DISASTER MANAGEMENT IN METROPOLITAN DHAKA

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INTRODUCTION

Bangladesh suffers from natural calamities every now and then. Whereas natural disasters have become part of the life-style of ordinary Bangladeshis, the country has to cater to the aftermath of such misfortunes almost empty-handed as nature has showered this extremely poor country with calamities, not resources. Proper management of disasters is thus even more important in order to ensure best use of available scarce resources. The poor people who continually suffer from poverty, insufficient food, ill health and limited opportunities, suffer most at the time of disasters. Any disaster management activity should thus be coupled with poverty alleviation to secure lasting impacts.

FLOOD AND WATER-LOGGING OF THE METROPOLIS

The capital city of Dhaka is virtually submerged underwater in almost all places whenever rains drench the city for some time. The city's outworn and ill-planned sewerage system fails to cope with the discharge at every occasion. As a result of the water-logging, traffic at some major city intersections move with great difficulty while many cars and other vehicles are stalled after getting stuck in water-logged roads. The grave condition that prevails frequently in Dhaka city roads can be visualized from figure 1 where even boats can be seen competing with rickshaws and buses. The situation turns worse at the time of floods.

Effect of Flood

During the monsoons of 1987 and 1988, Bangladesh suffered two of the most serious floods on record. During these floods, vast areas of Dhaka, with a huge population of about 4.8 million people, were inundated to a phenomenal degree with flood levels at about 150 cm above normal for periods upto four weeks. It is estimated that about 200 km^2 of the total 260 km^2 area of Dhaka City was submerged to depths ranging between 30 to over 450 cm and flood damages exceeded Taka 700 million (US$17.5 million). About 60 per cent of the city's population was directly affected by these floods. Figure 2 shows the desperate bid of a Dhaka dweller to save his car from the onrush of flood water during the flood of 1988.

Drainage Problem

Dhaka City is bordered on the south, east and west by the rivers Buriganga, Balu, and Turag. These rivers are directly fed by a natural system of canals from the city centre. A number of *khals*/canals, *viz*. Begunbari *khal*, Gerani *khal*, Dholai *khal*, etc., have served in the past as natural channels for excess water drainage. Unfortunately, the last decade has

witnessed the narrowing down or blocking up of part of these canals for the purpose of construction of roads and buildings. Unregulated disposal of garbage, many of which are nonbiodegradable, in the canals have also filled them up. During the flood of 1988 these canals overspilled their banks and immersed roads and housing areas in their vicinity. The flood or stagnant water understandably mixes with sewage and waste water from septic tanks and pit latrines, decomposes garbage dumps, and deteriorates the environment beyond what is hygienically safe. The outbreak of fatal diseases under such circumstances is thus rampant.

At present, the whole city is devoid of any storm water drainage system. Consequently, water is collected in roads, ditches and low-lying areas. In an effort to save the capital from the evils of flood, a gigantic project was started after the flood of 1988. Under *Flood Action Plan (FAP), Dhaka Integrated Flood Protection (FAP-8B)* was formulated. In practice, apparently, *FAP-8B* has turned out to be one of the causes of water-logging problems of the capital. The primary objective of the project was to construct embankments and flood walls along the perimeter of the city. The work was to be complemented by the provision of pipe sluices, cleaning and repair of internal drainage canals, and improvement of sewerage system.

It is alleged that *FAP* was formulated before giving much thought to its short- and long-term secondary effects. The feasibility studies and project planning were done hastily and are inconsistent to each other. The flood protection embankments are impeding excess water to be drained out of the city. Not only are the pumping stations not commissioned properly, but the so-called proposed water basins in the low-lying areas of the city are also being indiscriminately filled for the sake of housing projects and industrial areas. Figure 3 shows an under-construction reinforced concrete box culvert to be used in transporting sewerage. Ironically, the vast areas on either side of the culvert was a natural drainage channel only a few years ago, which was subjected to human interference. Unfortunately, like the private developers, the Dhaka City Development Authority (known as RAJUK) has earth filled, in the recent past, half of the width of Gulshan-Banani lake and allotted plots to the elite. Thus, even if the storm sewerage functions according to design, deficient natural drainage will invariably invite floods, water-logging and, of course, misery to the life of the metropolis.

ABSENCE OF BUILDING CODE

In Dhaka City, structures are designed and constructed without abiding to specific building regulations. The main reason for this lies in the absence of any such unified regulations in this country. Although, at present, a *Bangladesh National Building Code* is available in draft form, it will still take some time to make it law. Up until now the *East Bengal Building Construction (EBBC) Act* of 1952 with slight amendments has been practiced in the major cities of Bangladesh. The *EBBC Act* sets rules including building set-back, occupancy, master plan zoning for residential and commercial buildings. Understandably, these rules are quite old and cannot cater to the demands of modern times where the Dhaka city skyline is full of tall buildings. Although RAJUK has unofficially added some new rules regarding building height, parking, fire protection, design for high-rise structures, sanitation, ventilation, and road width, it is extremely difficult to execute them since these additions do not have any statutory status.

Design Specifications

Due to the absence of a *National Building Code*, there is no room for the designer to cater to local needs. Virtually anyone can design and construct a structure. There is no *Chartered Engineer's Act* and RAJUK has so far failed to ensure that the structures built under

its jurisdiction are safe from the structural design point of view. In August 1993, an under-construction framed structure collapsed at Mahakhali just half an hour after the last bucket of concrete was poured onto the roof of its third floor. The structure was being constructed in a water filled low-lying area without proper consideration given to the properties of the underlying soil. The foundation of the building settled on an average of about 300 cm (see figure 4) with a tilt of about 10 degrees towards the eastern side of the building.

A number of serious accidents have occurred in Dhaka City as an outcome of the prevailing confusion in the design arena. In 1985, in a Dhaka University residential hall, thirty-three students died and forty-three others were injured when the worn out roof of a more than seventy-year old auditorium collapsed. There are many such old buildings specially in the older part of Dhaka City. If immediate steps are not taken for their repair and rehabilitation, many of those old and other newly constructed but badly designed structures may collapse even at a tremor of low magnitude, during heavy rainfall or floods. Among many other poorly designed buildings, Faridpur Mansion in the Kakrail area (shown in figure 5) is one. The upward expansion of this building at the heart of the city went unabated until thirteen storeys were constructed. The ineffectiveness of the enforcing agencies is clear from this incident. The infill walls of the top floors were stripped off and occupation on these levels were stopped. A court order prevents the concerned organizations from demolishing this unauthorized and structurally unsafe building which poses a hazard to everyone in the vicinity of the structure.

Fire Regulations

In recent times fire has become a common hazard in high density residential as well as commercial areas. Dhaka has witnessed the fire at the United Stated Information Service building in the central business district of Dhaka; the tall structure had no fire fighting facility. About three years ago, fire broke out in a garments factory in Mirpur, Dhaka. The owner of the factory along with twenty female workers succumbed to fire injuries. The stair of the factory building was too narrow to allow the escape of a great number of frightened people. There was no alternative escape route either. In addition to the regular incidence of fire in godowns, markets and other inadequately housed commercial and industrial settlements, fire is very common in the squatter settlements and shanties and causes damage to life and property. Absence of a fire prevention code, setting up of industries in residential buildings and the mushroom growth of slums -- all contribute to the ever increasing number of fire related disasters in the city.

ENVIRONMENTAL AND HEALTH HAZARDS OF SLUMS

Slums are the end product of a country's poverty and pose a threat to urban health and sanitation. The slum problems of Dhaka City present no easy solution because of their ever-increasing volume and complexities. In metropolitan Dhaka, slums of various descriptions grow on vacant public lands, along railway tracks and around bazaars. Slums are virtually everywhere; rich neighbourhoods are no exception, as can be seen in figure 6.

It is estimated that about 50 per cent of the dwellers of Dhaka City live in slums. A majority of the slum dwellers lost their rural roots mostly due to natural calamities or economic stagnation prevailing in Bangladesh. Cyclones, floods, river erosions, and droughts are all some of the many natural causes which force village people to migrate to Dhaka City slums in the hope of getting a better life. But, instead, they fall easy prey to manmade disasters which are part of slum life. Usually cardboard, bamboo, straw matting, pieces of plastic sheet or tin or any other cheap material are used in the construction of the temporary structures in the slums.

Slums are breeding grounds of diseases and epidemics because of the extreme poverty, starvation and malnourishment of their dwellers. The minimum municipal facilities such as access, water, electricity, sanitation, and sewerage are either inadequate or completely denied to them. Social facilities such as education, health and recreation are also nearly absent. The housing of the low income group are most affected by flood or cyclone and, commensurate with the length of the monsoons, the poor are subjected to the mercy of the natural disasters almost half the year.

DISASTER ALLEVIATION AND MANAGEMENT

All activities concerning disaster mitigation in Dhaka City should be based on the understanding that natural calamity is a reality in Bangladesh. Skillfully planned and efficiently coorganized flawless efforts should be geared up for both short-term mitigation and long-term elimination of disasters in Dhaka City.

Excess Water Removal

In order to save Dhaka City from the miseries of water-logging, indiscriminate closure of natural drainage channels and low-lying areas should be stopped immediately. Existing drainage systems should be improved and use of nonbiodegradable packing materials banned. The present administrative framework is not capable of providing the intricate coordination needed for flood control, water resource management, and drainage of Dhaka City. It is to be mentioned here that the environmental, social, and long-term economical impact assessment of *FAP-8B* has not yet been conducted; but the project has already been started. Thus, apart from being instrumental in the water-logging of Dhaka City, the project may lead to even more dreadful environmental disasters. In order to successfully implement any flood control and drainage system, an effective and all-encompassing institutionalized management cell has to be developed. Otherwise, projects such as *FAP* will always remain deficient in one way or another. The government should conduct detailed studies related to *FAP* by local experts, who shall be answerable to the people, before implementing this or any other projects of national and environmental interest. Needless to say, the donors and their consultants are not answerable to the local people for their actions and mistakes.

Building Code as a Living Project

The *Bangladesh National Building Code*, currently under preparation, has to be given legal status and its effective application has to be ensured. Since a Code is an ever developing activity, unless it is updated on a regular basis, its use will be inappropriate. Here, the Code has been written as a consultancy project with its inherent limitations of time and resources. Whereas in the developed world, there are many institutions which continuously carry out research and incorporate their findings into the Code, in Bangladesh, a very limited number of research institutions are present. Understandably, many specifications of the *Bangladesh Code* are adapted from established foreign Codes. Thus, apart from constituting a Code Enforcement Authority, a research institution has to be created which shall conduct research on *Bangladesh Code* provisions, gather information regarding changes in the Codes which form the basis of *Bangladesh Code*, and regularly update it.

Urban Renewal Programme

In order to ensure safety of life, old and potentially dangerous dilapidated buildings should be identified and demolished if economically feasible renovations are not possible.

Slum Improvement

It is to be realized that the problems of the slums require to be treated more as part of poverty alleviation and possible urban environmental disaster protection, and not as a fringe issue to be given a casual and palliative treatment. The Government of Bangladesh, in its ongoing Fourth *Five-Year Plan*, has given some thoughts to address the slums and slum dwellers. The programme under the plan seeks to rehabilitate squatters through upgradation of the slums. Under the proposed programme, an agency known as the Dhaka Metropolitan Slum Improvement Committee will coordinate the efforts of various nongovernmental organizations, donor agencies, and the government. The proposed programme includes upgradation of living conditions and the surrounding environment of slums with provisions of civic amenities, employment opportunities, literacy, primary health care, and family planning. Apart from implementing the existing slum improvement programmes faithfully, economic emancipation of the whole country and natural disaster mitigation in other parts of Bangladesh is a prerequisite to off-load Dhaka City from an ever increasing amount of rural-urban migration.

Disaster Awareness

Although natural calamities cannot be totally avoided, the losses can be minimized by the provision of prior warning, building of cyclone/flood shelters and improvement in construction techniques. Reduction of damages by cyclones can be achieved by changing construction methods of low income housing which have been found to be most vulnerable. Improvements in the anchoring technique of roof to wall, joint design, and use of prefabricated building materials instead of temporary materials such as bamboo and thatch are considered effective.

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Figure 1. Water-logged Dhaka City Roads after Rains

Figure 2. Scene from the 1988 Flood in Dhaka City

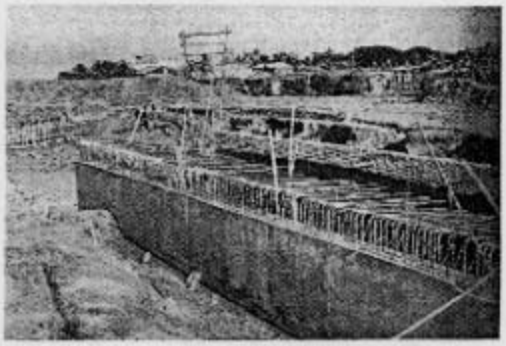

Figure 3. Under-construction Reinforced Concrete Storm Sewerage Box Culvert in Filled Land

Figure 4. A Multistorey Building after Failure of Foundation due to Unregulated Design

Figure 5. A 13–storey Framed Structure Stands at Heart of City without Occupants
It required the concerned authorities quite some time before discovering design faults and stopping construction and occupancy to avert possible disasters.

Figure 6. Slums Growing even in Well–to–Do Neighbourhoods