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# EFFECT OF WATER LOGGING IN TANGAIL PAURASHAVA

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**Abstract**

The study attempts to show the present condition of water logging, causes and effects of water logging in Tangail paurashava. Out of 18, 8 wards were most vulnerable among them in ward 18, 90% people were affected by water logging. The drainage condition of the study area was not good and sufficient. In ward 13 and 15 where 90% and 85% people were affected by stagnant water. The data for the study area were collected from primary and secondary sources. The result of the study showed that major causes of water logging in study area were poor drainage system, heavy rainfall, low land and poor waste management system. Of these 40% respondent claimed heavy rainfall as a cause of water logging in Palpara (ward 7) and West Akurtakur para (ward 3) and 70% respondent claimed poor drainage system as a cause of water logging in Sabalia (ward 18) and Thanapara (ward 13). 60% respondent said that communication problem occurred in College para (W. 6) and Babystand (W. 11), 30% said that sanitation problem created in Biswasbetka (W. 15), 20% said that diseases occurred in Palpara (W. 7), and 50% said that mosquito problem created in Adalat para (W. 14) by water logging. This water logging became a burden for the inhabitants of Tangail paurashava and created adverse social, physical, economic and environmental impacts.

**Keywords**: Water logging, drainage system and vulnerability.

## Introduction

Bangladesh is experiencing environmental degradation due to rapid urbanization, increase in population and industrialization. The process of urbanization is linked with the economic development, which makes an increasingly higher contribution to the national economy. However, when the growth of urban population takes place at an exceptionally rapid rate, most cities and towns are unable to cope with changing situations due to their internal resources constraints and management limitations (Bari and Hasan, 2001). Provision of infrastructure services viz., water; drainage and sanitation along with waste disposal are greatest concern to human settlements. Failure to provide these services adequately results in many of well-known costs of rapid urbanization: threats to health, loss of urban productivity and environmental quality.

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For the rapid growth of urbanization a lot water logging in Tangail paurashava is not a new problem but the frequency of this problem of urban disasters are occurring day by day. Among these water logging problem is one of them is increasing day by day. Flooding due to rainfall is also a severe problem for Tangail paurashava that is inundated for several days. There are several places inundated due to flooding in many days which causes a lot of problems such as environmental degradation, sanitation, problem of traffic movement, mosquito, diseases etc to the inhabitants of town. The present study explores the water logging problems of a municipality in Bangladesh considering Tangail paurashava as a case. The study was conducted to observe the water logging situation and identify the most vulnerable place of the study area and to ascertain the causes and effects of water logging in Tangail Paurashava.

## Materials and Methods

### *Study area*

Tangail Paurashava was selected for the study area as a case due to its condition and development characteristics. The area is located within latitude of 24°25′96″ N and longitude of 89°92′54″ E. It was established in 1 July, 1987 with 5 wards. Then the paurashava re-established with 18 wards in 1999 with an area of 29.42 $km^2$ is bounded by Kalihati upazila on the north, Nagarpur and Delduar upazilas on the South, Basail upazila on the east, Belkuchi and Chauhali upazilas on the west (Banglapedia, 2009-10). The climate of the studied area is moderate. Out of 18, 8 wards of Tangail paurashva were affected severely by water logging. Following map has shown the study area (Fig. 1).

All of these wards were not equally affected by water logging. Some wards were most vulnerable and some were lower vulnerable than other wards. Average 70% people were affected by water logging. At Sabalia and Kodalia (18), 90% people were vulnerable by water logging. Lowest vulnerable position was Pal para (7) where 50% people were affected by water logging (Table 1).

**Table 1. Vulnerable wards of Tangail paurashava due to water logging.**

| Ward no. | Areas | Vulnerable (%) | Not vulnerable (%) |
|---|---|---|---|
| 3 | West Akur takur para | 70 | 30 |
| 6 | College para | 70 | 30 |
| 7 | Pal para | 50 | 50 |
| 11 | Babystand | 70 | 30 |
| 13 | Thana para, Tangail moholla | 80 | 20 |
| 14 | Adalat para | 75 | 25 |
| 15 | Biswas betka | 60 | 40 |
| 18 | Sabalia, kodalia | 90 | 10 |


**Fig. 1.** Map showing the study area of Tangail paurashava (Source: Tangail paurashava, 2013)

*Data collection*

To fulfill the objective of the study both primary and secondary data were needed. Primary data were collected through observation, physical surveys, interviews, and pre-test questionnaire. This research required a substantial amount of primary data collection through physical surveys. Mainly this study was based on quantitative and qualitative data.

To find out inherent causes of water logging in Tangail paurashava and its associate impact on city life, a field survey as questionnaire survey, informal interview and open discussion was conducted with the authorities of different concerned organizations, experts and people living in different wards of Tangail paurashava. The questionnaire was designed in such a way that it would track down the problem from the inception and the impact of the water logging in the locality. Out of 18, 8 wards were selected as study

area or water logging prone area. The number of respondents was randomly selected (100) on the basis of severity of water logging in different wards with different categories which were: ward no. (3, 6, 7, 11, 15 and 18) were 60; and ward no. (13 and 14) was 40. Informal interview of official experts of different development agencies was also taken in order to know their view of causes and effects of water logging in Tangail paurashava and sustainable solutions. Secondary data were obtained from relevant studies, reports, journals, newspapers and other government and non-government sources. Internets were another vital source of secondary data used in this report. For the purpose of the present study, several types of maps, rainfall data, the storm water drainage system data, solid waste and other waste dumping data and other related data were collected from the Tangail Paurashava office and related department and organizations. Lots of photographs were also collected directly from field survey and daily newspapers to illustrate the situation of water logging.

*Data analysis and presentation*

The data were analyzed by using Geographic Information System (GIS) like Arc/info, Arc/view etc. and other statistical computer software like, Microsoft Excel, etc. Finally the analyzed data were integrated and presented as maps, tables, and graphs and putted in the research.

## Results and Discussion

Water logging pattern was mainly two types depending upon the area. According to field survey, average 59.38, 31.88 and 8.75% people faced water logging problem respectively by stagnant water, running water and others. Most vulnerable ward was 13 no. and 15 no. where 90 and 85% people were affected by stagnant water. 50% people of ward no. 6, 11 and 14 was faced by running water (Fig. 2).

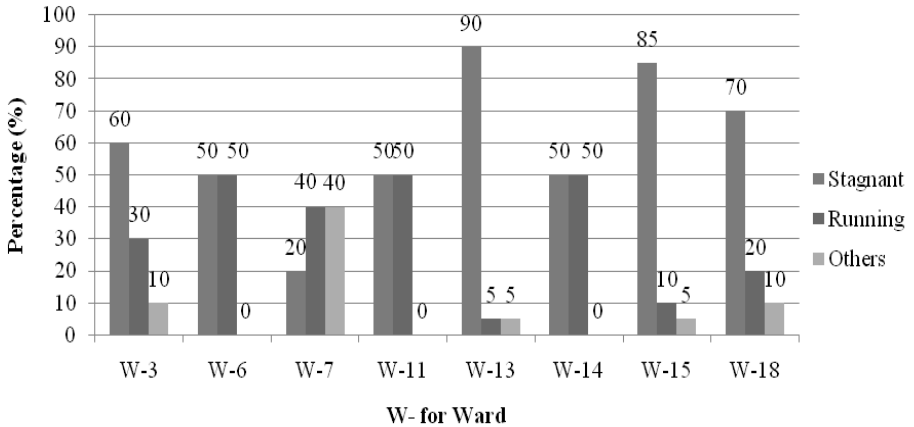


**Fig. 2.** Water logging pattern of Tangail paurashava.

According to respondent's opinion, in Sabalia (ward no.18) 60% claimed that water logging remained for 5 days because of low land and poor drainage system. 50% respondent said that logged water remained in Thana para (Ward 13) for 15 days because of poor drainage system and 20% people of ward no 3, 7 and 15 said that logged water remained for 10 days in the study area (Fig. 3).

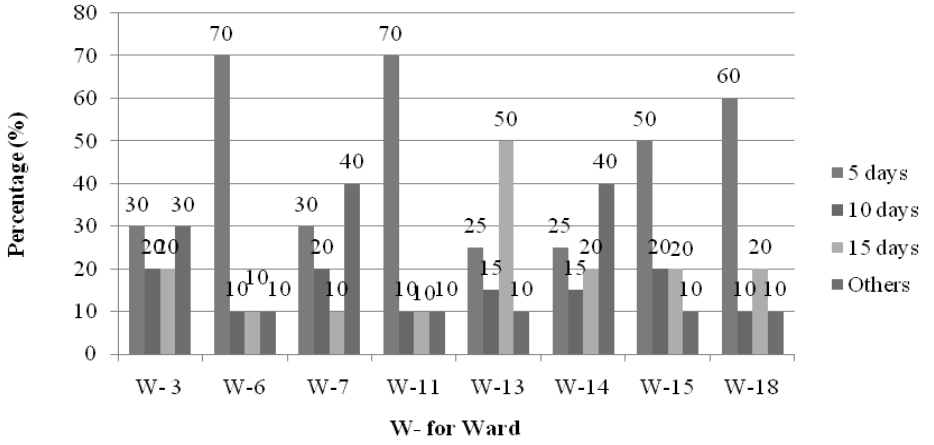


**Fig. 3.** Duration of water logging in Tangail paurashava.

*Causes of water logging in Tangail Paurashava*

According to survey, poor drainage system was the major causes for water logging of Tangail paurashava. Average 53.75% respondent was claimed that poor drainage system was the major causes of water logging in Tangail paurashava. Heavy rainfall, low land and some others also responsible for water logging that claimed respondent. 40% respondent claimed heavy rainfall as a cause of water logging in Palpara and West Akurtakur para and 70% respondent claimed poor drainage system as a cause of water logging in Sabalia (ward 18) and Thanapara (ward 13).

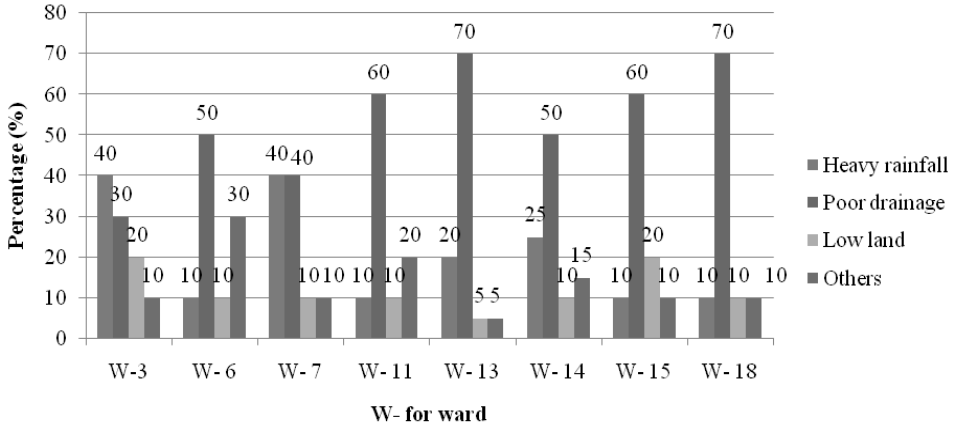


**Fig. 4.** Causes of water logging in Tangail paurashava.

*Other causes of water logging in study area*

Water from Tangail paurashava is drained out through the drainage system into the Lohojong river which situated western part of Tangail paurashava. There is another channel behind the Victoria road, Nirala moor which linked with the Lohojong River through Park bazar. But uncontrolled and haphazard disposal of solid wastes and garbage into the existing drainage system, and encroachment on lakes, khals/canals and rivers with unauthorized construction were responsible for disappearing the natural drainage system in this paurashava. The total length of drain in Tangail Paurashava was about 84.03 km. Some were pucca and some were kaccha. The pucca drain was about 59.20 km and kaccha was about 24.83 km which was very insufficient in the study area (Tangail paurashava, 2013).

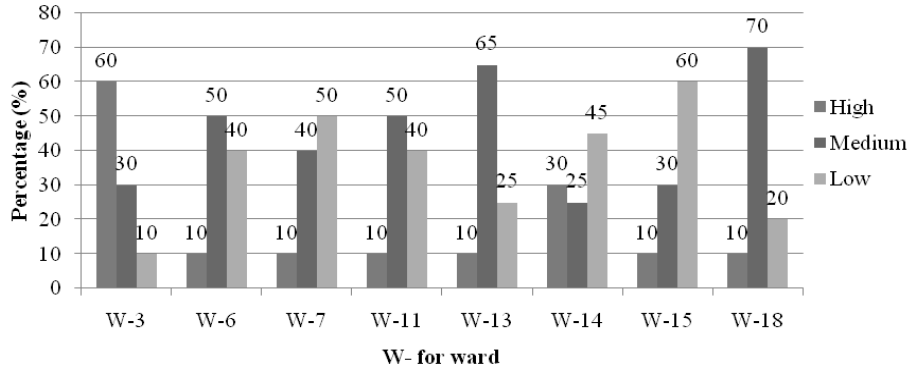


**Fig. 5.** Drainage condition of Tangail paurashava.

According to survey, average 18.75% respondent claimed that the area was contained with high quality of drainage system, 45% said medium and 36.25% said very low quality drainage system of Tangail paurashava. 60% respondent said that west Akurtakur para was covered with high quality of drainage system (Fig. 6). In this area some new drains had been added to remove water logging. Respondent had claimed that drains were good but not sufficient.

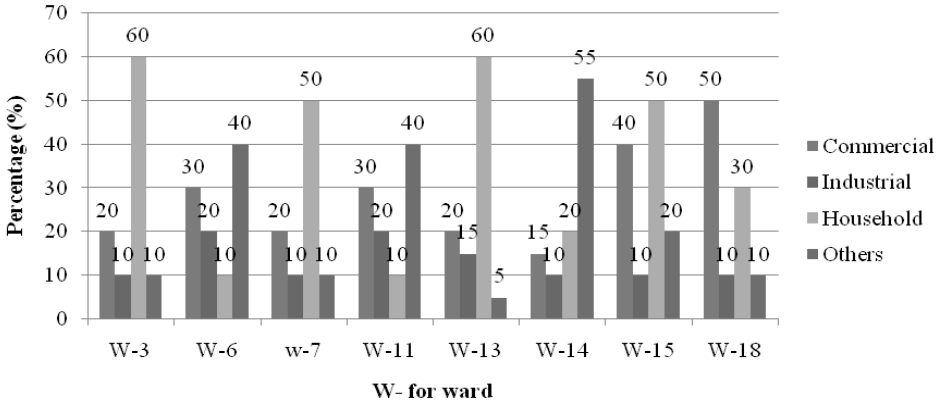


**Fig. 6.** Sources of urban waste in Tangail paurashava.

The major sources of solid waste in Tangail paurashava were residences, streets, market places, commercial establishment, and hospitals. Maximum of these waste were dumped into the open space and directly into the drain which caused water logging. According to survey average 36.25% household, average13.12% industrial and average 23.75% others wastes were produced every day in study area. (Fig. 6)

*Encroachment*

Most of drains of Tangail Paurashava disappeared or are in way to lose their existence due to illegal encroachment on the rivers and khals/drains through unauthorized construction and solid waste.

*Development work during rainy season*

Development works like construction of roads, sewerages, underground telephone and electricity lines etc. created unwanted obstacles into the drainage networks and hampered the smooth flow of storm water, therefore created water logging in the city area.

*Lack of policy guidelines and its implementation*

Lack of regulation; weakness in the existing regulations for development control, waste disposal, encroachment; negligence of the authorities for its implementation were responsible for water logging in Tangail Paurashava.

*Effects of water logging in Tangail paurashava*

Water logging became a burden for the inhabitants of the city, leading to and creating adverse social, physical, economical as well as environmental impacts. According to field survey 2013, average 41.25% respondent was claimed that water logging created the communication problem.

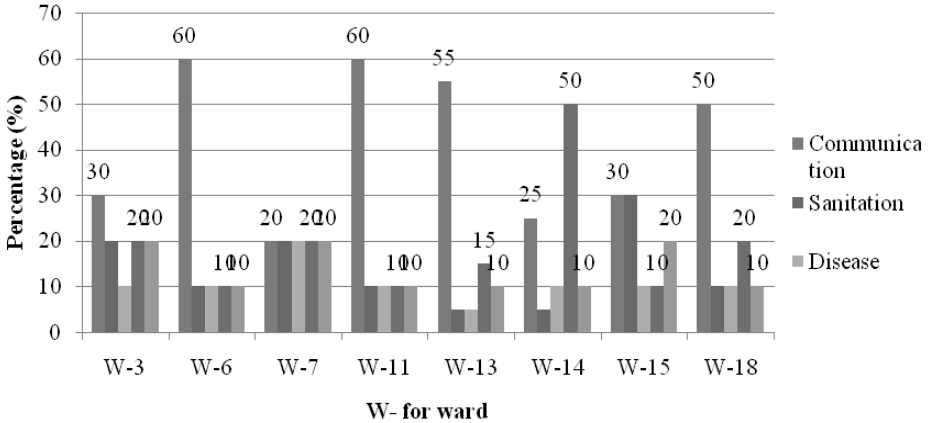


**Fig. 7.** Problems of water logging in Tangail Paurashava.

Sanitation 13.75%, diseases 10.62%, mosquito 19.37%, and others 13.75% were responsible for water logging according to respondent. 60% respondent said that water logging occurred communication problem in College para and Babystand, 30% said that it occurred sanitation problem in Biswasbetka, 20% said diseases problem in Palpara, and 50% said mosquito problem in Adalat para.

*Other problems of water logging*

The associated other problems due to water logging and its chain effects on human life are as follows:

*Disruption of traffic movement and normal life*

According to survey (Fig. 8) average 30.63% men, 27.5% women, 24.38% children, 17.5% others were affected by water logging. Most vulnerable group was men (40%) in Biswasbetka, Palpara and Adalat para, in Sabalia 50% was women and in Biswasbetka 40% was children who were affected by water logging.

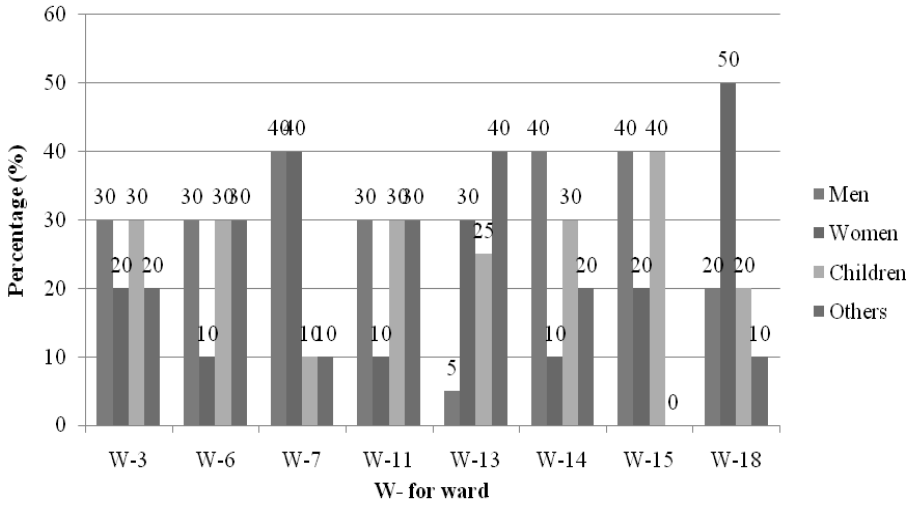


**Fig. 8.** Vulnerable group of water logging.

*Damage of infrastructure*

Respondent mentioned that metalloid pipes of various underground utility services such as water, telephone, sewerage etc. were damaged and they lost their longevity due to water logging in study area.

*Water pollution*

Lakes, rivers, canals were polluted by logged water in study area. Different survey reports in different periods shows that the water of lakes and rivers (Lohojong, Dhaleshwari rivers-the receiving water bodies of storm water) flowing in and around the Tangail Paurashava was completely polluted.

## Conclusion

Tangail paurashava is one of the most densely populated towns in Bangladesh. In recent years Tangail paurashava is facing extensive water logging during the monsoon (May to October) as a common and regular problem of the town. Two types of water logging were occurred by running and stagnant water in this area. Major causes of water logging in study area were poor drainage system, heavy rainfall, low land and poor waste management system. Of these 40% respondent claimed that heavy rainfall as a cause of water logging in Palpara (ward 7) and West Akurtakur para (ward 3) and 70% respondent claimed poor drainage system as a cause of water logging in Sabalia (ward 18) and Thana para (ward 13). 60% respondent said that communication problem occurred in College para (W. 6) and Babystand (W. 11), 30% said that sanitation problem created in Biswasbetka (W. 15), 20% said that diseases occurred in Palpara (W. 7), and 50% said that mosquito problem created in Adalat para (W. 14) by water logging. Some important measures can help the authorities for comprehensive management of water logging and minimize the suffering of the town dwellers through development control, comprehensive drainage development plan, establish 'Right of Way', improvement of drainage management system, awareness development against blocking of drains.

## References

Bari, F.M. and M. Hasan, (2001). Effect of urbanization on storm runoff characteristics of Dhaka city. Tsinghua University Press. XXIX IAHR Congress. Beijing.

BBS (Bangladesh Bureau of Statistics), (2011). Bangladesh population census 2011, Zila: Tangail. Government of Bangladesh.

BBS (Bangladesh Bureau of Statistics), (1997). Urban Area Report 1997, Government of Bangladesh.

Chowdhury, J.U., (1998). Measurement and analysis of rainfall runoff in selected catchments of Dhaka City. Institute of Hydrology. Wallingford, UK.

CIRIA, (2001). Sustainable urban drainage system: Best manual practice for England, Scotland, Wales and Northern Ireland. CIRIA C523. London.

Huq, S. and M. Alam, (2003). Flood management and vulnerability of Dhaka City. Bangladesh Center of Advance Studies (BCAS). Dhaka.

Muhammad, I., S.S. Prem and S.O. Tariq, (2000). Environmental hazards plants and people, CBS Publisher and Distributors (1st edn), pp: 38-49.

Islam, N. ed., (1998). Recent urban studies, Bangladesh. The University of Dhaka. Dhaka.

Islam, N. ed., (2000). Urban Governance in Asia: Sub-regional and city perspective. Pathak Shamabesh. Dhaka.

Islam, N. ed., (2001). Urbanization, urban planning and development, and urban governance: A reader for studies. Center for urban studies (CUS), Dhaka.

JICA (Japan International Cooperation Agency), (1991). Master plan for greater Dhaka flood protection project, FAB 8A. Main report and supporting report-II. Flood plan coordination organization (recently WARPO), Dhaka.

JICA (Japan International Cooperation Agency), (1992). Feasibility study of greater Dhaka flood protection project, FAB 8A. Flood Plan Coordination Organization (recently WARPO), Dhaka.

Khalequzzaman, M., (2001). Flood control in Bangladesh through best management practices. Department of Geology and Physics, Georgia Southwestern State University. Americus, GA 31709, USA.

Khan, S.A. and J.U. Chowdhury, (1998). Dhaka city storm water quality assessment. Institute of Water and Flood Management (IWFM), BUET, Dhaka.

Mark, O. and A. Chusit, (2002). Modeling of urban runoff in Dhaka city. Asian Institute of Technology (AIT), Thailand.

Rabbi, K., (2001). A mouse GIS study of the drainage in Dhaka city. Surface water modeling center (SWMC), Dhaka.

Yeasmin, S., (2003). Water logging in city. The New Nation (Bangladesh's Independent News Source), August 14, 2003, Dhaka.