



A Model Change in Urban Development and Planning After the Implementation of a Geographic Information System

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ABSTRACT

Planning and development are very complex processes that benefit from each other's expertise. Since land is a limited and extremely valuable resource, land-related activities account for the majority of urban problems. Conventional planning techniques, such as gathering data and maintaining documentation, are ineffective tools for managing today's urban environment. The reason for this is that technology and people are evolving at a far quicker rate and ahead of schedule. In the current situation, a tool that records, saves, evaluates, and produces a workable answer is required. Geographic Information Systems (GIS) are becoming widely accepted worldwide. GIS is a sophisticated technology that may be used to manage spatial data and analyse the physical environment in a step-by-step manner while taking into account its topology and attribute data, such as canopy, land use, land cover, environmental resources, water and sewer lines, etc. Our social lives have altered in many ways as a result of the Information Technology (IT) sector's rapid growth in the areas of the Internet, mobile computing, internet banking, remote sensing, and virtual reality. Even in the area of urban planning, this is evident.

This study aims to investigate the potential applications of geographic information systems (GIS) in urban planning, specifically in relation to master plans and development plans. A development plan for the instance of Obedullaganj Town has been produced using the advanced features of the GIS programme. In addition to the standard features of GIS, such as degree of change, expansion of impermeable areas, and growth pattern, its applications in urban planning and development have been examined for their potential for social development, environmental preservation, inclusivity, safety, and other factors, as this is a pressing need. The task of managing cities from several perspectives is a complex one, posing a challenge to urban planners who must integrate urban planning with technological improvements. A sustainably planned city will undoubtedly result from the right integration of urban planning solutions with remote sensing, GIS, and related tools.

1. INTRODUCTION

The most pressing issue facing India today is urbanization in a way that adds to social value rather than diminishes it. There is a need to bring out exhaustively, the probable paces of urbanization later on or of the infrastructural shortfalls, and the funding expected for them (Morris, 2017). The metropolitan populace in the creating scene is supposed to increment dramatically in the next few decades. According to responses to a 2007 United Nations (UN) survey, 51% of countries are concerned that they are becoming too urbanized too quickly. According to Suri (2010), the world's population is expected to rise by 9.6 billion (960 billion) people by 2050, while the urban population is expected to rise by 2.5 billion (250 billion), with the majority of the growth occurring in urban areas. According to Enumeration of India 2011, the number of inhabitants in the nation was 1.21 billion (121 Crore) out of which 31.1% live in metropolitan regions (Cushman and Wakefield, 2014). The quantity of towns and urban communities has expanded to 7,935 out of 2011. This builds the metropolitan populace from 290 million (29.0 Crore) to 377 million (37.7 Crore) of the country. Inside 2001-2011 evaluation many years, the quantity of urban areas and the metropolitan regions has populace expanded by 54% and 30% individually. Presently, there are 468 Class I cities and the quantity of million or more urban communities has expanded from 35 to 53 and 3 megacities (More noteworthy Mumbai, Delhi and Kolkata) in 2001-2011 statistics many years (Kshirsagar and Srinivas, 2013). It has additionally been projected that the metropolitan populace will surpass 600 million (60 Crore), dispersed unevenly in 87 metropolitan habitats inside the following multi decade (Jothilakshmy and Arulmalar, 2013). India's metropolitan populace is supposed to arrive at around 810 million (81 Crore) by 2050 (KPMG, 2014). By 2051, it is normal that a portion of the number of inhabitants in India would dwell in metropolitan settlements and it is assessed that the quantity of metropolitan (million or more) urban communities would be more than 100 and all out number of the metropolitan settlements might be more than 10000 (Kshirsagar and Srinivas, 2013).

Urban development in cities of India is uneven where a few are developing quicker than others. Current rebuilding of urban ranges to get ready themselves for the developing worldwide financial requests and giving superior infrastructural offices for smooth working of neo-liberal motivation had changed the heading and assignments of urban arranging (Gavsker, 2011). In result, most urban settlements are considered by underperformances in destitution, lodging, proficient water supply, satisfactory sewerage framework, urban infringements, activity blockage, contamination and social turmoil challenging urban administration a troublesome errand (Verma, Kumari, & Tiwary, 2008). The quick development of urbanization and increment of thickness inquires for arranged urban improvement and in this way get ready advancement arrange for urban ranges.

In arrange to keep urbanization beneath control, India is almost to confront various challenges in urban arranging and improvement. A noteworthy section of this increase would be in most raised metropolitan center of existing upper urban communities, envisioning furthest challenges to metropolitan possible destiny of the nation. At the national level, the Service of Lodging and Urban Issues and NITI Aayog of India are dependable for urban arranging and improvement. These are the most organizations that make laws, arrangements, and plans for urban improvement, among other things. At state level for the most part town orchestrating divisions or in couple of states locales are liable for the arranging of ground breaking methodologies or progression plans (UDPFI 1996). Progression plans oversee metropolitan arrangement of urban regions in India, which formats land-use zones like private, commerce, present day, organization and so forward. The metropolitan planning and advancement rule handle is beautiful much same all through the country taking after the state town and country orchestrating rule and rules indicated in Metropolitan Progression Arrange Specifying and Execution (UDPFI).

1.1 AIM AND OBJECTIVES

Develop and plan work together. Land, the most important asset, is a gift from God. This common property is expected for all human needs and private improvements. However, it is also a fixed and limited product. Due to expanding urbanization and further the influence of globalization, most cities are facing enormous urban tensions; The foundations of these metropolises are in question, which have become deserts of high altitude and considerable thickness. Understanding the pressure of the urbanization process and the problems that may occur in financial developments, the main reason for this review is to research, analyze and select the most suitable area for the process. Urbanization and urban development for certain concerns. Study investigated the change in attitudes toward urban preparedness following the presentation of GIS.

It provides an overview of urban planning and development in general, explores the advantages and disadvantages of using geographic information systems (GIS) in urban planning, and provides descriptions details of urban planning and development to prepare "development plans" based on typical examples. The purpose of the survey is to "propose work on the development of a geological data framework in modern urban planning practice". The research objectives, which have five phases, will be used to achieve the goals. Study methods after finishing grades and diploma, start detailed study of article.

1.2 SCOPE AND LIMITATIONS

Scope and limitations of the research objectives are:

- Study is given to investigate perspective change in metropolitan turn of events and arranging which are restricted to practices of GIS apparatus and methods.
- The published literature, primarily e-based, has identified the role of GIS in urban planning.
- Information and data have been gathered from auxiliary sources.
- After assortment of auxiliary information, these were approved through partner specialist and support of chosen residents.
- In the Indian context, it would investigate the possibility of elevating cultural tourism's status through initiatives in urban planning and development.

Only Obedullaganj's demographic, socioeconomic, and other non-spatial variables have been discussed.

- Obedullaganj's non-spatial and spatial data are analyzed using statistical and spatial tools, respectively.
- Just GIS based advancement has been talked about in various phases of metropolitan preparation.
- Close to previously mentioned degree and limits, key assignments (Table 1) to accomplish targets have been pronounced which depict the examination scope exhaustively. Objective wise key errands are following which are covered during the exploration interaction.

2. REVIEW OF LITERATURE

Artal-Tur explained international tourists engaging in cultural activities accounted for more than 500 million of international tourist numbers in 2017. City tourism relies on culture as a major product, providing benefits not only for interested visitors, but also for the local resident population. New trends in tourism include "experiential tourism", where the interactions between tourists and residents become a key part of the tourism experience and overall customer satisfaction. New technologies and IT applications allow tourists to design their own trip, given the presence of global companies like Trip Advisor, Booking.com and Air BnB. This comprehensive volume explores new trends in cultural tourism, demonstrating how and why culture has become a central factor in tourism [1].

Bostanci, B. et al. explained the development provides economic growth with location, project ideas, and capital factors. In addition to their own experiences, workers in the field of housing development should consider several criteria when choosing the best locations for residential investments. All of these criteria can be evaluated using fuzzy multi criteria decision-making analyses. In this study, the weights of different evaluation criteria are determined using the fuzzy analytic hierarchy process (FAHP) and fuzzy entropy (FENTROPY) methods. Luxury residential zone-oriented ranking is

applied using the fuzzy technique for order preference by the similarity to ideal solution (FTOPSIS) method with weights determined by the FAHP and FENTROPY methods. Performance evaluation for the determination of the best luxury housing is performed by the FTOPSIS method [2].

Bulatovic has been proposed that the tourism as the panacea for many of the problems of the developing world and has been seen as a potential solution to ensure the long-term protection of natural resources and as a means of satisfying the needs of the poor communities in close proximity to protected areas. Community-based ecotourism (CBE), a very specific form of tourism, focuses on initiatives that are not only environmentally sensitive, but aim to give community members a high degree of control over tourism and ensure that a significant portion of benefits accrue to them. Many CBE ventures have been plagued by many challenges in the past and have been unsustainable and as a result ceased to operation. This study applies a framework of sustainability indicators to a number of CBE ventures across southern Africa, in an attempt to ascertain areas of concern and potential threats to the long-term sustainability of these operations [3].

Chen, D. et al. explained in this study uses a hedonic price model to examine the relationship between proximity to newly purchased conservation lands and single-family property values. Specifically, a variant of the hedonic price model is used that addresses changing market values of neighborhood and locational attributes during a given period. Fixed effects are included to control spatial autocorrelation and year and month influences under three variants of an ordinary least-squares (OLS) model, which are double-log, semi-log, and linear model. In addition to the traditional OLS model to explain residential values, a geographically weighted regression (GWR) model is used to study the local difference of coefficient values

for each primary variable. An empirical study using a single-family house market-price data set from 2002 to 2010 and 104 newly purchased conservation lands in Alachua County, Florida, is also conducted. To account for the impact of the housing market crash around 2006, the researchers break the data set into two groups (precrash and postcrash), and compare them. The results indicate that sales price increases 0.04% for every percent decrease in distance to the nearest conservation land in general, while the positive influences from conservation lands are larger precrash compared to those afterward. In addition, time from acquisition is not significant precrash; however, it has a negative influence on property values after the housing market crash in 2006 [4].

Chen, H. described examines the interplay of visitor engagement, cultural contact, and memorable tourism experience (MTE), and destination loyalty in cultural tourism. The research was conducted with 320 individuals who have visited cultural tourist destinations within the past five years. Results, employing structural equations modeling, showed that visitor engagement positively influenced cultural contact and cultural contact positively influenced MTE. In addition, MTE had significant positive effects on loyalty. Furthermore, cultural contact was found to fully mediate the relationship between visitor engagement and MTE. Findings underscore the importance of cross cultural interactions in creating MTEs in cultural tourism. Avenues used to engage tourists must address the cultural tourists' need for deeper cultural experience in order to successfully create MTEs [5].

Deery et al. understanding the social impacts of tourism on communities is extremely important for government at all levels so that action can be taken to reduce the likelihood of a community backlash against tourists and tourism development. Given that the residents of many tourism destinations are a fundamental part of the tourism 'product', resident attitudes and behavior have a sizable impact on the success or otherwise of a destination. Research on the social impacts of tourism on communities is substantial and ongoing and while advances have been made in the area, the research has not addressed some of the deep seated issues faced by tourist destinations. This paper provides a critique of the social impact of tourism literature, highlighting the inadequacies in the research that has been conducted to date, which then leads to the development of a new conceptual framework. The paper traces the key developments in social impact research and argues that the predominance of quantitative methods potentially limits our ability to gain a more in-depth understanding of the impacts and how they influence both the host community and tourists. The paper finds that the quantitative focus from previous social impact research has led to a narrow understanding of the issues surrounding social impacts and proposes a new research agenda based on 'layers' of social impact understanding through the use of ethnography or phenomenology [6].

Durovic, M. explained that the attempts to form a group of indicators for measuring sustainability in development of cultural tourism. Sustainable development has become one of the most usual concepts mentioned in the business world for last three decades. It was created as the response on negative actions of process of globalization and industrialization. Many international organizations, governments started to emphasize the importance of implementing sustainable development concept in the business which brings together with financial benefits, social and environmental value to the community. Tourism as one of the major country's economic force requires the implementation of sustainable concept to its strategy and operation for long term success. For monitoring the implementation of sustainable tourism development indicators are very important. They warn management on a time for a specific risk so that the corrective actions can be taken. Various authors have identified group of indicators in tourism general [7].

Edadan, N. was examine the interplay between unregulated urban growth and residential land market pricing. This interplay is examined in the context of Bangalore, which is the one of the fastest growing cities in Asia through a few key research questions. (1) What are the factors contributing to the exponential growth and sprawl of Bangalore? (2) What are the structural factors determining residential land market prices? (3) How does the regulated and unregulated land development processes affect land market prices in growing urban systems such as Bangalore? And (4) what are the institutional challenges and opportunities for improving the land market efficiency in the city? Beside the use of extensive secondary data, including spatial data generated through satellite imageries and land conversion data collected from the District Land Registration Office, the study has used 720 actual land transaction price data over 2005-2010 periods from 9 fast-growing land market locations in Bangalore. The data set is treated as unbalanced panel data. The structure of residential land price is examined by developing a hedonic price model, using random effects multivariate regression. The model estimated that nearly 61% of the residential land price in Bangalore is determined by structural factors such as distance from the city business district, level of infrastructure, intervention of development agency, etc. One of the important findings from the analyses is that these structural factors could be used to bridge the gap between registered and market land prices and to address distortions in the land market efficiency [8].

Falleiro discuss for the attempts to provide a balance sheet of the economic and socio- cultural impacts of tourism on Goa, a state in India known for its relatively tourism-centric economy. Based on the same and on experiences drawn from other tourism dependent regions across the country and the world, the paper draws a list of options for Goa for the future – options that would minimize the problems created by unplanned tourism while at the same time extracting the maximum that planned and responsible tourism can offer [9].

Qian, J. et al. introduces the evolution of urban land expansion and the sustainable land use policy of the Shenzhen Government since 2005. The policy covers the reduction in rural-to- urban land conversion, the delineation of urban growth boundaries, arable land reclamation and the establishment of farmland protection areas, urban redevelopment, and the investigation and prosecution of illegal construction. This paper considers the aspects of urbanization and land management systems that are unique to China. The current top-down indicative and mandatory mode of control, which relies on the central government, has very limited effects. Good results were achieved in Shenzhen for the following elements: governmental self-restraint, governmental identity change, and policy innovation. Shenzhen's sustainable land use practices can provide a reference for other cities in China [17].

Richards, G. review and traces the development of cultural tourism as a field of research over the past decade, identifying major trends and research areas. Cultural tourism has recently been re-affirmed by the UNWTO as a major element of international tourism consumption, accounting for over 39% of tourism arrivals. Cultural tourism research has also grown rapidly, particularly in fields such as cultural consumption, cultural motivations, heritage conservation, cultural tourism economics, anthropology and the relationship with the creative economy. Major research trends include the shift from tangible to intangible heritage, more attention for indigenous and other minority groups and a geographical expansion in the coverage of cultural tourism research [18].

Sarkar, S. et al. explained the peri urban interface is a complex region in itself being transitional in nature and characterized by neglect, especially in the developing countries. Being neither urban nor completely rural, it falls beyond the purview of planners on either side, but continues to host the spill-over population from the urban vicinity, albeit without necessary infrastructural support. Land in the peri-urban interface is of vital importance as the region is impacted by a lack of clarity in land use planning and policies, while being a part of the city's hinterland, which has its typical economic as well as ecological role in the sustenance of both the urban and rural zones. This paper attempts to discuss the key perspectives of the peri-urban interface in order to assess its planning needs. Subsequently, the paper proceeds to provide empirical evidences of two major aspects of management, namely the economic and ecological relevance from the planning perspective as the two core issues in the Indian context. An overview of existing literature on problems and issues of the peri-urban interface reveals that there is an acute lack of holistic understanding of the region as a link in the chain of transition from the urban to the rural landscape systems [19].

Satashia, A. study for urban land management models. Land is a resource and at the same time, it is non-renewable. So it should utilize very carefully. The constitution of India grants the right to acquire hold and dispose of property to every Indian citizen. It, however, allows the state to impose restrictions on property and its acquisition in public interest. Different states like Haryana, M.P., U.P., Punjab and Tamilnadu have formulated Land Supply Models Keeping in focus the land requirements for urban poor. In this paper, different urban land management techniques used in different region of India are study by urban land management models [20].

Srivastava, S. study a case of Mahakumbh Mela. India possess its rich cultural heritage, ancient monuments, world famous temples, architecture masterpieces, wild animal's sanctuaries and scenic sports, and also holds a great attraction for foreign and the domestic tourists. The growth of pilgrimage tourism in India has been improved astonishingly. India is blessed with plenty of well-known religious destinations bring enormous economic gain to local residents. The pilgrimage (TirthYatra) journey undertake for the betterment of spiritual pursuits. Travel or pilgrimage for mental peace and to gain knowledge about rich heritage or religious places in the country is an integral part of Indian culture and tradition. Allahabad is one of the famous pilgrimage tourist's destinations in India. It is famous for magnificent historically, culturally, and It has great potential in the field of tourism as kumbh Mela at Triveni Sangam (confluence of three river Ganga, Yamuna and Invisible Saraswati), historical monuments, temples, holy places and other scenic places, which reflect the culture and tradition. Uttar Pradesh Tourism provides good infrastructure facilities for domestic and international tourists [21].

Wu, J. et al. studies on property value have mainly concentrated on transportation, and few studies have focused on the effect that green space has on property values. Researchers have mainly focused on specific parks within different communities rather than parks (on a larger scale) to study the average impact of green space on housing prices. Therefore, the objective of this research is to quantify the effect of public resources on property value, especially green space, using the hedonic pricing method (HPM). This paper focuses on 71 parks within Shenzhen to make results universal. Transaction price data and the structural attributes of 6,473 dwelling units were collected. This paper looks at HPM from three dimensions: structural attributes, location variables, and environmental variables. The results showed that

(1) proximity to a central business district (CBD) produced the greatest effect on housing prices, followed by distance to park, distance to school, distance to arterial road, and distance to subway; (2) proximity to a park noticeably contributes to housing prices at 0.041%, and housing prices decline at a rate of 20,920 CNY (US\$3,356)/km(US\$3,356)/km depending on distance to the nearest park; and (3) the average influence radius of Shenzhen parks was

1.73 km, and the 71 parks could promote an increase in value across 412.14 km 2412.14 km² of land [22].

3. METHODOLOGY ADOPTED

The problem of large metropolitan cities has been widely studied by many researchers. However, a country consisting of only a few very large urbanized areas haphazardly integrated into a rural landscape cannot survive optimally nor is it sustainable. A network of medium-sized cities evenly distributed

across the territory would be more feasible. Therefore, it is important to study the problems of these small towns. Understanding the importance of small towns Obedullaganj was chosen as an empirical case for the research work. These are small towns with less than twenty thousand inhabitants.

The 2021 census will present new population figures and other demographic details. Different planning scales require different data and techniques. Based on different aspects, data can be classified into different types. Primary and secondary data are the classification of data according to their available sources. Image data is mainly classified into raster and vector data based on their information range. The role of image data is important for GIS-based research because GIS works with geographic information. Raster data is useful for strategic urban planning because it covers large city-sized areas where high resolution is not required. Processing of raster data is much earlier and faster than vector data. The results can be observed specifically in the analysis of the cache and stacking of tags. Vector data is often used at small scales when planning districts and local areas due to the need for very high resolution analysis. An attempt has been made in this study to demonstrate the potential of GIS techniques in basic mapping, land use and land cover mapping, urban change detection and mapping, urban utility and infrastructure mapping, urban management, etc.

3.1 SELECTION OF STUDY AREA: OBEDULLAGANJ TOWN

Obedullaganj town was established as Gram Panchayat on 17 July 1983, but was later notified as Nagar Parishad. The city has a population of 22,845 divided into 15 districts. According to city records, the approximate city area is 28.86 square kilometers. But the empirical calculation by a geographic satellite image consulting company of the city's area is about 10.1225 km². The city boundaries were recently revised. The present study uses the latest municipal boundaries proposed by the Obedullaganj Municipal Corporation (OMC). As a small town, Obedullaganj exhibits diversity in terms of demographic, social and economic figures and facts. This transformation creates a vibrant residential and commercial real estate market. The main economic activity of the city's residents is agriculture and related activities. It is necessary to seriously take this difference into account when developing urban planning policies and project planning.

This town is the main town of Gairatganj Tehsil and 72 village panchayats also come under it. Many government agencies are present in the city, making this area a transport node in the city and contributing to business development, with many people living here and working in the government sector. The intersection of National Highway 12 and National Highway 69 is the city's major commercial center and many of the city's large commercial establishments are located on both sides of the highway. Apart from the fact that large commercial establishments have also developed at the second junction where the road to Rehti begins, the town has all the qualities that helped it develop into an industrial town like near Mandideep, etc.

Obedullaganj, although a small town, is very active. Therefore, choosing a city for development planning is very important. Emerging urban issues and urbanization are expected to receive greater emphasis as Obedullaganj has huge urbanization potential.

3.2 DATA COLLECTION

The research process involves processing data to make inferences. The analysis at different stages includes spatial and temporal data. City development plans, state regulations, urban development guidelines, central and national urban policies, annual progress reports, census and socioeconomic data, etc. is a secondary source of information and data. All the information is at a higher level and more general. Primary data is not collected, only secondary data is verified by field trips, physical verification in the field and in person if necessary.

The lack of data availability remains one of the main obstacles to the use of GIS (Yeh, 1991). For its function, GIS needs graphical information and textual data which can be spatial and non-spatial data. There is no life in GIS without applications, and there can be no applications without data, as shown in Figure 3.3. Data accuracy is another important concern when working with GIS. Therefore, the source of data and its reliability must be considered while preparing the data and its sources.

Data Checklist Preparation

Based on the literature review, spatial attributes were identified and collected from secondary sources. The document itself is also useful for other secondary information. Maps are needed to obtain detailed spatial information. Old maps collected from TCPO MP are useful for comparing their spatial and temporal variations.

Point location, polyline feature, and polygon feature data for various attributes are needed for spatial evaluation. Census of India is the most ideal source to collect comprehensive data on demography, socio-economic realities, housing and its types, etc. This census data is also available at the city, village and neighborhood level. Therefore, spatial data or shape files in GIS can be integrated and more resulting vector files can be developed. The City Manager (CMO) and other technical staff of Obedullaganj were actively involved in editing and updating the data.

The following organizations are good sources of non-spatial data at the housing and household level.

Census of India (CoI)

The decennial census contains a wealth of demographic and real estate data. Census data includes changes in the number of houses, the purpose of these houses, the nature of construction, the quality of construction, the number of rooms and the current state of the house from 2001 onwards etc.

National Sample Survey Organization (NSSO)

NSSO also collects housing data every five years through housing condition surveys. ONSS has expanded the scope of data collection by improving the inventory of occupation status, land ownership, foundation level, surface coverage, housing type, structure type, number of floors, value for rent and housing conditions, etc. in his 32nd, 38th and 43rd laps.

Likewise, NSSO data also have limitations; Some information is collected on one set of forms that is not repeated in other follow-up surveys and is therefore not comparable over a given time period. However, this limitation is targeted and taken into account to a certain extent. Another limitation of ONSS is that not all information is requested by the NBO in each round. It is anticipated that these limitations will be identified and addressed in a future investigation.

During the 44th cycle (July 1988 - June 1989), the 49th cycle (January - July 1993), and the 58th cycle (July - December 2002), ONSS collected data on household characteristics, housing conditions, environment and household characteristics. construction, construction and financial resources of individuals, entrepreneurs and companies. ONSS conducted the 65th survey (July 2008-June 2009) of housing conditions and urban slums.

National Buildings Organisation (NBO)

National Buildings Organization is the primary organization anxious with the data collection on various aspects of housing apart from the NSSO and Registrar General of India.

3.3 DATA ANALYSIS PROCESS

Data analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense, summarize, and evaluate data. Different analytical procedures “provide a means of drawing inductive inferences from the data and distinguishing the signal (phenomenon of interest) from the noise (statistical fluctuations) present in the data”. Current research involves the interpretation and analysis of qualitative research data using statistical procedures.

An important factor in ensuring the reliability and integrity of data is the accurate and appropriate analysis of research results. Inappropriate statistical analysis misrepresents scientific results, distorts inferences, and can unconstructively manipulate public perception of research. Questions of reliability are equally relevant when considering non-statistical data. Data analysis can be discussed in the statistical and spatial analysis department, as shown in Figure 3.7. Descriptive statistical analysis plays an important role in analyzing non-spatial data. Spatial analysis is also performed for spatial evaluation of geographic information. GIS applications have proven to be very useful for analyzing spatial data.

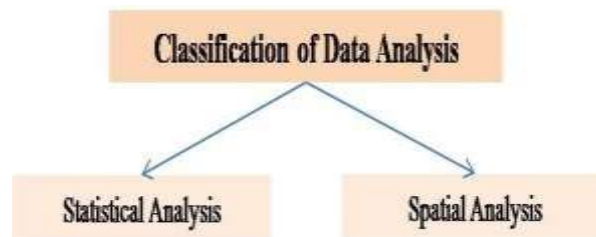


Figure 1 Data Analysis Process

4. ANALYSIS AND RESULTS

The aim of the study is to explore the innovative role of GIS in modern urban planning practice. Beginning with a review of the literature, the study covers urban planning practices in India and the growing role of GIS in urban planning. It also looks at GIS-based best practices in India. After learning from the literature search, move on to empirical research. In this section, GIS has been used for the case of Obedullaganj city, which can be useful for preparing a development plan or master plan.

4.1 PREPARATION OF DATABASE

The database was created by an in-depth survey of land use statistics and population census of Obedullaganj city. All analog maps and plans have been digitized, as have blocks and buildings. Numerical data is converted into tables, graphs and maps. Base maps with planning boundaries, roads, water bodies and other natural features were prepared. GIS-based thematic map layers are created with detailed topological data structures. Topologically encoded geo data and features enable physical querying and surveying, while large collections and diverse data types can be managed in ingenious ways. Planning problems can be solved more easily than conventional methods such as lack of public services, infrastructure and convenience of public services. All the prepared thematic maps such as district information, regional transport connections, public amenities, block attributes, village boundaries and housing have been merged into separate layers, represented graphically by detailed labels. Other layers were also developed using base maps and images from secondary sources. Data created with the GIS package has been converted to ArcGIS 10.1 compatible data.

Data Analysis

Specific research results show that suitability analysis is very useful when making master plans. It helps prepare a proposed land use plan to allocate sites for different land uses. Prepare the base map as the main reference. Thematic maps should be prepared for discussion of different areas separately. The GIS overlay process is useful in comparing different activities in the planning area through their thematic maps (Map 4.24 to Map 4.26). The demand for housing in Obedullaganj will increase in the near future.

To avoid future indiscriminate development, creation of slums and continued encroachment of settlements, the following measures should be taken: • Local municipalities can take preventive measures prevention by classifying developable areas for residential settlement in accordance with the development of industrial zones and proposals residential area, development in master planning, basic city services, public utility land and transportation and tourism networks.

- After recognizing urban housing, sites and basic services, standard specifications must be ensured by the construction of roads, storm water drains and sewers, electricity supply and drinking water, developing residential areas and service areas.
- The adoption of GIS-based techniques should be encouraged to sustain colonization progress using appropriate planning models and data in digital format.

5. CONCLUSION AND SUGGESTIONS

Planning and managing cities in the new era of globalization and economic liberalization will be a task that requires many new skills and approaches. Indian cities will have to compete with other cities to attract investments and thus issues such as quality of infrastructure, energy efficiency service delivery and environmental conditions of the city, in addition to economic stability, will play an important role in that competition. The planning discipline should address these questions and respond quickly. It is interesting to note that the dynamic spatial behavior of cities is difficult to understand and the urban hypothesis remains static.

In other words, planning agencies and agencies in all parts of the country should adopt new technologies such as remote sensing and GIS. They are capable of providing physical data and information required for the preparation of base maps, planning proposals and serve as monitoring tools during the implementation stages (Verma, Kumari and Tiwary, 2008).

Satellite remote sensing with its iterative and synoptic visibility, as well as multispectral capabilities, is a monitoring tool for mapping and monitoring environmental, physical and ecological changes in city center and in suburban land use planning, will help reduce unplanned urban coverage and lead to loss of natural environment and urban ecosystems. Going further, the interface of urban planning and development models with GIS must be considered and properly communicated to the public.

The combination of land suitability modeling, integrated land use transportation modeling, water distribution network analysis, and urban performance motion simulation should be explored to estimate development options. Various urban developments within a GIS frame work for added benefits.

5.1 DISCUSSION OF URBAN DEVELOPMENT AND PLANNING

Urban India is undergoing transformation all the time, in terms of physical form, demographic characteristics and changes in socio-economic conditions. In 2011, the migration of the population from rural to urban areas left nearly a quarter of the population living in slums. Negative attitudes towards urbanization or cities lead to wrong policies and limit the development potential of cities. The same goes for negative attitudes toward the urban poor. Rapidly urbanizing cities in developing countries often face land supply constraints. This is often explained by lengthy bureaucratic processes in converting agricultural land on the outskirts of cities into urban areas, by rigid urban planning regulations and by cumbersome mechanisms to land grouping for public projects. A new comprehensive approach is needed for planning, management, urban development, regulatory violations and control tools, flexible, comprehensive and comprehensive planning tools that allow facilities and government addresses the real challenges and opportunities that urbanization entails.

Important fundamentals of urban land development and management include the institutional capacity of local urban agencies to recognize and avoid vulnerable areas, propose property rights, register properties and create conditions for the urban land market to operate effectively. Zoning regulations and urban growth controls are fundamental land management tools and can also be the focus of development incentives related to the construction of affordable housing in rural areas. The real market is complex. Urban planning is one of the main applications of GIS. Urban planners use GIS as both a spatial database and an analysis and modeling tool.

GIS applications vary according to different stages, levels, stages, subdivisions, sectors and functions of urban planning. GIS is a better performing and more affordable information system for planning practice due to the user friendliness and increasing functionalities of GIS software, coupled with the reasonable reduction in prices of GIS software and hardware. This is gradually becoming a required component of support systems planning practices. Recent advances in combining GIS with planning models, visual research, and incorporating the use of the Internet make GIS more useful in urban planning practice. Today, the most important limitations in applying GIS to urban planning are not related to technical issues but to data availability, organizational changes, and personnel.

Although GIS has been successfully implemented, the development plan also raises a number of issues that need to be resolved. Some of it is the difficulty in translating every user request; difficulty in integrating data sets because they are available in many different forms, formats, and characteristics; It is

difficult to get full cooperation of the various agencies holding the data and there is a lack of clear workflows and analytical methods as is the case with the current system. The remaining challenge is to update and maintain the database and use the full potential of the system, mainly as a decision support tool in planning and monitoring urban development in the region.

A sustainable planning approach certainly needs a support system capable of supporting the monitoring process to arrive at better decisions. The emergence of GIS supported by various analytical tool software offers the opportunity to use it as an essential tool in urban planning and management activities. Over time, GIS capabilities can be improved and updated while collaborating without the need for additional packages.

We hope that this software will help GIS become a comprehensive and effective planning support system, taking into account land use regulations such as physical characteristics, traffic and environmental impacts of growth scenario. However, technical, organizational, legal and human issues must be resolved before GIS can truly be applied for planning and management purposes. Therefore, planning strategies play an important role in determining the success of GIS development.

Land management cannot be separated from urban planning and the two must work together to ensure sustainable and resilient urban economic and social growth. Reasonable allocation of land for different uses in the development plan will promote sustainable urban land management. The purpose of the research is to explore innovative GIS-based solutions in urban planning practice.

5.2 SIGNIFICANCE OF GIS APPLICATION IN URBAN PLANNING

The planning process aims to make appropriate future alternative decisions and the appropriate actions required for a range of options. Choosing between alternatives in the planning process requires, in addition to a methodical understanding of planning, the inclusion of general geographic data from the past, present, and future. Data and information may be descriptive, prognostic, predictive or prescriptive. Appropriate, consistent and effective information management will significantly improve the quality of planning activities. Creating accurate information using conventional manual methods is very complex.

GIS facilitates many other basic functions and supporting tools to manage geographic information in a professional and appropriate manner. Essentially, GIS applications support the collection, organization, maintenance, editing, analysis, and presentation of spatially correlated information.

GIS data makes it easier to measure multiple aspects and offers the potential for flexible questioning and presentation of information, as well as easier-to-understand presentations. From the research, it is clear that GIS is a very important tool that can be used to take planning to the next level in terms of saving time during plan preparation, by providing optimal decisions that best meet needs.

GIS is gradually being put into practice by planning agencies in both developed and developing countries. Planning agencies and departments that previously purchased mapping systems and purchased other software have now switched to using GIS software instead of other mapping software. GIS is gradually becoming a planning tool that is easier to operate and more affordable due to its user-friendliness and increasing number of functions.

Recent unique advances in GIS software with the application of planning models make it even more useful for urban planning. Today, technical solutions for GIS have made access easier, but data availability and its conversion to digital form are the main issues.

The application of GIS in the urban planning process as an analytical, logical and modeling tool. It covers a wide range of spatial and non-spatial issues. This includes detecting and troubleshooting problems related to data structures, components, and similar simple and complex survey models. GIS is especially useful for managing an area or organizing a feasibility study for the specific purpose of an area, for example, determining the suitability of an area for a solid waste dump site.

GIS is also very useful for studying the feasibility of even smaller structures, such as the location of public buildings, schools and hospitals, which can easily be done using GIS. GIS applications are supplemented with more specialized equipment to produce better results in areas where alternative designs or diverse plans are required. Application of GIS in environmental and spatial research is increasingly necessary to solve problems in spatial modeling exercises.

This has been recognized as extremely useful and practical for similar types of tasks. GIS also helps provide data or information about the environmental suitability of a land, its suitability and pollution behavior. GIS applications can also be used to determine the viability of waste disposal sites and waste disposal sites. The chemical, geographical, biological, topographical and physical characteristics of the area should be considered and the suitability of the target location should be examined. GIS and remote sensing technologies address broad questions such as which wetlands should be developed. GIS is more accessible to planners and is an important tool and database for urban planning in developed and developing countries.

Planners are calling for solutions that meet the needs of everyday efforts while enhancing the ability to predict and respond effectively to routine urban problems and future market fluctuations. The success of planners in solving chronic urban problems is largely determined by their ability to use effective tools and planning support systems that enable them to make informed decisions based on on actionable intelligence. Today, planners use GIS around the world in a variety of applications. The discussion illustrates how to use GIS as a platform to help planners achieve their goals of creating livable communities and improving overall quality of life while protecting the environment and promoting development economy.

Generating Development Scenarios

Previously, the number of alternative planning scenarios was quite limited due to the difficulties encountered in developing them. This is mainly due to the tedious procedures involved in creating the scenario as well as its subsequent evaluation. Policy makers, like most policy makers, face the difficult task of evaluating and considering the impacts of different resource allocations. Previously, the assessment process seemed quite static and limited.

Once the evaluation model is prepared, the activity can be carried out in much less time thanks to computerized data processing and computerized mapping of results. Despite the popularity of advanced equipment and software in the field of GIS technology, there are still many limitations in the use of GIS in urban and regional planning, limiting their effective application. Land use analysis remains an important GIS application.

GIS allows assessment against a number of criteria as part of land suitability analysis. This analysis is mainly characterized by assigning weights to evaluation criteria for recommending and ranking alternatives. An important advantage of GIS spatial planning support tools is the convenience of modifying evaluation criteria to illustrate and visually depict the significance of other spatial decisions and alternatives. The capabilities needed for decision making, available in a single system, make GIS an excellent tool for integration into planning processes.

Suitable residential areas for the Obedullaganj case have been identified. Using vector analysis, suitable residential areas were identified. It can be extended to suitable classification locations. Raster analysis based on the land suitable for each use will be helpful in identifying appropriately classified sites. Figure 5.1 below suggests a thematic vector and raster analysis process to identify suitable sites for different uses.

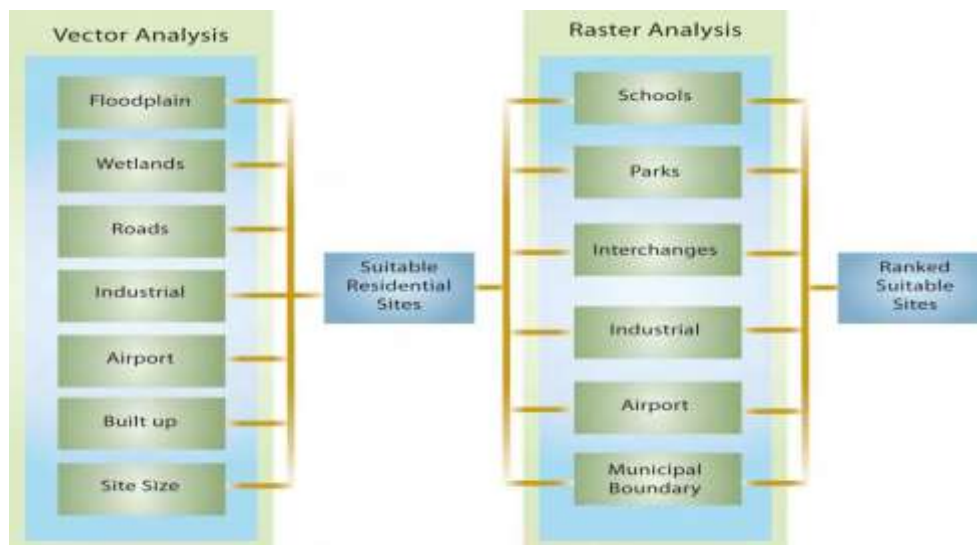


Figure 3 Spatial Analytical procedure for Land use preparation

In the same way that environmentalists plan, sites need to be classified and evaluated based on their potential for environmentally responsible development. In this regard, the protection of agricultural and forest lands as well as the maintenance of environmental integrity should be the most decisive factors influencing the criteria and decisions of environmentalists. **Table 5.1** below suggests factors and requirements for environmental planning.

Table 1 Site-specific selection factors for Environmentalists Planning

Factor	Requirements
Location in 100-year flood plain and / or wetland areas	The site must avoid floodplain designated areas or areas that have high runoff rates to prevent any environmental hazards.
Soil Type	The site should have soils with high bearing strength or avoid poor natural drainage network.
Topography	Avoiding sites that have steep terrains reduces the cost of site grading. Constructing on steep slopes means that a tremendous amount of site grading is necessary for adequate drainage and sewage systems.
Site Size	The site should be of a minimum size to increase the overall project profitability.

Proximity to the existing urbanized areas	The site should be connected to existing residential areas with a high growth potential. This condition ensures that the site is adequately served by the existing facilities and infrastructure. A desirable distance from the nearest built-up areas should not exceed a half mile.
Environmental legislation compliance	To preserve the environmental quality of the area, the site must avoid environmentally sensitive sites and open spaces.
Accessibility	The project site should be easy accessible and very well linked by the traffic and transportation network to guarantee that the required travel time for daily activities like work, shopping or recreational trips does not be more 30 minutes. And it should be economically accessibly.
Proximity to industrial area and waste landfill sites	There should be a minimum distance of at least one mile from industrial locations, waste landfill and other deleterious uses of land have to be protected to prevent noise problems and eradicate the instant hazard of chemical emissions damaging to the public health.
Airport Location	A minimum distance of one mile from the airport, located to the south of the Champaign-Urbana region, was deemed sufficient to avoid adverse impacts of airport noise.

Suggested Modifications in the Urban Planning approach

GIS is applied to store data on land use and thematic plans, socio-economic details, environmental status and urban or rural planning applications. Planners and other professionals can extract constructive information from stored and edited GIS databases through spatial query booking. Mapping with details presented at scale provides the most reliable display device in GIS. IS mapping is useful in exploring the distribution of socioeconomic, demographic, and environmental data, and in presenting levels of spatial analysis and modeling framework exercises.

The following amendments in the planning for urban or rural development approach are recommended having a more lively urban planning exercise:

- i. **Flexibility:** Prepared plans must be flexible to accommodate the ever-expanding spatial boundaries of urban areas and provide quality of life for all residents. The resulting plan must be flexible to respond not only to current requirements but also to different expected future circumstances.
- ii. **Role of Stakeholders:** Public participation in the preparation of policies, draft visions, prospective plans, regional plans, master/development plans and Annual short-term planning must be ensured by elected political representatives in the municipal council, council, panchayats and ward ULBs committees.
- iii. **M.I.S.:** A well-established and maintained management information system can enable proposals to be revised and screened at different stages of planning implementation according to urban scenarios different markets.
- iv. **Forthcoming Urban Areas:** City development prospects can be assessed for the peripheral suburban areas of the proposed development areas. Future development potential and expectations must be identified to optimize existing infrastructure and prioritize the development of these potential suburban areas.
- v. **Urban Growth Centres:** It would be more reasonable and palatable to encourage strategically planned development initiatives in Tier II cities, growth hubs and hinterlands due to scarcity development resources. Location of infrastructure, basic services, public amenities and environmental services in city growth centers can be a key focus of master planning/development.
- vi. **Policy Guidelines:** Development policy guidance prepared and in accordance with statutory planning legislation, can assist in selecting priority areas, achieving change and amending plans, management and government in general.
- vii. **Mixed Land Use:** Activity-based zoning rules need to be simplified from a liberal perspective to promote development with innovative initiatives. The proposed land use planning package is not subject to change by any authority. It should only be part of the review and revision of the city's development master plan.
- viii. **Financial Project Planning:** Urban planning requires land use planning and infrastructure investment to be in harmony with the integration of physical, financial and investment planning. For planning to be successful, it is necessary to develop a relationship between spatial planning and feasible resource mobilization plans, focusing on revenue generation and credit enrichment mechanisms.

- ix. **Land development Policy and Management:** In the context of the compulsory land acquisition process and the associated problem of low compensation rates, ULBs can adopt cooperative initiatives within the legal framework currently authorized.
- x. **Legal Framework:** The preparation and implementation of the plan must be governed by a legal and statutory framework to make it enforceable and binding on all. The legal framework must be supported by an effective and competent mechanism to monitor master planning and avoid distortion of planning proposals that will take place at the local level.
- xi. **Regulatory Standards:** The size of residential/commercial plots, layout details, marginal spaces and social charges must be designed to reduce costs based on the affordability of different income groups and the price of the parts economically. These lower costs can also be reduced to affordable costs by differentiation price.
- xii. **Building Bye-laws:** State building codes and zoning regulations may overlap with similar jurisdictions for similar cities/villages, which must also correspond to local requirements.
- xiii. **Database creation at different levels:** Existing laws can be simplified and made transparent to make the development process more favorable and free. Care should also be taken to ensure that there are no arbitrary elements that could cause confusion. Adequate civic infrastructure and social amenities such as parking must be provided.

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