

# USING AND RECYCLING PLASTIC WASTE IMPACT ON ENVIRONMENT AND INFORMAL ECONOMY IN DHAKA CITY

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*Abstract— Bangladesh is a developing and densely populated country. The process of urbanization is increasing day by day in this country. Dhaka is one of the most heavily occupied cities in the world. For this reason, there are huge environmental problems. Waste is widespread problem of Dhaka city. Over population and enormous consumption lead to large quantities of waste. Waste management is one of the most instant and serious problems of Dhaka city corporation. Plastic waste is an important issue in all countries now-a-days. Reducing or even prohibiting the plastic usage in daily life has been carried out by several countries to help creating a better environment in the future, but recently it has not been able to significantly reduce the volume of plastic waste worldwide. Recycling is one of the solutions to reduce the plastic waste. Plastic waste has huge adverse impact on natural environment because they usually don't biodegrade and remain unchanged for even millions of years. But recycling the plastic waste and reusing them can be a convenient informal business and provide employment for poor and needy. This paper tends to find out the adverse impacts of plastic waste to the environment and also how recycling plastic and other solid waste can contribute to informal economy. And finally, some recommendations have been prescribed.*

**Index Terms— Plastic, Solid Waste, Recycling, Environmental impact, Informal Business.**

## I. INTRODUCTION

Environmental degradation due to unplanned waste disposal and improper waste management in urban areas was not the prime concern even a few decades ago in the developing countries like Bangladesh (Bhuiyan et al., 2003). But the increasing urban population made the environmentalists think about the scientific waste management with topmost priority in urban planning in the developing countries. It has only been in the very recent times, when certain NGOs started working and highlighting the pathetic state of municipal waste services provision in the country. Then the decision-makers began to realize the importance of this particular aspect of environmental management (Rahman et al., 2000). Improper management of solid waste is one of the main causes of environmental pollution and degradation in many cities. Many cities lack solid waste regulations and proper disposal facilities. The present paper attempts to say that the poor disposal and handling of waste leads to environmental degradation, damage of the ecosystem and poses great risks to public health in Dhaka city. But sometimes problems can be turned into opportunity. A significant percentage off the city population are poor and live under poverty line. Somehow this people made their way to get benefited out of that dirt. They collect and sort different

type of solid waste and sale which are reusable and thus commenced the first step of recycling. So, this paper also discussed about how this opportunity can be capitalized and some recommendation have been made.

## II. STUDY AREA

Dhaka is located in central Bangladesh at 23°42'N 90°22'E, on the eastern banks of the Buriganga River. The city lies on the lower reaches of the Ganges Delta and covers a total area of 306.38 square kilometres (118.29 sq mi). Tropical vegetation and moist soils characterize the land, which is flat and close to sea level. This leaves Dhaka susceptible to flooding during the monsoon seasons owing to heavy rainfall and cyclones (Michael, 2004). Dhaka District is bounded by the districts of Gazipur, Tangail, Munshiganj, Rajbari, Narayanganj, Manikganj. Fig.01 is showing the Map of Dhaka City.



Fig.01 Dhaka City and Dumping Station Locations

Dhaka is one of the most overcrowded cities in the world. Population density is also too high here and every year people are migrating to this city in search of work. Extremely congested, largely populated and poor waste management system makes the city ideal for the study.

### III. ENVIRONMENTAL ASPECTS OF SOLID WASTES AND PLASTIC PRODUCTS IN DHAKA CITY

The problem of solid waste management and consequent impact on the environment is critical in Dhaka city. The environment in many parts of the city bears sign of polluted environmental condition in respect of surface and ground water contamination, air pollution etc. because of the accumulated uncontrolled garbage on the roads and drains filled with solid wastes and human feces in the low and middle- income areas of the city. Solid waste disposal possesses a greater problem as it leads to land pollution because of open dumping, water pollution because of dumping in low lands and air pollution because of burning (Akter et al., 1997). Dhaka City is facing serious environmental degradation such as land, water and air pollution and public-health risk such as skin disease, asthma, diarrhea and even skin diseases etc. due to uncollected disposal of waste on streets and other public areas, drainage congestion by haphazardly dumped wastes and contamination of water resources near uncontrolled dumping sites. Leachate, gas, odor, noise and dust etc. are the common environmental problems in the existing sites that cause threat to human health and nature. On the other hand, Plastic products are not naturally biodegradable. They remain the same for centuries and affect the chemical composition of the soil. There are three major forms of plastic that contribute to plastic pollution: microplastics as well as mega- and macro-plastics. Mega- and micro plastics have accumulated in highest densities in the Northern Hemisphere, concentrated around urban centers and water fronts. Plastic can be found off the coast of some islands because of currents carrying the debris. Both

mega- and macro-plastics are found in packaging, footwear, and other domestic items that have been washed off of ships or discarded in landfills. Fishing-related items are more likely to be found around remote islands (Walker et al., 1997). These may also be referred to as micro-, meso-, and macro debris.

#### A. Decomposition of plastics

Plastics themselves contribute to approximately 10% of discarded waste. Many kinds of plastics exist depending on their precursors and the method for their polymerization. Depending on their chemical composition, plastics and resins have varying properties related to contaminant absorption and adsorption. Polymer degradation takes much longer as a result of saline environments and the cooling effect of the sea. These factors contribute to the persistence of plastic debris in certain environments. Recent studies have shown that plastics in the ocean decompose faster than was once thought, due to exposure to sun, rain, and other environmental conditions, resulting in the release of toxic chemicals such as bisphenol A. However, due to the increased volume of plastics in the ocean, decomposition has slowed down. The Marine Conservancy has predicted the decomposition rates of several plastic products. It is estimated that a foam plastic cup will take 50 years, a plastic beverage holder will take 400 years, a disposable nappy will take 450 years, and fishing line will take 600 years to degrade.

#### B. Surface Water Stagnant

In Dhaka city, due to proper management and monitoring, people often dump waste on roadside in plastic bags which end up going into drain and sewerage. That plastic bags (polyethene bags) blocks the natural flow of those drains and sewage facility resulting in water logging. Those bags also go into surface water sources like ponds and degrade the water quality by covering the surface of the water thus endangers the aquatic life of that ponds.

#### C. Ground Water recharge

Plastic does not degrade too quickly so; they stay in the ground layer for long period of time and creates blockade for water from reaching the underground pervious water thus preventing ground water recharge.

#### D. Land Contamination

Leachate percolates to the ground and land might be responsible for the contamination of the vegetables sometimes produced in the lands near the disposal site, though after in a little scale. These can cause threat to the environment and pose a risk to human health and nature. Hazardous wastes are also dumped in the site that can pose threat to human health and environment.

**E. Air Pollution**

Air pollution is the concentration of air at the presence of various toxic and hazardous substances. The unauthorized (no legal permission from the municipal authority) and abandoned burning of waste at the existing disposal site causes air pollution. Burning of waste including partly hazardous and clinical waste, creates smoke, which releases toxic compounds and ashes into the air that is threat to the environment. However, Burning is also done, at limited scale, in all the sites. As no daily covers are used, dusts as well as unwanted greenhouse gases mixes with the atmosphere and pollute the air (Islam, N. and Shafi 2004).

**F. Odor**

Odors are a complex mixture of gases, vapors and dust. The potential health impact of odor depends on the concentration of odorous emissions as well as frequency and duration of exposure. In Dhaka city, the most commonly used technique to dispose waste is to incinerate them. But this can trigger creating harmful and venomous gases released into the atmosphere. And also, natural biodegrading releases biproduct which are responsible for Odor.

**IV. THE ROLE OF THE INFORMAL SECTOR IN RECYCLING PLASTIC WASTE IN DHAKA**

Dhaka, the Capital City of Bangladesh, is expanding rapidly, turning it into a mega city with an enormous growth of population. Rapid growth of industries, lack of financial resources, inadequate trained manpower, inappropriate technology and lack of awareness of the community are the major constraints of solid waste management for the fast-growing metropolis of Dhaka. Due to limited finances and organizational capacity, it has been really difficult for the municipality to ensure efficient and appropriate delivery of solid waste collection and disposal services to the entire population. Dhaka City Corporation is the only formal organization responsible for waste management. Matuail and Aminbazar landfill sites are designated for dumping of waste generated at DCC. But huge amount of uncollected wastes is creating serious environmental problems to the over populated Dhaka city. In Dhaka, solid waste generation per capita is quite low; however, due to huge and densely populated city, solid waste problem in Dhaka city is very acute in comparison to many other cities of the developing countries. An informal waste separation and recycling sector has established and developed itself in reaction to a demand for recyclable materials by the industrial sector due to rising prices of imported materials such as plastic resin, glass or paper. Separation and recycling contribute to the

collection challenge by reducing amounts of refuse to be collected. However, despite the demand for recyclables, large volumes of materials which could be of value to the recycling industry are still mixed with other refuse and thus damaged or soiled, and lose part of their initial value. Recycling such materials entails a time-consuming sorting and cleaning process whereby the material quality remains low-grade, obtaining a lower price. This is the reason why a lot of materials are not recycled and a large volume ends up discarded in dumpsites or landfills.

The flows of recyclables and mixed waste produced by households are depicted in Fig. 2:

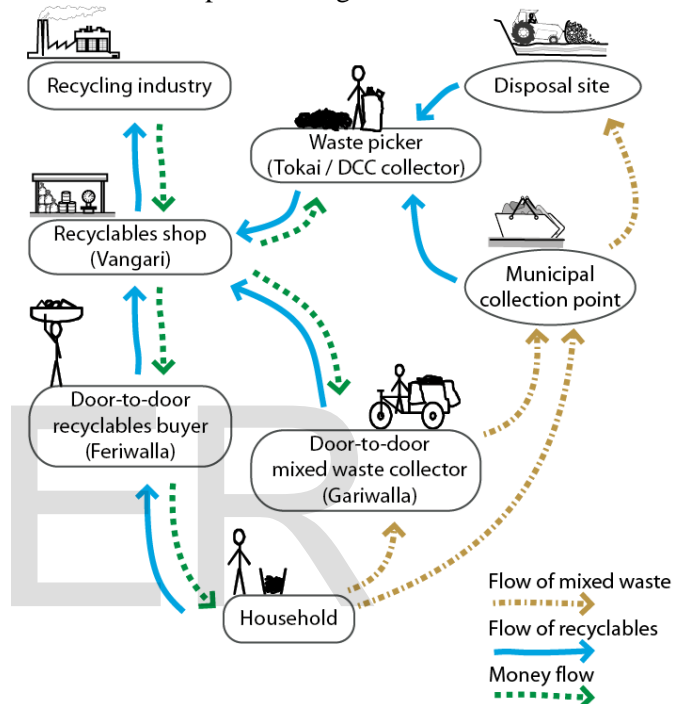


Fig. 2: Schematic overview of the waste management system for households in Dhaka.

**A. Recycling chain at Dhaka city**

The DCC does not perform any kind of resource recovery activities. However, wastes of some market value are being reclaimed or salvaged informally in three stages. In first stage, the housewives separate the refuse of higher market value such as papers, bottles, fresh containers, old cloth and shoes, and sell them to street hawkers. Some households' separate recyclables which they sell to recyclables buyers (Feriwallas), others only produce mixed waste. This mixed waste is either picked up by cycle-van drivers (Gariwallas), or the household members bring them to municipal collection points themselves. Another option which is not depicted here is that if the collection point is too far away or too full already, inhabitants dump the waste in streets or water bodies, where it will eventually be picked up by municipal cleaners, if at all.

Cycle-van drivers (Gariwallas) collect the mixed waste, and separate some recyclables which they can then sell in recyclables shops (Vangari Dokans, or Vangaris), thus earning some additional income to the salaries they are paid by the municipality or community for their collection services. They bring the remaining waste to a transfer point, from where it is transported to the city's landfills.

The second stage of salvaging is carried out by wastes pickers/scavengers. Scavengers act as the primary processor in recycling process of Dhaka city. They collect the refuse and domestic waste of low market value from bins, containers and sweeping accumulation centers. The third stage of salvaging is done by the refuse pickers when fresh refuse is unloaded by municipal collection vehicles at the local disposal sites. Scavengers also collect different materials from the final dumping sites, Matuail and Aminbazar. The items include broken glass, can, card board, waste paper, rag, plastics, metals and miscellaneous wastes discarded by households. The reclaimed materials go to the waste and old material shops through the street hawkers who purchase the old materials directly from the homesteads and through refuse collectors who reclaim materials from bins and final disposal sites. The refuse dealers separate the materials in proper form and sell them to consumers as well as supply them to appropriate processing or remolding mills and factories. The processed material recycled through market finally goes to users again.

#### *B. Involvement of scavengers in wastes recovery and recycling*

Scavenging is not a favorable job, but so many children are also engaged in this job. Solid waste management, recycling and poverty are closely linked with each other. Waste management and waste picking provide jobs, and support income and livelihood although waste pickers/scavengers have no social recognition. They work in unhealthy and risky environment. Waste picking is an easy choice of profession, and needs no skill or capital. Waste pickers enjoy freedom of starting and ending works. Scavengers act as the primary processor in recycling process of Dhaka city, who are found mostly in slums and squatter settlements and even living at footpaths. Majority of the waste pickers' income is not more than US \$40-75 per month. Most of these scavengers are migrated to Dhaka city from disaster prone areas because of seasonal & limited working opportunities in rural areas. They work in unhealthy and risky environment and do not use any safety materials during work. Significant numbers of female and child labors are engaged in the waste picking activity and luckily some of child labors who are working as scavengers got chance to go to school, mainly non-formal school.

#### *C. Recycling shop*

These shops are scattered at different areas of Dhaka city, but mainly concentrated at old part of the city. The shops are situated very near to their houses (within 0-0.5 km) in most of the cases. Segregation, collection and storage are the main activity of the recycling shops, and main materials are paper, iron, plastic and construction materials. Most of the shops are open every day in the week and work 10-12 hours/day. Like the scavengers, the people who are working at the recycling shop all face some occupational health risks because of manual handling and lack of protection equipment. Usually, none of them used to use any safety materials as they are unable to bear the cost of the materials and do not much concern about the health hazard. The shops sell their materials to the whole sale recycling shops or recycling factories that are situated at the older part of Dhaka city.

#### *D. Recycling factory*

Recycling factories are located at old part of Dhaka city. Most of the factories are recycling various types of plastic materials and iron, and the sizes of these are varied from 200-2,000 sq. feet. The number of working staff varied from 5-35. They work for 8-10 hours every day, but workers may enjoy 1-day holiday in every week. Recycling shops and factory workers face some occupational health risks because of manual handling and lack of protection equipment. Like the scavengers and recycling shops workers, the people who are working at the recycling factories also face some occupational health risks because of the same reason. They are also not using any safety materials as they are unable to bear the cost of the materials and do not much concern about the health risk. They are using locally made machines and tools at the factory and condition of the factory is also not so good.

### V. EXISTING LIMITATIONS

Despite the efforts of the City authority there are some problems associated with the current management system of solid wastes of the city. The City authority has no scientific and engineering approach on solid waste management planning approach. It has no solid waste management specialist with engineering background. City planning department is yet to allocate any specific space for storage of waste bin and placing of container. Placing of dustbin on the road, near any house creates social problem because of improper use, irregular cleaning and road blockage by collection vehicle, bad smell, rodent, vermin, flies and unhygienic condition. Open truck collection system needs average 2-3 hours for loading and unloading the waste to and from the trucks. Inefficient management of existing manpower, equipment, other resources, unscientific and inefficient collection practices, inefficient management of landfill

and lack of sufficient funds make the management system more vulnerable.

## VI. RECOMMENDATIONS

The recycling shops and factories are not getting any kind of help from the government, but expecting that the government will arrange loans, and encourage and recognize the recycling activity. Although recycling of solid waste is not included in the national environmental policy of Bangladesh, it has become a main source of income for several groups of the informal sector. Scavenging and recycling activities bring good economic value and generate employment. It also supports municipalities to manage and reduce solid waste. So, these activities should be encouraged considering current social and economic situation, but involvement of the children should not be encouraged. These activities are also treated as an informal sector although it contributes positively to the economy through waste collection, supplying finally to the recycling industry, and producing different goods in the factories by utilizing the recyclable waste.

## CONCLUSION

For managing solid wastes of a city, community-based projects have demonstration effect. NGOs can play an important role in initiating, innovating new concepts, providing technical knowledge and providing training to others. In Dhaka city, a large number of residences are not aware about the impact of unplanned waste disposal on health and solid waste related problems. Many households are disposing garbage in nearby open spaces. Therefore, it is important to launch a long-term awareness and campaigning program in the area so that people get motivated about enhancing own environmental conditions willingly.

However, wastes which have market value are being reclaimed or salvaged for recycling. Recycling contributes to resource conservation as well as environmental protection. Papers, broken glass; metals, plastic, etc. are purchased from house to house by a class of mobile purchasers. A section of the poor people collects reusable and recyclable waste materials from the dustbins/containers as well as from the streets and the dumping sites.

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