Solid waste dumping: A challenge for Dhaka City Corporation

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FAST growth of population in Dhaka city has led to serious inadequacy in urban solid waste management. Solid waste is being generated at an accelerated rate, posing increased environmental risks that must be addressed. Rapid growth of industries, lack of financial resources, inadequately trained manpower; inappropriate technology and lack of public awareness are major factors of constraint of solid waste management for this fast-growing metropolis. Due to limited resources and organizational capacity, it is increasingly becoming difficult for DCC to provide appropriate, modern technological and managerial solutions necessary to ensure efficient and appropriate solid waste collection and disposal services for the entire city population. Dhaka City Corporation has been disposing of garbage in Matuail landfill without following any hygienic technique, which tremendously threaten the environment of and public health in the city. This dumping site will also be filled up within a year; therefore DCC requires other dumping sites for future landfill ground. In order to save the city's environment and protect public health from diseases, it is extremely urgent to build up Sanitary Landfills to dump municipal waste hygienically, where solid wastes will be spread out in thin layers, compacted and covered daily with a fresh layer of clay.

Matuail landfill

DCC dumping site at Matuail is located in southern corner of the city. In order to dump municipal wastes 52 acres of land were bought by DCC in the area, from where 13 acres were filled with earth for resettling some people and the rest of the land has been used as a dumping ground. Now DCC plans to buy 20 acres of adjacent land in Matuail for future landfill. However by the year 2006 this extended land will also be filled up. Matuail dumping site is quite isolated but due to open dumping rodents and insects are carrying dangerous germs in the locality and environmental degradation like air and water pollution, ground water contamination are occurring intensely. The nearest community is about 0.5 km from the dumping ground and few fish farms are found right beside.

Environmental conditions: Overall environmental condition of the area is extremely vulnerable, as all types of pollution are present there. Due to open dumping of waste foul odor and air pollution is dangerously affecting the surrounding people's lives. Rodents are spreading germs and pathogens in the area and the workers of the landfill are highly exposed to hazardous diseases. Municipal waste of the city contains huge amount of moisture and when it gets diluted with extensive amount of inorganic and organic substances, it turns into leachate. A huge amount of leachate percolates through the surface and contaminates the ground water level of the area. Consequently, the leachate is also polluting the underground aquifers. If this process keeps continuing, the surrounding people who drink and use ground water will be dangerously affected and when the ground water is polluted, it is not so easy to decontaminate the source. Therefore, DCC needs to consider this situation and take immediate steps to build sanitary landfill sites to dump the solid wastes safely.

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Sanitary landfill

Modern state-of-the art landfills on geologically suitable sites is lined with clay and plastic before being filled with garbage. The bottom is covered with a second impermeable liner, usually made of several layers of clay, thick plastic and sand. This liner collects leachate and is intended to prevent its leakage into groundwater. Collected leachate is pumped from the bottom of the landfill, stored in tanks, and sent to a regular sewage treatment plant. When full, the landfill is covered with clay, sand, gravel, and topsoil to prevent water seeping in. Sanitary landfills for solid wastes offer certain benefits. Air-polluting open burning is avoided. Odor does not spread in the nearby area, and birds and insects cannot thrive on. If collected properly they can reduce groundwater contamination to a large extent. According to a 1996 EPA study, landfills give off an estimated 36 per cent of all methane gases, and collected methane can be used in small power plants or in fuel to produce steam and electricity. For taking such step in Bangladesh an intensive study is required. Even if the production of methane is low due to our waste characteristics, still it could be harnessed to generate power only to reduce the facility operating costs of a landfill and contribute to long term sustainability.

Recently after realizing solid waste dumping problem of Dhaka City, a feasibility study was conducted by Sheltech Consultants (Pvt.) Ltd. for primary identification and selection of landfill sites to facilitate DCC. It has been found in the study that approximately 563 acres of land is required to build sanitary landfill for 10 million people of Dhaka City. To facilitate the dumping process and reduce transportation cost, experts have divided the city into three zones (south, north and west). For each zone dumping sites are selected accordingly at Demra (120 acres), Amin Bazar (142 acres) and Gazipur (Site 1: approximately 3km from Joydevpur cross section where 140 acres of land is available, Site 2: in front of Bangabandhu Agricultural University, Gazipur where about 145 acres of land identified). This division will allow for better-decentralized management of solid waste. Accordingly DCC may set up three zonal Solid Waste Management Centers and also will be able to accommodate about 33.5 lakh people's daily waste from each zone.

A number of factors have been considered in selecting above landfill sites as discussed below. Several sites have identified and evaluated in terms of these factors and most advantageous sites have been selected.

Type of land: Solid waste landfill process can be used as a method of reclaiming derelict land. Therefore the physical characteristics of the land have to be such that the landfill price can be gainfully used to improve usefulness of the land. Naturally low lying land and areas excavated for earth for various purposes such as brick making, land filling etc, are suitable from this point of view. Selected sites of Demra and Amin Bazar are mostly that type of lands and sites of Gazipur may be excavated for the filling purpose.

Land use plan: The proposed sites should match the intended future use of the land. In this respect, Dhaka Metropolitan Development Plans (1995-2000) have been consulted for selection of the sites. Besides, land filled with solid waste cannot sustain heavy loads for a long period of time without undergoing undesirable settlements. These solid wastes filled also release methane and other flammable gases during decomposition of waste, which may last up to 30 years. Thus the selected lands can be used for construction of parks, playgrounds, golf courses and markets etc. when it is filled and abandoned.

Hauling distance: As the distance of a landfill site from the collection area increases, the time spent on travelling and the fuel consumption increases two folds. Therefore, the sites have been chosen in three different zones of the city to increase vehicle productivity and minimise operating cost.

Volume reduction of waste: Volume reduction of municipal garbage means the processing of compaction so as to decrease the amount of space they occupy. If one ton of waste is compacted by using bulldozer and other compaction equipment, its volume will be only 1 m3. The proposed landfill sites can be used for at least 10 years if volume reduction is done properly.

Preventing water pollution: The city depends on ground water for domestic use and every attempt needs to be taken to prevent ground water pollution. It is difficult to eliminate leachate and is expensive to collect and treat but to establish a sanitary landfill impermeable layers should be provided so that leachate can be collected by pumps and treated in a treatment plant before discharging to nature. Soil of selected sites has been examined carefully and found to be quite impermeable and clay loomed. Therefore, it will facilitate to provide plastic or concrete layers to prevent ground contamination.

Environmental conditions: During the decomposition process of waste in landfills many gases including methane, carbon monoxide, carbon dioxide, and hydrogen sulfide etc. are produced and some of these gases are highly combustible and inflammable. Therefore, in order to minimize the impacts of gases on the environment, sites have been selected away from residential and industrial developments taking into consideration the local predominant wind directions, which are southeast and northwest. A minimum distance of 100m from the nearest residential, industrial or commercial building to the landfill has been maintained. Landfill sites also attract various birds even if it is well managed. Therefore, minimum distances of 3 km between the airport and selected landfill site has been maintained.

Size of land: There is an initial cost involved in developing a site for sanitary landfill operation. As the size of sites increases, the unit cost of site development decreases. Therefore, large sites, which can be used for about 10 years have been selected.

According to a UN forecast Dhaka had a growth rate of over 4 percent per annum during 1970-2000 which will continue at a rate close to 3 percent per annum till 2025. Estimates by the Bangladesh Bureau of Statistics project the population of Dhaka at 15 million in 2015 and 20 million in 2025. Under the given prediction, DCC will need more dumping sites for accumulation of huge amount of daily municipal waste after 10 to 15 years.

The newly selected dumping sites will be capable of holding solid waste generated by city dwellers for minimum 10 years and before end of operation of each landfill, DCC should look for other dumping sites for establishing sanitary landfill. However, we can always look forward to new scientific methods of handling Solid Waste Management with reduced land requirements in the future.

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Appalling urban landscape

TANWEER KARIM

I RECENTLY visited Dhaka after an absence of over 12 years. I was appalled to see what havoc we have wrought on the urban landscape in so short a time. As a practicising architect and urban designer in the USA and being a product of the architecture faculty of BUET and the States, I have more than a passing interest in the development of the city I loved and grew up in. I fondly remember as a student, hearing from venerable architects and teachers that if we ever achieve Bangladesh we will be able to "plan each blade of grass". If this is our planning, I dread to think what unplanned growth is.

I was extremely disappointed on the complete lack of discourse or dialogue among the architect community regarding on what was being caused in the name of so called development. When I talked to my peers who have been in practice for nearly 30 years, they simply shrugged and said "what can we do, this is Bangladesh". To me the response is criminal. Just like we want accountability from fellow professionals like physicians, architects are accountable to society on what they put on the built landscape by their commissions. Someone told me that Dhaka is like Singapore. He is totally mistaken. Just because you have managed to build some midrise buildings, put neon's advertisement and billboards along the streetscape, you have not reached the status of Singapore. In fact there are lot of cities in the USA which envy Singapore.

The total lack of zoning, planning, height restrictions, greenery, landscape, traffic pattern, to name a few, causes immense damage to the urban landscape and society. The way we brutalized the open areas of Outer Stadium, Suhrawarddy Udyan, Dhanmondi Lake, Gulshan, Uttara and the rest is for everyone to see. The traffic monstrosity, congestion, smog wreak havoc on the health of the citizens. In the meantime we go on our merry way, putting one obnoxious building after another, cheek to jowl all over the city. Without any consideration to the width of the street, lack of sidewalks, sewerage capacity, we continually tear down the old and build vertically, so close to each other that we not only cut off air circulation but natural light too. We have in the process changed the micro climate and increased the heart index of the city.

What can we do different? I for one do not believe we cannot do better. At a minimum, we need to start around the Jatiya Sangsad designed by Louis Kahn. Stop burying leaders and politicians haphazardly. The capital is not a graveyard. Stop putting pontoon bridges on the Crescent Lake. Let's master plan the area and include the old airport land and make it part of the Capitol. Let's create a traffic mall radiating in different directions from the Sangsad. Lets plant trees, hardscape and softscape with a landscape design in mind, instead of trying to create a mini "black forest". And above all, let's establish a non-smog generating, urban and forward looking traffic system. Washington was master planned, street and traffic pattern established centuries ago and the buildings built over the years. We do not have to build in a few decades but let's at least establish the arteries of traffic and design standards so we can build correctly. Let's set height limits within the Capitol area so no structure is taller than the Sangsad building. If we can start there, we can develop Dhaka as an architectural tourist destination similar to what Bilbao in Spain managed to do with Frank Gehry's museum. In fact that building alone generated tourism to the tune of 250 million dollars for the city.

Who would have gone to Agra if it did not have the Tajmahal? We can at least get a fraction of the international tourist traffic from the architectural masterpiece started by Louis Kahn. One would be surprised how many people in the West know about Louis Kahn's Capitol in Dhaka, but do not know where Bangladesh is. That is the challenge and the opportunity.

Can we talk? Can the architects/planners of Bangladesh, the Institute of Architects, students, teachers and other professionals, civic leaders, politicians rise to the occasion? Do they have the ethical values and moral courage to say "Stop, enough is enough" or are they going to act like robber barons? Can they come together and give direction that future generations can be proud off? Will the architects overseas participate and give their input and raise their concern? Or are we going to come up short? If we can start the process of design and establish the standards for the Capitol, I am confident the citizens will demand and get the same for the rest of the city. We can and must clean up our act. The question begs to be asked -- will we collectively change the course of history or be co-opted in the massive fraud enacted in the name of so called development?

I strongly believe there is goodness in all of us. Bangladesh architects have the talent, some may have the vision; the question is do we all have the will?

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Air pollution: Deadlier than traffic crashes

SHAKEEL A L MAHMOOD

Air pollution kills an estimated 2.7-3.0 million people every year -- about 6 per cent of all deaths annually. About nine deaths in every 10 due to air pollution take place in the developing world, where about 80 per cent of all people live. Again out of this 2.7 million, 1.6+ million die in Asian countries alone. About 2.5 billion people, almost all in developing countries, suffer from high levels of indoor air pollution which is due to burning of wood, animal dung, crop residues, and coal for cooking and heating. Most of the victims of indoor pollution are women and girls, who have primary responsibility of cooking and house keeping. On the other hand, outdoor air pollution harms more than 1.1 billion people, mostly in cities.

While debates about energy choices, long term climate change impacts, and the capacity to adapt to those impacts continue to evolve, there is little doubt that air pollution from current patterns of fossil-fuel use for electricity generation, transport, industry and housing are already sickening or killing millions throughout the world.

Earlier air pollution studies have found that reducing emissions from older, coal-fired power plants in the United States would prevent 18700 deaths, 3 million lost days and 16 million restricted activity days each year. One regional study showed that reducing emission from nine older coal plants in the Midwest would prevent 300 yearly deaths, 2000 respiratory and cardiac hospital admissions, 10,000 asthma attacks and 400000 days of respiratory symptoms. In the latest study, researchers said even more public health benefits could come from reducing air pollutants they did not chart.

In cities that lack pollution control, millions of people are at risk from outdoor pollution. Densely populated and rapidly growing cities such as Bangkok, Manila, Mexico City, and New Delhi are often entombed in a pall of pollution from trucks and cars and from uncontrolled industrial emissions. In 1995, for example, the average ozone concentration in Mexico City was about 0.15 parts per million, ppm, 10 times the natural atmospheric concentration and twice the maximum permitted in Japan or the US.

In the developing countries, 22-lakh children die of respiratory infection associated with indoor air pollution a year. Lead pots, pipes, and smelters are usually held responsible by the experts for loss of intelligence among children and for brain damage and abnormal behaviour among adults.

Heavy metals released into the environment today come from uncontrolled emissions by metal smelters and other industrial activities, unsafe disposal of industrial wastes and lead in water pipes, paint, and gasoline. The heavy metals most dangerous to health include lead, mercury, cadmium, arsenic, copper, zinc, and chromium. Such metals are found naturally in the soil in trace amounts, which pose many problems. When concentrated in particular areas, however, they present a serious danger. Arsenic and cadmium, for instance, can cause cancer. Mercury can cause mutations and genetic damage, while copper, lead, and mercury can cause brain and bone damage.

Lead additives in gasoline cause widespread health problems. In Thailand, for example, a 1990 study found that some 70,000 children in Bangkok risked losing four or more points of IQ because they were heavily exposed to lead emissions from motor vehicles. In Latin America, some 15 million children under the age of two are at risk of ill health from lead pollution. In United States leaded gasoline began to be phased out after the passage of the Clean Air Act in 1970. It was not until the mid 1980s, however, that the European Community followed suit. Elsewhere (like Bangladesh), leaded gasoline continues to be used extensively.

Air pollution is not only a health hazard but also reduces food production and timber harvests, because high levels of pollution impair photosynthesis. In Germany, for example, about US$ 4.7 billion a year in agricultural production is lost to high levels of sulfur, nitrogen oxides, and ozone.

The World Health Organisation estimates that about 700,000 deaths annually could be prevented in developing countries if three major atmospheric pollutants -- carbon monoxide, suspended particulate matter, and lead -- were brought down to safer levels. The direct health cost of urban air pollution in developing countries was estimated in 1995 at nearly US$100 billion a year. Chronic bronchitis alone accounted for around US$40 billion.

Air pollution in Bangladesh

Air pollution kills 15,000 Bangladeshis each year, according to a World Bank report released recently. The report says Bangladesh could save between $200 million and $800 million per year -- about 0.7 per cent to 3.0 per cent of its gross national product -- if air pollution in the country's four major cities was reduced.

The United Nations framework Convection on air pollution should be implemented in our country. Within this framework a national level commission along with NGO's should be formed to combat this situation. UN Environment Programme, UNEP should open a technical office, specializing in air pollution in Dhaka as they have opened in Kathmandu, Nepal... We need to save the forest and promote plantation inside the cities to maintain or restore the ecological balance.

The report adds that 6.5 million people in those cities suffer each year at least 8.5 million cases of minor illnesses not requiring treatment. And the major disease in Bangladesh is not diarrhea, as is the general perception, but is the acute respiratory infections caused mainly by the polluted air. **Automobiles** (auto rickshaws, trucks and buses, some 35 per cent related to fine particulate matter and 48 per cent to hydrocarbon mainly generated by two stroke engines), **industrial emissions**, **bad civic practices** and **poor government** services are some of the factors causing air pollution in Bangladesh. The Bank gave Bangladesh $4.7 million last July to fund an air quality management project. It also supports a programme to train drivers how to reduce emissions.

The concentration of particulate matter and lead, carbon monoxide and hydrocarbon in the air of Dhaka City is much above the standard level and is probably the highest in the world also making Dhaka one of the more cancer inducing cities of the world. The lead content in dust of Dhaka City was determined by Atomic Absorption Spectrophotometer (AAS). Lead content of dust ranged from 7 to 240 parts per million, ppm. Which is ten times more than the standard level and several times more than even 'the most polluted city -- Mexico.' The highest amount of lead was found in the dust collected from Syedabad and the lowest was found at Dhaka University bus depot.. (Arifur Rahman and AKM Nurul Islam, Lead Pollution in Roadside Dust and Plants of Dhaka City, 1st National Conf. On Environmental Health in Bangladesh, 2002, 33 p).

A new child-attacking virus thrives in Dhaka as pollution heightens:

A new variant of a virus has been hitting small children of Dhaka with debilitating effect causing them breathing problem. The school children of Dhaka City had nasal irritation, cough when they catch cold, headache, dizziness. (Sk Akhtar Ahmed and others, Respiratory Problems attributable to Air pollution among school children,1st National Conf. On Environmental Health in Bangladesh, 2002, 34 p). The reason behind is the high lead in the environment from gasoline, ceramics, batteries, paints, etc. Young children are mostly exposed to cadmium through inhalation of smokes and contaminated soils and dust from industrial emissions and sewage sludge.

The children have in most cases been given antibiotic that is not useful in combating viral infections. However, what is alarming is that the medical community appears unprepared and unequipped to deal with this new viral strain and some medical experts have blamed it on the high level of urban pollution.

Recommendations: People have been crying out for solution for decades but nothing has yet been done. The atmosphere is under increasing pressure from green house gases that threaten to change the climate and from chemicals that reduce the ozone layer. 'The major air pollutants effecting respiratory tract are sulfur dioxide, photochemical oxidant, ozone and NO2.'(Dr. Kazi Saifuddin Bennoor and others, Air Pollution and Chest Diseases, 1st National Conf. On Environmental Health in Bangladesh, 2002, 34 p).

Government need to:

Take the lead in managing this disastrous situation;

Promote national energy efficiency and emission standards and develop efficient, cost effective, and less polluting mass transit systems;

Completely abolish import and use of leaded gasoline;

Completely abolish 2-stroke engine vehicles;

Completely abolish (which are more than 20 years) old vehicles;

Correct use of lubricants can reduce the emission levels;

Encourage people to use Converted Natural Gas (CNG) or Liquid Petroleum Gas (LPG), Rechargeable Battery (recently being used by US) driven car;

Immediately scratch out all unfit vehicles and punish if they drive all those kinds of vehicles on the streets;

Immediately relocate/shift the industries (such as Tanneries, Battery, Pharmaceutical, Tobacco) away from Dhaka city,

Provide training for the doctors and treatment facilities for the patients;

Import general training quarterly to the drivers how to reduce emission;

Dispose of industrial waste properly;

Create public awareness on air pollution through media materials (such as videos, pamphlets, booklets, radio and television including print)

Modernize exiting power systems by reducing fossil -fuel combustion.

The United Nations framework Convection on air pollution should be implemented in our country. Within this framework a national level commission along with NGO's should be formed to combat this situation. UN Environment Programme, UNEP should open a technical office, specializing in air pollution in Dhaka as they have opened in Kathmandu, Nepal.

We need to save the forest and promote plantation inside the cities to maintain or restore the ecological balance.

Lastly we need 'strong political will' to save our environment.

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