IV. Solid Waste Management

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CURRENT SITUATION

Dhaka, with a population of about 9 million, generates a massive quantity of waste everyday from various sources. According to the Urban Local Body Ordinance of 1977, DCC is responsible for collection, transportation, and treatment of solid wastes in Dhaka City. Because of resource constraints and many other reasons, DCC in general has not been able to provide satisfactory waste management system in Dhaka. In most of the areas of Dhaka City, solid waste has become a serious problem with health and hygiene consequences for city dwellers. In many areas, people have come forward to manage solid waste themselves. Private initiatives for solid waste management exist in Kalabagan, Kathalbagan, Shamoly, Pallabi, Banani, Uttara, and many other areas of the city.

The major sources of solid wastes in Dhaka are residences, streets, market places, commercial establishment, and hospitals. Sources and characteristics of urban wastes in Bangladesh are shown in Table 1.

Due to urban development, population growth, and consumption increase, the volume of solid waste generation in Dhaka City increases every year. At present, Dhaka City generates 3,500-4,000 tons per day, with a per capita generation of about 0.5 kg/day. The composition of solid waste varies according to location, standard of living, energy

Dhaka City generates 3,500-4,000 tons of solid waste per day.

Table 1: Sources and Characteristics of Urban Waste in Dhaka

Types of Solid Waste	Quantity (%)
Domestic	40-60
Commercial	5-20
Street sweeping	20-30
Combustible	20-30
Noncombustible	30-40
Moisture	45-50

Source: World Bank Survey Report.

sources, and season. The quantity of waste generation increases during the rainy season when many vegetables and fruits, especially mango and jackfruit, are available. Solid waste in Dhaka mainly consists of food, grass and plants, bricks, dirt, paper, and polyethylene materials (Table 2).

The density of solid waste depends on its organic and inorganic content. Density values in India and other developing countries range from 300 to 600 kilograms per cubic meter (kg/m^3). In Singapore, it is as low as 175 kg/m^3, while in Katmandu and Dhaka measurements of 600 kg/m^3 have been reported. The worldwide range of waste generation is 250 to1,000 grams per capita per day and the density varies from 100 to 600 kg/m^3.

Industrial Waste

There are over 1,000 small and large industries in the Dhaka metropolitan area generating a significant amount of toxic and hazardous wastes and contributing to environmental degradation in and around Dhaka City. These industries include chemicals, textiles, dyeing, printing, tannery, iron and steel, metal, plastic, rubber, and tobacco. Wastes

Table 2: Composition of Solid Waste in Dhaka City

Materials	Quantity (%)	
	Residential Area	Commercial Area
Food waste (organic)	84.37	79.49
Paper/cardboard	5.68	7.22
Textiles	1.83	1.59
Plastics	1.74	1.48
Glass/metals and construction debris	6.38	10.22

Source: World Bank Survey Report.

from industries are dumped into municipal bins and nearby low-lying areas. There is no separate waste management system for industries.

In Dhaka, industry has developed in a background characterized by low labor costs and ineffective anti-pollution laws. This has resulted in the generation of significant quantities of industrial waste. Lead, cadmium, and mercury are all widely used in industry. These materials should be carefully monitored and controlled to avoid pollution in waste disposal. Some common hazardous wastes in Dhaka and their impacts are described in Table 3.

Hospital Waste

Municipal solid wastes are augmented by other hazardous and toxic wastes such as clinical and hospital wastes. There are over 500 clinics and hospitals in Dhaka City. Based on a Directorate of Health inventory, the present average 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 hospital

Table 3: Common Hazardous Wastes

Common Name	Use	Environmental impact
Aldicarb	Insecticide	Miscarriages
Asbestos	Building material	Lung disorders
CECs	Chlorine-based foaming agent, refrigerant	Environmental hazard
DDT	Pesticides	Toxic to life
Dioxins	Byproduct of burning	Carcinogenic
Heavy metals	Industry	Toxic to life
Lindane	Insecticide	Toxic to life
Nitrite	Fertilizer	Damages hemoglobin
TBT	Fungicide	Toxic to marine life

wastes generated in the city is infectious and hazardous.

The rapid increase in the number of clinics and hospitals in the country has proportionately increased the generation of hospital wastes. But none of the hospitals (except one) provides for safe disposal wastes. Waste is collected from small bowls (plastic or metal) or plastic bins provided for each bed and emptied into larger containers. These containers are then conveyed by pushcart to the nearest municipal bin for dumping. The municipal bins are located either within the hospital itself or nearby outside. 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 dangerous than other types of wastes. In Dhaka, all types of medical wastes, including syringes and needles, are thrown into the municipal dustbin indiscriminately. It is therefore quite likely that waste collectors will become infected from these materials. Moreover, municipal dustbins in Dhaka are usually open. Therefore, the spread of infectious organisms through various means from

hospital wastes can increase the risk of epidemics of such infectious diseases as hepatitis, typhoid, pneumonia, gangrene, and AIDS.

There is no environmental awareness program in any hospital in Dhaka. However, the Bangladesh Centre for Advanced Studies has been conducting a program on Hospital Environmental Management in cooperation with the Asia Foundation. The program has been designed to train the hospital staff, including doctors, nurses, ward boys, cleaners, and sweepers for safe handling of hospital wastes as well as to raise environmental awareness among staff.

Tanning Waste

There are 149 tanning industries in Hazaribagh area in Dhaka producing 18,000 liters of liquid wastes and 115 tons of solid wastes during peak time and 75 tons during off-peak time. Liquid waste is mainly dumped into the Buriganga River, while a lesser amount is dumped into nearby drains and sewers. Solid wastes are generally collected by DCC. Before the wastes are collected, however, scavengers frequently comb through the bins. Wastes from tanneries contain sulfuric acid, chromium, ammonium sulfate, ammonium chloride, and calcium oxides that may seep into the groundwater. Also, odors produced by these chemicals and wastes affect the health of the people in the surrounding areas.

Tanning wastes have a very severe impact on environment in terms of health, welfare, and environment. This impact may increase the probability of death and diseases 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.

ONGOING DCC INITIATIVES

DCC collects only 50 percent of wastes — the rest is left behind to accumulate in low-lying areas or to be collected by scavengers.

DCC, which is responsible for collection, transportation, and disposal of solid waste in Dhaka City, is providing a very low level of conservancy service. It collects only 50 percent of wastes and the rest is left behind to accumulate in low-lying areas or to be collected by scavengers. Fast decomposition of mixed solid waste in the humid tropical climate of Dhaka causes foul odors and obnoxious conditions.

DCC has 5,200 conservancy and 135 supervisory staff for the solid waste management. Other waste management support facilities at the DCC are shown in Table 4.

Table 4: Waste Management Support Facilities at the DCC

Waste Management Support Facilities	Quantity
Dustbins	
Good quality	1,595
GI sheet built	2,450
Demountable container	400
Vehicles	
Covered trucks	35
Demountable garbage trucks	104
Normal trucks	130
Hand-drawn carts	3,000
Average staff per ward	
Conservancy staff	58
Supervisory staff	11
Other equipment	
Brooms	1/sweeper/month
Long poles	200 for all/month
Baskets	3,000 for all/month

DCC cleaners sweep the roads and clean the drains daily. They accumulate the wastes at the road and drain sides. Once the street sweeping and drain cleaning have been done, the cleaners collect the wastes in cane baskets and hand carts to dump them at the nearest collection point or dustbins. City dwellers also dump their household wastes at the nearby DCC dustbins. DCC trucks collect these wastes for final disposal at Matuail landfill areas. The solid waste is dumped at this location without any pollution control measures or treatment options. The leachate from open waste dumps produced in rainy season has extremely high pollution potential and causes surface water pollution around the dumping sites. This causes serious pollution to the surrounding environment, groundwater, and soil and is very hazardous to health.

With 378 garbage trucks (1.5-5 ton capacity), 104 demountable trucks, 3,000 hand carts, 5,200 cleaners, and a budget of about Tk90 million, DCC provides a highly unsatisfactory conservancy service. Over the years DCC has increased its staff size and equipment, but there has been little improvement in the quality of the service. Although it is true that the DCC faces various constraints in solid waste management, a better job could be done with existing resources given a good management system.

Despite DCC's various constraints, a better job could be done with existing resources given a good management system.

The following points may be considered as the main bottlenecks of solid waste management.

- *Negligence of duties and non-accountability.* DCC cleaners and sweepers do not follow their work schedule properly. There is no official action for such negligence of duty because of staff grouping and loosely defined accountability.

- *Bureaucratic red tape.* Sweepers and cleaners report to the inspector-in-charge, who is responsible to the zonal conservancy officers.

Zonal conservancy officers are responsible to the chief conservancy officer, who is responsible to the mayor. Although this hierarchy appears sound, there are many ways to avoid responsibility, as there is no recording system for the cleaners' activities at the local level.

- *Lack of supervision*. Although DCC has modern supervisory facilities such as telecommunications, wireless radios, motorcycles, and jeeps, the quality of service is not as good as might be expected because of lack of proper supervision.

- *Lack of coordination*. Lack of coordination among different divisions of DCC involved with waste management leads to unnecessary delay and inefficiency.

LOCAL COMMUNITY INITIATIVES IN SOLID WASTE MANAGEMENT

As mentioned earlier, DCC is entrusted with solid waste management in Dhaka City. Because the conservancy service level of the DCC is unsatisfactory, solid waste has become a serious environmental and social problem in many areas. People have started local initiatives on solid waste management in areas like Kalabagan, Kathalbagan, Shamoly, Mirpur, Banani, and Uttara to cope with the situation. The Kalabagan and Kathalbagan initiatives are the oldest and the system developed there is being replicated in many areas of the city.

Private operators that initiated waste management at the local level spent a lot of time convincing residents to participate. Some people were happy with these initiatives but became disheartened when they realized that they would have to pay for the service.

The primary objective of the private operators is to provide solid waste collection service at the

door step. Daily the cleaners go in front of the houses with vans and other equipment and blow whistles to alert households of their arrival. The servant or someone else in the house comes to the door and hands over solid wastes in plastic bags. The waste is then carried to the nearest DCC bins or demountable containers for collection by trucks. The service areas and facilities of the local initiatives are in Table 5.

Table 5: Service Areas and Facilities of Local Initiatives

Committee name	Service area (km2)	No. of Households	No. of Population	Quantity of solid waste collected (kg/day)
Parichchanna Kalabagan	1.0	1,000	5,700	2,000
Earth Watch	0.03	250	1,800	300
Pallabi Poribesh	0.2	400	2,600	1,560

The efforts of the three local initiatives listed in Table 5 are described below.

Parichchanna Kalabagan

Private initiative in solid waste management was first introduced about 10 years ago in Kalabagan, Dhaka City, by Mr. Kurram Mahboob. To introduce an innovative solid waste management system, he discussed his plans with friends and neighbors. Though some responses were favorable, most were cynical. He and one of his friends campaigned door to door to explain collection procedure and to obtain their cooperation, assuring them that service charges would be collected only if the system worked.

During the initial month, Mr. Mahboob did not collect any fees from the households. The salaries of the cleaners and the initial expenditure on logistics

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were borne by the initiators. When the system won the confidence of the people, a service charge of Tk10 per household per month was levied. Recently, the service charge was increased to Tk15. Fifteen percent of the users still pay Tk10, 50 percent pay Tk15, and the rest pay Tk20. For housing apartments and multistoried buildings, a lump sum of Tk50 per building is charged.

Today, of the households in the Kalabagan area that avail of the services of Parichchanna Kalabagan, 93 percent report that the service charge is reasonable. The remaining 7 percent deem the charge too low.

Earth Watch

Baitul Aman Housing Society is a planned residential area. Before the initiative, throwing of wastes here and there by residents was very common. The entire locality was dirty and reeked of foul odor.

Mr. Taslim Ahmed, one of the three partners of the project committee, was inspired from the activities he had witnessed at a nearby area called Shamoly. He and his partners realized that if better waste collection service could be provided to the residents the environment would be improved. Moreover, such a private initiative would be profitable. A private initiative called Earth Watch was therefore started in the Baitul Aman area with an initial capital of Tk22,000.

Pallabi Paribesh Shongrakhkhan

Watching a television program featuring the activities and successes of Parichchanna Kalabagan encouraged citizens in the Pallabi area to form a solid waste management committee in the middle of 1996. They named it the Pallabi Paribesh Songrakhkhan Committee.

The project was developed by the efforts of Mr. Labu and his friends. The ward commissioner,

Mr. Mohammed Ahsanullah Hasan, also played an important role in developing the project. Mr. Hasan met with the community people and tried to convince them. The project had an initial investment of Tk15,000 donated by various residents, including five committee members.

In the first month of the project, about 70 percent of householders did not pay the service charge. Finally, the committee declared that dumping waste on the streets would be strictly prohibited and violators fined Tk500. The rule worked and is still operative in the area.

Today, most households pay a monthly fee of Tk20 for the service. Others pay Tk10, and there are still some families who do not pay at all but nonetheless enjoy the service. About 67 percent of the service users assessed the rate as reasonable, 15 percent reported that the rate was low, and 18 percent felt the service charge was high.

WASTE CONCERN: AN NGO INITIATIVE

In 1995, a local NGO called Waste Concern initiated a small-scale, community-based organic waste recycling project for the composting of municipal solid waste. Waste Concern's initiative had three aims: (i) capture value from the organic portion of Dhaka's solid waste, (ii) create job opportunities for the urban poor, and (iii) create business opportunities for local entrepreneurs.

In January 1996 a local Lions Club (Dhaka North) donated a small piece of vacant land (1000 square meters) for the composting project. Waste Concern's composting plant is the first of its kind in Bangladesh. The primary goal is to explore the technical and commercial feasibility of labor-intensive aerobic composting. The technique is based on waste reduction and separation of compostables, recyclables, and other wastes. Source-separated organic wastes are collected from

Waste Concern's composting plant is the first of its kind in Bangladesh.

the neighboring community, vegetable markets, and local hotels.

At present, one project manager and six persons (three female and three male) from informal labor are working in the project. About 200 kg of compost is produced from one ton of collected solid wastes. Three hundred households in Mirpur have been included under the composting project. Modified rickshaw vans are used by Waste Concern for the house-to-house collection system. A fee of Tk10/month is charged to each household. The collected domestic waste is separated and sorted in the composting plant site and processed into compost (Box 1).

PROBLEMS EXPERIENCED IN LOCAL COMMUNITY/NGO INITIATIVES

The stakeholders of these initiatives faced various problems while implementing their waste management schemes. The following problems were reported by each of the three groups involved.

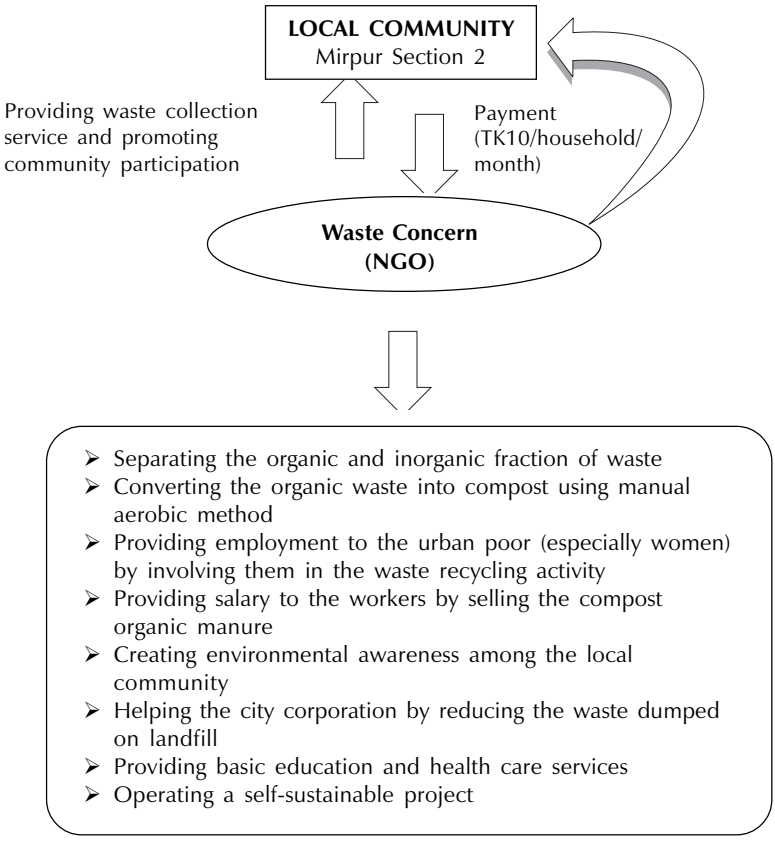
Service Users

- No fixed time for garbage collection
- Whistle blowing, knocking at the door, pressing doorbell is disturbing

Cleaning Staff

- Some people do not treat them properly, epecially when they fail to collect the garbage on time
- Cleaners are underpaid and salaries are rarely paid on time
- Cleaners do not have gloves or masks to protect themselves from health hazards, diarrhea frequently afflicts them
- Cleaners do not get any medical assistance from the committee

Box 1.Waste Concern's Activity



- Irregular collection of waste by DCC, demountable containers are not removed regularly (usually after every 2-3 days)
- Demountable containers are placed outside the service area and they have to go a long distance to dump collected garbage

Committees

- Collection of service charge is embarrassing, some people do not pay willingly
- Some people do not pay but they take the service
- Income from the project is meager
- Committee cannot hire additional cleaners or purchase more equipment for lack of funds
- The project has no legal status

RECOMMENDATIONS

1. Stringent laws should be enacted locally so that people are constrained from throwing solid waste here and there.
2. Private solid waste management systems should be encouraged in all areas of the city.
3. Community projects should be given a legal status.
4. Cleaners' remuneration should be increased. They should be given proper medical facilities and be provided with protective measures like masks and gloves.
5. Cleaners should be given proper training.
6. A recording system for the cleaners' activities should be introduced and maintained.
7. There should be strict action for negligence of duties by cleaners and sweepers.
8. DCC should remove solid waste from the demountable containers regularly.
9. Public awareness should be raised. This could be done by DCC in collaboration with ward commissioners through local meetings, group discussions, and the mass media.
10. A separate management system should be introduced for toxic and hazardous wastes.

11. Coordination and cooperation among different divisions of DCC involved with the waste management should be improved.