# Study the Parameters of Urban Expansion in West Zone of Surat City

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**Abstract –** *The city can expand in a variety of ways, and understanding the patterns of urban expansion can help explain the big picture, which can help the city expand in a variety of ways. In recent decades, cities with more amenities have developed more quickly. Surat is working to become a smart city, thus infrastructure efficiency and effectiveness must be a primary concern. The City Transformation Strategy intends to provide information on the city's economics, livability, and vital urban services by identifying and measuring the infrastructural requirements for development. Although more human capital, smaller businesses, and a broader variety of production enhance urban expansion, the exact pathways by which these effects spread remain uncertain.*

*Key Words*: Urban expansion, GIS software, Land use

## 1. INTRODUCTION

Cities all around the world have experienced a number of economic, social, and environmental issues in the last 40 years, including fast population increase and socio-spatial transformations. In underdeveloped countries, these factors have a big impact on urban areas. Approximately 54 percent of the world's population currently resides in cities, with this figure anticipated to increase to 66 percent by 2050. Furthermore, increased urbanisation in emerging countries has had a significant impact on relationships between citizens, the corporate sector, civil society, and government. Concerns regarding democracy, decentralisation, and governance have arisen as a result of this. To address these concerns, local governments must strike a balance between the development of urban economic competitiveness and the seemingly unavoidable social issues that globalisation has brought about, such as urban poverty, unemployment, and rapid population increase.

Growth trends, directions, and factors differ from one city to the next. Determine the elements that influence Surat City's (West Zone) growth pattern and direction, as well as the growth patterns in the study area. The size, strength, and technology of an urban area, as well as the rate at which its population rises and extends, are all factors that influence urban expansion. Urban population increase is the foundation of urban expansion in general. Urban development, along with technical advancement, innovation, and population expansion, is a primary factor in luring

people to a city. This is owing to the large number of people from the region's rural and urban areas who are looking for better jobs and living conditions.

## 1.1 Urban Expansion

The rate at which a city's population grows is referred to as urban growth. This is the effect of urbanisation, or the migration of people from rural to urban areas. A country's economic development may improve as a result of urbanisation. The expansion of a metropolitan or suburban area into the surrounding environment is referred to as urban growth. It can be used as a barometer of a country's economic health because the effects of urbanisation have a direct impact on the country's economic progress. The greater the metropolitan area's growth, the more jobs it generates, and so economic growth occurs.

## 1.2 Parameters of Urban Expansion

- Residential
- Agriculture
- Industrial
- Commercial
- Social infrastructure
- Physical infrastructure
- Educational
- Public purpose
- Recreational
- Population density
- Vacant land
- Water Body

## 2. CASE STUDY

1. Tamilnadu, Salem city

- This research has been described as analysing future city expansion, monitoring that growth, and identifying land-use changes, in other words, determining land-use changes plays a vital part in urban development.

- To supply essential services such as water, sewage, and power, urban planners need information about the rate of growth, pattern, and extent of sprawl. Most sprawl areas lack essential infrastructural facilities due to a lack of such knowledge.
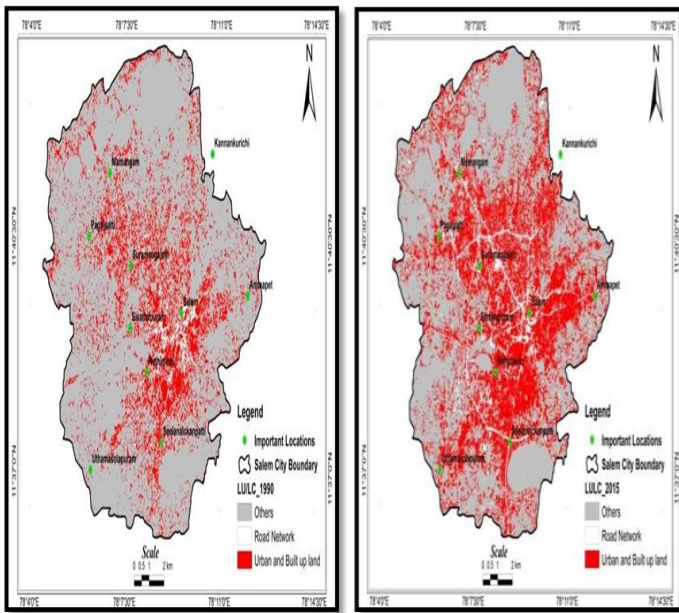
**Fig.1** Growth of Salem city in 1990 and 2015

- The directional change of urban and built-up area has been computed from the city's centre, and the built-up area has maximally extended towards the southeast, while the minimal expansion has occurred towards the western direction, according to this case study.

- This study will aid in the decision-making process and will assist planners and authorities in developing an appropriate strategy for long-term urban development in Salem.

## 3. STUDY AREA PROFILE

Surat's West Zone, which is surrounded by the River Tapti, is also known as the Rander Zone. The city's West Zone, which is adjacent to the walled city district, is one of the city's oldest. The city's West Zone was revealed to be a flood-prone low-lying sector. During the 2006 flood, the West Zone was identified as one of the most dangerous areas to avoid.

As seen in the table below, the population of this area has increased during the last decade. This indicates that this is a developing area, which, as previously mentioned, is perfect for Canal Oriented Development.

**Table 1** Population of wards, west zone, Surat city

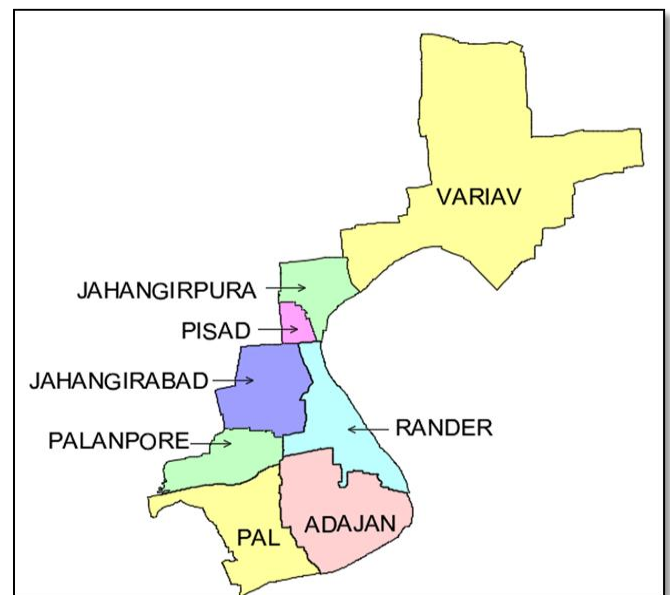| Ward No. | Ward Name | Area (Sq. KM) | Population | |
|---|---|---|---|---|
| | | | 2001 | 2011 |
| 14 to 26 | Rander | 5.120 | 86,047 | 1,14,632 |
| 27 | Adajan | 6.370 | 1,52,274 | 1,96,970 |
| 63 | Jahangirabad | 4.160 | 9,288 | 27,813 |
| 64 | Jahangirpura | 2.920 | 1,120 | 2,165 |
| 65 | Pisad | 0.696 | 1,751 | 4,057 |
| 67 | Pal | 6.045 | 11,165 | 36,107 |
| 68 | Palanpor | 3.008 | 11,496 | 23,514 |
| 69 | Variav | 22.600 | 14,003 | 19,728 |
| Total: | | 51.279 | 2,87,144 | 4,24,986 |



**Fig. 2** Study area

## 4. Population Density

The Surat Municipal Corporation website provided the population density. The highest population density is in rander, pal, and adajan wards, while the lowest population density is in jahangirpura, palanpor, pisad, jahangirabad, and variyav wards, as shown in Figure.
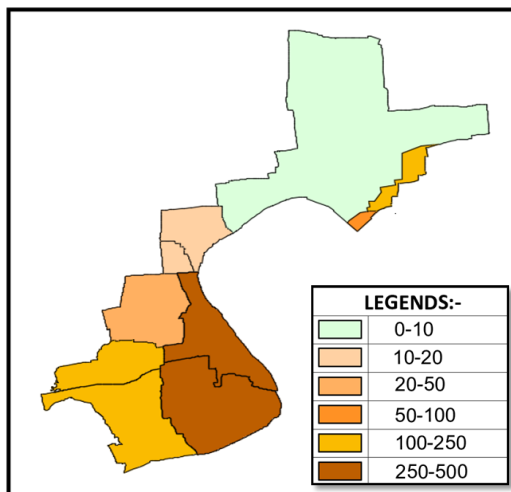
**Fig. 3** Population density map

## 5. Road Network map

National highways, state highways, main district roads, and other district roads make up the road network. It has a total area of 1.9 square kilometres.
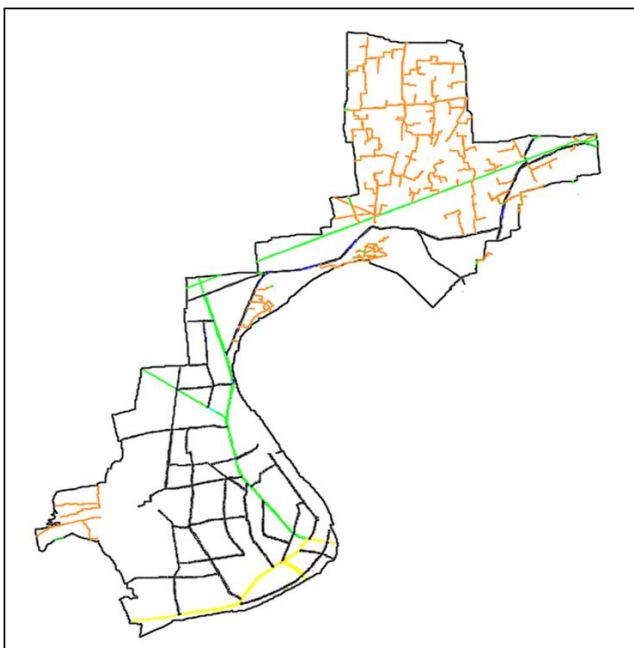


**Fig. 4** Road network map

## 6. Land Use Map

Using the GIS approach, the data on urban expansion was studied over the research periods. In the year 2021, urban areas were defined. Changes in land usage are a major consequence of urbanisation. It changes the landscape in unexpected and long-term ways.

A significant aspect of change detection is determining what is genuinely changing, i.e. which land use type is shifting to the For the analysis, ArcGIS 10.8 was used.

As a result, satellite images, maps, and data form the basis of analysis. Satellite data on the latitude and longitude of numerous locations was acquired using Google Earth Pro programme. The research area boundaries was drawn using Google Earth Pro.

As shown in Figure, the land use map in 2021 indicates changes in land use categories such as residential, agricultural, industrial, water body, and so on, based on automatic categorization and visual interpretation.
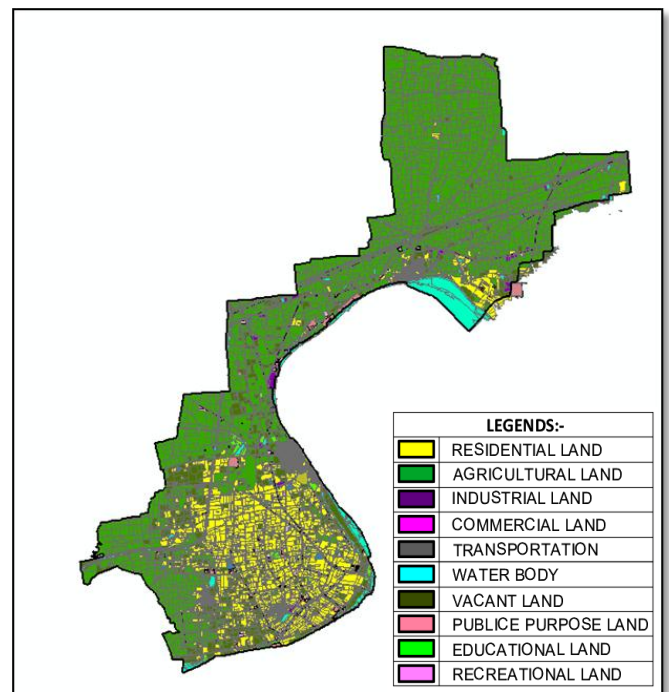


**Fig. 5** Land Use map

**Table 2** Different Land use area in sq.km

| Land use purpose | Area in sq.km. |
|---|---|
| Residential land | 13.98 |
| Agricultural land | 25.20 |
| Commercial land | 0.32 |
| Educational land | 0.17 |
| Vacant land | 5.45 |
| Recreational land | 0.36 |

| | |
|---|---|
| Public purpose land | 1.20 |
| Industrial land | 0.31 |
| Transportation | 1.9 |
| Water body | 2.39 |
| **Total** | **51.279** |

## 7. CONCLUSIONS

The purpose of this study was to determine the expansion of Surat's west zone. Surat's expansion in the West Zone is imbalanced. Residential, agricultural, commercial, population density, vacant land, industrial land, educational land, public purpose land, recreational land, social infrastructure, physical infrastructure, and water body were all used to define the growth of the west zone.

The urban growth of Surat City's West Zone was investigated using satellite images (USGS Earth Explorer). Using Google Earth Pro software, the selected area's perimeter and numerous locations were gathered. The land use map of the west zone is examined using ArcGIS 10.8. The outcome of the above satellite image and land use map shows that the west zone is growing in a south-west direction.

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