

# The Plastic Deluge

*In The Sylhet Metropolitan City Area, Bangladesh*



Situation Analysis Report, 2021



# The Plastic Deluge in The Sylhet City Corporation Area, Bangladesh

(Situation Analysis Report, 2022)

## Published By

Environment and Social Development Organization-ESDO

## Publication Year

January, 2022

## Team Leader

Dr. Shahriar Hossain

## Editorial Team

Siddika Sultana, Prof. Abul Hashem

## Study & Analysis

Hridita Ferdous

## Team Coordination

Sarah Jabeen Kristy

## Support Team

Khalilur Rahman, Mamun ul Hasan, Fahmida Sarker, Monisha Fareen, Juthi Rani Barai, Umme Fariha Tasnim & Volunteers

Copyright © Environment and Social Development Organization-ESDO, 2022



## Contact Address:

Level: 5, House: 8/1, Block: C, Lalmatia,  
Dhaka-1207, Bangladesh  
Phone: +880-2-55008178  
Fax: +880-2-55008179  
E-mail: info@esdo.org



## Contact Address:

University House, Winston Churchill Ave,  
Portsmouth PO1 2UP, United Kingdom  
Phone: +44 (0)23 9284 8484  
E-mail: info@port.ac.uk

## Disclaimer

*This study publication does not imply the expression of any opinion whatsoever on the part of the Environment and Social Development Organization-ESDO concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision of national policy, or trade name of any commercial products.*

## Acknowledgement

First of all, praise to our Creator, the almighty for his kindness, who is merciful to all.

ESDO acknowledges the spontaneous and valuable cooperation of Professor Dr. Shameem Ara Begum and Professor Dr. Md. Jahir Bin Alam of Shahjalal University of Science and Technology.

ESDO acknowledges the mission of University of Portsmouth named “Revolution Plastic” to tackle the plastics crisis for our local community and the wider world. We appreciate the University of Portsmouth’s agreement with a leading university in Bangladesh to help tackle the problem of urban plastic pollution in the global South which is a part of the University’s Sustainable Transitions to End Plastic Pollution (STEPP) project. We particularly acknowledge the contribution of Dr Cressida Bowyer, Professor Steve Fletcher and Sayyidah Salam who continuously supported us throughout the study.

We also acknowledge the tremendous support of the volunteers, who conducted surveys and interviews in the Sylhet City Corporation in this time of COVID-19 pandemic. We appreciate the contribution of our volunteers: Sajmin Nahar Mily, Akikur Rahman Borolaskar, Md. Mahmudul Hasan, Mohammed Iftekhar-ul -Islam, Nabid Hasnat, Md. Abu Redwan Khan, Saiful Alam, Khadijatul Kubra Mim, Rashed Mahmud, Md. Nur Nobi Islam of Shahjalal University of Science and Technology. Without them this study wouldn’t have been possible.

# Contents

|   |    |
|---|----|
| <b>Acknowledgement</b> .....  | 3  |
| Executive Summery.....  | 5  |
| Introduction .....  | 7  |
| Background .....  | 8  |
| Objective of the study.....   | 10 |
| Methodology.....  | 10 |
| Field Testing:.....   | 11 |
| Baseline Survey .....   | 11 |
| Key Informant Interviews (KII) .....  | 12 |
| Sample Size .....   | 12 |
| Study Area.....   | 13 |
| Findings: Current Scenario of Plastic Waste in Sylhet City Corporation..... | 14 |
| Plastic Waste Generation in SCC.....  | 14 |
| Plastic Waste Sources and Frequency of Usage of These Products In SCC.....  | 18 |
| .....   | 21 |
| Plastic Waste Management & Disposal Scenario in SCC .....                   | 22 |
| Consumers view on current waste management scenario of SCC .....            | 27 |
| SCC Consumers view on plastic waste .....                                   | 27 |
| Plastic Waste and The Waste Workers of SCC.....                             | 29 |
| Gaps in Current Waste Management System.....                                | 30 |
| Consequences of Plastic Waste Pollution in Sylhet City .....                | 32 |
| Recommendation.....   | 34 |
| Conclusion.....   | 35 |
| References .....  | 36 |
| Annex .....   | 37 |





## Executive Summary

*Plastic has been considered the best invention of time. But as a result of its overproduction and consumption, it has become an environmental scourge. The ever-increasing plastic production, consumption and waste generation are escalating the threat to marine and terrestrial ecosystem and has transformed its most attractive features into a curse. Plastic is a non-biodegradable polymeric material that is largely used in daily life. Since they are largely non-biodegradable, they tend to persist in natural environments and causes all kind of major pollutions. Plastic pollution has become one of the most pressing environmental issues, as rapidly increasing production of disposable plastic products overwhelms the world's ability to deal with them.*

*Sylhet is a metropolitan city located in northeastern Bangladesh, on the north bank of the Surma River at the eastern tip of Bengal. Sylhet has a subtropical climate and lush highland terrain. The city is one of the largest cities by population in Bangladesh after Dhaka, Chittagong and Khulna with a population of nearly a million.[1] Sylhet is one of the most important spiritual and cultural centers in Bangladesh. Furthermore, it is one of the most economically important cities in the country after Dhaka and Chittagong which produces the highest amount of tea and natural gas in the country.*

*The current state of plastic waste in Sylhet city corporation was examined in order to have a better understanding of the common view of plastic product usage. Consumers and city garbage collectors from key 27 wards were surveyed using a structured questionnaire, and KII was conducted at various workplaces. Consumers and people in the workplace rely on a wide range of plastic items in their daily lives. In Sylhet City Corporation (SCC) 67% of the total generated waste are organic waste, 17% are plastic waste, 5% are paper waste, 3% are e-waste, 2% are medical waste and 1% are other waste. The mismanagement of safety products, which are largely made of polymers, has exacerbated the situation of plastic pollution in Sylhet city. This is also to mention that because Covid-19 is highly contagious, the demand for single-use plastic products such as PPE masks, gloves, and medical waste has increased dramatically. According to the KII report of Sylhet City, plastic waste has increased dramatically, accounting for approximately 17% of all waste. A sharp increase of plastic waste generation was observed in Sylhet City Corporation*

*during COVID-19 pandemic making the yearly increase at 18 tons/year in Year 2020-2021. Around 54 tons of plastic waste is generated each day in SCC in 2021, where the most used single-use plastic products are sachets, one time used utensils, and personal care products. Among the total plastic waste 78% of them was single-use plastic. As the population of SCC in 2021 is 928,000<sup>1</sup> making the annual per capita of plastic waste generation of Sylhet city corporation 18.849 kg. In 2021, the annual per capita of single-use plastic waste generation of Sylhet city corporation 10.837 kg. However, there was absolutely no segregation at source and collection time was found during the survey.*

*69% of the consumers of SCC supports banning single-use plastic item which underlines the fact that they are well aware about the harmful effect of single-use plastic. However, around 54% people consider single-use plastic important in their daily life. So, we can conclude that despite knowing the fact single-use plastic is harmful, some percentages of people still consider single-use plastic important. Furthermore, it is worth noting approximately 97% of consumers and 100% of KII participants would prefer to use an alternative to plastic products if they had the choice.*

*This study looks at the fate of these plastic products after they've been used, as well as the repercussions of plastic pollution. Moreover, this study demonstrates preventive measures for reducing plastic waste pollution.*

---

<sup>1</sup> <https://www.macrotrends.net/cities/20136/sylhet/population>

## Introduction

Plastic pollution has received attention during the last 10 years, after polluting ecosystems and ruining the aesthetics of seas and negative impacts on marine species. Most of the plastic materials have attributes to be used only once, therefore plastic packaging materials constitute half of the world's plastic waste. The major amount of this waste is produced in Asia whereas USA, Japan and the European Union represent the highest producers of per capita plastic waste. However, only nine percent of these nine billion tons of plastic has been recycled<sup>2</sup>. Most plastics are non-biodegradable and break down into tiny fragments known as micro plastics.

In Bangladesh, plastic waste is one of the most visible environmental problems. In recent years, the lack of a comprehensive waste management strategy has made the situation more wasteful. Generally, plastics are made from synthetic or semi-synthetic organic material. The raw materials of plastic are derived from cellulose, coal, natural gas, salt, crude oil; and most industrial plastics are made from petrochemicals. Plastic has a wide range of applications and is used in a variety of industries around the world, for instance, in packaging, building and construction, industrial machinery, textile, and consumer products. It has been found that plastics are primarily consumed by the packaging industry which consumes almost 36 percent of the total world plastic production (Rucevska, 2020). Plastic trash has become so ubiquitous it has prompted efforts to write a global treaty negotiated by the United Nations. The chemical bond between the monomers responsible for plastic's durability makes it resistant to natural degradation processes. Plastic waste does not decompose; instead, it accumulates in landfills and the ocean. Plastics often contain additives making them stronger, more flexible, and durable. Many of these additives, on the other hand, can extend the life of products if they become litter, with some estimates ranging as high as 400 years for decomposition. It is reported that plastic production has increased exponentially from 2.3 million tons in 1950 to 448 million tons by 2015 and expected to double by 2050 (Parker, 2019). Almost half of the total produced plastic waste is single used plastics constituting mainly plastic bags, straws, stirrers, sachets, food packaging, one-time utensils e.g., disposable cutlery etc. Among the total annually produced plastics, 25 percent is incinerated, 20 percent recycled and the rest 55 percent are directly released in the environment (Roser, 2018). In addition, during the corona virus pandemic in 2020, the use of single use of plastic products has increased many folds; approximately, 96% of the people around the world are using different types of personal protection equipment (PPE) ranging from disposable mask and face shield, which are directly being disposed to environment and causing plastic pollution hazard. Therefore, plastic pollution is very alarming problem for today's world.

In developing country like Bangladesh plastic waste pollution is considered as the most threatening, where garbage collection systems are frequently ineffective or non-existent. There has been little effort to assess the amount of plastic waste in various environmental compartments, as well as the associated environmental and human health impacts. In this study, we have aimed to portray the present scenario of plastic pollution in Sylhet city corporation area, which is in north-eastern part of Bangladesh.

---

<sup>2</sup> <https://www.thedailystar.net/supplements/29th-anniversary-supplements/governance-development-and-sustainable-bangladesh/news/challenges-and-opportunities-plastic-pollution>





## Background

We depend on the environment for the food we eat, the air we inhale and the water we drink. However, humankind is harming that very environment, affecting natural resources and ultimately our living conditions as we know them. The more interest we have for resources, the more strain we are putting on the environment.

Bangladesh, formally the People's Republic of Bangladesh, is the eighth-most populated country on the planet. As far as landmass, Bangladesh is positions 92<sup>nd</sup>. As a country at the beginning phase of development, Bangladesh, being one of the populated nations of Asia and the Pacific, throughout quick financial development that is changing its well established provincial rural agricultural economy into an urban-industrial economy, is assailed with overwhelming nature of the environmental problems of all kinds. Of these issues, the most noticeable one is waste, especially in its metropolitan environment.

Plastic pollution is becoming a tremendous problem in this country because of its increasing use by all kinds of people. With increasing use, the volume of plastic wastes inside the country is also rising greatly. A recent report published by Earth Day Network (2018) ranked Bangladesh 10th out of the top 20 plastic polluting countries in the world. Plastic contributes eight percent of the country's waste, which is equivalent to 800,000 tones, of which around 200,000 tonnes go into the ocean and rivers<sup>3</sup>. Because of the ever-increasing use of plastic in different industries, especially packaging, Bangladesh remains one of the top plastic polluted countries. Images of clogged rivers as a result of the haphazard disposal of plastic bottles partly depict the gravity of the problem. Three major areas of Bangladesh, such as Dhaka, Chittagong, and Sylhet, are in great danger. A report has found that about 14 million pieces of poly-bags are being thrown out every

<sup>3</sup> <http://www.ccsenet.org/journal/index.php/ass/article/view/0/42146>

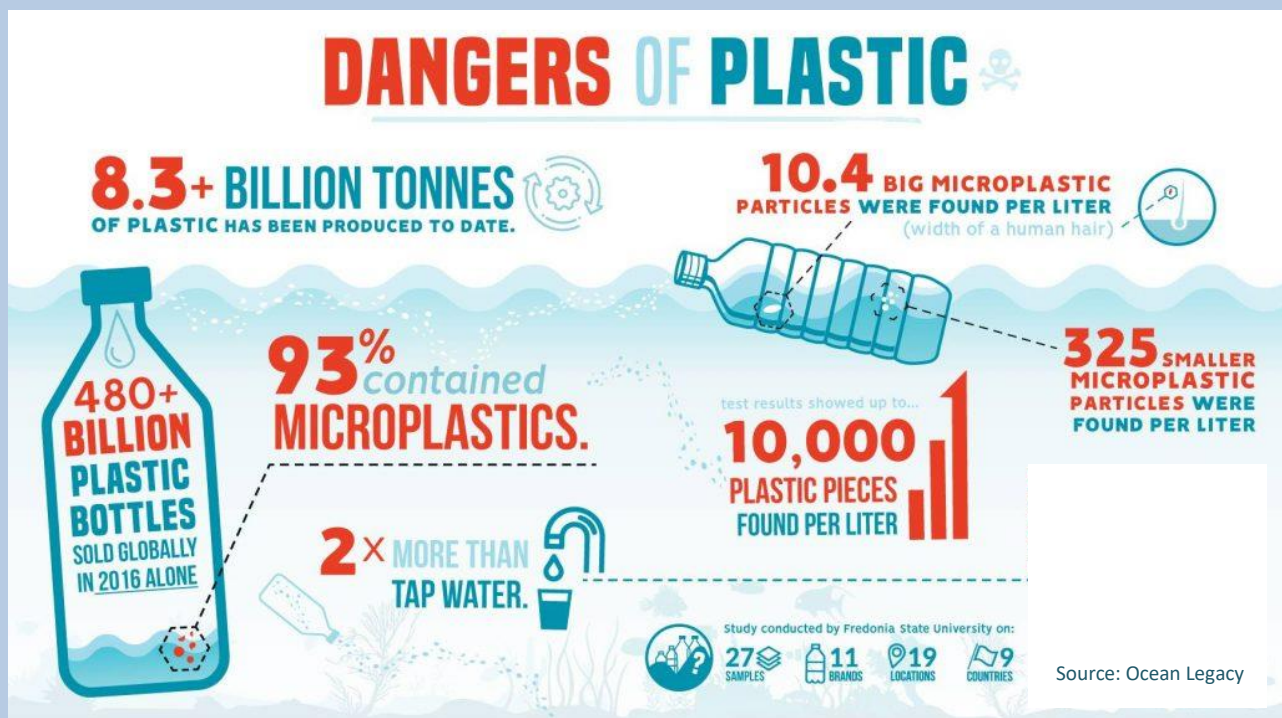


day in Dhaka city. Besides, considering this generation rate around 0.6 million inhabitants of this city are generating more or less 280 tons of different categories of solid waste in each day<sup>4</sup>.

Despite being the first country to ban plastic bags, there are no specific laws, rules or guidelines for plastic waste management in Bangladesh. Hence it is facing an immense problem of plastic and garbage waste in its urban areas. Areas like Sylhet city, which has become stretched to the limits due to food waste, poly-paper and plastic bags, ashes and residues, roadside litter and abandoned vehicles are creating the main solid waste in the city. Sylhet city currently generates around 1,000 metric tonnes of solid waste per day. Only around 50% is collected for proper disposal by the city authority. The leftover waste creates huge problems including water contamination which presents a health-hazard for residents. Solid waste management has become a major cause for alarm. Local people dispose of solid waste in open areas and on roads, which causes harm to the ecosystem and general health of the environment. This open dumping is environmentally and hygienically hazardous. Due to lack of resources the city authority is struggling to manage the problem (Isl22).

Also, proper management and operation of the supply chain of recycling the plastic waste are absent. Approximately 50 percent of all plastic waste like lightweight, single-use plastic products and packaging materials are not properly deposited for subsequent removal to particular landfills, recycling centers, or burners in every major city and Sylhet is not an exception. A pervasive culture for littering continues to add to the problem. And, to make matters worse, water channels such as rivers, are used for dumping industrial and domestic wastes that contain a huge amount of plastic in this city which ultimately end up in the sea.

Environment and Social Development Organization-ESDO has conducted this study to find out people's perception on single use plastic in residential, commercial and slum areas of Sylhet through an extensive survey. As Sylhet is one of the most important cities in terms of population and economy, it is really important to assess the situation of plastic waste management in this city as this plastic waste have direct impact to our environment as well as human health.



<sup>4</sup> <https://sialert.net/fulltext/?doi=jas.2006.1506.1512>

## Objective of the study

1. To find out the current status of the hazardous plastic wastes in Sylhet City Corporation.
2. To assess the local situation of plastic wastes management and identify the gaps
3. Understand general perception of plastic product consumption
4. To promote further study requirement
5. To design awareness campaign and policy advocacy

## Methodology

The survey conducted in the Sylhet City Corporation was a questionnaire survey. To prepare this extensive report, the relevant study for data have been collected from both primary and secondary sources. The initial review was expanded relevant terms and included the following websites and sources – Department of Environment, Ministry of Environment, Forest, and Climate Change, National Geographic, The Guardian, Goggle Scholar, United Nations Environment Programme and local media releases - using an advanced search by country, with key words and filters for the evaluations, most relevant to least relevant, special evaluations, and other ESDO supported study/documents. The primary data collection methodology has divided into two parts – Survey and KII which have elaborated in this section. Then the data was compiled and analyses were made to make relevant assessments. The methodology section underlines the survey-related key information and the detail of plastic usage & plastic waste management.



## Field Testing:

An initial field testing was conducted prior to starting the main survey to understand if the set method was right or wrong to proceed. The team covered 10-15 surveys on consumers, retailers and waste pickers to cross check the questionnaires and analyzed the collected data with proper indicators. After sorting few minor errors, the questionnaires were revised and distributed for the main survey.

## Baseline Survey

The baseline survey had been conducted through questionnaires and carried out from June 2021 to August 2021 on total 1020 people (consumers, retailers, manufacturers and waste workers) in 27 wards of the Sylhet city corporation area. Set of structured questionnaires were formed to ensure getting all relevant data from targeted segment. Amid the Covid-19 pandemic, ESDO's volunteers had gone physically in different locations of Sylhet City and conducted questionnaire survey different segment of people. The primary target was 1150 respondents. However, they covered almost 600 consumers, 270 retailers, 150 waste pickers and few manufacturers.





## Key Informant Interviews (KII)

Besides survey, a key informant interview was done with representatives of Govt. agencies, private offices, educational institutes and healthcare, manufacturers and retailers to get a brief idea about their workplace situation to manage plastic waste in current time. Total 15 KII were conducted instead of 25 because of the sudden lockdown and spread of COVID-19 infection in Sylhet City on that time.

## Sample Size

The baseline survey was conducted among 600 consumers, 270 retailers, 150 waste pickers and few manufacturers. The Key informant interview was conducted among 15 people who were mostly officials of bank and other private sectors.



Figure 1: Volunteers Performing KII

## Study Area

Sylhet, the northeastern divisional city of Bangladesh, is located at 24°53'N latitude and 91°52'E longitude stands on the banks of river Surma.

The selected location for this study is Sylhet City Corporation area. Sylhet is one of the most important cities for both trade and business in the economy of Bangladesh after the capital Dhaka and port city Chittagong. It is also a well-known tourist destination, with soothing greeneries and holy burial sites of Muslim saints and is surrounded by tea states and rain forest. The city is very rich in natural resources and also attracts tourists and business entrepreneurs. Thus, the city must maintain a health-friendly environment, clean water and food. All the major wards have been covered in terms of data collection from various respondents. Total 27 major wards were selected and covered for collecting data through survey and key informant interviews so far.

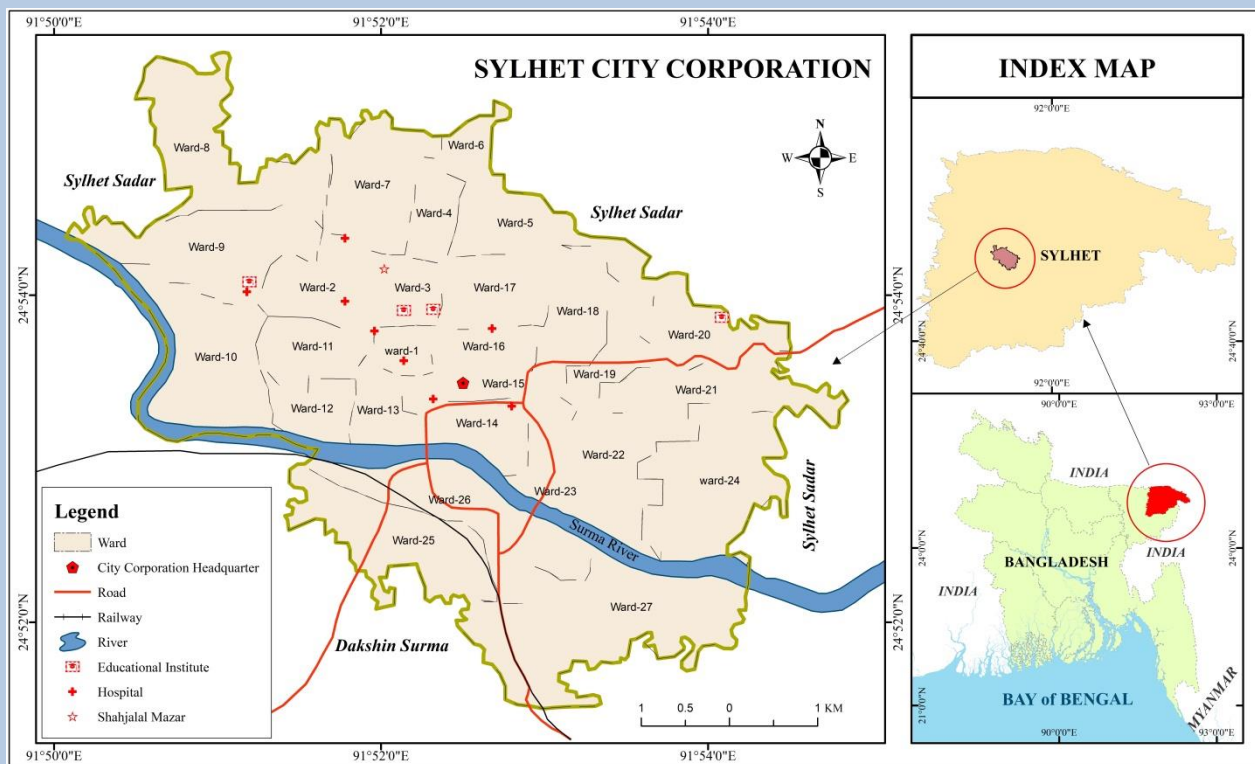


Figure 2: Map of Sylhet City Corporation



## Findings: Current Scenario of Plastic Waste in Sylhet City Corporation



### Plastic Waste Generation in SCC

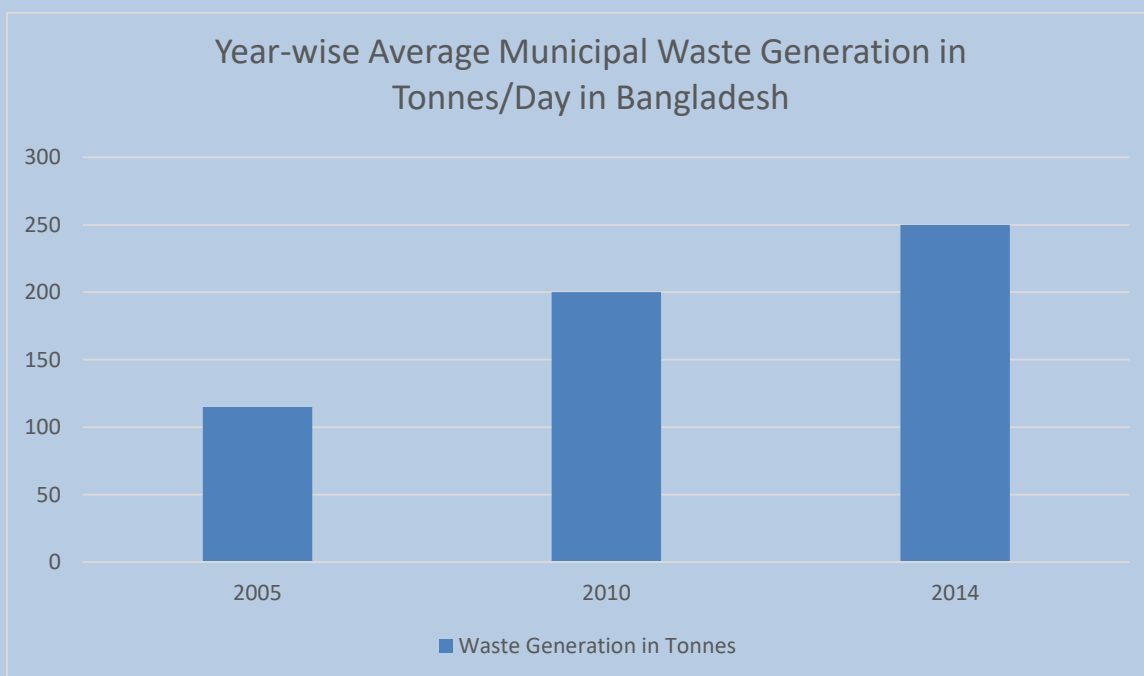
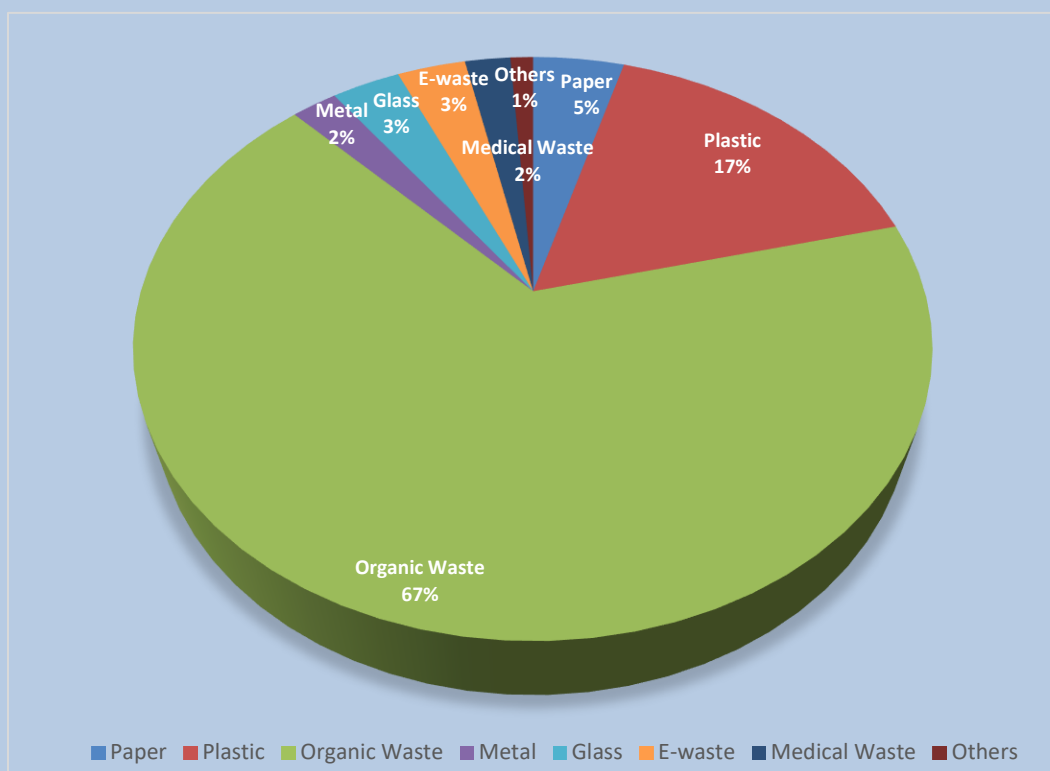


Figure 3: Year wise Municipal Waste Generation in Tonnes/Day Source: (Salma Akhter Iqbal, et al., February 2015)



Considering the demand of the huge increasing population, rapid and mushrooming growth of markets restaurants and private clinics/hospitals is established in the recent years in Sylhet city and most of the private clinics are housed in renovated residential building and do not have the facilities for adequate waste management systems. According to a study on water pollution by solid waste shown, around 31% wastes are plastic waste which are constantly polluting the water bodies of Sylhet city<sup>5</sup>. In this total of 31% plastic wastes, PET bottles are produced 12-18 tons per day and soft plastics are produced 18-24 tons a day (Islam, et al., 2017). This result might include the plastic portion of e-waste and medical waste. However according to our survey, we found that 17% of the total generated waste are plastic waste, 3% are e-waste, 2% are medical waste and 1% are other waste. The mismanagement of safety products, which are largely made of polymers, has exacerbated the situation of plastic pollution in Sylhet city. This is also to mention that because Covid-19 is highly contagious, the demand for single-use plastic products such as PPE masks, gloves, and medical waste has increased dramatically. According to the KII report of Sylhet City, plastic waste has increased dramatically, accounting for approximately 17% of all waste.

In a previous study by the Environment and Social Development Organization (ESDO, 2020) around 14,500 tons of hazardous plastic waste emerged in Bangladesh during the first month of official lockdown to prevent coronavirus outbreaks, including face masks, hand gloves, and polythene bags. After the emergence of Covid-19, about 5796 tons of plastic waste were generated in a single month of which 3076 tons were generated in Dhaka city, capital of the country, alone.



However, besides solid waste from household and commercial site, clinical plastic wastes are also responsible for health hazard and environmental degradation. People need to be aware of the hazardous effects of plastic consumption and improper dumping of single use plastic in daily life. To create mass awareness, ESDO has conducted this study to find out people’s tendency about plastic consumption in Sylhet City Corporation so that, based on the data, ESDO can do advocacy and awareness campaign to stop the consumption of single use plastic.

<sup>5</sup> [https://www.researchgate.net/publication/328852209\\_MUNICIPAL\\_SOLID\\_WASTE\\_MANAGEMENT\\_IN\\_SYLHET\\_CITY\\_CORPORATION](https://www.researchgate.net/publication/328852209_MUNICIPAL_SOLID_WASTE_MANAGEMENT_IN_SYLHET_CITY_CORPORATION)

Bangladesh has been fronting a huge problem of plastic and garbage waste mostly in its urban areas specifically in big cities. Areas like Sylhet city, which is slowly becoming overextended to the limits due to food waste, poly-paper and plastic bags, ashes and residues, roadside litter and abandoned vehicles are creating the main solid waste in the city.

In Sylhet city only around 50% is collected for proper disposal by the city authority.<sup>6</sup> The non-collected part of the waste creates enormous problems. This includes contaminating water that poses a health risk to residents. Solid waste management has become a major cause for alarm especially the non-biodegradable waste like plastic waste is creating huge environmental impact all over the country. Local people dispose of solid waste in open areas and on roads, which causes harm to the ecosystem and general health of the environment. This open dumping is environmentally and hygienically hazardous. Due to lack of resources the city authority is struggling to manage the problem.



Figure 4: Open Disposal of Waste in Sylhet Sadar. (Source. Daily Star)

According to previous researches, it was found that from year 2005 to 2010 there was an increase rate of 17 tons/year and it decreased to 12.5 tons/year during 2010 to 2014 (Salma Akhter Iqbal, et al., February 2015). Referring to this data, an average 14.75 tons/year can be considered till year 2020. However, according to our survey, a sharp increase of plastic waste generation was found in Sylhet City Corporation during COVID-19 pandemic making the yearly increase at 18 tons/year in Year 2020-2021. From this analysis we can underline the monthly and yearly production of solid waste as well as plastic waste as according to our findings 16% of the total waste is plastic waste in 2021. Considering the facts, the annual per capita of plastic waste generation of Sylhet city corporation in 2020 would be 19.4335 kg as in 2020 the total population of Sylhet City Corporation was 852,000. The population of SCC in 2021 is 928,000<sup>7</sup> making the annual per capita of plastic waste generation of Sylhet city corporation 18.849 kg.

From the data analysis it was found that around 54 tons of plastic waste is generated each day in SCC in 2021, where the most used single-use plastic products are sachets, one time used utensils, and personal care products. Among the total plastic waste, 78% of them was single-use plastic. In year 2021 the per day single-use plastic waste generation would be 41.7768 tons/day which ends up to 1253.304 tons/month and 15039.648 tons/year in the year of 2021; making the annual per capita of single-use plastic waste generation of Sylhet city corporation 10.837 kg.

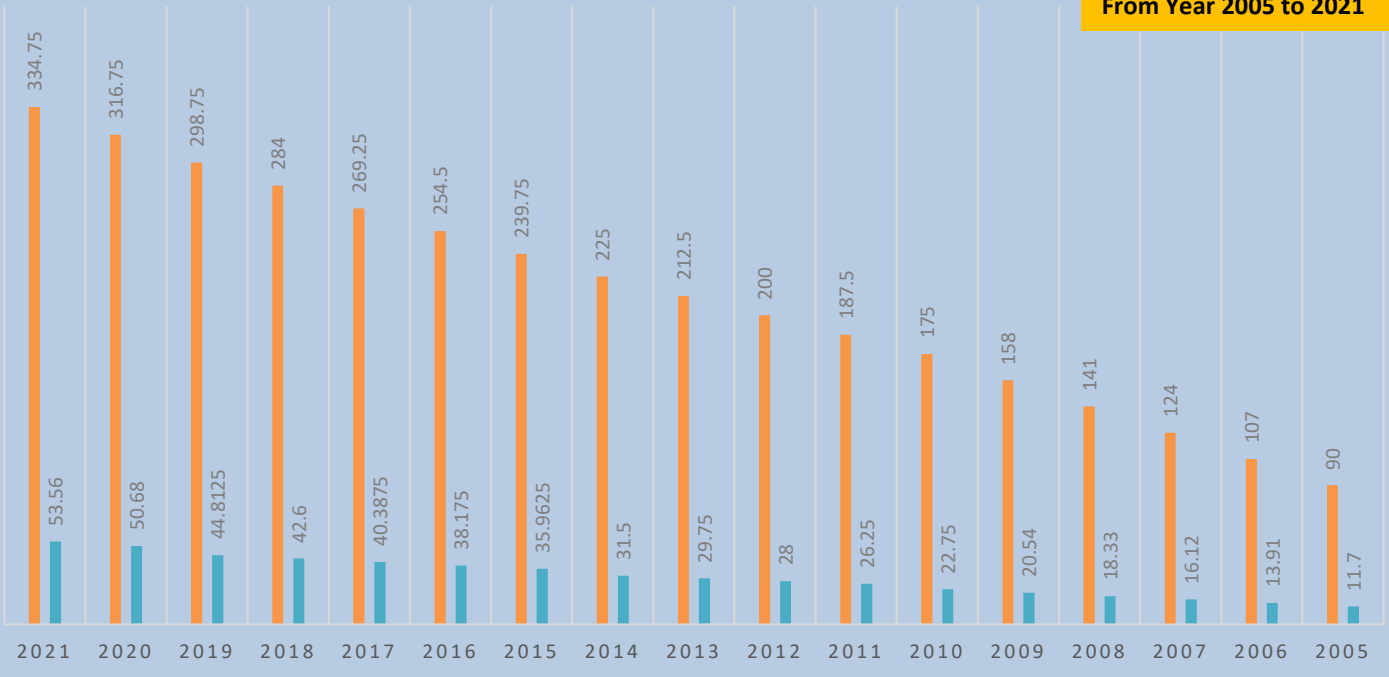
<sup>6</sup> <https://www.islamic-relief.org/why-were-helping-bangladesh-cities-facing-a-rising-tide-of-waste/>

<sup>7</sup> <https://www.macrotrends.net/cities/20136/sylhet/population>

# Sylhet City Corporation Waste Generation In Tons/Day

■ Total Waste in Tons/day ■ Plastic Waste in Tons/day

From Year 2005 to 2021

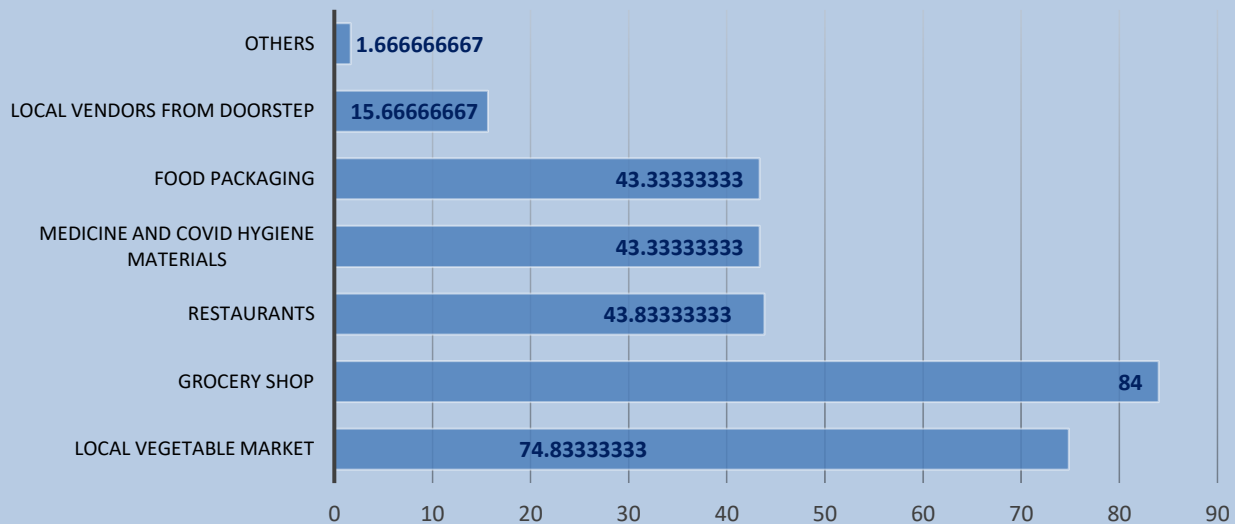




## Plastic Waste Sources and Frequency of Usage of These Products In SCC

Generally, the discarded waste contains a variety of plastics, the most common of which are plastic bags, plastic bottles, personal care products, sachets, food-packaging, one-time utensils such as disposable cutlery, plastic shoes, ornaments, baskets, barrels, plastic furniture, PVC fittings, PVC banner, festoon, and plastic toys.

### Sources of Consumers' Plastic Products in %



According to the study, approximately 38% of people used a wide variety of plastic products regularly, 25% used more frequently, 20% used rarely, and 18% never used any plastic products. In addition, plastic bags and bottles are the most commonly used plastic items; accounting for 78% and 77% of total usage, respectively. Furthermore, the KII summary shows the same result that plastic bottles, bags, plastic stationaries are the most used plastic products contributing about 56% of total consumption and PVC/festoon/posters count 15% as well.

### Frequency of Plastic Product Usage by Consumers in %

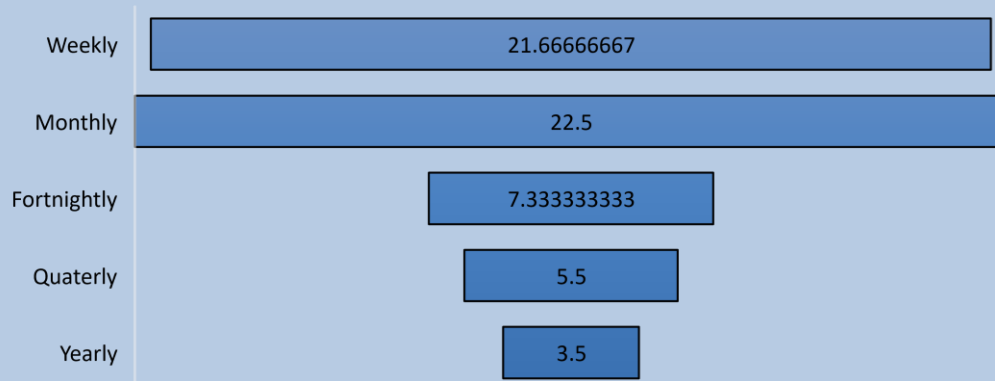
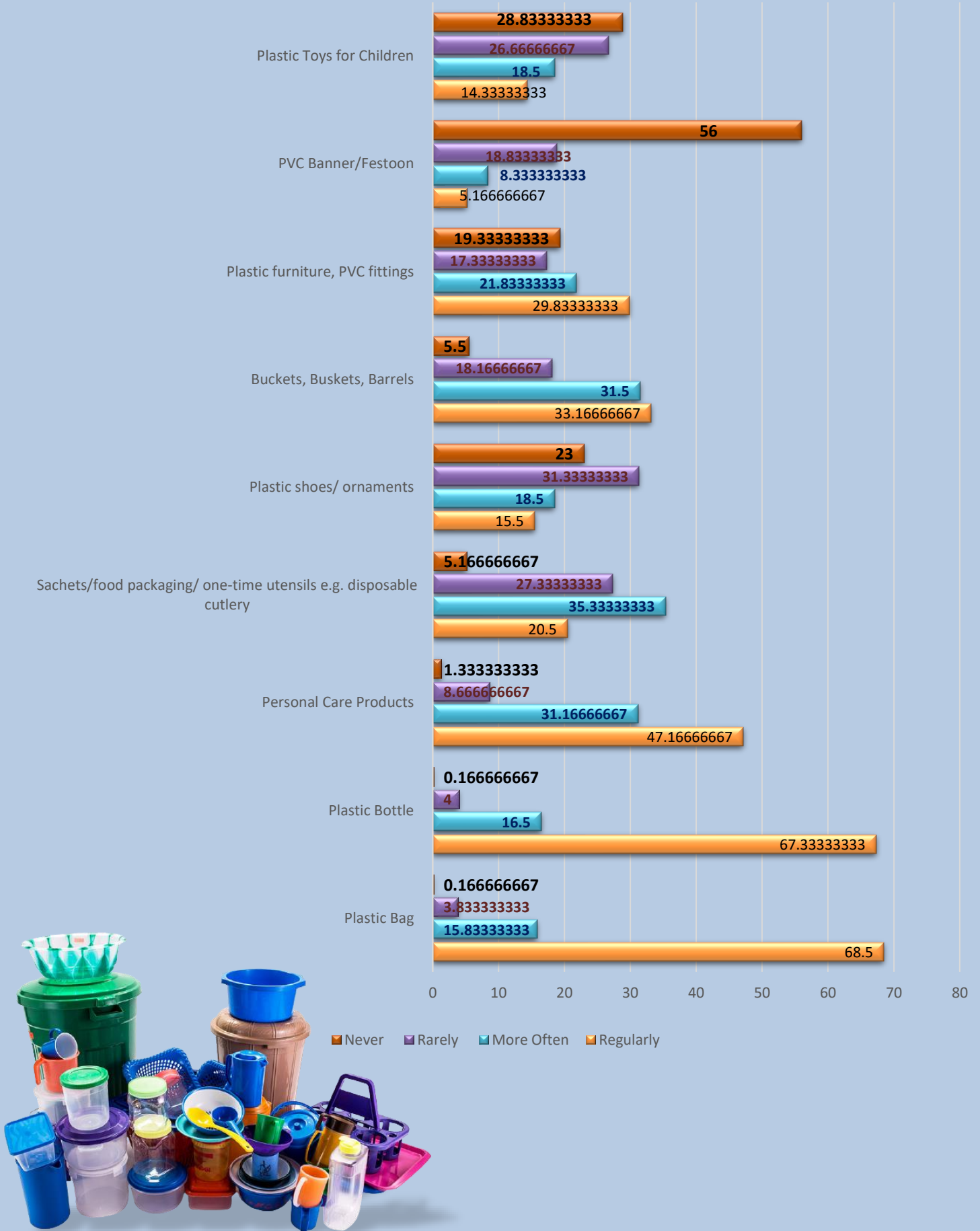
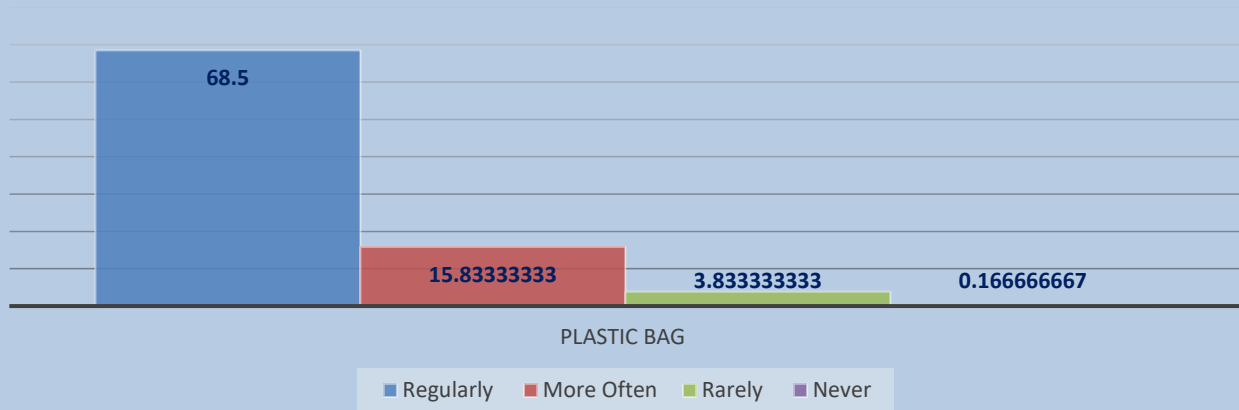


Figure 5: Sources of Plastic Products which are frequently used by consumers

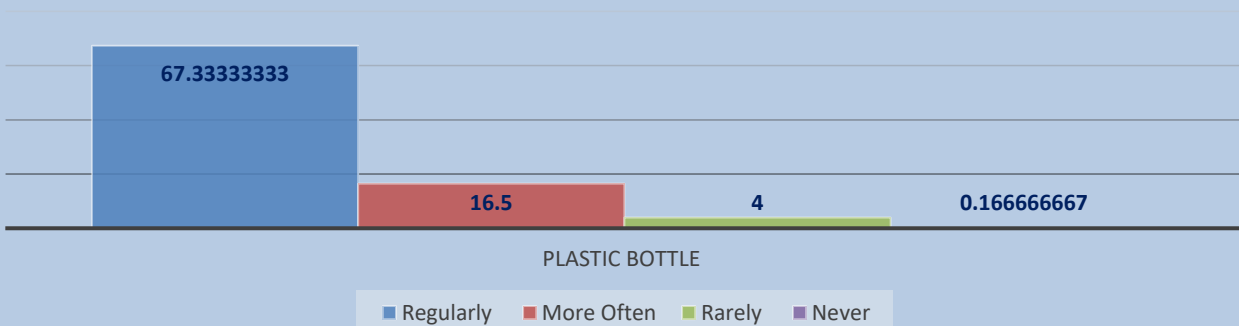
## Frequency of Consumers' Using Different Types of Plastic Products (in %)



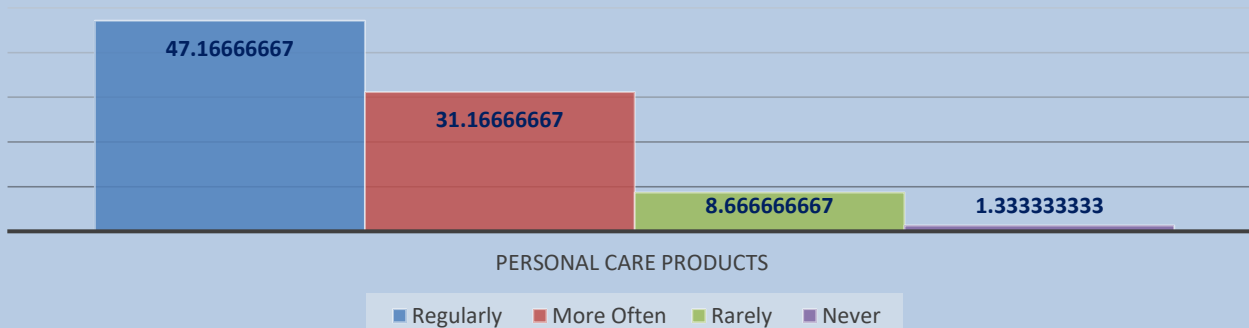
### Frequency of Using Plastic Bags by Consumers (in %)



### Frequency of Using Plastic Bottles by Consumers (in %)

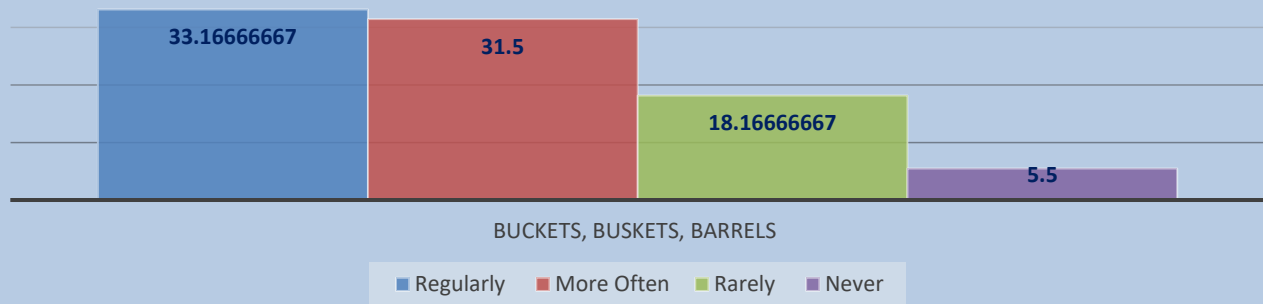


### Frequency of Using Personal Care Products by Consumers (in %)

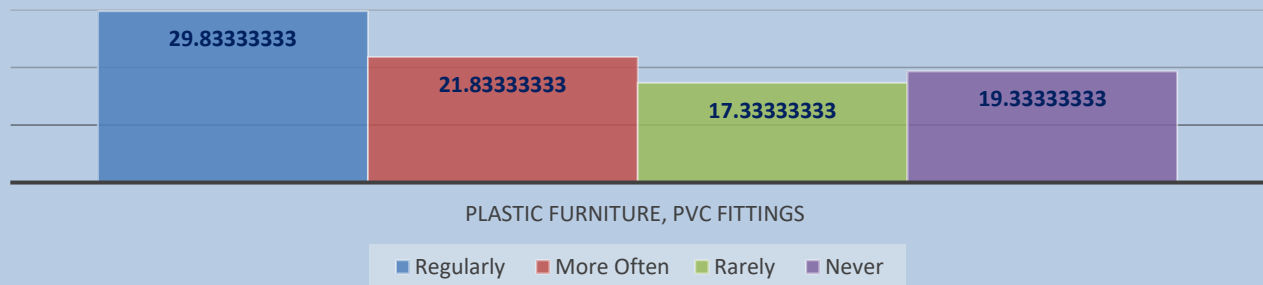




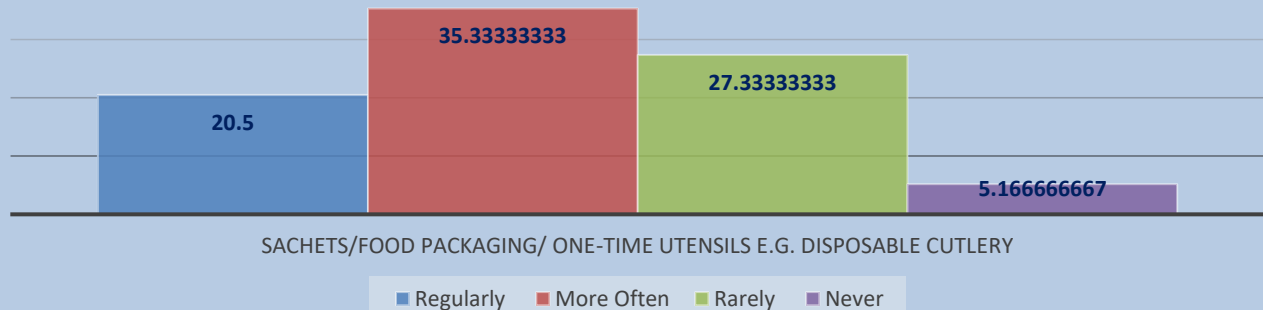
### Frequency of Using Buckets, Baskets & Barrels by Consumers (in %)



### Frequency of Using Plastic Furnitures & PVC Fittings by Consumers (in %)



### Frequency of Using Plastic Packaging & Single-use Cutleries by Consumers (in %)



## Plastic Waste Management & Disposal Scenario in SCC

Presently, household waste is collected in four different ways. It was found that relatively effective dumping of household waste management was the door-to-door collection system based on existing other ways. It is noticeable that some residents were dumped solid waste in the open places. The final disposal sites also spread all over the open environment are unsightly as no proper systems were maintained for sanitary landfilling which results in a high threatening to health and the environment.

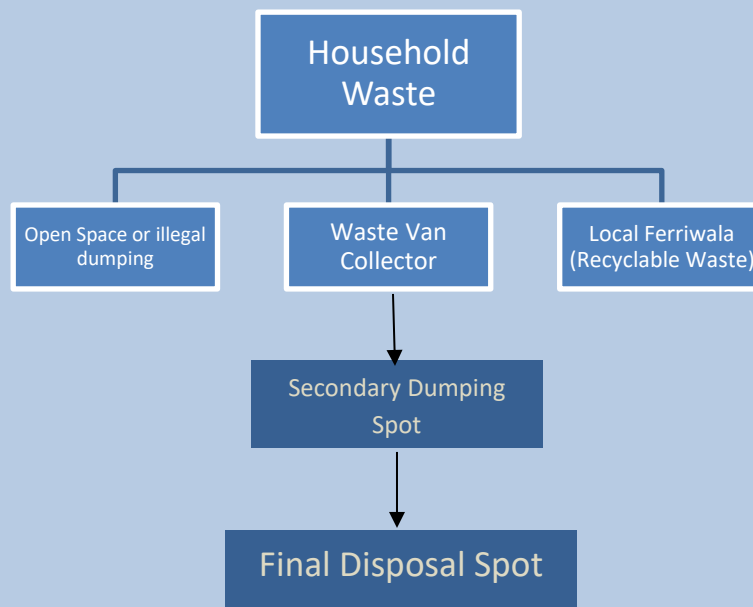


Figure 6: Existing Waste Management Practice in SCC

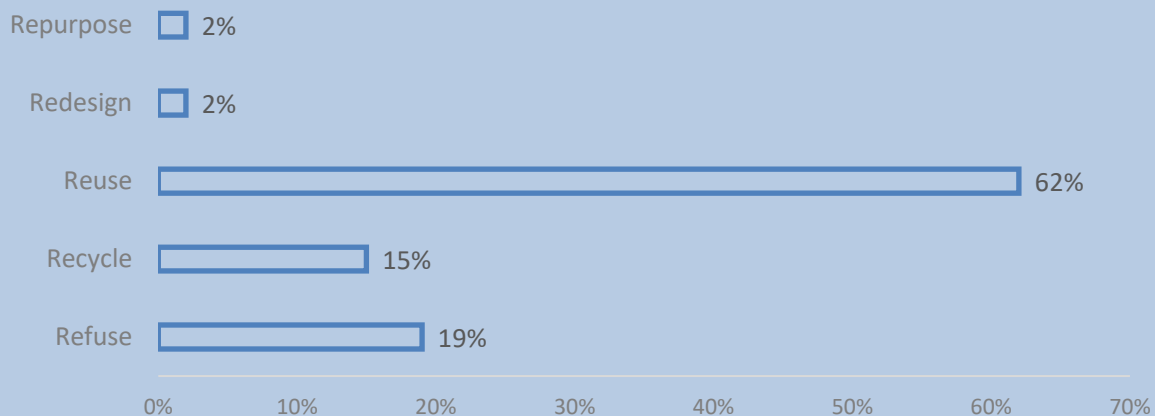


Figure 7: 5R's percentage of Plastic Waste Management of Sylhet City

From survey data analyzing it was found that more than 50% of people of Sylhet city area dispose of their plastic waste in the garbage bin after usage with all other waste in unsegregated manner. Approximately less than 20% of people reuse and less than one-quarter of people discard plastic products in open spaces after consumption. Furthermore, a tiny percentage of people of Sylhet city incinerate their plastic waste.

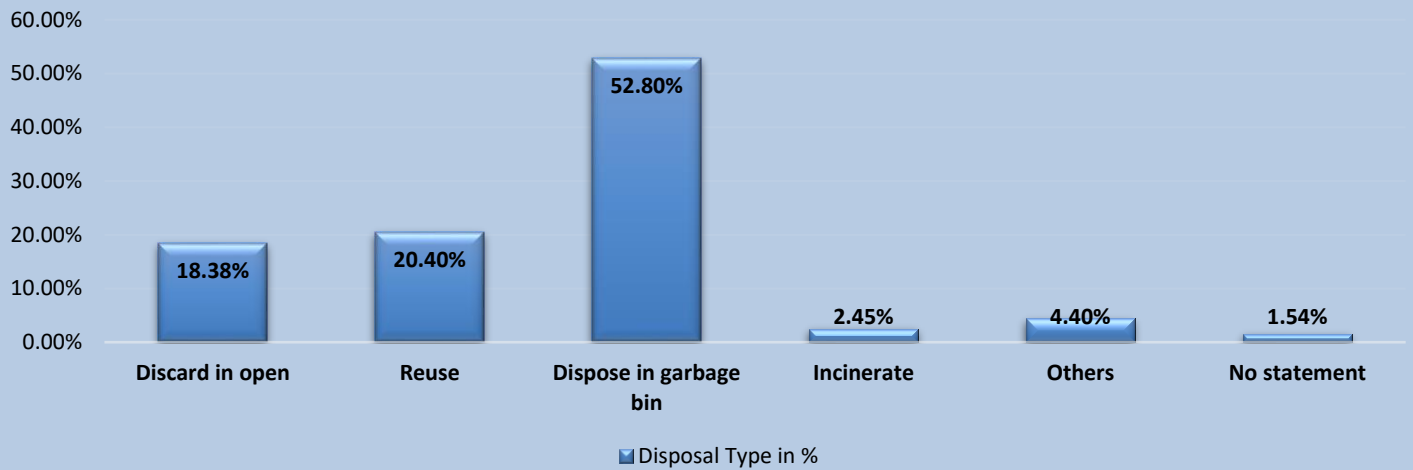


Figure 8: Plastic Waste Disposal Pattern Practiced by General Consumers

On the other hand, in the workplace majority of people dispose the plastic products in the garbage bin. Regarding the frequency of recycling of plastic products, in combine about 50% people of Sylhet city reuse their plastic products (mostly plastic bottles, plastic bags) on a weekly and monthly basis.

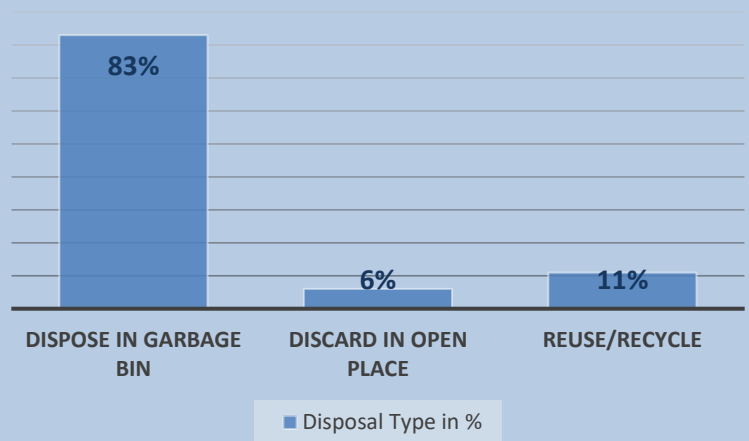
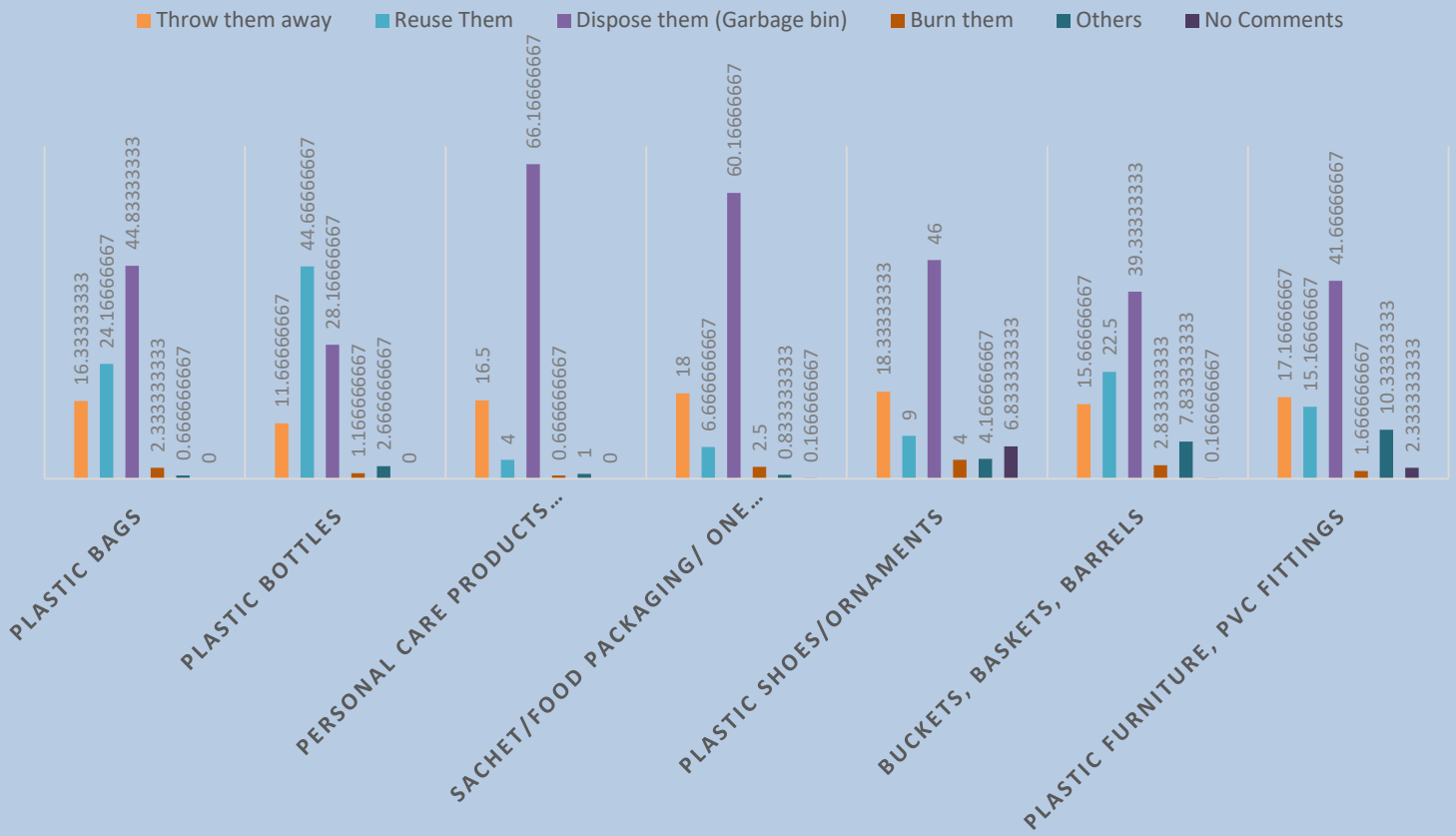


Figure 9: Plastic Waste Disposal Pattern Practiced by Consumers in Workplace



## CONSUMER'S WAY OF MANAGING DIFFERENT TYPE OF PLASTIC WASTE



Previous studies shows that waste was collected 63% on a daily basis of household waste by the Sylhet City Corporation (Muhammad Rashed Al Mamun). The scenario is quite depressing as 17% household was not collected means thrown into open places or unused places either in water bodies. Therefore, it spreads bad odor in environments and the emission of greenhouse gases.



Figure 10: Waste collection schedule in study areas



There are 250 mobile dustbins and 90 bins (25 steel and 65 plastic) alongside the roads arbitrarily in SCC area. The household waste is collected by rickshaw van vehicles to the dustbins. When the dustbins are full of its capacity, the waste is transported by trucks to the disposal area. There are approximately 400 rickshaw vans to carry household waste to the dustbins and 52 trucks to transport the waste from dustbins to the disposal area. There is only one dumping ground for Sylhet City Corporation which is located in Lalmatia (parirchokh) with 1 vacuum tanker, 4 water tanker (Md. Shimul Hossain).

#### SOLID WASTE MANAGEMENT SUPPORTING FACILITIES OF SCC

|                                |                 |     |
|--------------------------------|-----------------|-----|
| <b>MANPOWER</b>                | Supervisor      | 52  |
|                                | Driver          | 55  |
|                                | Truck helpers   | 163 |
|                                | Store keeper    | 1   |
|                                | Engineers       | 3   |
| <b>PHYSICAL INFRASTRUCTURE</b> | Mobile dustbins | 250 |
|                                | Plastic bins    | 65  |
|                                | Steel bins      | 25  |
| <b>TRANSPORT &amp; VEHICLE</b> | Trucks          | 52  |
|                                | Rickshaw vans   | 400 |
|                                | Washing machine | 2   |
|                                | Excavators      | 2   |
|                                | Payloader       | 2   |

The solid waste is transported for disposal by truck after collecting from dustbins to the dumping site/ground. There is only one dumping site for disposal of waste of SCC. The dumping site is located about 13 kilometers away from Sylhet City, which is about 35-acre land owned by SCC. One mini excavator with bucket capacity of 2.5-ton, one big excavator with bucket capacity of 9 Ton and one payloader with bucket capacity of 10 Ton is used in dumping site to organize waste after disposal from trucks.



*Figure 11: Sylhet City Corporation Dumping Site*

The number of trucks used for transportation of waste is increasing through the past years. In 2013, the number of trucks was 20, whereas in 2017 the number of trucks is 52. Within five years the number of trucks is increased by more than two times (Md. Shimul Hossain). This is also a sign that the amount of waste is increasing, because more transporting vehicles are needed to transport more waste.



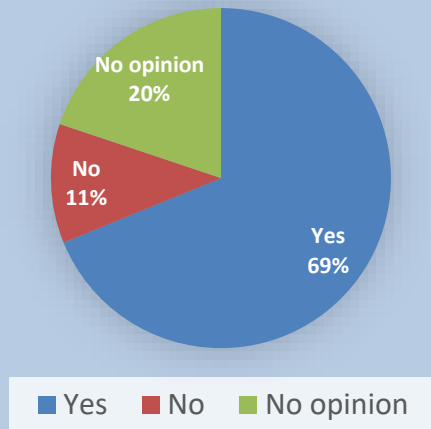
## Consumers view on current waste management scenario of SCC

The dwellers were not satisfied with the present solid waste management system of Sylhet City Corporation. The study indicates that some respondents were thought the solid waste management system moderate. According to the observation of the study reported that the solid waste management department was not working effectively to build up a green city of Sylhet. Therefore, improving the collection efficiency some steps should be taken such as modification and upgradation of solid waste management laws and regulations.

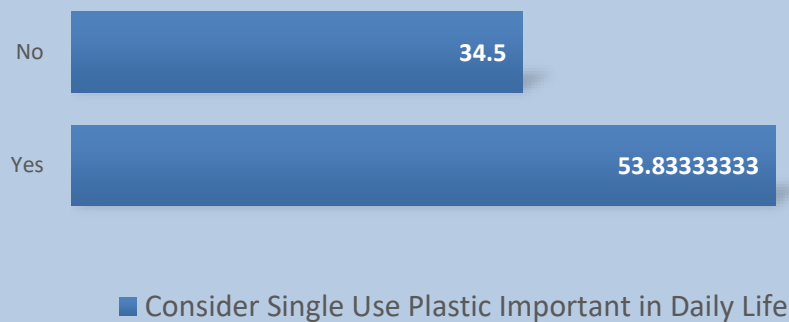
## SCC Consumers view on plastic waste

69% of the consumers of SCC supports banning single-use plastic item which underlines the fact that they are well aware about the harmful effect of single-use plastic. However, around 54% people consider single-use plastic important in their daily life. So, we can conclude that despite knowing the fact single-use plastic is harmful, some percentages of people still consider single-use plastic important.

Supporting the Ban on Single-use Plastic



Consider Single Use Plastic Important in Daily Life in %

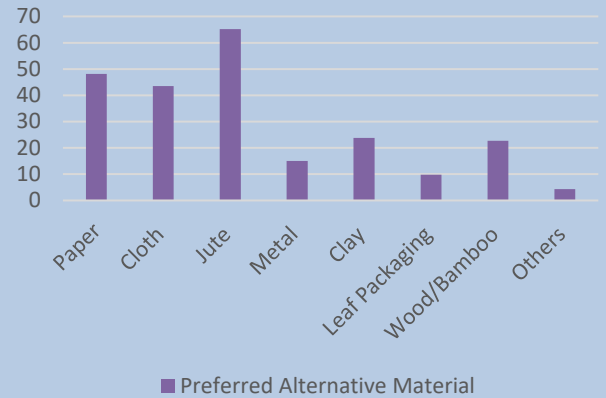


It is worth noting approximately 97% of consumers and 100% of KII participants would prefer to use an alternative to plastic products if they had the choice. The residents of Sylhet city would like to prefer using biodegradable products such as paper, cloth, jute, leaf packaging, wood, bamboo instead of plastic products in their daily life of which 74% people have a choice for jute, 55% and 49% for paper and cloth packing, respectively. Furthermore, single-use plastic should be banned in all sectors, according to about a third of consumers in the Sylhet city area.

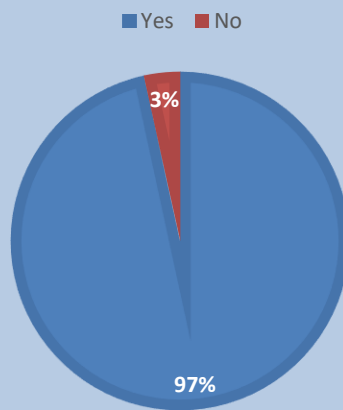
According to the results of a consumer survey, the majority of Sylhet residents are willing to reduce waste in their surroundings. Approximately 77% of consumers tried to decrease plastic waste by refusing or recycling.

Moreover, around 50% of the surveyed consumer think authority should impose regulatory measures against single-use plastic and promote alternatives to combat single-use plastic pollution in SCC.

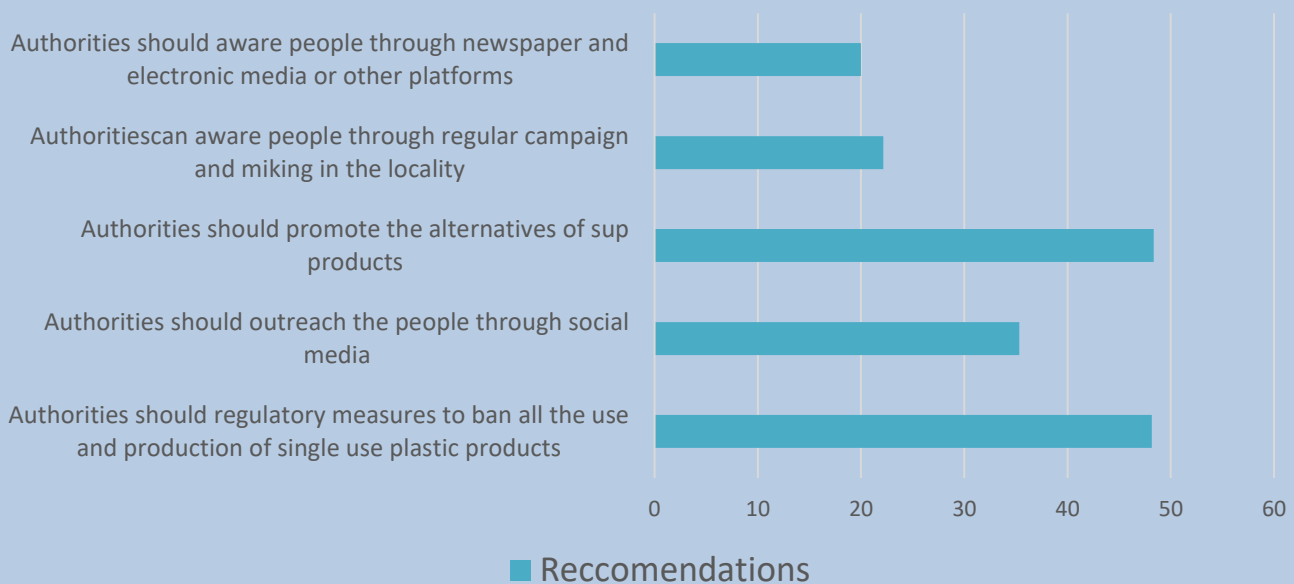
**Consumer's Preferred Alternative Material in %**



**IN SUPPORT OF USING ALTERNATIVE OF PLASTIC IF PROVIDED**



**Reccomendations From Consumers in SCC (%)**



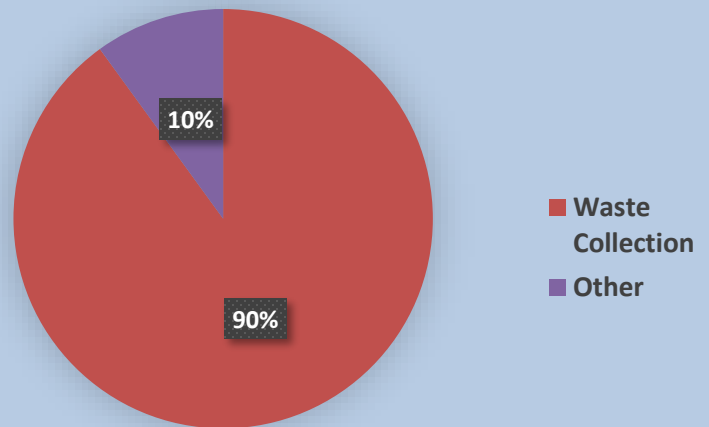
## Plastic Waste and The Waste Workers of SCC

We conducted a survey of 150 waste collectors in the Sylhet city area to learn more about their living and working conditions. Males of various age groups are involved in the municipal waste collection occupation. They are mostly illiterate, with a monthly income of around 8,000-10,000 BDT. However, around 22% of waste pickers have monthly income of above 15000 BDT and among them 10% have other sources of income rather than just waste picking which clearly underlines that most of the waste picker are lacking from proper social benefits considering the current price range of daily basic needs.

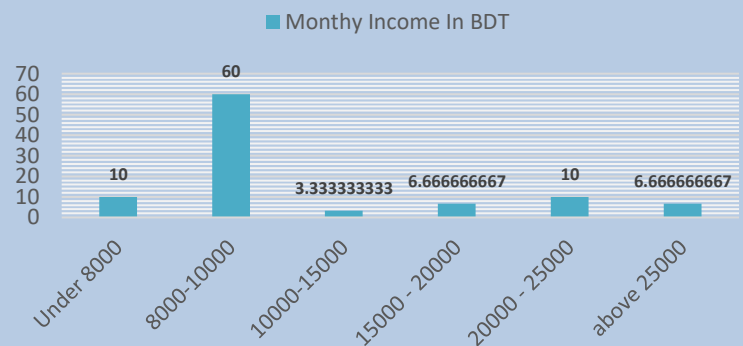
Waste pickers collect city waste from various places and locations such as households, markets, office areas, roadside, colleges/universities, hospitals, bus terminals, railway stations, hotels, and restaurants daily. The most common types of waste materials are broken glass, paper, plastic, and organic waste, of which polythene bags, plastic, broken furniture, medical waste, one-time utensils, and food packaging are the most commonly collected waste, with only plastic waste accounting for about 10-15 kg per day by each person. They sometimes sell to recyclers or dump directly in landfills or roadside ditches after collecting municipal waste.

Furthermore, more than half of waste collectors are unaware of the negative effects of waste. However, some waste collectors have mentioned that collecting waste has caused them health problems such as allergy, asthma, injury, respiratory disease, and coughing.

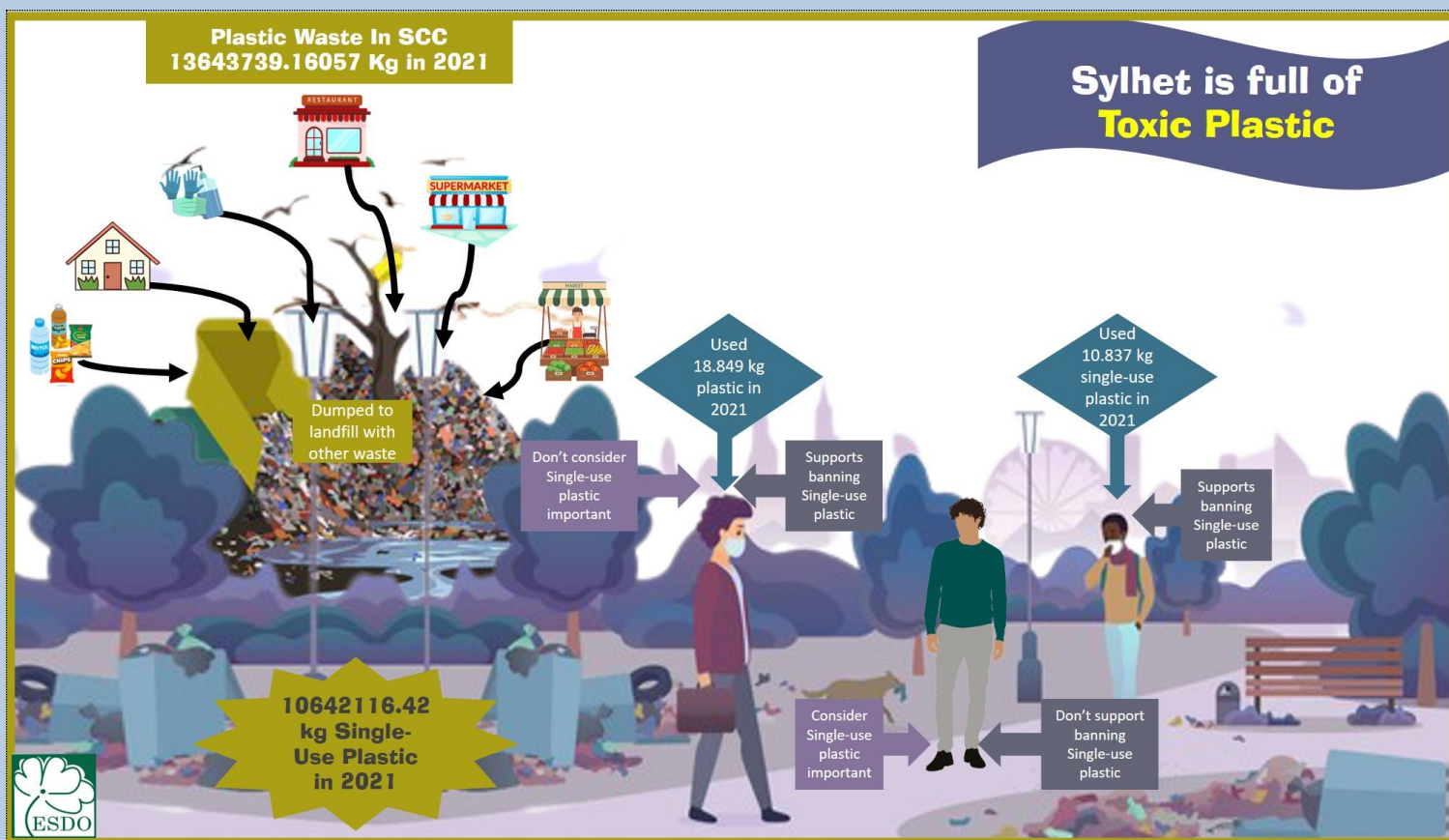
Waste Workers Monthly Income Source



Waste Workers Monthly Income In BDT (%)







## Gaps in Current Waste Management System

Solid waste management is a grave concern for Sylhet as well as Bangladesh as by 2025 waste generation per capita will be 0.75 kg/capita/day and total amount of waste will reach 21.07 million tons per year (Md. Ashikuzzaman, et al., 2019).

Since waste is the ever-present issue for every society, the management of solid waste is also an ancient phenomenon. Bangladesh has had a traditional waste management system since its independence in 1971. Early waste management in Bangladesh allowed indiscriminate open dumping and burning, disposal of wastes into water bodies, landfilling, and direct disposal into agricultural land in rural areas. Bangladesh has shifted to door-to-door collection of waste and shifting them to one place where all the wastes are dumped in mixed state.

With the advent of time, the world has shifted its waste management system from traditional to a modern approach. Wastes are now considered resources and this should also be implemented in our country. The current waste management practice in Sylhet involves collecting waste from sources through a community collective bin system, after which it gets transported to a low-lying landfill system with intermediate processing of Municipal Solid Waste (MSW). The open dumping practice is leading to various problems like pollution and health hazards. Both surface and groundwater are affected by this; in fact, groundwater is in a critical state. This clearly underlines the current waste management system is not sustainable. The found gaps in current waste management system has been identified as below:

1. Lack of public awareness and responsibility on waste and its management.
2. Lack of source segregation. All the wastes, like organic waste, recyclable waste, non-recyclable waste, hazardous waste, e-wastes are dumped in a single bin in households as well as offices and other sources.
3. Wastes are collected in an unsegregated way. The waste pickers only sort the recyclable waste manually which is causing them serious health hazard. Although the waste pickers collect and sort the recyclable wastes manually, the other wastes stay in mixed state.

4. There is a practice of open dumping among the resident of SCC
5. There is also a practice of burning waste in landfill and in community people which is a major contributor to air pollution.
6. No central composting unit to manage the organic waste.
7. Informal recycling sectors are recycling waste more than formal recycling sector; in both case they are producing microplastics while recycling plastic waste causing serious havoc to health and environment.
8. No collection and dumping process exists for managing waste in segregated way.
9. The waste pickers are not equipped with proper safety and hygiene material.
10. The waste generators (consumers in all sectors) are not much insightful in managing waste on their own, otherwise reusing old things would have been prominent and waste generation wouldn't have the sharp increase.
11. Lack of capacity and education on waste management on general.
12. Lack of technical knowledge among waste worker and city corporation waste management team.
13. Lack of community participation.
14. Lack of proper guidance of household and commercial waste management.

## Consequences of Plastic Waste Pollution in Sylhet City

Plastic pollution is causing direct and indirect harm to all creatures, from humans to zooplanktons, by polluting the environment. Dumping site for deposition of waste of SCC is open. Disposal of waste to this open dump site increases the risk of various infectious diseases and physical impairment, which are caused by pathogens and hazardous materials proliferated by windblown dust, rats, different insects and rodents, etc. Moreover, leachate, gas, odor, dust and potential fire hazard, etc., can be produced from this open dump site which can cause air and water pollution and soil contamination.

Often plastic waste is burnt at dumping site which can generate smoke and cause air pollution. Since in SCC most of the waste is organic waste, this waste produces several gases including methane, carbon dioxide, nitrogen and hydrogen sulphide. Methane and carbon dioxide is produced due to the anaerobic fermentation of waste. This process is possible in the presence of moisture providing a congenial environment for the bacteria to carry out this process. These gases can create risk of explosion and fire hazard. Beside of this, carbon dioxide which is generated from waste dump has a great negative impact on vegetation around the dumpsite. The plants would be distressed and may also die as a result of high concentration of carbon dioxide in the air. Moreover, there is a chance of property value around the dumpsite to be decreased as a result of the odors of the generated gases.

When the rain water passes through the dump site, liquid waste is produced known as leachate containing harmful chemicals of microplastics as plastics break down to microplastic when it is exposed to sunlight. Percolating leachate can contaminate ground water in and around the dump site. People use ground water in their everyday life in Bangladesh, so using this contaminated ground water can be harmful for the people surrounding the dump site. The leachates can also be transported to the surface water in the vicinity of the dumpsite directly. There is also a possibility of surface water to be contaminated by the entry of contaminated ground water to the surface water.

Contamination reduces the amount of oxygen in the surface water which is able to affect the aquatic life. The soil underlying solid waste can also be contaminated by leachate as well as microplastic. Leachate can pass from the soil to the surface and ground water by evaporation, erosion and infiltration. Not only dump site, but also dustbins are open in SCC. Waste from hospitals and clinics dumped into these dustbins may contain germs of different diseases and toxic contamination, particularly considering this time of pandemic. Personnel who are involved in picking and collecting this waste would be infected due to long term exposure and waste handling activities.

This is also to be considered that Sylhet is rain prone area and having longer monsoon period (April – October). All though rainy season starts from June and lasts up to September in Bangladesh but in Sylhet it starts from the April and longed up to October. So, drainage problem is severe Sylhet and plastic waste is making it even worsen by blocking the drainage system.

Sylhet have slopped topography and the river Surma is the final out fall of all drainage system. There are 26 canals flowing through city area and falls to the river Surma. So, a huge amount of the improperly dumped plastic waste get washed away by rain water to canals which finally falls to the river Surma. From its source in the Manipur Hills near Mao Songsang, the river is known as the Barak River. At the border with Bangladesh, the river divides with the northern branch being called the Surma River and the southern the Kushiya River. This is where the river enters the Sylhet Depression (or trough) which forms the Surma Basin.<sup>8</sup> Due to the connection between these rivers, plastic wastes from India are migrating in Bangladesh and as Surma river form into Meghna with Kushiya river and ultimately flow into the Bay of Bengal, these wastes are also ending up in the Bay of Bengal River affecting the aquatic ecosystem. Because of these plastic wastes,

<sup>8</sup> <http://herkules oulu.fi/isbn9514267117>



people are affecting highly. Not just people but also the aquatic animals in that rivers are being affected badly. According to the residents near the bank, many species of fishes have disappeared or died from this river. Harmful chemicals released from plastic waste tend to seep through the soil and pollute groundwater as well as the river. Besides, Surma rivers passes through many haors which are also being affected by the plastic wastes are flowing through the Surma River. Biodiversity of Surma River and its connected haors are destroying because of plastic pollution. According to a report of The Daily star, The Surma river is on the verge of becoming another Buriganga. More than 7.5km of the river flows through Sylhet metropolitan areas. According to the report, most of the wastes were plastic bottles, cutleries, chips packets and polythene bags at several points such as Sheikhghat, Kazirbazar, Topkhana Chadnighat, Kalighat, Machimpur, Kadamtali, Kushighat, and Technical Road. A Prothom Alo news reported that the most polluted spot of the river was located around the Kin Bridge. Almost a kilometer of this area was seen covered with plastic bottles and other discarded materials. Some of these wastes were migrated and some were created by local people. The report also stated that People were seen throwing garbage and leftovers of hotels and restaurants on the riverbank. In the report, it was mentioned that residents of the area said most of the wholesale markets are situated in the locality. Business owners often throw their discarded goods on the riverbank or directly in the river<sup>9</sup>.

The water of Surma River is not suitable for drinking purpose. Average Biochemical Oxygen Demand (BOD) at Baluchar is 27.33 mg/L, at Shibgonj 33.83 mg/L, at Uposahor 34.83 mg/L, at Chalibonbar 42.42 mg/L, at Masimpur 44.33 mg/L, at Surma u/s 39.5 mg/L, at Surma d/s 47.17 mg/L. BOD at Goalichara channel and Surma river is higher than 2 mg/L permissible value of Environment Conservation Rules (ECR) (1997) due to high concentration of sewage discharged directly to the water. The water of Surma River is not suitable for drinking purpose. Average ammonia at Baluchar is 0.512 mg/L, at Shibgonj 1.025 mg/L, at Uposahor 1.652 mg/L, at Chalibonbar 2.365 mg/L, at Masimpur 2.49 mg/L, at Surma u/s 2.53 mg/L, at Surma d/s 3.84 mg/L. At every point except Goalichara u/s, ammonia contents are higher than expected (Rahman, et al., 2013). Leachate from wastes in the landfills and other open spaces can be a prime contributor of this ammonia content in the water of Surma river.



Figure 12: Surma River Dying Due to Plastic Pollution

<sup>9</sup> <https://en.prothomalo.com/bangladesh/Unabated-pollution-in-Surma>



## Recommendation

- Raising awareness among end-users about the negative consequences of plastic use through media advertisements and activities by government and non-government organizations
- An increasing collaborative project between universities and research institutes to assess the impact of plastic waste in various environmental compartments
- Expanding research opportunities and funding for biodegradable and cost-effective alternatives to plastic products, particularly packaging plastics
- Exploiting the country's vast jute production potential in the manufacture of cost-effective biodegradable alternatives to plastics, as well as providing incentives for such businesses
- Strict enforcement of current regulatory laws prohibiting the use of plastic bags
- Developing a national action plan for monitoring and managing plastic waste at the point of generation
- Building a network which would contribute to a broader regional and global conversation.
- Including details of the bad impact of plastic packaging, polythene, etc. in the primary and high school curriculum.
- Developing a proper waste management mechanism at all the tourist spots of Sylhet and monitoring it.
- Ensuring public participation to improve household to institutional (source) waste management system.
- Building zero waste community and moving towards zero-waste lifestyles



## Conclusion

Since Bangladesh is getting populated day by day, more people will be concentrated in the mega cities in Bangladesh. Sylhet is very important city in Bangladesh and thereby the number of people migrating to Sylhet will be increased exponentially. So, the amount of generated waste per year will also be increased. There is no alternative of managing the solid waste properly and banning single-use plastic to keep the environment and life safe. Only the proper management of solid waste and reducing the amount of plastic waste generation can lead to a safe and sound environment which will keep the health of the people, animals and plants in and around SCC, Bangladesh out of the danger.

Plastic affects harmfully on both our environment and health. In a UN report on the environment, plastic items never fully decompose; instead, they shrink in size (particle). Those microscopic particles enter the human body after traveling a short distance. These particles have the ability to travel a long distance and stay in the environment for an extended period. Furthermore, burning these plastics releases toxic gases and particles into the air, which humans can inhale. Adults and children are estimated to inhale 1063 and 3223 microparticles per year, respectively, through dust inhalation (Sharareh Deghani, 2017). Literature study showed that marine biotas such as seabirds, whales, fish, and turtles mistake plastic waste for food, and the majority of them starve to death as their stomachs fill with plastic debris. At least 700 marine species are affected by plastic pollution. An estimated 100 million marine animals are killed each year as a result of plastic pollution.

This study shows that there is no existing policy or manual for disposing of plastic waste in different institutions such as colleges, universities, hospitals, hotels, banks, industrial areas of Sylhet city. There should be some important regulatory measures taken into consideration to ban the use and production of single-use plastic products. For example, outreach to people through social media, promoting the alternatives to SUP products, educating people through regular campaigns and meetings in the locality, and educating people through newspapers and electronic media or other platforms as well.

All the gaps that were found in the present waste management system can be solved simply by building zero waste communities in Sylhet city corporation area. Our current culture of consumption is unsustainable. Extracting raw materials from natural spaces requires large amounts of energy and causes pollution, whether it is logging a forest, mining for minerals or drilling for oil. Processing these materials requires more energy and causes more pollution. Once they're used, the goods are simply dumped in a landfill or destroyed in an incinerator. In contrast, a zero waste approach conserves natural resources and reduces pollution from extraction, manufacturing and disposal. Reducing and reusing means fewer products are made, as people buy less and as products are made to last. Recycling keeps waste out of landfills and incinerators and provides manufacturers with recycled instead of raw materials to make new goods. Reducing, reusing and recycling can be a key part of a climate change strategy to reduce our greenhouse gas emissions. A zero-waste approach can build community capacity, support marginalized communities and protect community health. Community-based zero waste strategies like composting at a community garden, tool sharing and skills sharing to reuse and repair, build capacity to reduce waste and costs. A zero-waste strategy needs to ensure everyone has access to tools to reduce, reuse and recycle waste where they live, work and play. This allows everyone to participate in protecting our environment. A zero waste Sylhet will build a circular economy, where one person's "waste" is a resource for something new. This will also create good, green jobs as resources are endlessly recirculated through our economy instead of being used once and then disposed or destroyed.

Every possible step should be taken and every possible decision needs to be made to ensure proper management of wastages and reducing plastic waste generation as well as plastic production. This study is a small step to minimizing risks for human caused by poor wastage management in areas like Sylhet City. Taking initiative from every level of people should be considered as a major step in this sector.

## References

**Islam Md. Ashraful [et al.]** Municipal Solid Waste Management in Sylhet City, Bangladesh [Conference] // 5th International Conference on Solid Waste Management in South Asian Countries. - Khulna : [s.n.], 2017.

Islamic-Relief [Online] // Islamic Relief Worldwide. - 01 2022. - <https://www.islamic-relief.org/why-were-helping-bangladesh-cities-facing-a-rising-tide-of-waste/>.

**Md. Ashikuzzaman Khulna University and Md. Hasan Howlader Khulna University** Sustainable Solid Waste Management in Bangladesh: Issues and Challenges [Book Section] // Sustainable Waste Management Challenges in Developing Countries. - [s.l.] : IGI Global, 2019.

**Md. Shimul Hossain M.G. Muntasir Shehab, Mir Raisul Islam, Md. Shaheen Shah and Simanto Kumar Pal** Review on solid waste management process and environmental impact due to solid waste in Sylhet City Corporation, Bangladesh [Journal]. - [s.l.] : Int. J. Environment and Waste Management. - Vol. 22.

**Muhammad Rashed Al Mamun Sultana Jahan Lovely, Sharmin Akther** CHALLENGES OF SOLID WASTE MANAGEMENT IN SYLHET CITY [Journal]. - [s.l.] : J. Sylhet Agril. Univ. - 2 : Vol. 5.

**Parker Laura** The world's plastic pollution crisis explained [Article]. - 2019.

**Rahman Abdur, Zafor Md.Abu and Rahman Mursheda** Surface water quality and risk assessment in the vicinity of Sylhet City [Journal]. - [s.l.] : International Journal of Water Resources and Environmental Engineering , 2013. - 1 : Vol. 5.

**Roser Hannah Ritchie and Max** Plastic Pollution [Journal] // Our World in Data. - 2018.

**Rucevska Maria Tsakona and Ieva** Baseline report on plastic waste [Report]. - 2020.

**Salma Akhter Iqbal SUST and Farzana Tasnim SUST** MUNICIPAL SOLID WASTE MANAGEMENT IN SYLHET CITY CORPORATION [Conference]. - February 2015.

**Sharareh Dehghani Farid Moore, and Razegheh Akhbarizadeh** Microplastic pollution in deposited urban dust, Tehran metropolis, Iran [Journal] // Environ Sci Pollut Res Int. - 2017. - pp. 20360-20371.



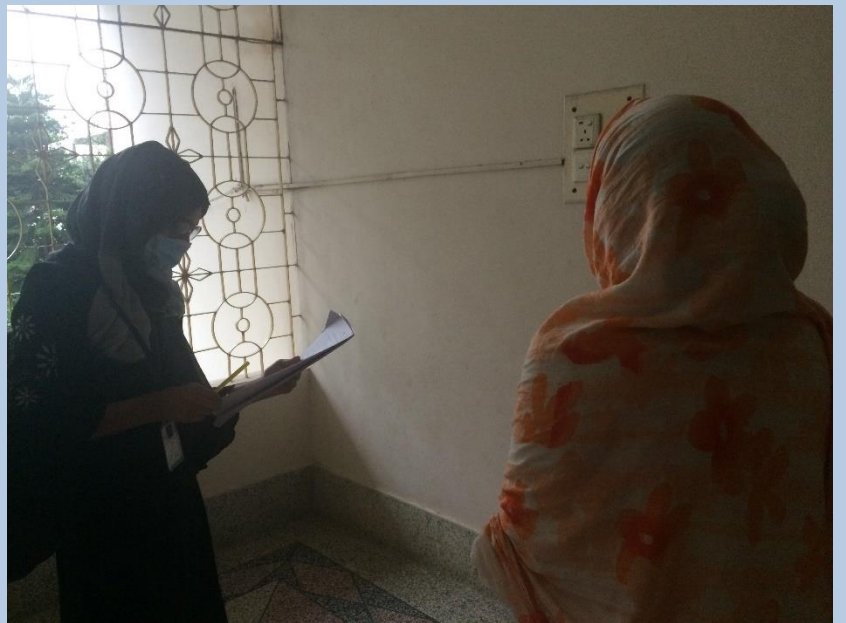
Annex  
Pictures



































Environment & Social Development Organization – ESDO  
House # 8/1, Level # 5, Block # C, Lalmatia,  
Dhaka-1207, Bangladesh  
Website: <http://esdo.org/>

