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Urban Flood Hazard Vulnerability & Risk Assessment of Aurangabad City

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ABSTRACT: Urban flooding has become a regular phenomenon in many towns and cities in the Asia Pacific region over the past years. Professionals associated with disaster management and climate change are at the fore-front of addressing urban flooding. To reduce flood risks, vulnerability and its components must be understood. Vulnerability assessment methods are diverse and complex, with a varied nature of understanding the key terms used in various contexts, and this diversity ultimately reflects on the interpretation of results in research settings. Diverse interpretations and definitions exist in the disaster risk and climate change literature, complicating the process of astute and comprehensive vulnerability assessment. The main purpose of this study was to quantify vulnerability indicators and develop a multidimensional model for vulnerability assessment. Vulnerability is explored through the lens of five dimensions: social, economic, physical/infrastructural, institutional, and attitudinal. This methodology is applied to urban flooding in India, to verify the proposed model. These study sites in urban areas with different population sizes, situated in high-risk flood zones in the Aurangabad Maharashtra India were selected for empirical investigation. A household survey was conducted, and indices were developed for each dimension based on well-defined indicators. The proposed methodology for vulnerability assessment was tested and found operational. This method can be replicated irrespective of spatial scales and can be modified for other disasters by streamlining hazard specific indicators.

KEYWORDS: Urban flooding, risk assessment, vulnerability assessment

I. INTRODUCTION

Urban Flooding is an inundation of land in a constructed setting, particularly in densely populated areas. It happens when rainfall or allied instances overwhelm the capacity of drainage systems. Overburdened drainage, unregulated construction, no regard to the natural topography and hydro-geomorphology all make urban floods a man-made disaster. Urban flooding is a critical issue affecting many countries worldwide with severe consequences on the lives of their residents. As population and urbanization is rapidly growing in Aurangabad city there are the chances of have hazard due to urban flood. The increasing population in urban areas can make urban flooding more vulnerable as large number of population gets hit by its adverse effect, diseases can be widely spread. Due to increase in rainfall intensities previously designed storm water drainage system gets overflowed due to its previous design and poor maintenance. To avoid choking and overflow of storm water drainage system and to save locality from several diseases born from water logging urban flooding concept is must focused.

In this paper, we conduct a case study of the flood hazard vulnerability and risk assessment in Aurangabad city at some critical zones. Understanding of present and future flood risk is still a challenge, since both contextual characteristics and climate changes influence flood risk with uncertain and unclear impacts. Contextual characteristics include both the geographical dimension (hazard formation and its interaction with the territory) and the socio-economic aspects of the society (social, economic).

The aim of the study was to understand the problems of increasing flooding incidences in urban areas and related contexts of urban development and ecological issues. Paper is organized as follows. Section II describes automatic text detection using morphological operations, connected component analysis and set of selection or rejection criteria. The

flow diagram represents the step of the algorithm. After detection of text, how text region is filled using an In painting technique that is given in Section III. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

II. RELATED WORK

Flooding is a critical issue affecting many countries worldwide with severe consequences on the lives of their residents[1].The prevention of disastrous flood events is supported by models and quantitative flood risk assessments that provide the evidence for risk-based decision making[2]. A number of major cities and towns in India reported a series of devastating urban floods in the recent decades [3], Challenges of urban flooding in terms of drainage and flood mitigation including structural and non-structural measures and key issues of urban ecology in two major metropolitan cities of India – Bangalore and Chennai, have been studied. Risk management challenges in the context of land-use, city and population growth, wetland degeneration, waste disposal have been discussed [4]. In [5], unplanned urbanization has drastically altered the drainage characteristics of natural catchments, or drainage areas, by increasing the volume and rate of surface runoff. Drainage systems are unable to cope with the increased volume of water and are often encountered with blockage due to indiscriminate disposal of solid wastes The authors in [6] demonstrate an approach for citywide urban flood vulnerability assessment based on the capability of storm-water drainage network.

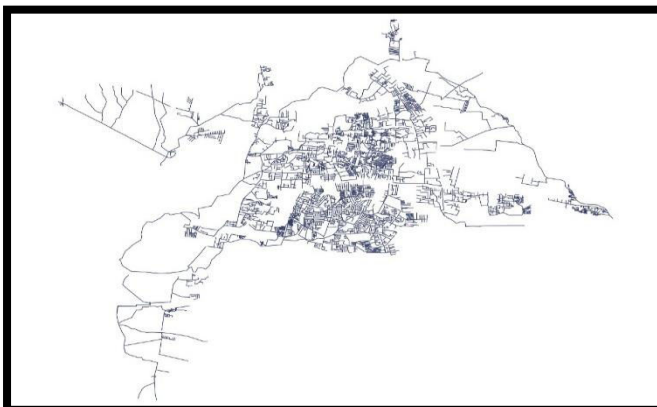
The threat of urban flooding will increase in India in the near future due to excessive unplanned urbanization, development without disaster mainstreaming and climate change. The risk of urban flooding has already been aggravated due to poor drainage system, shoddy land use planning, ignoring flood plain zoning and aging infrastructure in the cities. The issues has particularly increased over the last two decades as the natural land cover of the earth's surface and vegetation are being replaced by built-up structures, roads and other impervious surfaces leading to increased runoff due to rapid urbanization and population growth.

III. METHODOLOGY

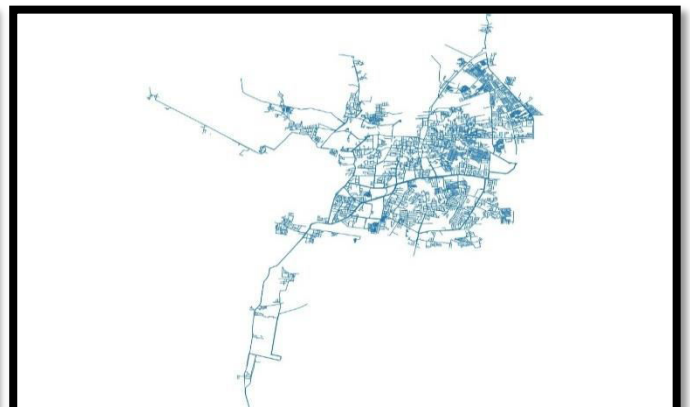
Aurangabad is not the city where there are the chances of having heavy rainfall more than excess and causing condition of flood nowadays but as population index and rainfall intensity is varying and increasing there are severe chances of urban flooding. For assessment of flood risk and vulnerability zones we prepared the DEM(digital elevation model). For that we collected Road network of Aurangabad city, Aurangabad municipal corporation boundary, Drainage line plan, sewer line plan. Overlayed all these maps to get the low laying area that is the area or part or locations of Aurangabad city which are in depressions or at lower elevation. After getting low elevation locations we decided to conclude the survey regarding drainage line, reasons of water logging etc.

IV. EXPERIMENTAL RESULTS

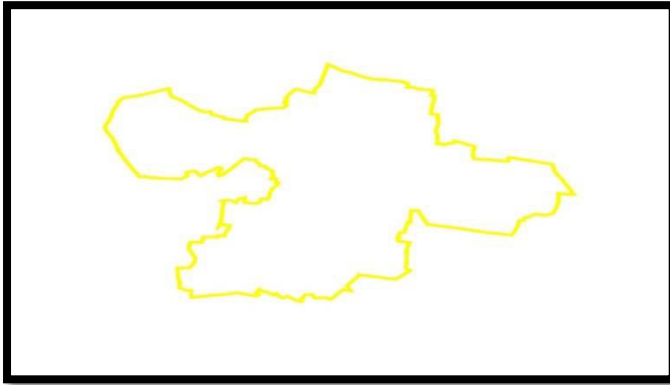
Figures shows the results of data collection and DEM preparation .(A) is the drainage line map of the Aurangabad city,(B) is the water supply network of city,(C) is Municipal corporation boundary of Aurangabad city,(D) is road network.



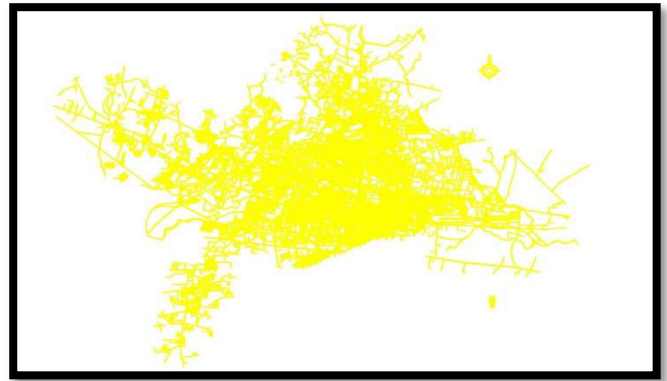
(A)



(B)

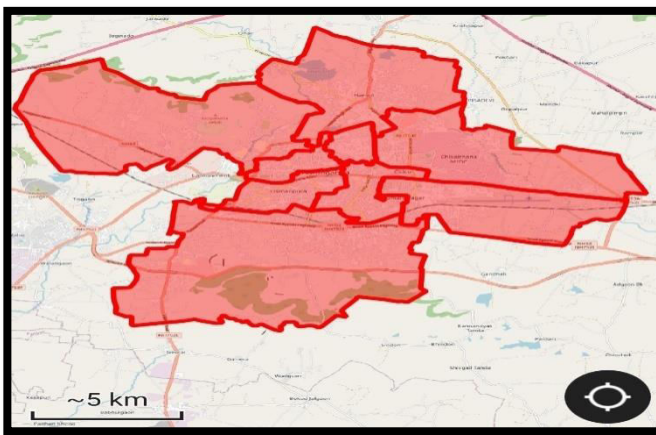


(C)

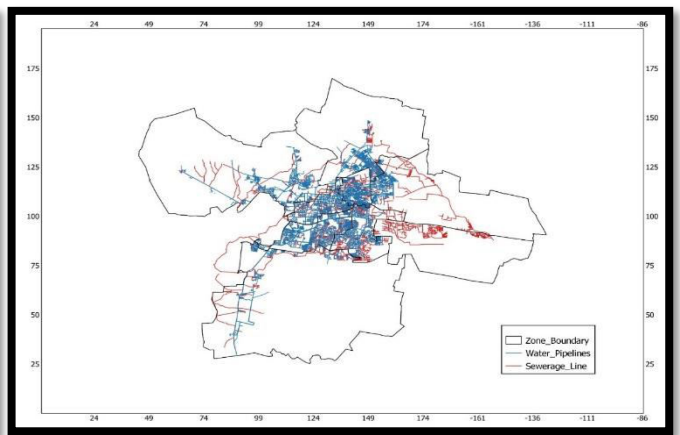


(D)

Fig. (E) shows zonal boundary of Aurangabad city, (F) is Overlaid map of sewerline, water supply network, zonal boundary and municipal corporation boundary of Aurangabad city,

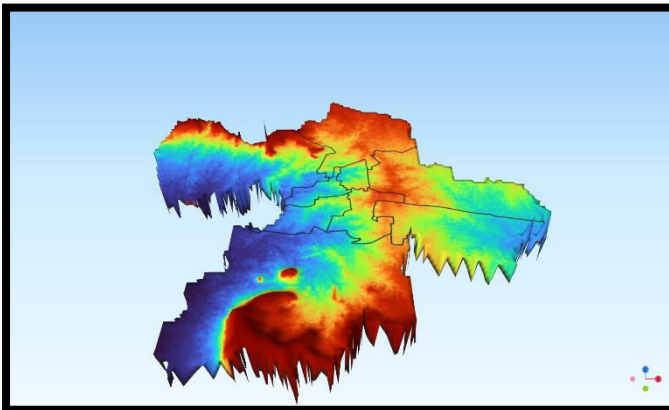


(E)

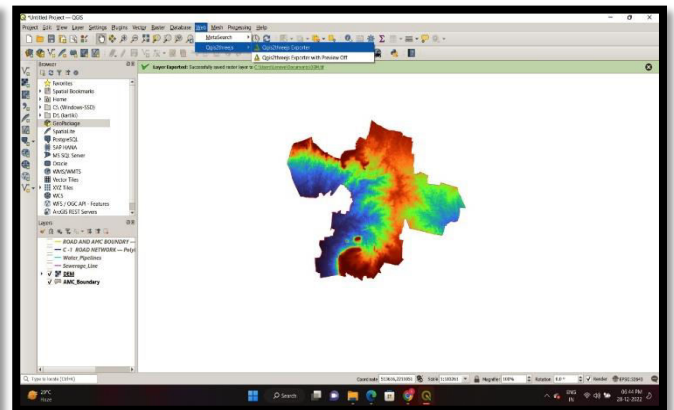


(F)

Fig (G) and (H) shows DEM of all the maps and LULC of Aurangabad.



(G)



(H)

Following are the images clicked during city survey regarding urban flooding at the locations collected from DEM file Above image are clicked at location Rajabajar,like wise clicked at the possible locations and got to know that



Aurangabad city has risk of having urban flooding in upcoming years.

V. FINDINGS

The main objective of preparing DEM is to find out lower elevation areas or locations of the Aurangabad city in order to perform the survey regarding drainage facilities and water logging cases if there. The locations we got from the DEM are as follows:



Sr. No.	Location	Sr. No.	Location	Sr. No.	Location
1	Sharnapur	12	Bhavsingpura	23	Jaysingpura
2	Kasliwaltarangan	13	Nanadanvan colony	24	Panchakki
3	Padegaon	14	Bibi kamaqbara	25	Jubli park
4	Naralibagh	15	Central bus stand	26	Aurangpura
5	Paithan gate	16	Ajabnagar	27	Usmanpura
6	Sahabazzar	17	Deodibazzar city chowk	28	Dalal wadi
7	Devandevdi	18	Junamondha	29	Samarthnagar
8	Chitamani colony	19	Kokanwadi	30	Panalalnagar
9	New usmanpura	20	New sheryanagar	31	Jay nagar
10	Joti nagar	21	Peer bazaar	32	Vits hotel
11	Bancilalanagar	22	Railway station aurangabad	33	Jalannagar

VI. CONCLUSION

We focused on to quantify vulnerability indicators and develop a multidimensional model for vulnerability assessment. Vulnerability is explored through the lens of five dimensions: social, economic, physical/infrastructural, institutional, and attitudinal. We observed the so many problems occurred due to flooding in Aurangabad city due to drainage system and we also found out the set of solutionsforthe problems.



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