

## Solid Waste Management of Dhaka City: A Socio-economic analysis

Fatema Tania\*

### 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. This paper will examine various vital facts on waste management and use of updated technologies also recognize for improving the waste management system.*

**Keywords:** *Waste Management, Recycling, Environmental Pollution, Sustainable Development, Waste minimization.*

### Introduction

Waste is produced by different human activities, like industrialization, urbanization, improving living standards etc. Urban population and industrialization have been increasing rapidly and these are creating a serious hassle on our natural resources, which is a big challenge for sustainable development. Disorganized management and dumping of waste is a noticeable cause of ruin of the environment in most cities. A municipal corporation of Dhaka city is trying to manage this problem but they are unable to control waste management. Each day Dhaka produces 3000 tons of household waste (Chowdhury. T. Ahmed & Afza. S. Rownok, 2006 : 1 ).On the other hand Dhaka city also produce more waste in different ways , like- hospital, small industry , tannery and others heavy industry.

Maximum waste is not collected and all are throw on open air. This result is uncollected waste on roads, canals, river and other public places. This human practice is making our urban life truly vulnerable. At this moment we are concerned and have to make sure the proper utilization of waste and we have to recycle all types of waste. Recycle is the intellectual salutation of urban waste problem. Because of, if we can recycle our waste we will also financially get benefits.

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\* Lecturer, Department of Applied Sociology, ASA University Bangladesh.

Maximum people are not concerned about waste management. This is an important cause of mismanagement of waste. In Dhaka city household waste are thrown in the roadside and open areas. Clinical wastes also are thrown in the open dustbin. These types of human practice create huge environmental pollution. The sources of solid wastages are garbage, refuse, sludge and discarded material and the wastages are produce by industry, hospital, or household community activities. (DU Journal, Office of land quality-2000). Waste management is a tactic used to waste collection largely from different sources, including recycling and re-use of materials.

### Objectives of the study

The general objective of this article is to develop solid waste management and recycling process on Dhaka city, and the specific objectives on the study are as follows:

1. To discuss about the sources of solid waste and its composition.
2. To discuss the applicability of waste management systems in terms of disposal collection and temporary storage, reuse, recycling, and treatment.
3. To discuss about public participation in recycling, employment and financial benefit.

### Methodology

The study uses both primary and secondary data. Primary data were collected from cleaner, community service providers of Dhaka City. Secondary data were also used in this report. These were mainly collected from different journals, dailies, official reports, NGO publications and various wave sites.

### Solid waste management in Dhaka city

Dhaka City is now seizing with the troubles of sky-scraping volumes of wastes. But, these troubles have also afforded a window of prospects for city to find solution. The community and all the sectors have to involve their innovative technologies and disposal methods and concerning behavior changes and awareness rising. A healthy planned waste management process will not only help of pledge a cleaner atmosphere but it also cost-effective for citizens. Dhaka City Corporations are mainly maintaining this responsibility. DCC separated its area into 10 zones for supervision of solid waste production. Following table shows total waste composition in Dhaka city every day.

**Table -1: Nature of Waste composition in Bangladesh**

Waste Composition	Bangladesh (Dhaka) (% By Weight)
Food and Vegetable Waste	70
Paper Product	4
Plastics	5
Metals	0.13
Glass and ceramics	0.25
Wood	0.16
Garden Waste	11
Other(Stone dirt etc)	5
Moisture	65

Source: Ahmed, M.F. & Rahman, M.M. 2000

The total solid waste management involves 3 departments namely conservancy, transport and mechanical engineering. A number of studies were undertaken from time to time by the World Bank, Bangladesh Centre for Advanced Studies (BCAS), Japan International Cooperation Agency and DCC itself for assessment of waste generation. JICA has prepared “Clean Dhaka Master Plan” that will address solid waste management of Dhaka city. Following table shows the growth rate of solid waste in Dhaka city from 1991 to 2025. The growth rate of waste is increasing dangerously.

**Table-2: Growth in Solid Waste Generation in Urban Cities of Bangladesh.**

Year	Total population	Urban population(% Total)	Waste Generation rate(KG/cap/day)	Total Waste Generation(Tone/day)
1991	20872204	20.15	0.49	98,73.5
2001	28808477	23.39	0.5	11,695
2004	32765152	25.08	0.5	16382
2025	78440000	40.0	0.6	47,064

Source: ADBI and ADB 2000 & Zurbrugg 2002.

The DCC conservancy department currently holds 370 trucks and container carriers, 4,920 bin/container and 300 handcarts per day. It is supported by 7,156 cleaners/ sweepers and 190 supervising officers and only 1 officer to supervise transports, for all desired activities (DCC, 2004). Of the total waste produced, nearly 20% issued for recovery and recycling and about 37% remains scattered laying around on roadsides, open spaces or in drains. (Dhaka city state of environment: 2005: 1)

According to a World Bank report, the solid waste generation of Dhaka Metropolitan area (360 sq km) in 1998 was 3,944 tons/day (WB1998a in BCAS, 2003). Report of “Solid Waste Management Project” of DCC was prepared by JICA and DCC experts in 2000 and it shows that the metropolitan area of the city generates 4,750 tons of solid waste everyday.

Another report stated that the waste generation of DCC area was no less than 3,700 tons per day (Imtiaz and Alam, 2002). DCC and some other reports state that the waste generation of DCC is about 4,000 to 5,000 tons/day (personal communication and The Daily Star, 21 June 2004). On the other hand, JICA team of “Clean Dhaka Master Plan” found the existing solid waste generation (dry season) within Dhaka City Corporation area 3,340 tons/day, will increase to 4,600-5,100 tons/day in 2015 (JICA, 2004).

The team also mentioned that the waste generation would be a little higher during the summer when fruits are available abundantly, which may result in 3,500 tons of average waste generation per day (JICA, 2004). Of the total waste produced, nearly 20% is used for recovery and recycling and about 37% remains scattered laying around on roadsides, open spaces or in drains.

### **Potential sources of waste**

There are many sources of waste production, but truly potential sources are residential and commercial source. Different commercial and residential sources are explain here-

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### **Commercial sources**

Commercial sources are one of the bulky sources of waste production. Commercial sources mean different industries like garments, pharmaceuticals Company, hospital and other industry. Basically huge chimerical are used by different industries like sulfuric acid, chromium, ammonium sulfate, ammonium chloride, and calcium oxide. The wastes may contain chromium salts and/or tannic acid.

The manufactures also use pesticide and fungicide. Metallic and non-metallic industries may produce solid waste containing some sort of heavy metals. Dust discharged from smelter or furnace of those factories may often contain heavy metals to some extent, so that, if dust is not disposed of appropriately, dust will be a pollution source of soil as well.

Hospital and pharmaceutical industries produce three types of wastes-

- Infectious waste -(Pathological tissues, organs, body parts, blood and blood products, body fluids, placenta, human excreta, culture materials from laboratories and other infectious materials.)
- Sharp Waste(Needles, syringes, intravenous set, scalpel, saw, blades, broken glass, nails and sharps generated from support service, etc)
- Non-infectious Waste(Expired drugs, waste contaminated with Cytotoxic drugs and leftover Cytotoxic drugs & radioactive waste)

(Source: Information is modified from Manual for Hospital Waste Management, Ed. by A.K.M. Saiedur Rahman, General of Hospital Services, Ministry of Health and Family Welfare, 2001)

### **Domestic Waste**

Domestic waste is another big source of solid waste, which is about 1718 tons /day at a percentage of 49.08 %. These contain paper, vegetable peelings, onion seed coat, broken plastic and festal, spider net, soil and dust, pieces of thread, animal fascses, grasses, used shoes, pieces of cloth, small bottles, soot, used car parts, etc.

### **Hospital and clinic waste**

There are more than 500 clinics and hospitals in Dhaka City, and all hospitals and clinics are producing huge amount of waste in every day. The present average of clinical waste generation in hospitals and clinics is calculated using 1kg/bed/day and an extra 200 kg/year for clinics. It is estimated that 20 percent of the whole hospital wastes (255 tons, 7.29 % of total solid waste generated per day) generated in the city is infectious and dangerous.

Waste is collected from small bowls (plastic or metal) or plastic bins provided for each bed and emptied into larger containers. Wastes from operation theaters, laboratories, and kitchens are also dumped into these municipal bins. Since hospital wastes contain toxic and infectious materials, they are more unsafe than other types of wastes. In Dhaka, all types of medical wastes, like syringes and needles are thrown into the municipal dustbin. For this reason inflectional diseases spread out easily.

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### **Tanning Waste**

Tanning waste is another type of industrial waste, which is polluting the environment dangerously. There are about 149 tanning industries in Hazaribagh area in Dhaka and they are producing 18,000 liters of liquid wastes and 115 tons of solid wastes. Wastes from tanneries contain sulfuric acid, chromium, ammonium sulfate, ammonium chloride, and calcium. Tanning wastes have harmful impacts on environment in terms of health, welfare, and environment like fever, headaches, respiratory and skin diseases and may also bring undesirable changes in land use and fisheries. It has also negative impact on groundwater, surface water, and the ecosystem in general.

### **Recycling the wastages**

Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse, and Recycle" waste hierarchy (Wikipedia). Recycling includes collecting recyclable materials that would otherwise be considered waste, sorting and processing recyclables into raw materials such as fibers, manufacturing raw materials into new products, and purchasing recycled products.

### **Step of recycle**

The first step of recycle is to collect waste from the community. All types of waste should not collect collectively. Because of waste are being in different categories. After collection waste will be sorting. Then recyclables are sent to a materials recovery facility to be sorted and prepared into marketable commodities for manufacturing.

More and more of today's products are being manufactured with total or partial recycled content. Common household items that contain recycled materials include newspapers and paper towels; aluminum, plastic, and glass soft drink containers; steel cans; and plastic laundry detergent bottles. Recycled materials also are used in innovative applications such as recovered glass in roadway blacktop (glassphalt) or recovered plastic in carpeting, park benches, and pedestrian bridges.

Purchasing recycled products completes the recycling loop. By "buying recycled," governments, as well as businesses and individual consumers, each play an important role in making the recycling process a success. As consumers demand more environmentally sound products, manufacturers will continue to meet that demand by producing high-quality recycled products.

The glass, lumber, wood pulp, and paper manufacturers all deal directly in commonly recycled materials. However, old rubber tires may be collected and recycled by independent tire dealers for a profit. Recycling is also an eco-friendly process. That's why it's become more popular in the present world.

### **Communal involvement in recycling process**

Many studies have addressed recycling behavior and strategies to encourage community involvement in recycling programmes (waste management.net). It has been argued that recycling behavior is not usual because it needs a focus and appreciation for lengthy planning, while humans have evolved to be responsive to survival goals.

It was found that personal contact with individuals within a neighborhood is the most effective way to increase recycling within a community (wastemanagement.net). Government also should develop awareness program, especial media can play a vital role to develop communal awareness. All people should be personally concerned about hygiene and we have to know how we use our waste again. It is financially positive that's why people want to do recycle their waste. But maximum people are not introduced with new technology which can make our life easy and profitable.

Recycling is one type of investment that does create low cost investment and employment. But this process needs popularity. Government should provide various facilities to recycling process. Government should establish recycling plant. Corporations and persons should be involved it with their CSR (Corporate Social Responsibility) programme.

### **Possible income and loss from recycle**

In many countries of the world, the traditional job of recycling is performed by the entrepreneurial poor such as the rag-and-bone man, waste picker and junk man. Waste recycle can become a profitable source of income for the poor people. Government and non governmental organization should arrange recycle based training programs. There are many things around us that we don't use, that we can recycle and earn money from the wastage. Cell phone, ink cartridges, plastics, metals, woods etc we can easily recycle this product and earn money. Maximum people think that recycling is very expensive. But there is an interesting fact that is; cans, electric parts and plastics are the most available item in our bin. We can reuse those products by little investment. Especially plastics goods and cans are easy to recycle. However, as seen in Brazil and Argentina, waste pickers/informal recyclers are able to work alongside governments, in (semi)funded cooperatives, allowing informal recycling to be legitimized as a paying government job.

Because the social support of a country is likely less than the loss of income to the poor doing recycling, there is a greater chance that the poor will come in conflict with the large recycling. Incinerating 10,000 tons of waste creates one job; land filling 10,000 tons of waste creates six jobs; recycling 10,000 tons of waste creates 36 jobs. (www.uncrd.org.jp)

The Landfill is one of the big sources of bio gas. If we can reuse wastes and produce gas, it will become an eco- friendly project. The production of biogas is a process which split organic substances into an oxidized form (carbon dioxide) and reduced form (methan). (Tormod, Briseid, p.8). The biogas process is useful for moisture substrates with high water content.

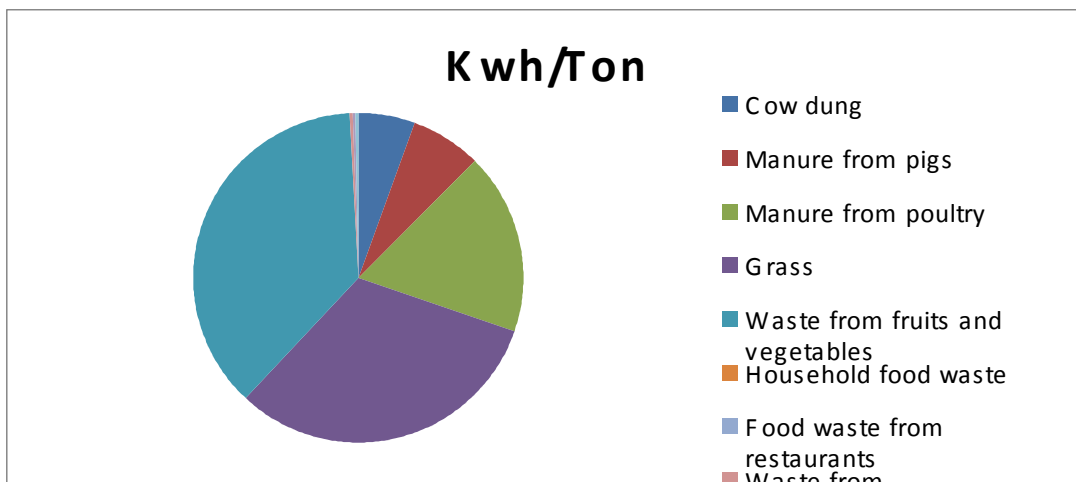
Typical substrates for the biogas process:

- Sewage sludge
- Food waste
- Waste from food industry
- Manure from cows, pigs etc.
- Residues from agriculture
- Energy herbs and plants like grass

**Table -3, Examples of energy contents in different Substrates-**

Substrates	KWh/Ton
Cow dung	140
Manure from pigs	180
Manure from poultry	450
Gras	810
Waste from fruits and vegetables	950
Household food waste	1.300
Food waste from restaurants	1.300
Waste from slaughterhouses	2.000
Pure carbohydrates/sugar	3.900
Proteins	4.900
Fat	8.500

Source: Tormod, Briseid, p.8

**Chart-1 is the example of waste contents n in different substracts-**

### Purposes of Bio-gas

Bio-gas is used for electricity production. So we can use it as fuel. Fuel is very important today, because we are using fuel for many purposes, like car, electronic accessories and also in our home appliances. So government should establish bio-gas plants. The bio-gas process produces a moist rest product (the biorest), about 8% dry matter. The biorest contains the important nutrients (ammonia, potassium, phosphorus, stable organic matter and biomass). The biorest is useful for agricultural production. It is really a natural way to increase production. There is no artificial material; so it is totally an organic fertilizer. So we can say that bio-gas plants produce non waste product. Bio-gas plant is very expensive plant, but if we are able do build it one time we will be benefitted for long time. In this case government and non government organization may work jointly.

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### **Waste recycle and environmental benefit**

A healthy environment is the essential condition for a happy life. In order to gain a healthy environment, management of waste materials is very essential. In very simple words, waste management is a process that involves collection, transportation, processing, recycling or disposal, and monitoring of waste materials (wastemanagment.net). The waste management method involves processing of waste materials for the purpose of producing new products. It prevents waste of potentially useful materials by reducing the consumption of new materials.

Waste recycle offers an admirable and environmentally-friendly process. Waste management methods reduces air, water and land pollution, it also limits the need for new natural resources, such as timber, petroleum, fibers and other materials. Waste reduction is a way to reducing greenhouse gas emissions, a contributing factor to global warming.

Greenhouse gases, such as carbon dioxide, methane and nitrous oxide trap heat in the lower atmosphere that would otherwise escape to the stratosphere. Both the manufacture and distribution of products and the disposal of associated solid waste in landfills can contribute to the emission of Greenhouse gases (East-West Gateway Council of Governments.p.8). Waste recycle will help to reduce greenhouse gas emissions by diminishing the energy needed to make products from raw material; reducing emissions from incinerators and landfills.

Solid waste recycle can eliminate air, water and land pollution. Ammonia, carbon dioxide, carbon monoxide, methane are produces from solid waste and that creates huge pollution. In Bangladesh maximum rivers are polluted by industrial wastages. In same way land and air also become polluted.

Buriganga River, which flows by Dhaka, is now one of the most polluted rivers in Bangladesh because of uncontrolled dumping of industrial and human waste. “Great part of the Buriganga is now gone, having fallen to insatiable land grabbers and industries dumping untreated effluents into the river,” said Ainun Nishat, a leading environmental expert. “The water of the Buriganga is now so polluted that all of the fish have died and increasing filth and human waste have turned it into a black gel. Even rowing across the river is now difficult for it smells so badly,” he told to the reporters. (Financial Express, 7)

A World Bank study said four major rivers near Dhaka — the Buriganga, Shitalakhya, Turag and Balu rivers receive 1.5 million cubic meters of waste water every day from 7,000 industrial units in surrounding areas and another 0.5 million cubic meters from other sources.

“Unfortunately, all these bad things - encroachment dumping of industrial waste occur in full knowledge of the authorities,” said Professor Abdullah Abu Saeed, a renowned activist for “Save Buriganga, Save Lives.” Among the top polluters are dozens of tanneries on the banks of the Buriganga. The government has initiated to move the tanneries outside the capital, and also asked illegal encroachers to vacate the river. There are no fish or aquatic life in this river apart from zero oxygen survival kind of organisms. Chemicals such as cadmium and chromium and other elements such as mercury carried by the industrial waste are also creeping into the ground water. If we want to protect our river we have to take initiative now. Industrial wastages should recycle properly. Otherwise we can’t save our environment.



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### **Power Savings**

The productions of recycle materials are less expensive rather than virgin materials. Power is saved by reducing the need to extract and process raw material so that new products can be manufactured. For example, by recycling one ton of plastics, the equivalent of 3.85 barrels of oil is saved. Less energy used means less burning of fossil fuels such as coal, oil and natural gas. Most of the energy used in industrial processes and in related transportation involves burning fossil fuels. When these fuels are burned, toxins such as sulfur dioxide, nitrogen oxide and carbon monoxide are released into the air. (Environmental benefits and recycling study, p13)

### **Recycle and employment**

Wastages are not only great sources of investment; it can also play a vast source of employment. It creates huge employment opportunities. Wastages recycle will help us to reach a sustainable solution and develop our entrepreneurial actives. We have to start our waste management process at micro level, like community level. Most of the develop countries are trying to rethinking about their garbage and developing an extensive system to decrease environmental hazard and cost-effective solution of wastages. Bangladesh is one the poor country of the third world and Dhaka city is one of the most populated and polluted metropolitan city of the world . Unemployment problem is another crucial issue for Dhaka city. For this reason wastage recycle is the most excellent solution for Dhaka city. Waste recycle provides three great particulars to us, like neat and clean city, employments, recycle goods. So recycle will help us to solve our three big problems.

### **Conclusion**

In Bangladesh we have some common dreams that are neat, clean and poverty free society, and waste recycle process can help to bring this dreams into reality. But government alone can not bear the responsibility. We have to work together and share these responsibilities.

The city corporations have started to organize their own waste collection services for keeping their localities clean. The city corporation starts their work on the basis of their community-arranged system. Wastages are being collected from households and carried to then ear by municipal roadside containers. The community-managed house-to-house waste collection service is gaining momentum in Dhaka City and gradually expanding into a major environmental movement. In Dhaka City, more than 170 communities of varying sizes (less than 50 to more than 300 households) have stared this participatory intervention. The system has already increased garbage collection coverage by 20 percent of the generated waste and created approximately 500 jobs and proven to be appropriate for addressing local problems(Mousum, 2007:94).

We can save our environment and also be come finically benefited through concerted efforts. Waste recycle also reduces the greenhouse gas reduction. The recycle waste helps to decrease the energy need of new production and reduces emissions of carbon dioxides in the atmosphere.

That is why we have to increase waste recycling actives and help to increase environmental benefits for our future generation.



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