

Case Study on Water Logging Problem in an Urban Area of Ahmednagar City

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Abstract - Water Logging is become a severe problem in metropolitan region with the increase of the high-rise buildings, which made the land congested and disrupted also. The sewerage and drainage system is disrupting day by day due to unscientific land use system in the city. Mainly in the central portion of this metropolitan city's decreases the amount of open surface and there has created submergence due to ongoing high rises. So there are crises in this area badly due to water logging situation after small downpour. Water Logging is a persistent problem in different area, this work is trying to identify the locational extent of the city with its affected area by water logged condition and to find out the main causes and result that led it to be a hazard. It analyses and picture out the main waterlogged zone, characters of canal and channel which helping to pass out the storm water flow from different part of the city, the drainage flow character and behavior, ward wise waterlogged area with its varying depth, roads which are affected due to water logging, the traffic situation and the number of people affected by the water. So, it also analyzed the proposed plan like setup new pumping station, development of sewerage system etc. which help to the people to get rid of that devastating situation hampering the socioeconomic situation of the city.

a very short span of time creates water-logged situation in both the rural and urban areas. Water-logging problem is one of the main reasons for land degradation, In our country. Drainage network is an important element for any community. The artificial and natural drainage helps to remove sullage and storm water from surface and prevents many problems such as water logging, environmental pollution etc. So it has importance in the natural consequence as well as in our daily life. Drainage in human settlements has assumed considerable significance due to the enormous population growth and the rapid but haphazard urbanization evident in most countries. Failure to provide adequate drainage is directly linked to the resurgence of malaria, the spread of diarrhea diseases, damage to housing and property, disrupted communications, and environmental degradation. Therefore this paper focuses on the theoretical framework of the study and thus tried to clarify the terminologies and others important matter which will give a clear idea regarding the subject matter of the study. Our aims to do a case study of the current urban water logging in Delhi-Gate area of Ahmednagar City, trying to highlight the main causes behind it, the effects of water logging in the area and the remedial measures to counter act the water logging crises.

Key Words :- Waterlogging, Urban Area, Drainage Study, Delhi-Gate

2. STUDY AREA

1. INTRODUCTION

In recent years, rainfall-induced water-logging has become a common hazard in the Urbanized areas. Water Logging is a form of natural flooding that occurs with over-irrigation, heavy rainfall and water that rises from underground levels to surface. This causes water in soil to become displaced, natural processes in the soil are affected and there is build -up of toxic substances in the soil, which can causes problems with growth of plants in the immediate area. It also happens due to unscientific management of water and obstruction of natural drainage systems by the haphazard embankment construction through disrupting the balance of inflow and outflow of water. The word "water logged" is used as an adjective referring to soil that is saturated with water and thus cannot keep oxygen between its particles. Sometimes, excessive rainfall within

Ahmednagar, It is a city in the state of Maharashtra, in India, about 120 km northeast of Pune and 114 km from Aurangabad. The average annual rainfall is 561 mm in the city. Climate of Ahmednagar district is generally hot and dry. In Maharashtra, Ahmednagar district gets rain mainly from south-west monsoon, but the distribution of it is mostly uneven. The rainfall is adequate and concentrated in the western part of Akole tehsil and it decreases as one proceeds towards east. About 77% of the annual rainfall of the district is received during the south-west monsoon season, September being the rainiest month. The district, mostly lies in the rain shadow to the east of Sahyadri. Therefore, the Ahmednagar district is known as a drought stricken region of the Maharashtra But it's not always regular. The total area of the Ahmednagar city is 1741271 hector. The district is drained by two chief rivers ,the Godavari and the Bhīma a tributary of the

Krishna. The Water-shed line is the great spur of the Sahyadris which branches off at Harichandragad and stretches completely across the district from west to east. The important rivers flowing through the district are Paravara, Mula, Sina and Dhora. Pravara is tributary of the river Godavari. Waters of the river Pravara fall from a great height, creating the Randha Falls. As per the information of Ground Water Survey Development Agency, Ahmednagar district is divided into 80% of the catchment area of Godavari, Bhīma and Sina rivers. In Ahmednagar city, near Delhi Gate region this gate is one of the ancient gate and well-known landmark in Ahmednagar. This gate is stonework and having two small windows inside to watch. The oldest Maruti temple is located near to this gate. The average annual rainfall in Delhi Gate is 360mm. There is improper disposal of garbage on streets & road due to this, residence living in that locality faces problems & health issues.

3. METHODOLOGY

This work is mainly based on several collections of data. Collection of all the information about Delhi-Gate Area, analyzing and checking of data. Which includes, surface area of Delhi-Gate, terrain (steep or flat), location of Delhi-Gate on city map, No. of hotels, schools, colleges, shops etc. situated in that area. Collection of data from local authority i.e. From Municipal Corporation of Ahmednagar city which includes Ahmednagar City Plan, Drainage Plan Of Delhi Gate Area, Population of the city & people leaving nearby in that area, Drainage Plan in that area & Average Rainfall of city etc. And Study of existing drainage system and to define new diameter for the drainage pipe.

3.1 Problem Identification

- To identify the water Logging prone area by the AMC. Delhi gate area in Ahmednagar City is the most water logged area.
- The construction of existing drainage system is improper Drainage system get clogged due to heavy rainfall.
- There is improper disposal of garbage waste.
- The existing drainage system is full in off season but during monsoon it get over flow.
- There is defective air circulation. The existing drainage system is open.

3.2 Cause of Water-logging

Inadequate surface drainage - When the surface drainage is not adequate, the heavy precipitation in the area is not drained off quickly and the rain water remains stagnant

over the area for considerable time. This gives rise to heavy percolation and water table rises in the area. Obstruction of nature drainage - If the nature drainage is obstructed by irrigation channel, rail or road embankments, it will not be able to pass the rain water of catchment. There will thus be flooding of land and consequent water Logging. Obliteration of natural drainage - Sometime the cultivators plough up and obliterate an existing natural drainage. This results in to stoppage of storm water flow, consequent flooding and water Logging. Topography, geological features and rainfall characteristics of an area can be the natural causes of water Logging. Introduction of surface water irrigation facilities disturbs the balance between natural outflow and inflow of ground water reservoir. The main reason behind the water Logging is Logging of drainage network due to plastic garbage bags. Throwing of domestic and household waste directly on streets. Due to heavy rainfall and Improper planning of existing drainage system. This leads to water logging crises in the city and also in the Delhi-Gate area. The following picture indicates the Water Logging crisis during rainy season in Delhi- Gate area.



Fig -1: Water-logging problem due to heavy rainfall.

3.3 Effects of Water-logging

1. Durability of road decreases.
2. Roads are blocked leading to traffic jams, pedestrians have to wade through flooded streets and especially the urban poor, living in slum.
3. Failure of road.
4. Sometimes drainage line may get cracks or it may get burst.
5. People living in locality faces problem.
6. Defective air circulation
7. Destruction of roads occurred due to reduced bearing capacity of waterlogged soil.
8. Difficulty in cultivation operations.
9. Growth of unwanted wild plants.

Table -1: Different Types of Problems Faced due to Water Logging in Urban Areas of Delhi-Gate

Problem	Percentage
Disruption in Traffic Movement	90
Disruption in Normal Life	85
Damage of roads	85
Damage of houses	10
Damage of household goods	10
Damage of commercial sector	15

The heavy rains make some parts of the city to suffer from water Logging and Delhi-Gate is one of the area dealing more water-Logging problems. Due to improper garbage dumping by the public the sewers get choked with garbage which exacerbates water Logging. So, water Logging makes the life of Ahmednagar city dwellers miserable as the roads. The logged water becomes polluted with solid waste, silt and contaminants that are washed off from roads. The increase in volume and rate of logged water causes erosion and siltation. It becomes a burden for the inhabitants of that urban area, leading to unhygienic environment and creating adviser social, physical, economical as well as environmental impacts.

4. Conclusion

The diameter of circular pipe should be near about adequate. The sufficient slope should be maintained through the drainage system. The half full condition is suitable for efficient working of drainage system. Proper system to be provided to enter the runoff water into the drainage system. The drainage system should be fully closed. Proper Solid Waste Management is required. A helpline should be started where citizens could report instances of water Logging problem. Usage of pervious cement blocks for pavements and driveways, parking lots etc. which allows rain water to drain down into the earth up to 50 % should be used. Low lying areas should be identified and adequate pumping arrangement into proper disposal facility should be arranged. The overall studies have identified the main waterlogged zone , ward wise waterlogged situation and its varying depth , waterlogged road and traffic congestion and the people who have been suffered from water-borne diseases(mainly in the slum). A.M.C had provided recommendation for maintaining the drainage and sewerage system. But all of are not

materialised properly due to lack of A.M.C interest and this worst situation are increase day by day and people are affected badly. Water-logging is the resultant function of relationships between geological structure, soil types, surface elevation, slope, drainage density, haphazard embankments, depth of ground water, human activities, and so forth, from the spatial as well as environmental perspective. Detailed engineering survey is a pre-requisite for planning of tertiary drains. The existing drains and also those will be constructed shall have to cleaned at regular interval. Maintenance and cleaning of drains shall have to done at least once in every year specially before starting of monsoon season.

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REFERENCES

- [1] Ria Roy, Md Kutubuddin Dhali. Seasonal Water logging Problem In A Mega City: A Study of Kolkata, India Journal of Research in Humanities and Social Science Volume 4 (2016).
- [2] Nureen F Anisha, Shahadat Hossain. A Case Study Of Water Logging Problem In An Urban Area Of Bangladesh And Probable Analytical Undergraduate student, Dept. of WRE, BUET, Dhaka, Junior Engineer, Institute of Water Modelling (2014).
- [3] Abhay Sankar Sahu A Study on Moyna Basin Water-Logged Areas (India) Using Remote Sensing and GIS Methods and Their Contemporary Economic Significance Volume (2014).
- [4] Akter, A., Mohit, S. A., & Chowdhury, M. A. H. (2017). Predicting urban storm water-logging for Chittagong city in Bangladesh. International Journal of Sustainable Built Environment.
- [5] Christen EW (1994) The feasibility of using mole drainage to control waterlogging in irrigated agriculture. PhD thesis. Silsoe College, Cranfield University, England
- [6] Belford R and McFarlane D (1993) Managing waterlogging and inundation in crops. Department of Agriculture and Food, Western Australia. Farmnote.