

# Bhopal's Urban Evolution: A Comprehensive Study on Morphological Challenges Through Advance Mapping Techniques

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**Abstract** - The study helps to investigate the evolution of the urban morphology of the city of Bhopal in depth through multilayered mapping approaches based on the urban forms of the city. This research is part of my academic urban design studio work on “Reimagining Public Spaces: Redevelopment Strategies for 10 No. Market, Bhopal”. It examines the various aspects such as the junction and its issues by identifying the most critical concerns such as traffic congestion, and pedestrian safety hazards with inadequate signages and guidance. The study also covers the various mapping approach aspects including Land Use mapping which helps analyze the spatial distribution of urban places and specifies the residential, commercial, Industrial, and various other factors revealing the functional zoning and the possibilities of understanding the area of conflicts. Built-use mapping helps to develop deeper and classify the typology of the buildings within the proximity of the land use zones and helps to identify and understand the city's built-use fabric and mixed-use developments. Analyzing the building height maps using the GIS mapping techniques and the issue mapping techniques used to analyze the impact on sunlight ventilation and the views. By integrating these mapping layers the study provides a comprehensive understanding of the city's urban forms and its channels by improving their technical strategies for improving urban mobility and enhancing livability to promote sustainable urban growth.

**Key Words:** mapping , strategies, aspects, techniques, zoning, approaches, technology, gis ,

## 1. INTRODUCTION

The city of Bhopal also known as the “ City of Lakes “has a rich cultural history that takes back the centuries. The testament to its evolution as an urban fabric can be considered from changing a princely state to a modern urban center. However, we can see there are four challenges that mainly the city demands a comprehensive understanding of its form and urban morphology. (BMC n.d.). Generally, urban morphology is the

study of the physical form of cities which mainly focuses on the spatial settlement patterns of various aspects such as the buildings, streets, and open spaces. The Increase in rapid urbanization has led the city to take several issues which include unplanned development, traffic congestion, environmental degradation, and many more. (Thao n.d.)

This research paper aims to address the type of challenges through the various advanced mapping techniques and helps to provide an in-depth analysis of features

1. Land-use and Built-use mapping
2. Issue mapping for identifying the rapid urban growth challenges
3. Mix use developments

Recommends for sustainable and eco-friendly urban planning.

## 2. METHODOLOGY

### 1. Data collection :

a) Primary collection which includes internet browsing, Interviews of urban planners and local authorities, and B.M.C. municipal Records.

b) Secondary collection includes satellite imagery, GIS data & mapping.

### 2. Mapping techniques :

Land-use & Built-use mapping, GIS Mapping, Issue Mapping, Identifying mixed-use developments and unauthorized Buildings.

### 3. Analysis

### 4. Conclusion

## 3. ANALYSIS

Land use maps are generally used to represent visually how the land within a specific area is utilized. These maps help various types of urban and regional planners designers, architects, and policymakers to understand spatial organizations and plan for sustainable development. (Kimre 2021). By analyzing the land use patterns they can easily identify the growth, conservation, and redevelopment of the specific area. They help make good decisions for infrastructure, transportation, and the various

community needs. The Current land patterns of the city divided into

- a) Residential Area: There can be significant area growth in areas like Kolar Road and Ayodhya Bypass.
- b) Commercial Hubs: The main market areas are focused on the old city (Chowki Bazar) and other areas like MP Nagar and New Market
- c) Industrial Zones: Located on the outskirts of the city areas such as Mandeep and Hoshangabad roads.
- d) Recreational Spaces: Shrinking due to the various encroachments and unplanned development.

Whereas the function of the Built-use mapping illustrates the Specific area's built structure. These maps are used for the understanding of urban density, planning transportation networks, and optimizing land use. These help in maintaining the balance between the built spaces and the open areas. (BMC n.d.)

This issue mapping is a tool to identify, organize, and analyze challenges within the specific constant. It involves various steps including systematically charting out problems, their impacts, and causes to provide a clear understanding of the complex issues. The main insights that I've seen are

- a) Traffic Congestions: Where the areas like the Bairagarh, New Markets, and MP Nagar, 10. Market and Habibgunj Area face a lot of congestion due to inadequate road infrastructures and parking facility problems
- b) The Environmental concerns that have the encroachments around the upper lakes, Bittan Ground, and many other places led to economic and structural imbalances. The city's urban forests and the green cover are declining due to rapid urbanization which is mainly affecting the air quality and the Bio Diversity of the surroundings.
- c) Infrastructure Gaps: The Peripheral areas such as the Kolar roads and the Hoshangabad Roads have uneven infrastructure developments which have created disparities between the old city and the new city developments.

These are the types of spaces where the residential, commercial, cultural, and recreational spaces are built within a single area. Their main priority is for compact, Efficient land use and often near public transit-oriented developments. The key benefits include the economy, reduced commuting, and also challenges like zoning conflicts, and infrastructural strain must be addressed. The Mix is used in Bhopal with Areas like Arera Colony and Shahpurs Blending various activities. It also includes

- a) Raise of the zoning conflicts due to lack of proper rules and regulations.
- b) Improper parking facilities and the utilization of high-density areas.
- c) Strains on Existing infrastructure.

Whereas the Under Utilized buildings which ahs the historical heritage structures in the old city are home to several old buildings that are under-utilized or in disrepair. We can preserve the cultural heritage of this building by amending the adaptive reuse of buildings while meeting modern urban needs. However several buildings are vacant or underutilized. These properties can be used for community centers, co-working spaces, and affordable housing. (BMC n.d.).

#### 4. ROLE OF ADVANCED MAPPING TECHNIQUES AND CHALLENGES RECOMMENDED IN URBAN MORPHOLOGY

Advanced mapping techniques such as GIS and satellite imagery techniques (India n.d.) provide precise data and data and land use challenges which helps to enable data-driven decision making (HABITAT 2021). This further recommends

1. Policy and Planning Interventions
2. Technology Integrations
3. Sustainable development practices
4. Community participation
5. Proper set of guidelines and Regulations for mixed-use and underutilized buildings.

#### 5. CONCLUSIONS

The evolution comes with a unique blend of challenges and various opportunities. We can achieve sustainable growth in Bhopal by integrating technology., policy, and community engagement techniques by preserving its rich cultural and historical heritage. This research paper states the comprehensive approach of urban planning which ensures a resilient and Inclusive future of the city. Using various mapping techniques both physically and virtually can be helpful for policymakers to draft for better future developments. (Jain 2019)

#### REFERENCES

- [1] BMC. (n.d.). Retrieved from [https://www.bmconline.gov.in/sap/bc/ui5\\_ui5/sap/zbmcpdhome/index.html](https://www.bmconline.gov.in/sap/bc/ui5_ui5/sap/zbmcpdhome/index.html)
- [2] HABITAT, U. (2021). *BHOPAL CITY PROFILE AND DIAGOSTNIC REPORT*. Retrieved from [https://unhabitat.org.in/sites/default/files/2024-11/city\\_profile\\_and\\_diagnostic\\_report\\_bhopal\\_compressed\\_c\\_ompressed.pdf](https://unhabitat.org.in/sites/default/files/2024-11/city_profile_and_diagnostic_report_bhopal_compressed_c_ompressed.pdf)
- [3] India, d. o. (n.d.). Retrieved from State GIS portal: <https://stategisportal.nic.in/stategisportal>
- [4] Jain, M. (2019). *Effect of Urban Morphology on Subtropical Humid Microclimate: the case of Bhopal, India*. Retrieved from

[https://www.researchgate.net/publication/364106167\\_Effect\\_of\\_urban\\_Morphology\\_on\\_Subtropical\\_Humid\\_Microclimate\\_the\\_case\\_of\\_Bhopal\\_India](https://www.researchgate.net/publication/364106167_Effect_of_urban_Morphology_on_Subtropical_Humid_Microclimate_the_case_of_Bhopal_India)

[5] Kimre, S. (2021). *Assessment of Bhopal city*. Retrieved from  
[https://issuu.com/saketkirme2759/docs/assessment\\_of\\_bhopal\\_city](https://issuu.com/saketkirme2759/docs/assessment_of_bhopal_city)

[6] Thao, M. P. (n.d.). *Ethnicity & Urban Morphology at Bhopal*. Retrieved from  
<https://www.blcurbanmorphologies.com/bhopal-morphologies>

## BIOGRAPHIES



Hey, this is C Nuthan Varma (author), my main intention in writing this research paper is to reach out to people and help them. I hope It helps you. All the very best.