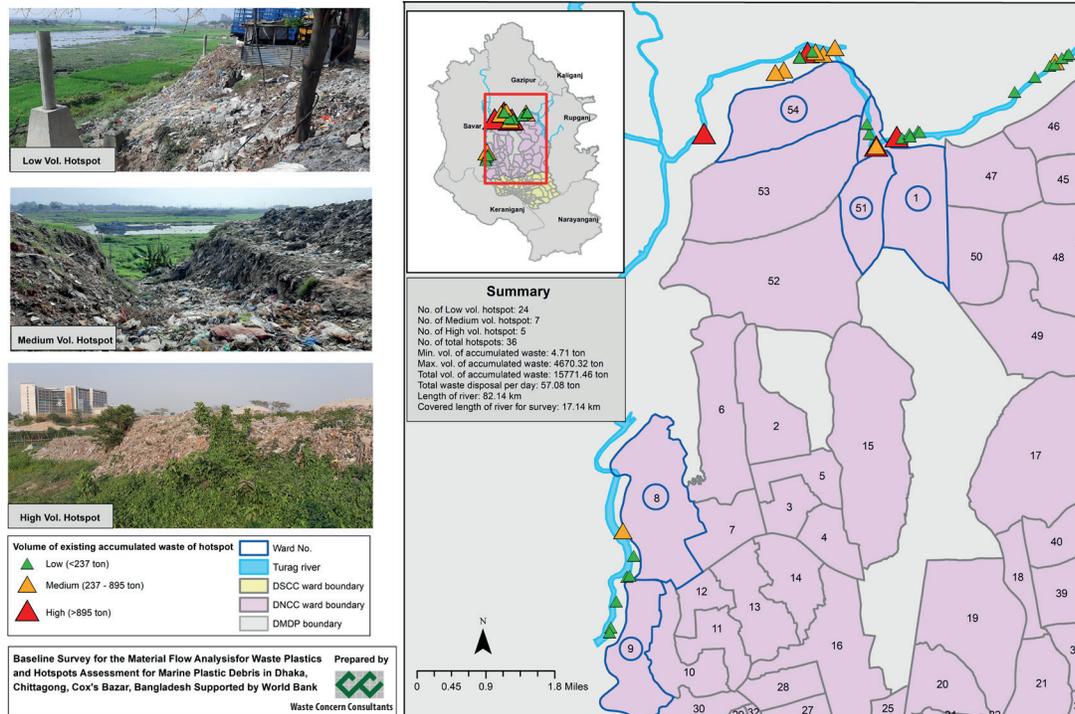
Note: DMDP = Dhaka Metropolitan Development Plan ; DNCC = Dhaka North City Corporation; DSCC = Dhaka South City Corporation; WASA = . Water Supply and Sewerage Authority

## 2. Map showing location of hot spots based on volume of accumulated waste along the bank of Buriganga River



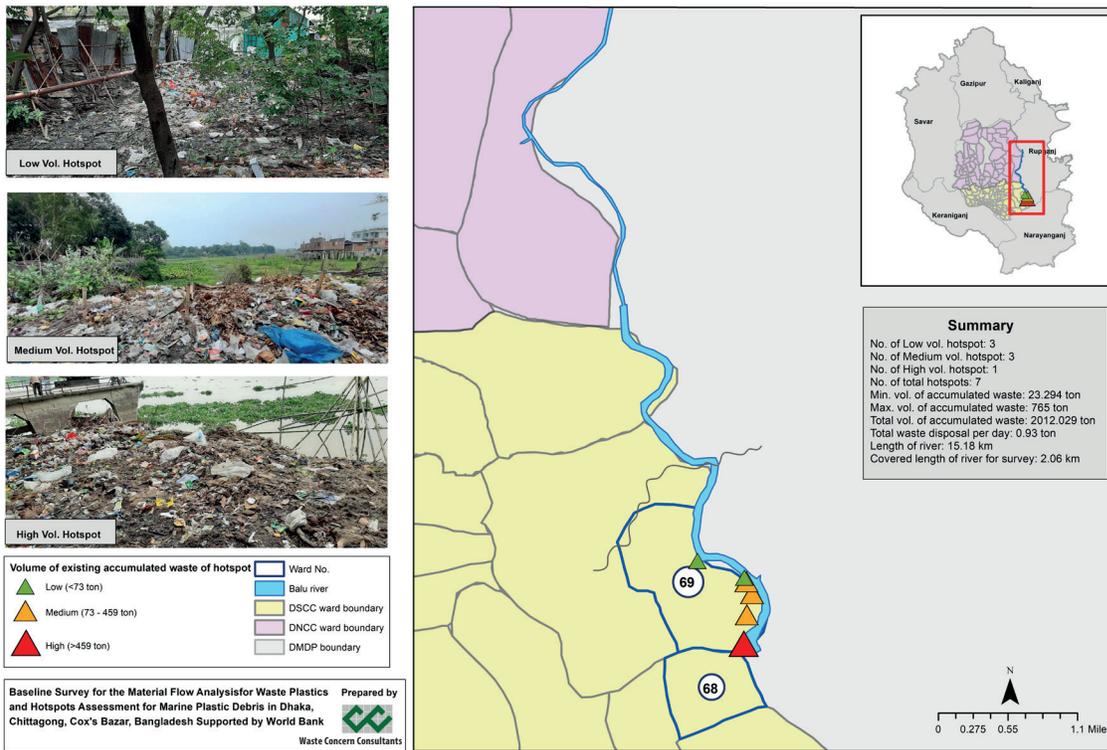
Note: DMDP = Dhaka Metropolitan Development Plan; and WASA = Water Supply and Sewerage Authority

## 3. Map showing location of hot spots based on volume of accumulated waste along the bank of Turag River



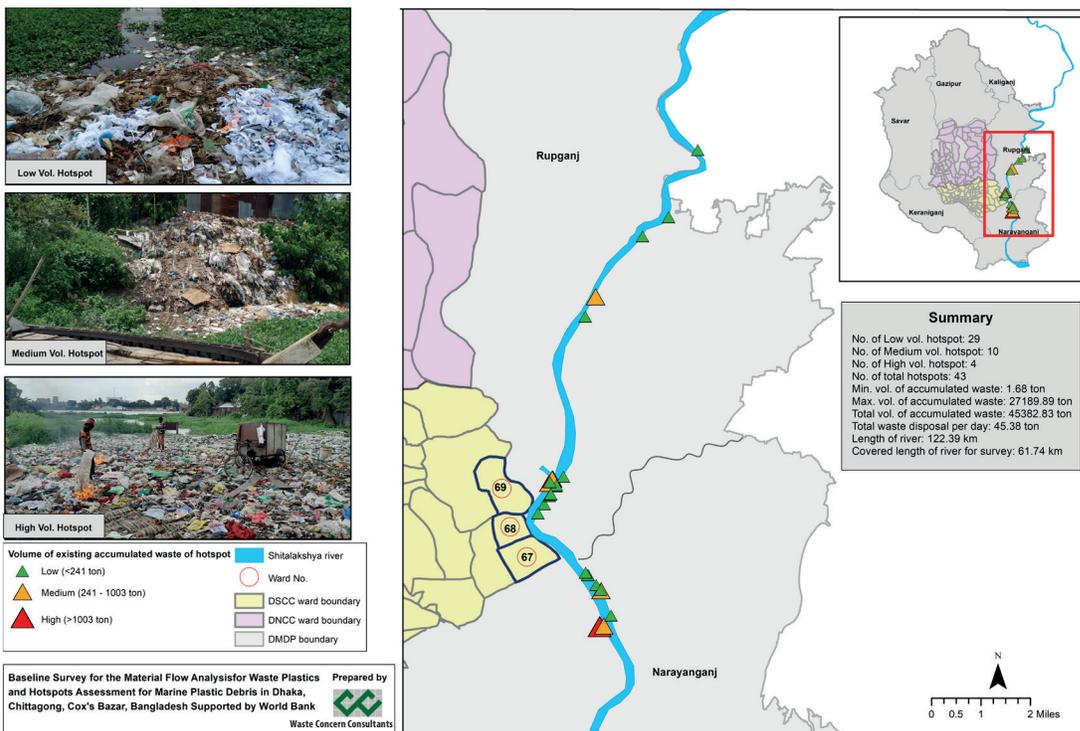
Note: DMDP = Dhaka Metropolitan Development Plan; and WASA = Water Supply and Sewerage Authority

#### 4. Map showing location of hot spots based on volume of accumulated waste along the bank of Balu River



Note: DMDP = Dhaka Metropolitan Development Plan; and WASA = Water Supply and Sewerage Authority

#### 5. Map showing location of hot spots based on volume of accumulated waste along the bank of Shitalakshya River

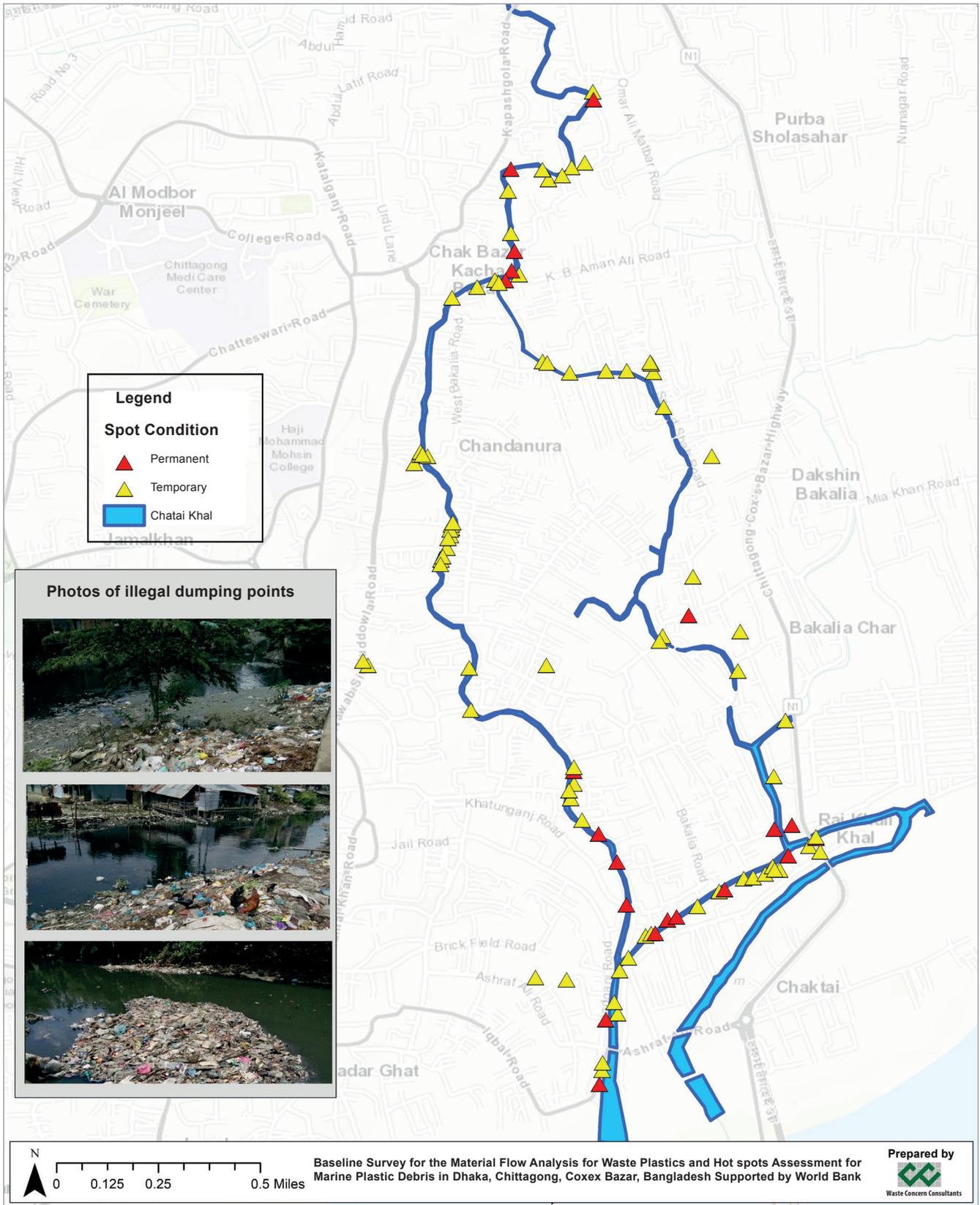


Note: DMDP = Dhaka Metropolitan Development Plan; and WASA = Water Supply and Sewerage Authority

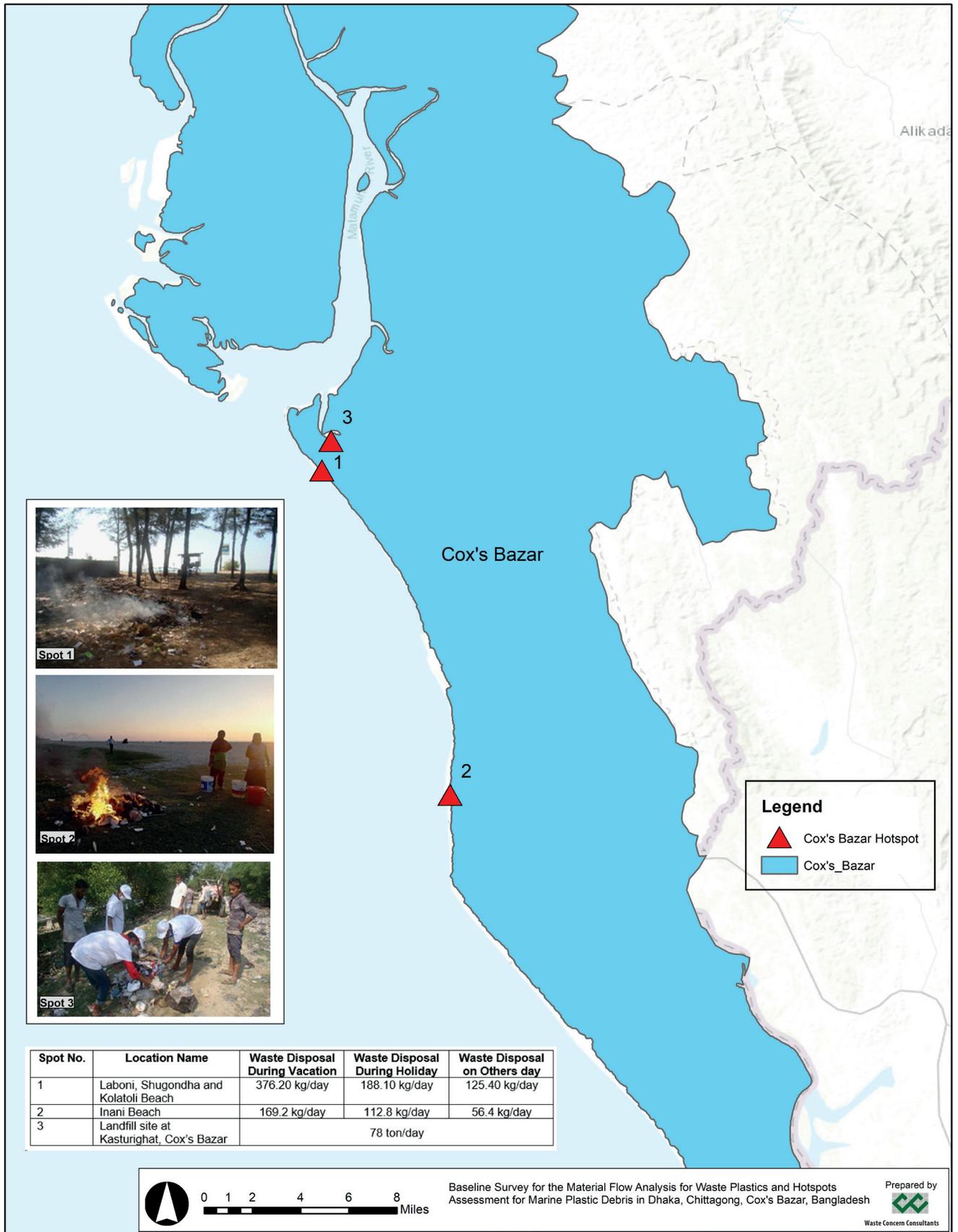
6. Map showing location of hot spots along the bank of Karnaphuli River



7. Map showing location of hot spots along the bank of Chaktai Khal



8. Map showing location of hot spots of Cox's Bazar



# Appendices - C

## Stakeholder Consultations

**Table C-1. People interviewed during the study**

### Manufacturers

Name of Manufacturing Organization	Address
Plastic Sign Pvt Ltd.	Gognagar, Naranyanganj Sadar
Hamko Industries Ltd.	Noapara town, Fakirhat, Bagerhat
Akij Plastics Ltd.	Kumna, Chatak, Sunamganj
Fahim Accessories Ind.	
Madina Packaging & Garments Acc. Ind.	Narainchora, Sreemangal, Moulovibazar
Nabila Enterprise	K.B. Abdur Sattar Road, Rahmatganj, Chattogram
Global Enterprise	Pahartoli, Hathazari, Chittagong
Al-Faruque Bags Ltd.	Shantohor Road, Narhotto, Kahaki, Bogura
Ifraz Packaging Ind. Ltd.	Singair Road, Hemayetpur, Savar
Nahid Plastics Ltd.	Dhurasram, Joydebpur, Gazipur
Wellpac Polymers Ltd.	Boktarkandi, Gojaria, Munshiganj
Sana Accessories	Keraniganj, Dhaka
M/S Rony Filament	Munshiganj
AKD BIAX	Trishal, Mymensingh
Racy Fashion Pack. Ind. Ltd.	Dhurasram Road, Gazipur

**Brand Owners**

Name of Manufacturing Organization	Address
Unilever Bangladesh Limited	ZN Tower, Plot-2, Road-8, Gulshan -1, Dhaka
Nestlé Bangladesh	227/A, Gulshan Tejgaon Link Road
Bangla Building Material Ltd.	105, Pragati Sarani, PRAN Center
Bangladesh Petrochemical Company Ltd.	H-14, Road-5, Sector-1, Uttara
Durable Plastic Ltd.	105 Middle Badda
Coca-Cola Bangladesh Ltd.	Doreen Tower, Level 6, North Avenue, Gulshan Circle 2
Astech Ltd.	Bangladesh Small and Cottage Industries Corporation Industrial Estate, Sagorika Road, Ctg

**Brand Owners and Manufacturers Interviewed**

Name of Manufacturing Organization	Address
Bangladesh Plastic Goods Manufacturers & Exporters Association	Suite- 603,604, Paltan Tower, 87 Purana Paltan, Dhaka
Maliha Poly Tex Fibre Industry Limited	House-57, Gausul Azam Avenue, Sector 14, UTTARA, Dhaka-1230.
Bangladesh PET Flakes Manufacturers & Exporters Association	City Heart Shopping Complex City Heart, 67, Suite- 5/8, 4th Floor, VIP Road, Dhaka 1000
Bangladesh Petrochemical Company Ltd.	H-14, Road-5, Sector-1, Uttara, Dhaka

## Minutes of the Baseline Study and Action Plan

Meeting Held for Baseline Study and Action Plan on Plastic Waste Management with the Technical Working Committee of the DoE on Proper Management of Plastics/Polythene Products and Packaging and Plastic Users Institutions and Other Concerned Stakeholders

Date and time of the meeting: February 8, 2021, at 11.00 AM

More than forty people participated in the discussions

The meeting began with an introduction to the proposed road map and action plan. After that, a television commercial on awareness of plastic was shown prepared by the DoE. The DoE appreciated the initiative of the World Bank to assist the government and emphasized harmonizing/aligning the proposed road map and action plan with the set targets to stop the use of SUP according to the High Court's order. The DoE presented a road map to implement the ban of SUP in the coastal towns of Bangladesh and stressed the importance of the Draft Urban Waste Management Handling Rules and the need for awareness and piloting of recycling facilities. DoE representatives mentioned that relevant government departments, ministries, and agencies will submit a work plan on how they are going to stop the use of SUP. Identification of the coastal area will be made to demarcate the areas where the ban of SUP will be carried out. A technical committee will be established to handle the plastic and plastic packaging issues. DoE representatives also mentioned giving a target for source segregation to avoid plastic waste going to the landfill and water bodies.

A Bangladesh Plastic Goods Manufacturers & Exporters Association (BPGMEA) representative said that buds, straws, stirrers, and SUP cups and plates could be stopped initially and noted that the banned polythene bags are being produced/used/marketed by various illegal, unlicensed organizations that are not on the list of the association. The chairman of the meeting commented that regular campaigns against the production and use of banned polythene through mobile courts are continuing. He said polythene bags could not be completely eradicated due to their easy availability, low cost, and lack of alternative uses. Representatives of the Bangladesh Paribesh Andolon noted that in 2002, the production, use, and marketing of polythene shopping bags were banned. However, polythene bags are still widely used, and the pollution caused by polythene products is increasing. He also mentioned the COVID-19 crisis, where special care must be taken in waste-related problems.

A representative of Nestlé Bangladesh said that Nestlé has adopted a plan to reduce plastic pollution by 50 percent by the year 2025 using corporate social responsibility (CSR). An initiative had been taken to use warning instructions on their plastic packaging products. A representative of Unilever Bangladesh said that a pilot project on plastic recycling had been undertaken through Unilever's organization in the NCC area. The meeting also discussed the formation of an EPR forum using the concept of CSR among the companies manufacturing plastic products/packaging materials. Nonbranded items should be brought under monitoring.

Bangladesh Petrochemical Company Limited's representative emphasized quality control of the recycled product. With the proper standard for recycled products, Bangladesh will be able to export quality recycled products and promote upcycling of recycled raw materials. A representative from the Bangladesh Standards and Testing Institution commented that recently it had installed equipment to measure the tolerable limit and migration test standard for plastic products and packaging.

The discussions pointed toward prevention and control of plastic waste and other waste pollution on St. Martin's Island to raise awareness in tourist spots, hospitals, fast-food joints, the aviation sector, and so forth. Arrangements were made to compress the collected plastic waste on St. Martin's Island and send it to the recycling industry in Teknaf, Cox's Bazar, and Chittagong. In addition to creating public awareness, the discussions emphasized the importance of separate bins for household waste disposal and setting up proper dumping points for waste management through city corporations and municipalities.

These are the key recommendations from the discussions:

1. In order to reduce the use of plastic packaging, it is recommended to introduce warnings on the plastic packaging or bottles as guidelines for public awareness and environmental management.
2. It was requested during the meeting that plastic/polythene products and packaging manufacturers/importers and users should promote antiplastic-pollution-related TVC as a part of CSR with their own initiatives to raise public awareness.
3. Plastic manufacturers/users are requested to undertake pilot EPR initiatives using the 3R concept with their own initiatives.
4. During the meeting, it was advised to co-opt a director-level officer from Bangladesh Scouts in the technical working committee on proper management of plastic/polythene products and packaging.
5. Biodegradable plastic alternatives to plastic/polythene products and packaging products should be promoted. Federation of Bangladesh Chambers of Commerce and Industries requested to take the initiative. In this case, the Finance Department/National Board of Revenue is requested to give incentives from government to manufacturers.
6. Various organizations are producing/using/marketing polythene bags without clearance from the proper authority. The BPGMEA can take legal action, however it needs to be provided assistance by the ministry.
7. Requests are made that the MoEFCC create a plastic advisory committee where brand members will be included.

# Appendices - D

## Policies related to plastic management

**TABLE D-1: Waste related policy and legislations in Bangladesh**

Policy, Act, Rule, Strategy	Year	Description
National Policy for Water Supply and Sanitation	1998	The government shall maximize adoption of waste recycling measures and use organic waste materials for compost and biogas production.
Urban Management Policy Statement	1998	Recommends privatization of services to municipalities, prioritizes facilities for slum dwellers (including water supply, sanitation, and solid waste disposal).
Bangladesh Environment Conservation Act	1995	Replaced the Environmental Pollution Control Ordinance, 1977; provides for environmental conservation, environmental quality and control, and mitigation of pollution; although it does not include specific provisions on solid waste management, it authorizes the director general of the Department of Environment to take necessary measures for control, abatement, and mitigation of environmental pollution.
National Environment Policy	1992	Restricts disposal of municipal, industrial, and agricultural waste in water bodies (e.g., rivers, ponds, drains) and discourages open truck transportation of waste during the day.
Bangladesh Standards and Testing Institution Ordinance	1985	Adopts standards related to materials, commodities, and products and provision of their compliance; sets standards regarding whether a product is suitable for local consumption, import, and export and awards the Bangladesh Standards and Testing Institution seal to products conforming to such standards.
Private Sector Housing Development Guideline	2004	Recommends private sector investment in waste management sector (all types of waste).
Industrial Policy	2005	Provides all necessary assistance for producing an environmentally friendly product, with the objective of creating a pollution-free environment in the industrial sector; assists with waste management to minimize waste, waste removal, and production of pollution-free goods.  Environmental pollution control: the 1995 Environmental Protection Act and other related legislation have been gradually implemented to control environmental pollution; industries that pollute and endanger public health must develop pollution control measures; industrial enterprises will be encouraged to obtain ISO14000 certificates.
Private Sector Housing Development Guideline	2005	Recommends space in new housing areas for waste recycling, especially composting and biogas generation.
Dhaka Environment Management Plan	2005	Promotes recycling, discourages use of landfills, and promotes environmental management system (EMS) in industry.
National Clean Development Mechanism Strategy	2005	Harnesses carbon financing to promote pro-poor Clean Development Mechanism projects in the waste sector.
Draft National Urban Policy	2006	Covers all aspects of land and housing in urban areas; emphasizes the Clean Development Mechanism and recycling.

Policy, Act, Rule, Strategy	Year	Description
Biomedical Waste Management Rules	2008	Recommends source separation of hospital waste and separate collection, transportation, treatment, and disposal of all hospital and clinical waste.
National Renewable Energy Policy	2008	Promotes production of biogas and other green energy from waste and provides incentives for development of the Clean Development Mechanism to promote green energy projects.
Bangladesh Climate Change Strategy and Action Plan	2009	Carbon mitigation and low-carbon development are key pillars of this strategy; the waste sector has been considered a potential contributor to achieving Bangladesh's mitigation objectives.
Local Government (City Corporation) Act	2009	City corporations are under the purview of this act; there is a need to harmonize this act with the E-Waste Rules and Urban Solid Management Handling Rules to address the issues related to source segregation of plastic, collection, labelling, transportation, disposal, and recycling.
Jute Packaging Act	2017	Requires that all commodities be packaged in jute bags; violators face a maximum one year in jail, a BDT 50,000 fine, or both for using nonbiodegradable synthetics for packaging; originally mandated that six agricultural commodities—paddy, rice, wheat, maize, sugar, fertilizer—have jute packaging and later added 11 more commodities—ginger, garlic, onion, potato, fish feed, poultry feed, flour, chilies, pulse, coriander, and rice bran.  Note: Specific plastic packaging rules are needed for Bangladesh to address the overall packaging waste.
National Water and Sanitation Strategy	2014	Emphasizes resource recovery and recycling (instead of disposal) to improve urban sanitation.
Import policy	2015–2018	Prohibits importation of waste into Bangladesh.
Electrical and Electronic Waste (Management and Handling) Rules	2017	Mandates extended producer responsibility for manufacturers and assemblers, with five-year e-waste collection targets; these rules are applicable to all producers, traders, shopkeepers, stores, collectors, transporters, repairers, collection centers, crushers, grinders, refurbishers, recyclers, auction dealers, exporters, distributors, and large users involved in production, marketing, purchase, sale, or distribution of electrical and electronic products.
National Environment Policy	2018	Refines the 1992 Environment Policy to ensure sustainable development and ensure that the protection and improvement of environment, improvement of biodiversity is adopted in the Constitution of Bangladesh as the fundamental principles of state policy, in case of environmental degradation, disasters, the impact of climate change, and limitations of natural resources; it consists of two main parts: environmental policies for 24 sectors or areas and implementation plans and activities.
Public-private partnership (PPP) regulatory framework	2019	Provides guidelines on how to implement PPP projects and the roles and responsibilities of various line ministries.  Note: PPPs will help develop innovative technologies and skilled manpower to promote investments in the recycling of plastic.

**TABLE D-2: Plan Developed by DoE for SUP management**

Content	First Year (2021)		Second Year (2022)		Third Year (2023)	
	January – June	July – December	January – June	July – December	January – June	July – December
Single-use plastic (SUP) cups, glasses, plates, and utensils	Passenger and cargo ships	Beaches	Hotels, motels, restaurants near beaches	Markets, bus stands, declared public places, county governments, semigovernment offices, educational institutions near beaches	Entire county near beaches	District near beaches
Straws, polystyrene foam food packages, coffee stirrers						
Lollipop wrappers, sachets, cigarette filters, cotton swabs, surgical gloves, and masks	Solid waste rule preparation	Brand owner or supply chain and its traders and waste managers accepting the views of policy makers	Prepare extended producer responsibility guidelines	Establish environmentally friendly waste collection and waste disposal facilities in coastal areas (pilot project can be implemented in Cox’s Bazar and Patuakhali)	Provide waste collection and waste disposal training in coastal areas	Implement extended producer responsibility pilot project in coastal areas
Nonrecyclable, non-biodegradable items (multilayer packaging)						

**TABLE D-3: Plan Developed by DoE for plastic management**

Considerations	Functions	Short Term	Medium Term	Long Term	Institution in Charge
		(1–6 mos.)	(6–12 mos.)	(13–18 mos.)	
Administrative matters	Provide requests to controlling departments to prevent use of SUP in passenger vessels				
	Issue semi-official letter to deputy commissioners to prevent use of SUP in coastal areas				
	Exchange views with concerned stakeholders, including hotel and restaurant owners in coastal districts and divisions				
	Place publicity in print and electronic media (television commercial preparation)				
	Place public notices in newspapers				
	Encourage children to prevent plastic contamination through green clubs and nature clubs in coastal schools				
	Share information through religious institutions				

Considerations	Functions	Short Term (1–6 mos.)	Medium Term (6–12 mos.)	Long Term (13–18 mos.)	Institution in Charge
Policy making	Conduct SUP material flow analysis and prepare database				
	Assess SUP status (use and disposal) in coastal areas				
	Demarcate coastal areas to control use of SUP				
	Determine category of SUP and formulate year- and item-based phase-out plans in coastal areas				
	Develop regulatory framework (prepare rules and statutory regulatory order)				
	Periodically declare SUP-free areas (e.g., boats, beaches, beach-adjacent hotels and motels, coastal district government offices, public transport, public places)				
	Prepare guidelines for phase-out of SUP without alternatives (e.g., surgical gloves, masks)				
	Form national coordination committees at field and central levels to coordinate implementation				
	In case of emergency, collect SUP in coastal areas after establishing separate environmental disposal system				
	Coordinate with pilot project preparation and funding agencies				
	Existing production and supply system				
Existing production and supply system	Provide interest-free investments, tax rebates, and incentives to gradually motivate SUP manufacturing companies to produce environmentally friendly alternatives (implementation of year-based commitments)				
	Provide technical assistance to SUP manufacturing companies to help them adapt to environmentally friendly alternative production				
	Provide compensation through special endowment fund to cover business losses due to alternative production or declaration of SUP-free zone				
	Market development of eco-friendly alternatives produced by SUP manufacturers (e.g., purchased by government agencies)				
	Increase taxes to discourage imports of raw materials or finished goods to prevent production and use of SUP				
	Encourage production of environmentally friendly alternatives, lift duty on imports of raw materials and equipment, tax rebates				
	Provide one-time interest-free loans to companies affiliated with the supply chain and registered by the Department of Environment or approved by the plastic association to stop marketing SUP				
User Matters	Raise public awareness, produce media and publicity campaigns				
	Impose fines, promote community patrolling to prevent use of SUP				
	Promote mobile court against SUP users prohibited by rules				
	Officially recognize SUPs, avoiding hotels, motels, restaurants, and offices and giving priority to various government functions				

Source: DoE 2021.

Note: The Department of Environment prepared this work plan in response to the High Court's 2021 directive.





