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WATER LOGGING RISKS IN DHAKA CITY: AN OVERVIEW AND THE WAY FORWARD

Zenat Islam¹, Shafinaz Sameen², Anika Tasnim Ananna³

Abstract

In recent years Dhaka City is facing extensive water logging during the monsoon. Over the years, water-logging problem has assumed a formidable challenge with the burgeoning population. Disruption of traffic movement and normal life; damage of structures and infrastructure; loss of income potentials are the encountered effects of water logging on city life. The particular paper gives a review of the causes of water logging along with the consequences the city suffer and presents a case (Mirpur Road adjacent to Dhanmondi 27 signal) to demonstrate the multiple factors contributing to water logging and its induced disruptions. The paper aims to draw attention on considering water logging to be a growing concern for Dhaka city and provides some notions towards way forward.

Key Words: Water logging, Dhaka, Drainage, Decreasing wetland, Unplanned Development

¹Lecturer, Department of Architecture, State University of Bangladesh

²Lecturer, Department of Architecture, State University of Bangladesh

³Lecturer, Department of Architecture, State University of Bangladesh

Introduction

The backbone of water played a dominant role in the growth of Dhaka for many years (Rahman *et al.* 2016). Day by day Dhaka has turned into the centre of economy for the country; and pressure of inward migration has given rise to the increased need of land development and infrastructures resulting in filling up of water bodies.

On the other hand lack of law enforcement and monitoring resulting in poor construction standards, construction on filled up canals and water bodies, unplanned-uncontrolled growth in hazard prone areas is turning the whole city into a source of potential hazards (Sameen *et al.* 2016). Faster growth of cities with insensitive or non-inclusive urban land use planning, urban development and management lead to higher disaster risks (Sharma *et al.* 2011).

Laws in conserving the rivers and other natural water resources, though exist, are not strictly enforced. In addition to the Environment Conservation Act (1995), the Conservation of Playing Field, Open Space, Garden and Natural Water Body Act 2000 made indiscriminate filling of water bodies illegal, but lack of proper definition and delineation of water bodies made these difficult to implement. Private sector developers, taking advantage of housing crisis, prepared plots on filled up wetlands by flouting rules and norms. As described previously (Rahman *et al.* 2016), the city as a result, has become vulnerable to frequent flooding and water stagnation. The particular write up realizes the importance of addressing water logging as a major disruption in the city life and aims to draw attention on it by demonstrating the contributing factors and effects as well as describing a particular case of Mirpur road (adjacent to Dhanmondi 27 signal) as a manifestation of the multifaceted trouble it inflicts.

Methodology

Methodology of the study contains literature survey (scholarly articles and newspaper data), site survey through observation, informal interviews, taking photographs and producing and analyzing drawings.

An Overview of Water Logging incidence in Dhaka City

The paper recognizes the causes of water logging to be both natural and manmade and the consequences become extreme when a city with huge population is exposed to it.

Rapid Population Growth and Unplanned development of Dhaka city

Dhaka and the municipalities that make up the Greater Dhaka Area have a total population of over 18 million, and the city has shown population growth of about 4.2% annually. On the other hand, Dhaka city expanded from Buriganga and as the capital city, had to house more of all types of urban activities, besides taking in a large number of migrations. Due to this most if

the provisions of the city's first master plan (1959) became redundant. In 1997 the city had a structure plan but could not be fully implanted and resulted in unplanned and often illegal growth of the city. Increased population within an unplanned city increases the severity of effects due to any hazard.

Change of land use

Sayed et al. (2017) explained that from 1989 to 2009 the agricultural land decreased from 129 km² (43%) to 73 km² (24%) and this decrease was caused by development of infrastructure and factory. Such changes are associated with changes in life pattern and livelihood activities and so is with increased risks. As a result of this change, he also described that there was a similar decrease in water surface from 42km²(14%) to 23 km² (7%) within this twenty years.

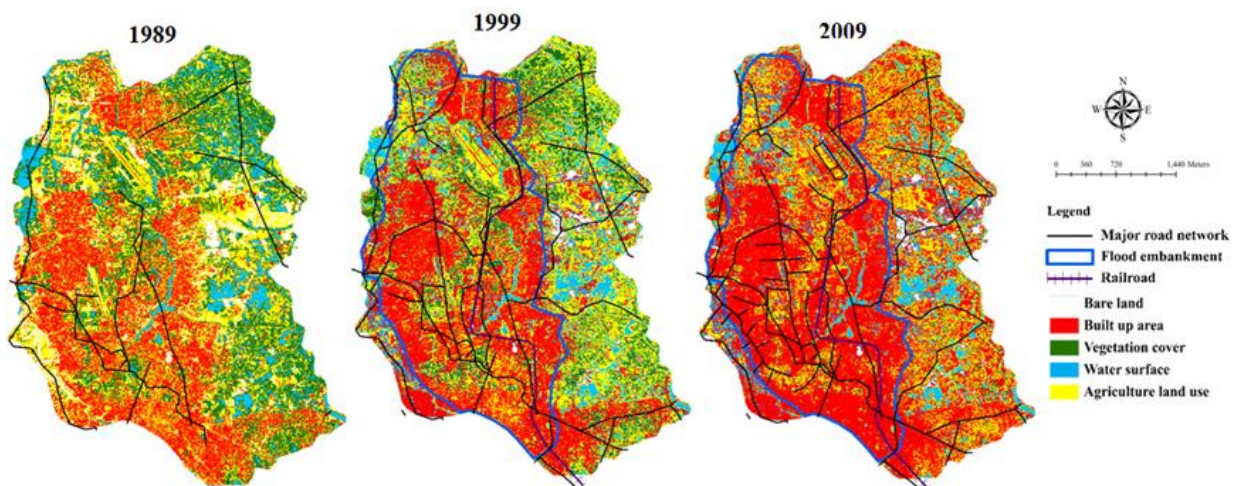
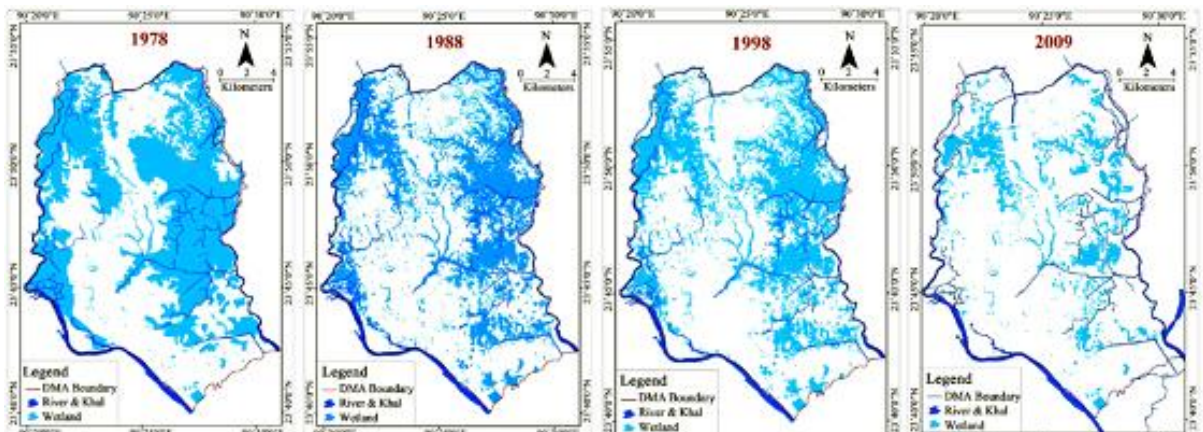


Figure 1: Image showing change of Land use with time (Source: Sayed *et al.* 2017)

Decrease of Wet Land

Figure 2 shows the drastic change of water bodies of Dhaka city from 1978 to 2009. Many canals are cut off and transformed into lakes e.g. Dhanmondi, Gulshan, Banani or Baridhara Lakes. DMDP' 95 tried to take care of the Dhaka's hydrological systems in the land use planning but never pursued seriously.



Increase in Periodic rainfall:

In 1953-1963, the average annual rainfall was 1927.3 mm, which becomes 2023mm. in 1997-2004. Normally in monsoon season the total rainfall trend is increasing. During the last 52 years the precipitation increase 381 mm (Roy et al 2013).

Decreasing Natural Drainage System

Among the city canals, the Dholai Khal which once used to be the artery of an important navigational route for country boats to and from destinations within the metropolis, has almost disappeared due to four decades of wrong policies of the city administration to construct roads by closing the canal (Huq and Alam, 2003). The closing of the Khal had far-reaching impact on the natural drainage system of the city. A major part of it is under illegal encroachment by influential people in the Segunbagicha, Purana Paltan and Naya Paltan areas. Begunbari Khal extending from Dhanmondi Lake to Trimuhani via Rampura before emptying into the Balu River, the Ibrahimpur canal, the Khathalbagan-Rajarbagh canal, the Gopibagh canal together with other minor canals of the city is all victims of either illegal encroachment or acquisition for the construction of roads, box culvert or underground drain.

Poor Maintenance

According to the DCC statistics, there are around two-and-a-half thousand ditches and water bodies across the Dhaka city. But these spaces are either being grabbed or filled up with waste. Improper maintenance of existing drainage system and the disposal of solid waste into the drains are also responsible for blockage in drainage system and water-logging (MNA.bd).

Consequences of Water Logging

Disruption to traffic movement is an important impact which arises during the water logging. Traffic congestion is a major consequence during peak time.

As found from literature, water logging contributes to ground heave, subsidence, dampness. It causes damage to roads. The substructure of the buildings in the low laying areas remains underwater due to water logging. The brick foundations lose its longevity by being affected with corrosive effect of salinity.

Theoretically, Dhaka WASA maintains two separate sewer systems: one for domestic wastewater and another for storm water. However, in reality storm sewer also receive domestic wastewater, which causes unwanted deterioration of the storm water discharges. In poorly drained areas, urban runoff mixes with sewage from overflowing latrines and sewers, causing pollution and a wide range of problems associated with waterborne diseases.

Water logging increases the construction and maintenance cost because it reduces the life span and damage to roads and metalloid pipes of various underground utility services.

Sometimes, water enters into houses and the floor and wall remains wetted for a long period and it damages the household goods, stored food grains etc. It also leads to direct financial costs, loss of income potential and seriously disrupts normal life.

Discussion on Case Study of Mirpur Road (adjacent to Dhanmondi 27 signal)

Morphology of Dhanmondi Residential Area

Dhanmondi is one of the earliest planned residential areas of Dhaka; however it did not have provisions for neighborhood facilities and as a result in time, small shops and other facilities were soon set up by influential or concerned residents (Hafiz *et al* 2016). The commercial success of the small scale endeavors eventually led the way to intrusion by large scale incompatible uses within the area, which eventually brought about morphological changes and environmental deterioration of Dhanmondi. Sometimes, well-connected people can influence or coerce the authority to create extra plots in Dhanmondi by converting open spaces and parks, or by filling up parts of or whole water bodies (Nancy *et al* 2004). Such acts to accommodate school, government staff quarter, mosque etc. Other than this, some portion of the lake and some open spaces in the area have been encroached by the owners of the plots adjacent to them (Hafiza *et al* 2016).



Figure 3: Dhaka city map (left), plan showing building uses nearby study area (right)

Major Aspects of Mirpur Road Adjacent to Dhanmondi 27 Signal

The nodal point of Mirpur Road and Dhanmondi 27 no Road is one of the worst affected area for water logging due to rainy season in Dhaka city. This is the main connecting road from Mirpur to Azimpur where various important roads like Asad gate avenue, Manik Mia Avenue, Dhanmondi 27 no Road, Rassel square are connected. It is the business area and includes a

number of shopping malls and centers. However, within the last decades the adjacent areas has been quickly developed by private developers.

Incidence of Water Logging, Causes and Effects

Though Dhanmondi is a planned residential area it has been through great morphological changes as well as has incorporated commercial uses.

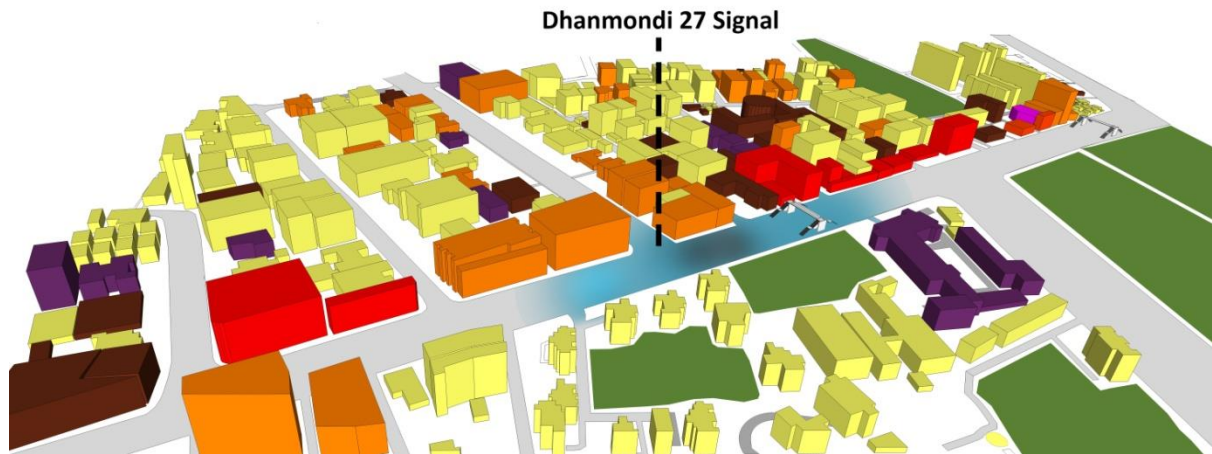


Figure 4: Image showing water stagnation in Mirpur road adjacent to Dhanmondi 27 signal, (During rainfall)

Moreover, in addition to shopping centers, that exist in a great number in the area, there are other commercial and institutional uses like private offices, cultural centers, restaurants, banks, etc all of which is making Dhanmondi a place of great rush and movement. These attract unwanted traffic, crowding, outside visitors, and cause scarcity of utility and resources, resulting in environmental deterioration (Chowdhury et al 2008). On the other hand Dhanmondi 27 signal and Mirpur road is a major arterial road of Dhaka that goes under water even in moderate rainfall. So the water logging of this point affects a large extent of population. Especially, in particular times of a day (i.e peak time of office travelers, end of school time etc.) the area mentioned faces haphazard situation. Figure 4 shows the worst affected area from in front of Rapa plaza to Sunrise plaza.

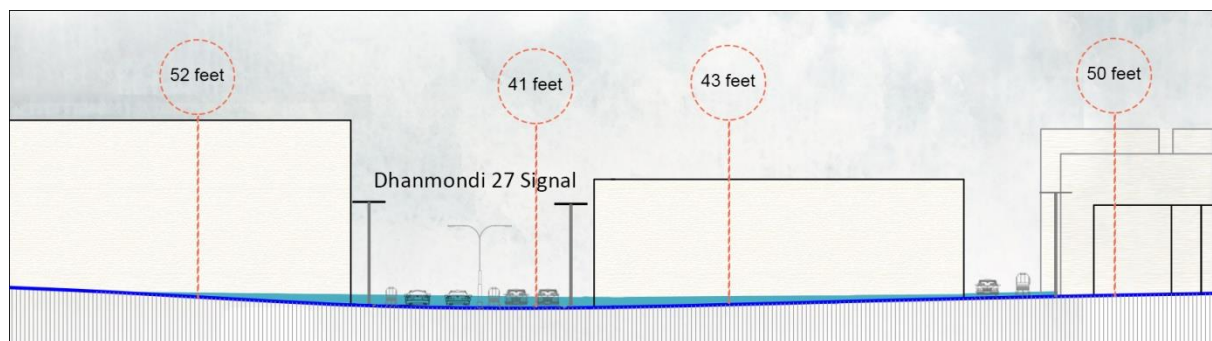


Figure 5: Section through Mirpur Road showing elevation data

The topographic data (Figure 5) showing different height of different points from the sea level where obvious the lower point is the Dhanmondi 27 signal.

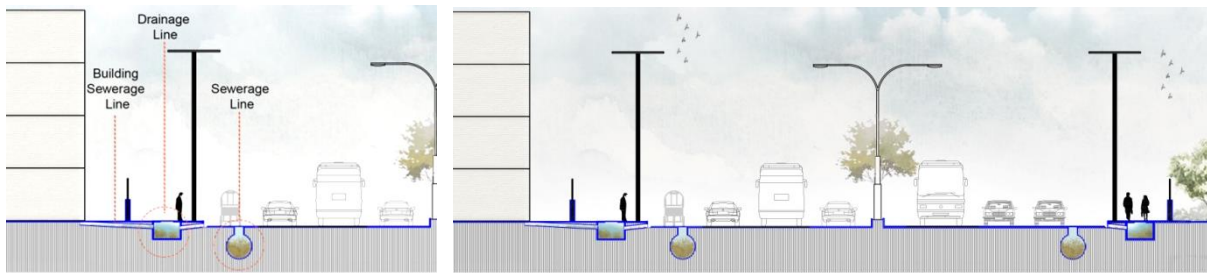


Figure 6: Section showing Sewerage line meet with drainage (left), Drainage full of garbage (right)

The poor drainage is another important cause of water stagnation in that point. Maximum area of the drainage line is filled up with garbage (Figure 6). Intrusion of commercial use in the residual area is in one hand welcoming more outsiders who are engaged in different activities and on the other hand resulting in increased use of local resources and waste formation (plastic bottles, bags, food container etc.) that are eventually clogging the roads and drains. In many cases the sewerage line is directly connected with the drainage line (Figure 6).



Figure 7: Water logging scenario in the site (taken 6 October 2017).

Major understanding from the Case

Despite of the presence of green areas and Dhanmondi Lake the particular area goes under water during monsoon as water cannot flow towards those areas. Apparently the lower elevation and uneven construction and clogged drains make water to stagnate and disrupt not only the local area residents but also the daily activities of people from a varying background who use the road. In this context, the area being an important point of connecting the whole city, it is imperative that this issue is considered seriously.

Way Forward

- Building construction rules if followed properly will ensure a great percentage of green space to allow water discharge.
- The prevailing laws regarding water body preservation if enacted may save the rest that are still in existence while retrieving the gone is not possible.
- Although mixed-use of buildings and lands are encouraged these days the extent may be defined and checked in order to secure a more local use of the commercial spaces than of a city scale.
- Maintenance of utilities (drainage, sewerage) on regular basis can solve the problem to a great extent by removing clogging of drainage and through monitoring of errors and need of repairing.
- Synchronization among different agencies (WASA, RAJUK, City Corporation etc.) can contribute to ensure sustainability of any endeavor regarding maintenance and repairing of sewerage, drainage or roads.

Conclusion

The problem of water-logging in any area of Dhaka city takes a catastrophic turn in to the whole city as the city is connected. Disruption in one point can collapse the normal life of a huge number of populations in this mega city. Therefore, now a day's water logging in Dhaka city is not merely a seasonal problem rather a great concern. It is a need of the time that, while Dhaka is heading in great pace and tremendous development is going underway (new cities, flyover, metro-rails etc.), water logging is addressed properly so that the developments do not prove to be unsustainable at the end.

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