



# Geospatial Affect Evaluation of Urbanization on Land use Land Cover and Livable Environment of Hyderabad

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## **Abstract:**

Urbanization is a without a doubt worldwide trend, affecting populations in advanced and rising areas throughout all continents. To maintain up with the fast inflow of latest metropolis dwellers, metropolis leaders are turning to technology. One of the most difficult situations in many cities is safe drinking water. Other principal troubles in lots of towns throughout the growing global are traffic, parking, waste management, lighting, security, training and fitness care.

Livability has been defined variously to mean an understanding by the residents of the quality of life provided by the place they inhabit. This takes into account the subjective nature of the concept, while also considering the physical aspects Location: Topography and landscape, buildings and infrastructure, services and facilities.

The current study focuses on the livability of urban neighbourhoods; thus, the housing dimension was excluded from the analysis. Three dimensions of functional, physical and social components are used to analyse the perception of livability that are deemed to be relevant to neighbourhood environments. Changes in the land cover and land use impact the pattern of urbanisation and ultimately, the livability of a Hyderabad by impacting one or the other of the endless factors that influence the quality of life in an area.

The urbanization of Hyderabad and adjoining areas is important to study from the point of view of monitoring the urban growth of this capital city as well as for analysing the factors that affect the quality of life in the urban areas of the region and for ensuring that the development that takes place here is Thus, it is the aim of this study to assess the values of the attributes and the dimensions that residents might consider in evaluating the liveability of their neighbourhood and among the various localities of the study area. This shall complement a geospatial approach towards assessment of the impacts of urbanisation on the land use/land cover of the city of Hyderabad.

**Key words:** Urbanization, Livability, Land use and Land cover.

## Introduction:

Urbanization, in step with Luck and Wu (2002), has modified Natural landscapes for the duration of the sector profoundly. Urban improvement takes region through the natural increase of populace in any city centre and additionally through migration, that is specifically rural-to-city and now increasingly, city-to-city in nature. The manner of urbanisation impacts the bodily region in addition to the inhabitants, the three former via way of means of a metamorphosis within side the bodily traits of the panorama from a herbal to an city form, and the latter thru a alternate within side the economy, way of life and great of life (Jain and Subbaiah, This attention of human beings and sports into regions categorized as city is known as urbanization, despite the fact that the urbanising results are felt across the peri-city and rural environment of a metropolis over a far large peripheral area (Ichimura, 2003; Pivo, 1996).

Urban centres are an increasing number of turning into large in length and displacing different land makes use of and land covers; however land is a finite resource. It is the important thing foundation for all our economic endeavours of agriculture, industries and strength production. It presents the space for people to construct their settlements and increase their society and cultures. It is the issue of each floor and floor water via catchment and storage. With the growth of population and socio-economic activities, natural land cover is being changed for numerous improvement purposes. Inappropriate land use might also additionally motive environmental degradation which won't be reversible with inside the brief term, and might result in irreparable monetary and social harm together with lack of precious ecological functions.

Livability is a complex concept encompassing a multiplicity of fields of study. Hence it becomes difficult to define and explain in any standardised manner (Vergunst, 2003). The term can be applied to a number of perspectives depending on the field of study, the object of study as well as the perception of those conducting the study. As Heylen (2006) stated after a comprehensive literature review, no broad agreement has been arrived at about the dimensions that should be included in a study to completely understand the concept. This can be because researchers come from a variety of background disciplines. Assessing livability as a research objective has been the aim in various studies, such as ecology, geography, health, environmental sciences and sociology.

Thus, it is the aim of this study to evaluate the values of the attributes and the measurements that residents might consider in evaluating the liveability of their neighbourhood and among the various localities of the study area. This shall complement a geospatial approach towards assessment of the impacts of urbanisation on the land use/land cover of the city of Hyderabad using the techniques of remote sensing and GIS. The combination of approaches is expected to yield relevant data on which future planning can be based, taking into account the problems and issues identified through this study.

## Data:

Historical remote sensing data (Landsat satellite series images) were collected from the public repository of the US Geological Survey (USGS) for three decades (1990–2017). These data were geocorrected and pre-processed to maintain spatial integrity without any distortions. The administrative boundary of Hyderabad was extracted from the city development plan (CDP) and topographic maps were obtained from the Survey of India

online digital repository. The study was carried out for the region covering the Hyderabad administrative boundary to understand land use dynamics in peri-urban regions at the city outskirts.

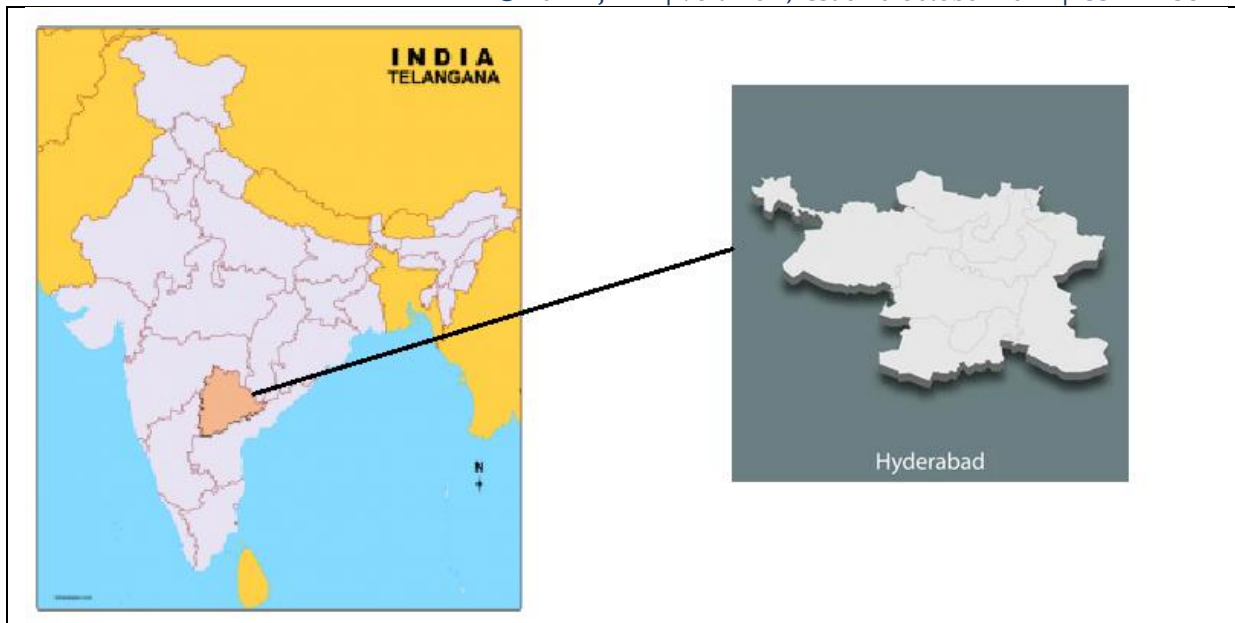
### **Literature Review:**

In growing countries, migration from rural to city regions keeps unabated. This ends in cities and towns accommodating humans at very excessive densities main to congestion. Traffic congestion additionally takes place which results in discount in each financial performance and great of life (Gardner and Evans, 1998).

According to Ichimura (2003), rural-city migration, globalization and mismanagement may be indexed because the primary reasons of urbanization. According to him with inside the case of migration, city regions are visible as locations of extra possibilities and entice rural migration with guarantees of higher infrastructural offerings and provision of amenities. Livability refers back to the surroundings from the attitude of the character and additionally consists of a subjective assessment of the great of the housing conditions. It encompasses the traits of city environments that lead them to appealing locations to live (Throsby, 2005). Palmer (2004) investigated the residents' belief of scenic great in Dennis, Massachusetts for the duration of a length of good sized panorama extrade over a twenty yr time length.

### **STUDY AREA:**

The study area covers Hyderabad City located with inside the heart of the Deccan plateau at a mean peak of 540 mts (1760 feet) above mean sea level. The city is located at 17° N to 17.5° N and 78° E to 78.5° East Longitude, covering an area of 240 Sq.Kms. The city is placed alongside the banks of the Musi River and surrounded through many lakes inclusive of Osman Sagar, Himayat Sagar and Hussain Sagar (Figure.1). Hyderabad is one of the essential participants of the country wide gross home product. With advent of unique financial zones (SEZs) at Gachibowli, Pocharam and Manikonda to inspire country wide in addition to global industries and establishments to installation operations. Erstwhile, the Hyderabad Urban Development Authority (HUDA) become improved in 2008 to the Hyderabad metropolitan area, monitored through the Hyderabad Metropolitan Development Authority (HMDA) masking 7257 km<sup>2</sup> and a populace of 7.74 million (2011). HMDA is spread throughout 5 districts, particularly Hyderabad, Rangareddy, Medak, Mehaboobnagar and Nalgonda. The city is witnessing a rapid expansion, industrial boom, increased trade opportunities coupled with excessive population rate extended because of migration from rural areas although built-up area is most important only in the city center and accounts for 7.5% of the entire region, its impact on the natural resource base in the region is massive. Urbanization has alternated the land-use –land cover in the region with agricultural land being converted into settlements, roads, railways and industrial complexes.



**Figure 1**

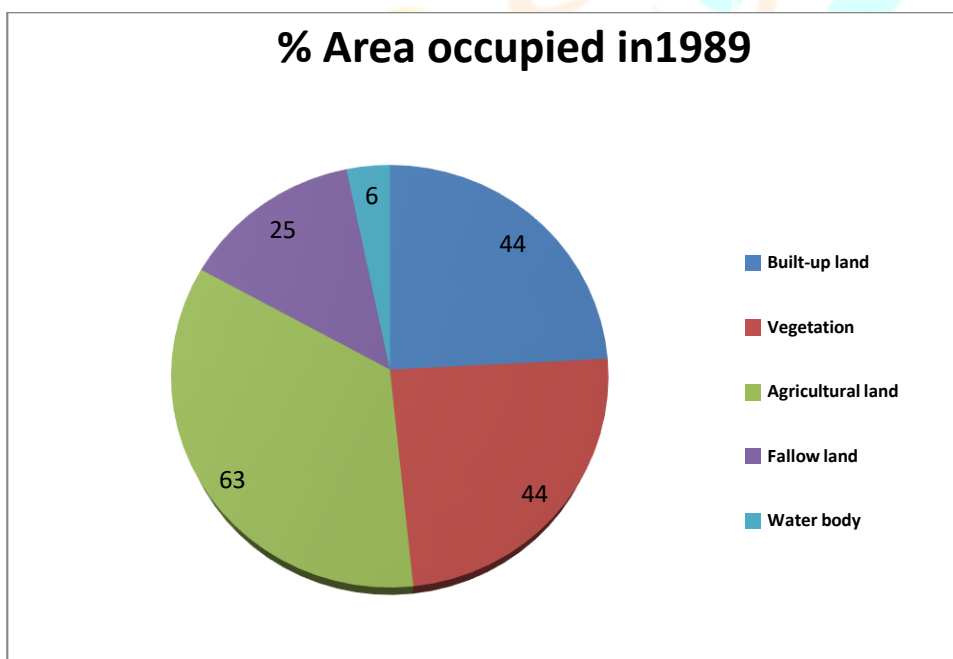
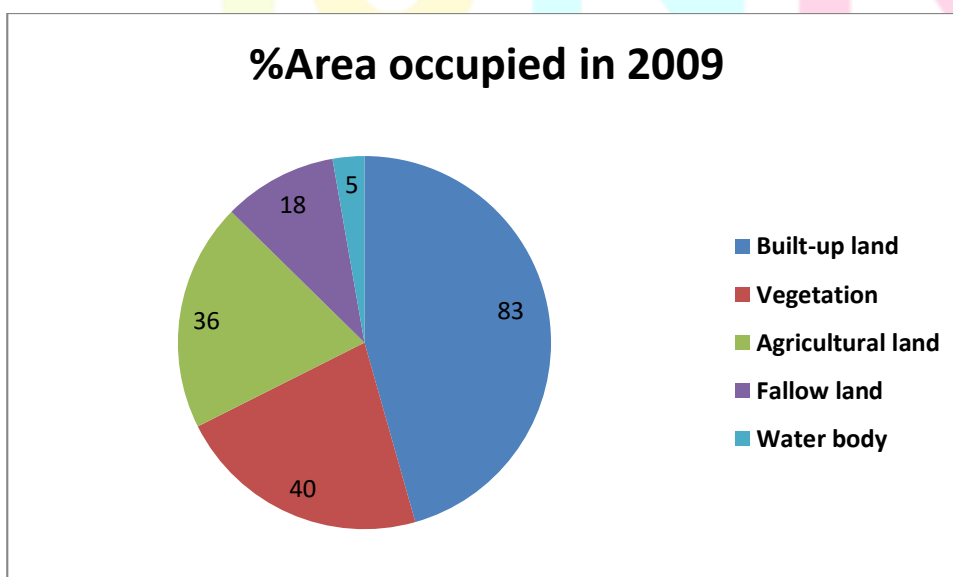
### **Land Use Land Cover of the Study Area:**

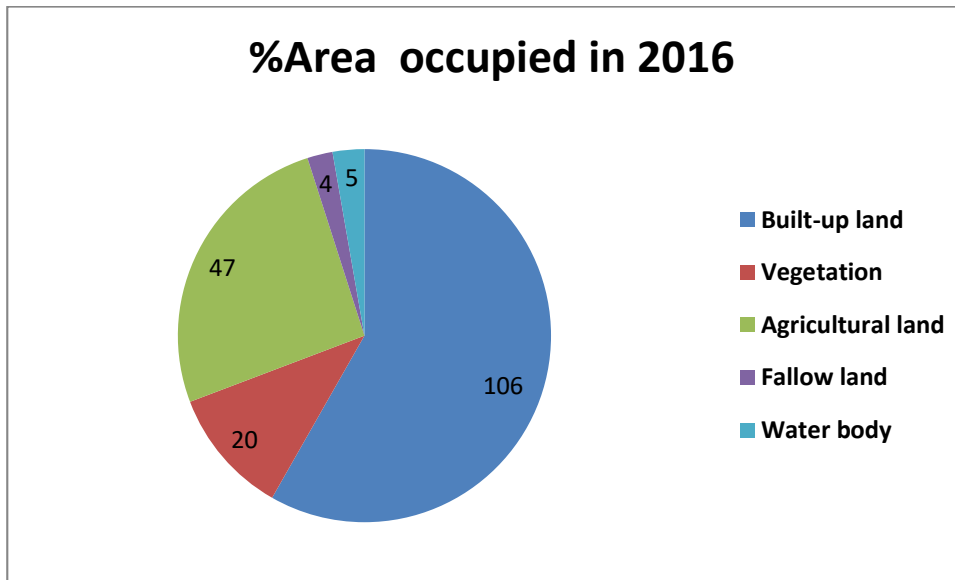
The urban change analysis presented in this article is based on statistical data extracted from 3 land use and land cover maps in Hyderabad. The built-up area has been changed drastically from 1991 to 2016. Built-up area has been increased by 24.18%, vegetation and barren land area has been reduced by 2.23% and 14.45%. There are many reasons for the increase in built-up areas. Hyderabad is well-known for its manufacturing and education facilities, and has added a lot of facilities on this basis. The availability and expansion of the corresponding infrastructure has led to an increase in building area. To identify the physical changes that occurred in and around Hyderabad, land use/land cover (LU/LC) classification and mapping using multi-temporal satellite data of Landsat for the three years 1989, 2011 and 2016. Facts have proved that cultivated land is an excellent and efficient alternative, and all LULC categories have declined from 1989 to 2016. The built-up land has expanded from 44 km<sup>2</sup> in 2001 to 106 km<sup>2</sup> in 2016. The built-up land turned into focused on the eastern facet of the city on the banks of Musi River in 1991. Later the growth occurred with the reduction in agricultural land, forest cover and fallow land on the southern and western facets of the metropolis. At 2011, the proportion of location under built-up land to general location has reached to 58 %.

Represents land use dynamics for Hyderabad during the past three decades with significant changes altogether categories. Results reveal the steep increase in built-up areas of 93% (1989–1999), 91.3% (1999–2009) and 70% (2009–2016). It's important to note that urban areas show significant increase during the years 2000–2010. This may be attributed with emergence of assorted industrial bases within the automobile and hardware manufacturing likewise as information technology parks directly affecting the surrounding land use. The Other category has consistently reduced from 90.5% to 72.75% (1989–2016) indicating an outsized scale conversion of agricultural lands or bare soil land use types to urban. Water bodies show a very critical decrease specifying either these land uses are converted or they have dried up. Statistics show a visit the values from 3.75% to 0.64% during the past three decades suggesting a direct intervention for rejuvenation of lakes.

**Table.1**

LULC categories	1989		2009		2016		Change in 1989-2016	
	Area in Km	Percent share to total area	Area in Km	Percent share to total area	Area in Km	Percent share to total area	Absolute change (in Km <sup>2</sup> )	Percent change (in %)
<b>Built-up land</b>	44	24	83	46	106	58	62	141
<b>Vegetation</b>	44	24	40	22	20	11	-24	-55
<b>Agricultural land</b>	63	35	36	20	47	26	-16	-25
<b>Fallow land</b>	25	14	18	10	4	2	-21	-84
<b>Water body</b>	6	3	5	3	5	3	-1	-17
<b>total</b>	182	100	182	100	182	100	0	0

**Figure 2**

**Figure 3****Figure 4**

### Percentage Distribution of LU/LC during years 1989-2016

Analysis of the effects shows a clear growth in residential, commercial, industrial and transportation with inside the city region. In the non-city region, there's a reduction in agriculture region and additionally in vacant land suggesting the elevated depth with urbanization activities. The study done the use of satellite information of 1999 of Hyderabad and its environs studied the city sprawl depth at special zones, viz., Commercial (Paradise, Panjagutta, Abids, Koti, Charminar), Residential (Banjara Hills), Industrial (Balanagar, Jeedimetla, Sanathnagar), IT sector (HITEC city and madhapur) Sensitive (Zoo park) and Mixed zone (Uppal). In the non-city land cover, there's a clear reduction in agriculture region of 225 km<sup>2</sup> which turned into transformed to city land use all through 1980-1999. Decreasing trend may be visible in the vacant land from 780.99 km<sup>2</sup> to 485.86 km<sup>2</sup> in two decade.

### Understanding Livability:

Livability refers to the living conditions of a place and reflects people's perception of the place to be fit for living or not. Though the interpretation of livability varies with time and place but the concept seems to share terms like "quality of life", "well-being" and "life satisfaction" all across. (Pacione) suggested livability to be a quality that is not an attribute inherent in the environment but is behaviour-related function of the interaction between environmental characteristics and personal characteristics. (Veenhoven). Livability being a subjective opinion, its variety differs with distinct economic, social, cultural and nearby affects thereby governing the inhabitants' impact and belief approximately livability. Hence, for the purpose, an Indian metropolis representing numerous aspects regarding culture, religion, caste, creed and so on. of Indian society became decided on wherein extra than 60 percentage of families constitute center and decrease earnings groups. Higher earnings organization (HIG), economically weaker section (EWS) and men and women underneath poverty level (BPL) aren't taken into consideration as livability expectancies of HIG magnificence might be extra orientated closer to intangibles like logo value, fame image and so on wherein as for EWS and BPL men and women, the availability of simple social and bodily infrastructure might be right sufficient for livability. Hyderabad is a substantial

metropolis showcasing social and economic variety amongst its states and towns. Therefore, a metropolis representing numerous aspects regarding culture, religion, caste, creed and so on. of Indian society became decided on to perform the studies work. Based on above concerns Hyderabad, the capital metropolis of Telangana became decided on for the study. Hyderabad being centrally placed in Telangana is properly related to different important towns thru rail, avenue and air and has been attracting peoples from all elements of India, thereby giving upward thrust to a completely cosmopolitan culture. Historically, it's been dominated with the aid of using each Hindu in addition to Muslim rulers, which has best brought to its evolution into a completely pluralistic society. Analysis of resident's reaction might permit for the identity of the variety of approaches wherein citizens belonging to a specific organization of socio economic magnificence grab livability. These differing experiences, understandings and so on are grouped in phrases of classes of description, logically associated with every different and forming hierarchies when it comes to given criteria. An advent to the livability became framed after a mind storming consultation with academicians to introduce livability phenomenon from a regular resident's perspective.

### **Livability analysis:**

The analysis of this part of the study aimed at identifying the land available for residential purposes classified in terms of the livability. The objective was to see areas of the city were more livable in the context of the natural characteristics of the land as well as the modifications introduced by the infrastructure facilities through urban development, and how the different areas of the city fared when modeled in GIS using the criteria factors. The livability index was obtained through multi criteria analysis based suitability modeling using Raster Calculator facility of ArcMap10. Obtained values indicate that most of the cells occupy the moderately livable class. The area occupied by this class is 5268 sq, kms out of a total of 7228 sq, kms of the study area. The observations made in this study with regard to livability index revealed that out of a total of 1,08,900 ha of the study area, the majority was occupied by the class having fair livability, with 14,610.11 ha (58%), followed by moderate livability class with 10,780.77 ha (27.30%). Area under good livability was 6625.85 ha (17.17%) whereas no areas were found to fall under the class of very good livability. For analysing the livability index another approach was undertaken in which only the natural factors along with land use/ land cover were considered in a weighted model. This approach was considered to visualise the livability of the study area by minimizing the influence of highly weighted infrastructure factors which might have the effect of skewing the model in their favour. For this analysis, the factors of hospitals, schools, roads and industrial areas were withdrawn, the weights were recalculated and a new model was worked out and run.

### **Conclusion:**

The theme of the study reveals that Hyderabad region is a crucial region where urbanization is catching up. The impact of urbanization creates lot of changes in environment like changes in elevation, disappearance and shrinkage of Water bodies, ground water depletion, and impact on Land Surface Temperature which disturbs the urban environment severely. The danger of urban impact and its consequent land transitions is one of the most critical situations assumed to be faced in the study region, because it is one richest natural resource region of Hyderabad. Most of the arguments say that urbanization is a significant factor for environmental change. These changes

modify the natural landscape in to urban land which has provided space and opportunities for billions of people to live, work, and raise their standard of living called urban environment. It is just a name given to the process how urban centres grow by size with increasing population and demand for goods and services. Urbanization does not drive changes in an environmentally way without our decisions about how to use our natural resources.

As discussed in the study, livability is determined not only by the facilities available and the judicious use of the land cover, but also by the character and sense of belonging to the city. The nature of urbanisation in modern Indian cities is taking away this very culture of every city and replacing it with monotonous caricatures of the vibrant cities that India has always been famous for. It remains a challenge to move forward in the direction of greater urbanisation while ensuring that all sections of society benefit from such development. It is in the interest of the city as a whole, from residents to authorities to give thought to conceptualising and implementing a plan for development that preserves the vibrant cosmopolitan nature of this city and makes a statement for a modern, efficient urban design.

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