

# URBAN FLOODING BY REMOTE SENSING AND GIS IN WEST ZONE AHMEDABAD

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**Abstract** - Ahmedabad is the largest and most populated city of Gujarat. The city is on flat terrain and Sabarmati river runs through its center. The city is highly vulnerable to the urban flooding mainly in monsoon season. The floods in the city happen mainly due to man-made activities relevant to blockage of natural drainage, unsystematic construction of roads, building and storm water drainage network. Mainly the western zone of city is at high risk, also it is highly urbanized and also covers some main areas of city, first step is to identify the area of the zone which is at higher risk of flood disaster. Hence this study focused on recognize flood risk zone in western zone of Ahmedabad city by multi-criteria decision analysis by geographical information system by remotely sensed data.

**Index Terms** – Urban flooding, multi-criteria decision analysis, Flood disaster, Remote sensing, Vulnerability.

## 1. INTRODUCTION

Now days, urban population is increasing rapidly with this growing urbanization and climate change, urban flooding and water logging problems are frequently occurring hazards. Urban flooding has caused extensive economic, social, environmental and human losses.

There can be many reasons of urban flooding like unplanned urbanization, haphazard construction of roads, buildings, blockage of natural drainage, poor waste management, insufficient drainage system, high rainfall intensity. The main reason of major floods are caused due to heavy rainfall, high tidal condition with inadequate drainage and runoff.

For appropriate management of urban flood hazards, flood modeling and forecasting is very essential. It required huge data management and surveying “Remote Sensing and Geographical Information System” technologies helps to collecting, monitoring and managing the data at a distance. Which is mostly done by observing earth surface from aircraft or satellite. It can be used in flood planning, land suitability analysis, flood zone making, flood risk mapping, run-off simulation, digital elevation modeling etc.

## 2. Need of study

- The western zone of Ahmedabad covers some main areas of the city included Ambawadi, Vasna, Paldi, Wadaj, Sabarmati, Usmanpura, Navrangpura etc And also have some public places like schools, hospitals, banks, market, colleges etc.
- Due to closeness with river Sabarmati, Pattern of land use, poor storm water drainage network is highly vulnerable to the flood and water logging.
- This study will be helpful for local planning authorities and planner to identify the flood vulnerable area of the zone and to take proper decision at the time of flooding by assessing the flood risk.

### ➤ 2.1 AIM

- Aim of the research is to make the flood vulnerability map of western zone of Ahmedabad and to analyze the reasons and to give accordingly solution.

### ➤ 2.2 OBJECTIVES

- To prevent or minimize the effects of urban flooding
- To spread awareness about urban flooding
- To protect urban area and its properties and lives
- To preparedness of urban flooding situations
- To recover after flood happened

### ➤ 2.3 SCOPE

- To analyze the flood vulnerability of western zone of Ahmedabad city to minimize flood effects.

3. STUDY AREA

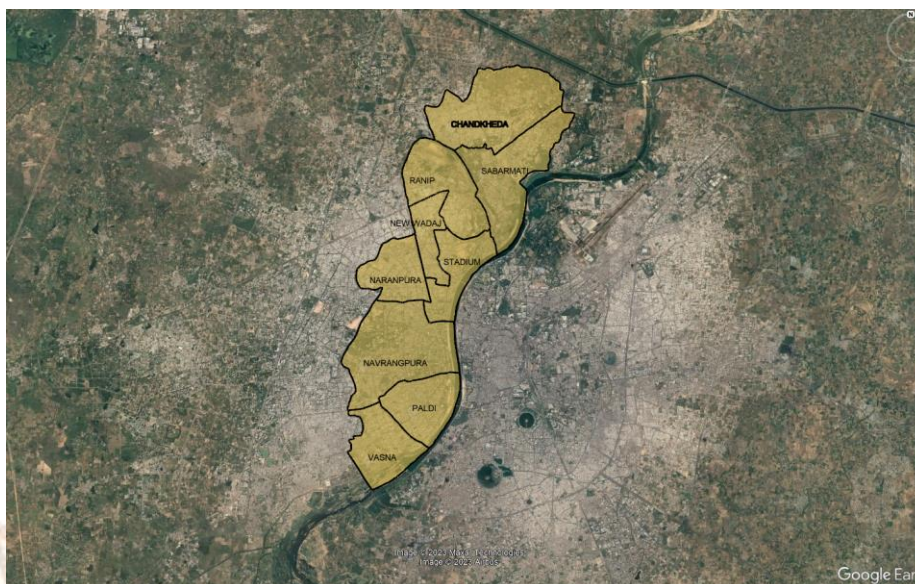


Figure 1 Study Area  
(source :- Google Earth)

Ahmedabad is the largest and most populous city of Gujarat and located at 23.03° N 72.58° E in north-central Gujrat at the banks of sabarmati river and covers 505 km<sup>2</sup> area. The average elevation of the city is 53 meter (174 ft above sea level). The Ahmedabad is divided by the two physically distinct eastern and western region. It is divided into 9 zones central, east, north, north-west, south, south-west, west zone. Average annual rainfall is about 782 mm and city is on flat terrain and western zone contains some low lying area as well so water logging problems are happen during monsoon.

4. DATA COLLECTION

The data collection involved collection of base maps of Ahmedabad city, Zone map (west zone), Topography data, Satellite data, Rainfall data, Land use/ Land cover, Population density, Geographical details.

| Sr No. | Data                       | Sources                                   |
|--------|----------------------------|---|
| 1      | Base map of Ahmedabad city | Google earth                              |
| 2      | Zone map of western zone   | Ahmedabad municipal corporation (AMC)     |
| 3      | Satellite images           | Landsat TM                                |
| 4      | Rainfall data              | Metrological Department of Ahmedabad city |
| 5      | Land use/land cover        | Internet services                         |
| 6      | Population data            | Ahmedabad.gov.in                          |
| 7      | Catchment data             | Ahmedabad municipal corporation           |

Table : 1 Data and its sources

4.1 Base Map:-

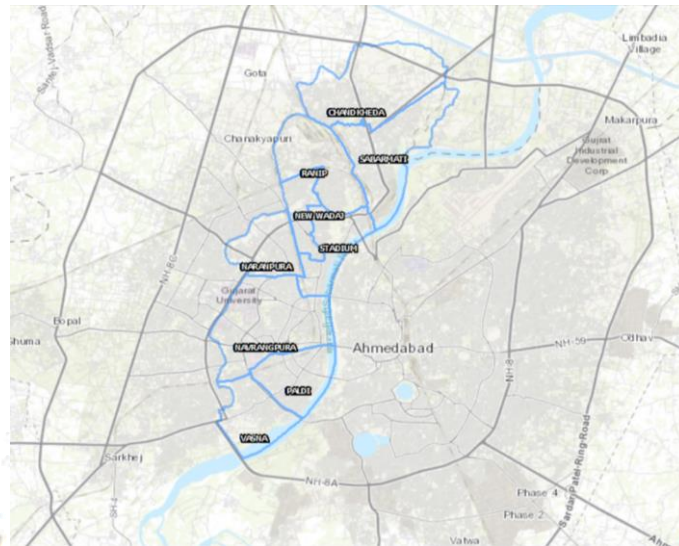


Figure : 2 Base Map  
[Source: Google earth]

4.2 Zone Map:-

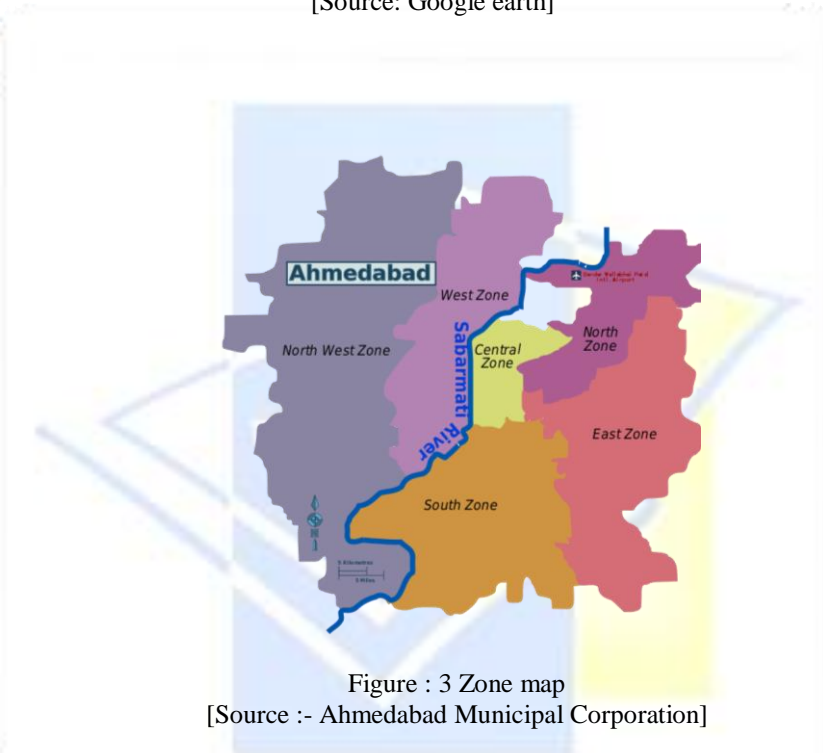


Figure : 3 Zone map  
[Source :- Ahmedabad Municipal Corporation]

4.3 Satellite Images:-

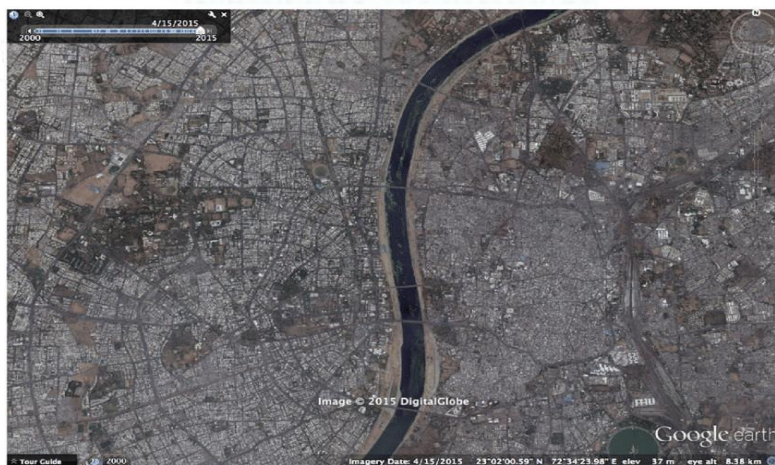


Figure : 4 Satellite  
[source: - google earth (Landsat TM)]

4.4 Rain fall Data :-

| Sr. No | Year | Rainfall received (in mm) | % of Averages |
|--------|------|---------------------------|---------------|
| 1      | 2018 | 638                       | 76.77         |
| 2      | 2019 | 817                       | 100           |
| 3      | 2020 | 925                       | 116           |
| 4      | 2021 | 561                       | 70.5          |
| 5      | 2022 | 880                       | 110.5         |

Table : 2 Rainfall Data  
 [Source:- Metrological Department of Ahmedabad]

4.5 Land use/ land cover :-

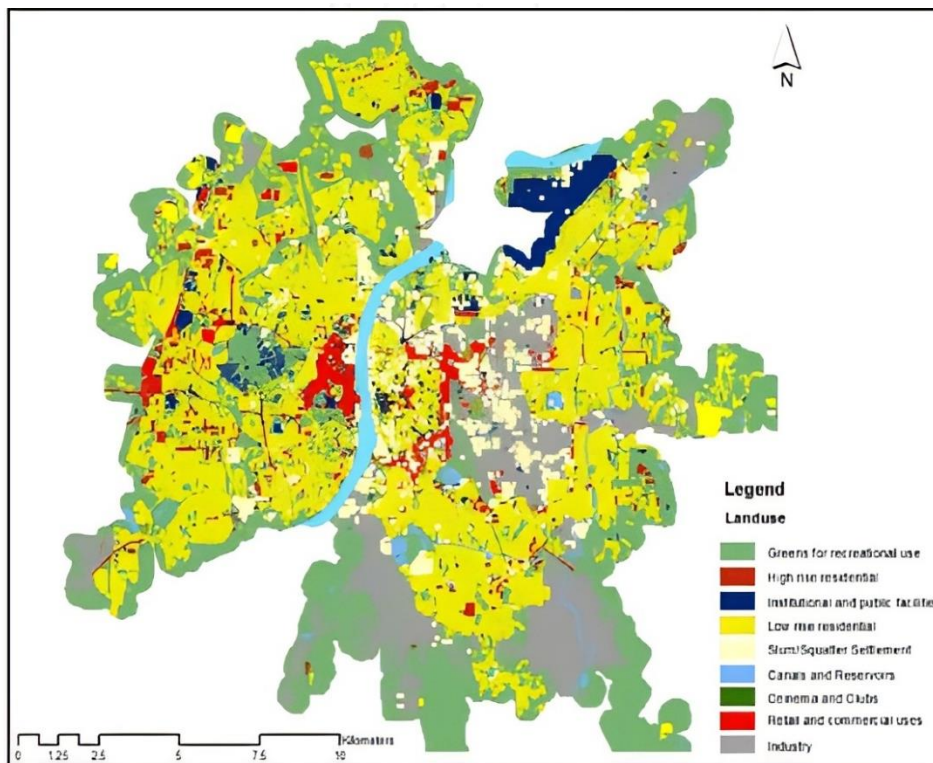


Figure : 5 Lu/lc map  
 (Source:- Internet services)

4.6 Population Data

| Sr. No | Ward                     | Total population |
|--------|--------------------------|------------------|
| 1      | Navrangpura south        | 55647            |
| 2      | Gandhigram north & south | 68911            |
| 3      | Naranpura                | 88032            |
| 4      | New wadaj                | 77814            |
| 5      | Sabarmati                | 68566            |
| 6      | Paldi                    | 83109            |
| 7      | Stadium                  | 75051            |
| 8      | Vasna                    | 123116           |

Table : 3  
 (Source:- Ahmedabad.gov.in)

## 4.7 Catchment Data :-

| Sr. No | Name of catchment | Area of catchment (Ha) |
|--------|-------------------|------------------------|
| 1      | Navrangpura south | 1382.68                |
| 2      | Gandhigram south  | 487.98                 |
| 3      | Naranpura         | 240.55                 |
| 4      | New wadaj         | 494.12                 |
| 5      | Sabarmati         | 181.00                 |
| 6      | Paldi             | 172.47                 |
| 7      | Stadium           | 36.89                  |
| 8      | Vasna             | 56.52                  |
| 9      | Gandhigram north  | 179.73                 |

Table : 4 Catchment Data  
(Source:- Ahmedabad municipal corporation)

## 5. CONCLUSION

This study shows current situation of urban flooding in western zone of ahmedabad and data collection which can be very useful to know more about city's morphological, topographical, demographical data. Which helps to identify the various vulnerable zone by the use of GIS and Remote sensing technology to minimize or protect the various properties of urban area like infrastructure, communication and transportation, water supply, power transmission line, loss of lives etc.

## 6.ACKNOWLEDGEMENT

The completion of this report gives me the feeling of fulfilment. With immense pleasure I would like to present this report on this dissertation of **LDRP Institution of Technology and research**. I would like to take this opportunity to best of my acknowledgement to entire team who has directly or indirectly availed me in making my project feasible and to turn it up to successful piece of work . I take this opportunity to express my gratitude to all those who motivated, encouraged and help me in the project work. I am grateful to my supervisor, **Prof. VIKAS BHAVSAR** for his kind support, guidance and encouragement throughout the project work, also for introducing this topic, which has been very intreating and has given me great insight to future work on this area.

## 7. REFERNCES

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