



International Journal of Geography, Geology and Environment

ISSN Print: 2706-7483
 ISSN Online: 2706-7491
 NAAS Rating (2026): 4.5
 IJGGE 2026; 8(9): 227-234
www.geojournal.net
 Received: 11-07-2026
 Accepted: 25-08-2026
 Published: 29-09-2026

H P Krishnaswamy
 Research Scholar, Department
 of Geography, Karnataka State
 Open University, Mysuru-06,
 Karnataka, India

C S Manjunatha
 Assistant Professor,
 Department of Geography,
 Karnataka State Open
 University, Mysuru-06,
 Karnataka, India

Comparative analysis of land use/land cover dynamics and landscape pattern changes in three local planning areas of South Karnataka, India (1995-2025)

H P Krishnaswamy¹, C S Manjunatha²

DOI: <https://www.doi.org/10.22271/27067483.2026.v8.i9c.883>

ABSTRACT

Land use/land cover (LULC) change associated with urbanisation is an important concern for sustainable spatial planning and landscape management. This study comparatively assesses the spatio-temporal dynamics of LULC and landscape configuration in the Mysuru-Nanjangud, Shivamogga-Bhadravati and Tumakuru Local Planning Areas of Karnataka, India, during 1995-2025. Multi-temporal Landsat satellite imagery was classified into five LULC classes including agriculture, built-up land, waterbodies, vegetation and barren land using supervised classification in QGIS. Changes in LULC composition were assessed through area-based analysis, while landscape-level changes were evaluated using FRAGSTATS with six metrics: CONTAG, DIVISION, SPLIT, MESH, SHDI and SHEI. The results show substantial expansion of built-up land in all three LPAs, with the highest increase in Shivamogga-Bhadravati LPA (71.68 km²), followed by Mysuru-Nanjangud (68.61 km²) and Tumakuru (45.40 km²). Mysuru-Nanjangud recorded a marked decline in agricultural land, whereas Shivamogga-Bhadravati and Tumakuru showed increases in agricultural area. Barren land declined substantially in all three LPAs, while waterbodies decreased throughout the study period. Landscape metrics revealed distinct structural responses: Shivamogga-Bhadravati experienced the strongest increase in fragmentation, Mysuru-Nanjangud showed notable changes in aggregation and diversity, and Tumakuru exhibited comparatively stable landscape configuration. The findings demonstrate that similar LULC transformations can produce different landscape-level responses depending on the spatial arrangement of land-cover patches, highlighting the need for integrated and landscape-sensitive planning in rapidly changing urban regions.

Keywords: LULC Change, Urbanisation, Landscape Fragmentation, Landscape Metrics

1. Introduction

Land use/land cover (LULC) change is an important component of environmental and landscape transformation, reflecting interactions between human activities and natural processes. Population growth, urbanisation, economic development and changing land-use demands have resulted in substantial transformations of agricultural land, vegetation, barren land, water resources and built-up areas (Lambin *et al.*, 2003; Turner *et al.*, 2007) [2, 1]. Understanding these changes is essential for sustainable land management and effective spatial planning.

Rapid urbanisation is a major driver of LULC transformation, particularly in developing countries. Urban expansion frequently involves the conversion of agricultural, vegetated and open lands, thereby altering the spatial and ecological characteristics of surrounding landscapes (Seto *et al.*, 2011; Seto *et al.*, 2012) [3, 4]. Recent studies in India have reported substantial increases in built-up areas accompanied by changes in agricultural, vegetation, barren land and waterbody classes, highlighting the continuing influence of urban growth on regional land systems (Bharath *et al.*, 2023; Lakshmipathi *et al.*, 2025; Nooji *et al.*, 2025) [5, 6, 7]. A recent systematic review further emphasises the growing application of LULC analysis and landscape metrics for understanding urban expansion and fragmentation in India (Sharma *et al.*, 2024) [8].

Remote sensing and Geographic Information System (GIS) techniques provide effective approaches for monitoring and quantifying LULC changes over time. Multi-temporal satellite data facilitate the identification of changes in the extent and spatial distribution of LULC classes, while GIS supports their spatial analysis and comparison (Roy *et al.*, 2010) [9]. Recent studies from Karnataka have documented substantial LULC transformation associated with urbanisation, including urban sprawl in Bengaluru Rural (Bharath *et al.*, 2023) [5], built-up expansion and changes in cropland, vegetation and wetlands in the Bengaluru Metropolitan Region (Lakshmipathi *et al.*, 2025) [6], and LULC transformation in the medium-sized coastal cities of Mangaluru and Udupi (Nooji *et al.*, 2025) [7].

Corresponding Author:

C S Manjunatha
 Assistant Professor,
 Department of Geography,
 Karnataka State Open
 University, Mysuru-06,
 Karnataka, India

The Mysuru region has also experienced considerable urban and land-use transformation. Previous studies have documented significant changes in LULC patterns and urban footprint using remote sensing, GIS and multi-temporal geospatial data (Manjunatha *et al.*, 2020; Manjunatha *et al.*, 2023) [10, 11]. These studies provide an important regional basis for examining the longer-term transformation of the Mysuru-Nanjangud area.

However, changes in the area of individual LULC classes alone do not fully explain landscape transformation. Similar increases in built-up land can produce different spatial patterns depending on patch size, distribution, connectivity and arrangement. Landscape metrics therefore provide an additional means of quantifying structural characteristics such as aggregation, fragmentation, division, effective mesh size, diversity and evenness (Herold *et al.*, 2005; Jaeger, 2000) [12, 13]. Recent studies have demonstrated their usefulness in assessing urban fragmentation and spatial configuration, with landscape-level changes reported in rapidly expanding urban regions of India (Barman *et al.*, 2024; Mansingh *et al.*, 2025; Engineering Proceedings, 2024) [14, 15, 16].

Recent research further indicates that LULC change and landscape structure may not respond proportionally. Urban expansion can produce substantial changes in contiguity, dispersion and edge characteristics, resulting in structural reorganisation of urban landscapes (Bindajam *et al.*, 2026) [17]. Similarly, integrated LULC and landscape-fragmentation assessments have demonstrated significant restructuring of urban landscapes in rapidly growing Indian cities (Beuria *et al.*, 2026) [18]. These findings highlight the importance of examining not only the magnitude of LULC change but also the spatial organisation of the resulting landscape patches.

Despite the growing application of remote sensing, GIS and landscape metrics in India, comparative assessments of multiple Local Planning Areas (LPAs) integrating LULC composition with landscape-level configuration remain limited. LPAs provide an appropriate spatial framework for examining urban expansion alongside changes in surrounding agricultural, vegetation and open lands. A comparative approach can reveal whether similar LULC transformations produce comparable landscape responses or distinct structural patterns due to differences in the spatial arrangement of land-cover patches.

Against this background, the present study comparatively examines the spatio-temporal dynamics of LULC and landscape-level changes in the Mysuru-Nanjangud, Shivamogga-Bhadravati and Tumakuru Local Planning Areas of *Karnataka*, India, during 1995-2025. The study assesses changes in major LULC classes and evaluates landscape configuration using CONTAG, DIVISION, SPLIT, MESH, SHDI and SHEI. By integrating LULC change analysis with landscape metrics, the study identifies differences in the magnitude, direction and spatial structure of landscape transformation among the three planning areas and provides a comparative basis for landscape-sensitive land-use planning.

2. Study area

The study covers three Local Planning Areas (LPAs) of south *Karnataka*, India: Mysuru-Nanjangud LPA (MNLPA), Shivamogga-Bhadravati LPA (SBLPA), and Tumakuru LPA (TLPA). The three LPAs represent important urban and regional planning areas with diverse land-use characteristics and varying degrees of urban development. They were selected to comparatively examine LULC transformation and associated changes in landscape configuration during 1995-2025.

The Mysuru-Nanjangud LPA extends between 12.06°-12.42° N latitude and 76.49°-76.76° E longitude, covering approximately 520.39 km². The LPA encompasses Mysuru and Nanjangud and their surrounding settlements and rural landscapes. The area has experienced considerable urban expansion accompanied by changes in agricultural, vegetated and open lands.

The Shivamogga-Bhadravati LPA extends between 13.78°-14.03° N latitude and 75.44°-75.78° E longitude, covering approximately 434.06 km². It encompasses the cities of Shivamogga and Bhadravati and their surrounding settlements. The LPA comprises a mixture of urban, agricultural, vegetated and open landscapes and has undergone significant land-use transformation.

The Tumakuru LPA extends between 13.26°-13.43° N latitude and 76.99°-77.23° E longitude, covering approximately 329.13 km². The LPA includes Tumakuru city and its surrounding planning area, characterised by a combination of built-up, agricultural, vegetated and barren lands.

3. Materials and methods

Satellite data and pre-processing

Multi-temporal Landsat satellite imagery was used to assess LULC changes. Images with less than 10% cloud cover and 30 m spatial resolution were selected for the analysis. Landsat 5 imagery was used for the earlier observation periods and Landsat 8 for the later periods. The details of the satellite datasets are presented in Table 1. The selected images were processed using QGIS and clipped to the respective LPA boundaries. The imagery was prepared for classification and analysed using consistent LULC categories across the study period.

LULC classification and change analysis

A supervised classification was performed in QGIS to classify the satellite imagery into five LULC classes: agriculture, built-up land, waterbodies, vegetation, and barren land. Training samples were generated for each class based on their spectral characteristics and reference information. The classified outputs were examined to ensure consistent representation of the LULC classes.

The area of each class was calculated in km² for the selected years. LULC transformation between 1995 and 2025 was assessed using net change:

$$\text{Net Change} = \text{Area in 2025} - \text{Area in 1995}$$

Positive values indicate an increase and negative values indicate a decrease in the respective LULC class.

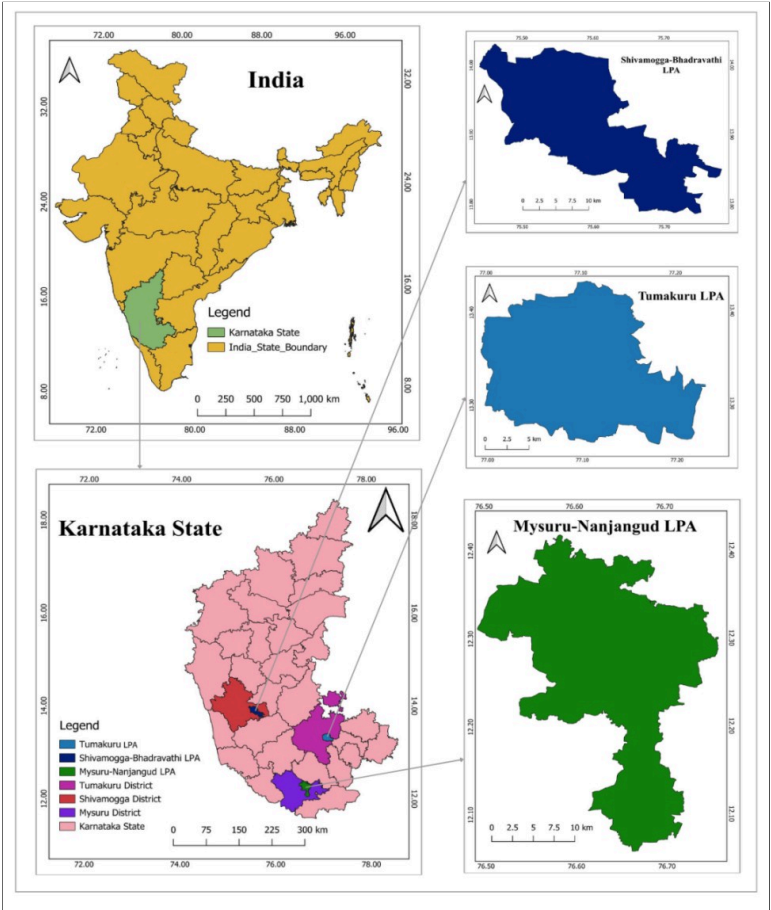


Figure 1. Study Area Map of the Mysuru-Nanjangud LPA, Shivamogga-Bhadravathi LPA and Tumakuru LPA in *Karnataka*, India

Landscape-Level Analysis: The spatial implications of LULC change were analysed using FRAGSTATS. The classified LULC maps for 1995 and 2025 were used as categorical raster inputs with consistent spatial characteristics. Six landscape-level metrics including CONTAG, DIVISION, SPLIT, MESH, SHDI and SHEI were selected to assess landscape aggregation, fragmentation, subdivision, effective mesh size, diversity and evenness. The metric values for 1995 and 2025 were compared to identify changes in landscape configuration across the three LPAs.

Comparative Analysis: The LULC statistics and landscape metrics were integrated to compare the magnitude and nature of landscape transformation among the three LPAs. This approach enabled the as-

essment of both changes in LULC composition and changes in spatial landscape configuration during 1995-2025.

4. Results and discussion

4.1. Spatio-temporal dynamics of LULC

The analysis examines the distribution of major LULC classes in 1995 and 2025 and their subsequent gains and losses. The spatial patterns observed from the LULC maps are compared with the quantitative changes to understand the extent and nature of urban expansion, agricultural transformation, changes in vegetation and waterbodies, and the reduction of barren land across the three LPAs.

Table 1. Details of Landsat Satellite Data Used for LULC Classification

LPA	Date	Satellite	Path	Row	Spatial Resolution	Cloud Cover
MNLPA	22 January 1995	Landsat 5	144	52	30 m	< 10%
	19 April 2025	Landsat 8	144	52	30 m	< 10%
SBLPA	15 February 1995	Landsat 5	145	50	30 m	< 10%
	03 October 2025	Landsat 8	145	51	30 m	< 10%
TLPA	23 February 1995	Landsat 5	144	51	30 m	< 10%
	13 March 2025	Landsat 8	144	51	30 m	< 10%

(continued on next page)

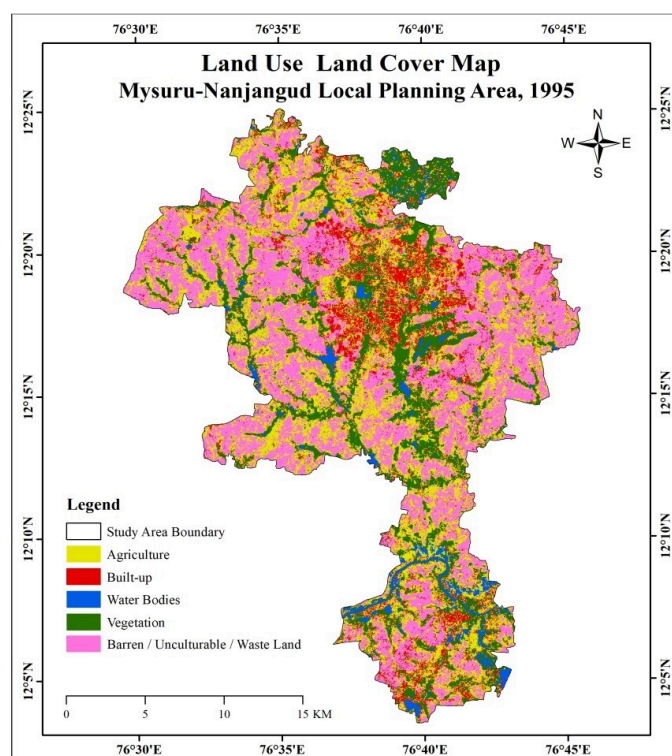


Figure 2. Land Use/Land Cover of the Mysuru-Nanjangud LPA, 1995

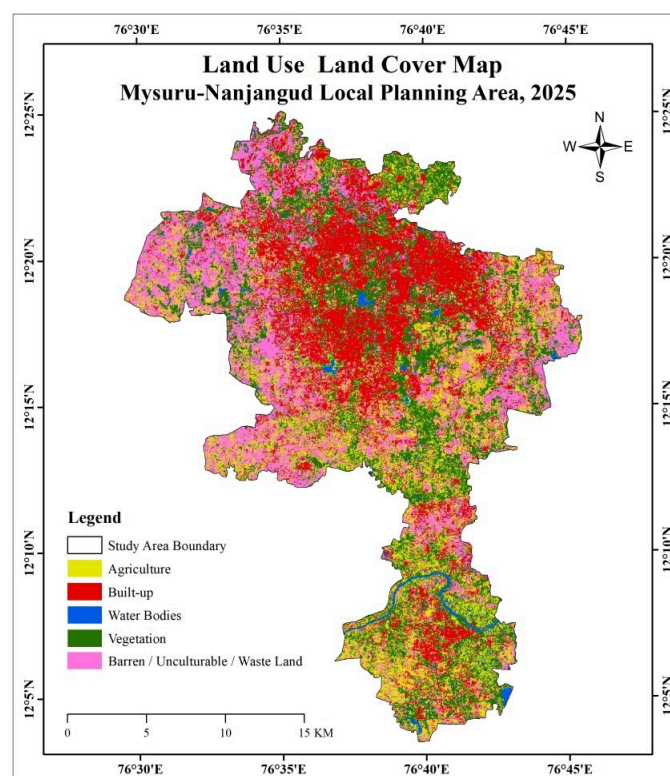


Figure 3. Land Use/Land Cover of the Mysuru-Nanjangud LPA, 2025

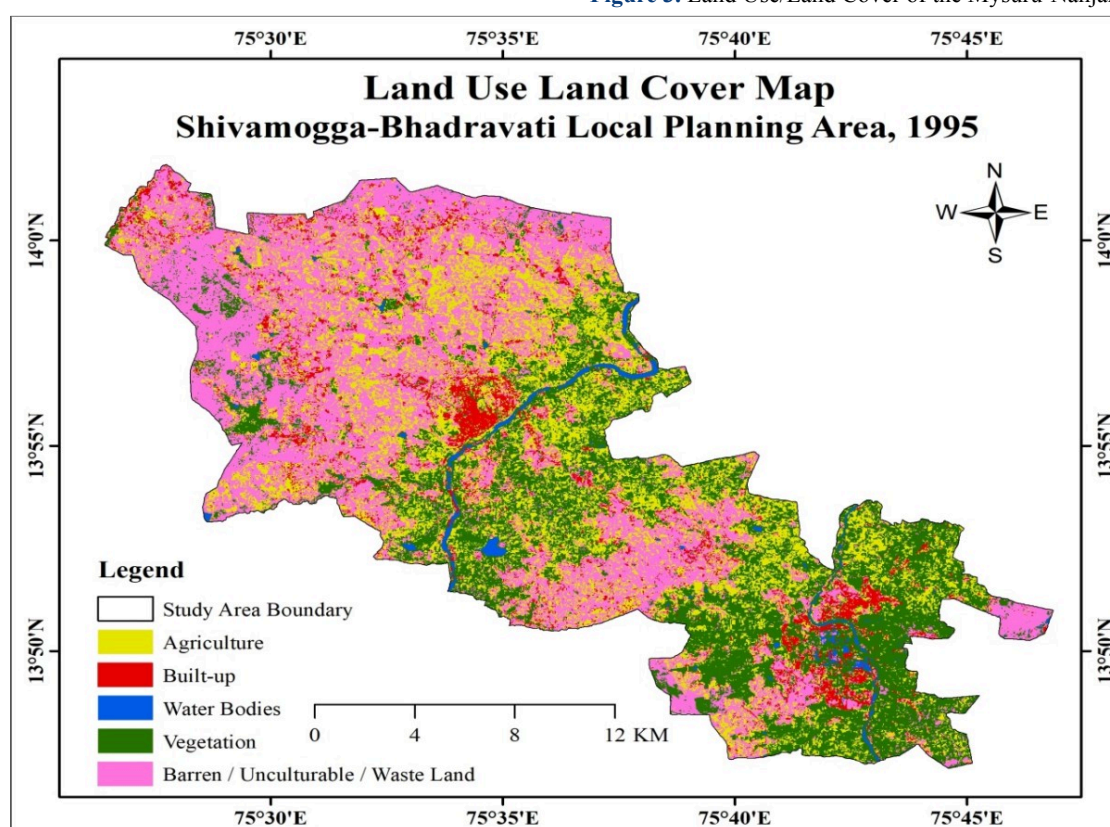


Figure 4. Land Use/Land Cover of the Shivamogga-Bhadravati LPA, 1995

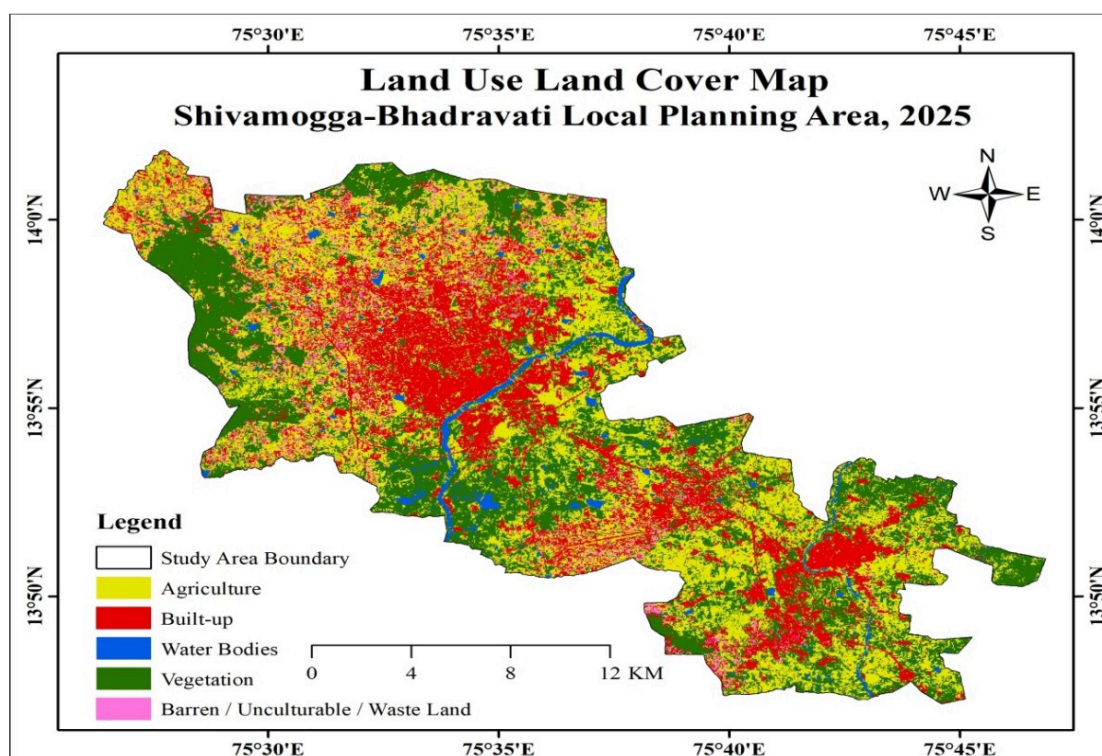


Figure 5. Land Use/Land Cover of the Shivamogga-Bhadravati LPA, 2025

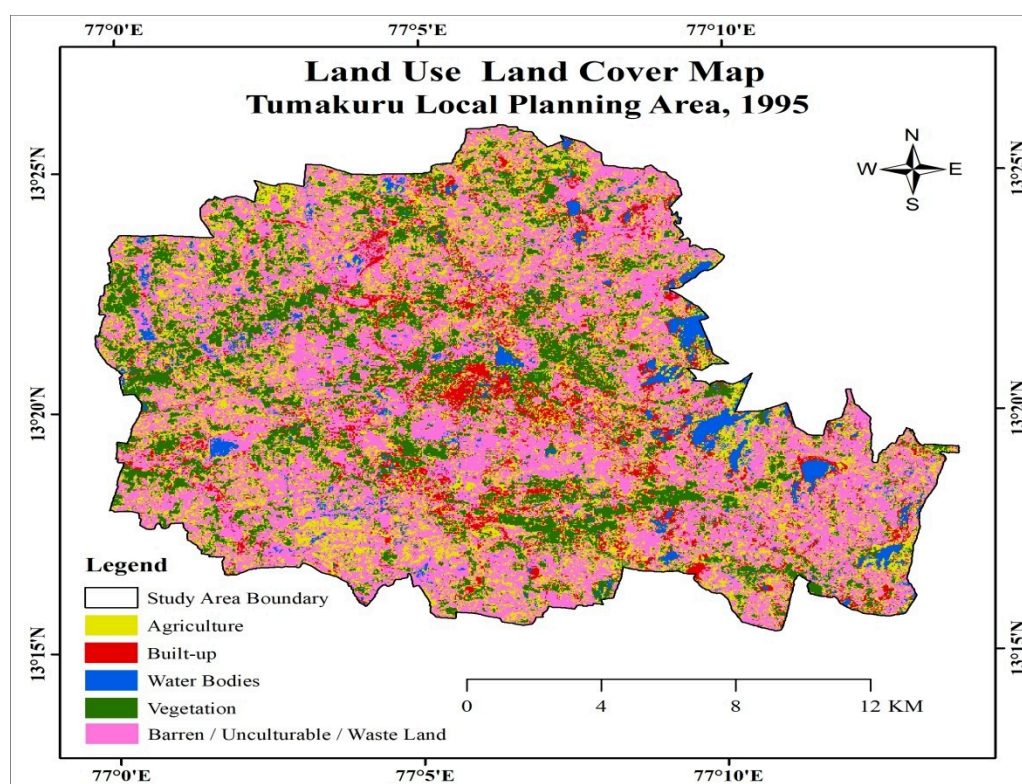


Figure 6. Land Use/Land Cover of the Tumakuru LPA, 1995

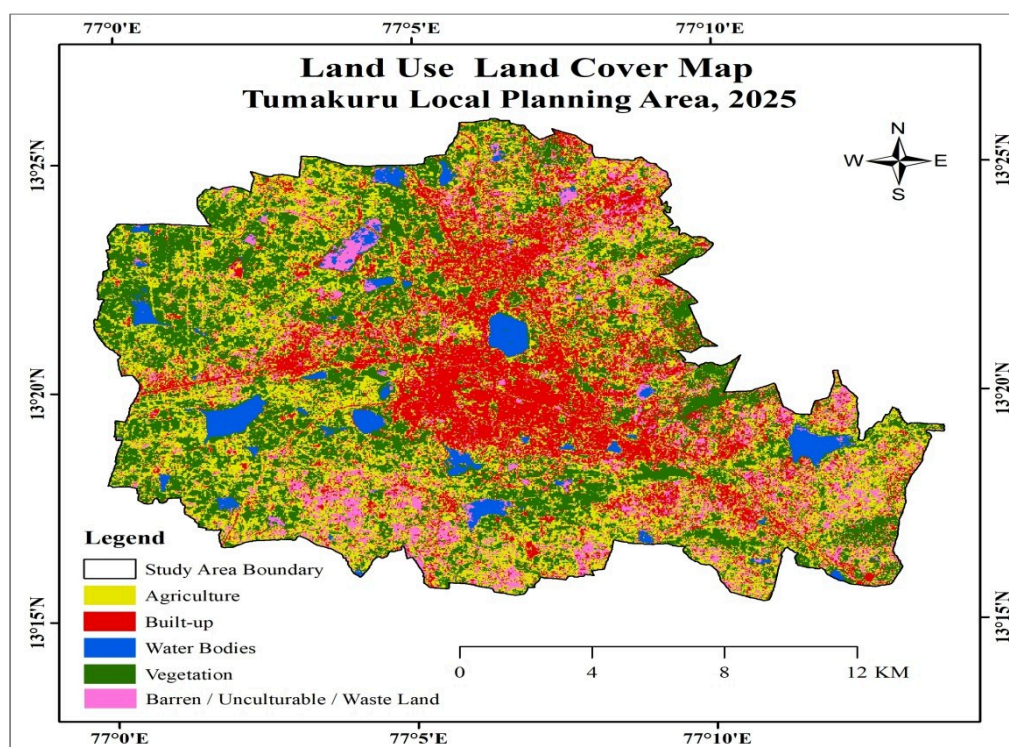


Figure 7. Land Use/Land Cover of the Tumakuru LPA, 2025

Table 2. Comparative LULC Dynamics and Net Change in the Three Local Planning Areas, 1995-2025

LULC Class	MNLPA		Net Change	SBLPA		Net Change	TLPA		Net Change
	1995	2025		1995	2025		1995	2025	
Agriculture	164.00	118.93	-45.07	116.86	160.51	+43.65	87.33	111.83	+24.50
Built-up	59.83	128.44	+68.61	31.88	103.56	+71.68	30.29	75.69	+45.40
Waterbody	19.08	13.59	-5.49	8.78	7.91	-0.87	13.87	11.63	-2.24
Vegetation	87.18	123.79	+36.61	133.56	130.76	-2.80	80.51	77.76	-2.75
Barren land	190.29	135.63	-54.66	142.98	31.32	-111.66	117.13	52.22	-64.91
Total	520.38	520.39	-	434.06	434.06	-	329.13	329.13	-

The LULC maps (Figs. 2-7) and Table 2 reveals substantial changes in the three Local Planning Areas between 1995 and 2025. The most consistent trend was the expansion of built-up land, accompanied by significant changes in agricultural and barren land. However, the magnitude and direction of these changes varied considerably among the LPAs, indicating different patterns of landscape transformation.

Mysuru-Nanjangud local planning area (MNLPA)

In MNLPA, barren land was the dominant class in 1995 (190.29 km²), followed by agriculture (164.00 km²). By 2025, built-up land had increased from 59.83 to 128.44 km², recording a net gain of 68.61 km². This represents more than a twofold increase in built-up area and indicates substantial urban expansion during the study period. In contrast, agricultural land declined by 45.07 km², suggesting increasing pressure on agricultural land associated with urban growth. Vegetation increased from 87.18 to 123.79 km² (+36.61 km²), while barren land declined by 54.66 km². The concurrent changes suggest that the reduction in barren land was associated with its redistribution among vegetation, built-up and other land-use categories. Waterbodies experienced a relatively small decline of 5.49 km². Overall, MNLPA shows a pronounced transition towards a more urbanised and heterogeneous landscape, with a notable reduction in agricultural and barren land.

Shivamogga-Bhadravati local planning area (SBLPA)

SBLPA experienced the largest overall built-up expansion among the three LPAs. Built-up land increased from 31.88 to 103.56 km², representing a net increase of 71.68 km². This more than threefold increase

is clearly reflected in the spatial expansion of built-up areas between 1995 and 2025. Such growth indicates intensification and outward expansion of urban land within the planning area. The most substantial decline was observed in barren land, which decreased from 142.98 to 31.32 km² (-111.66 km²). At the same time, agricultural land increased by 43.65 km², from 116.86 to 160.51 km². The contrasting changes indicate substantial restructuring of previously barren or less-utilised areas, with increases in both agricultural and built-up land. Vegetation remained relatively stable, declining only marginally by 2.80 km², while waterbodies decreased by 0.87 km². Thus, SBLPA is characterised primarily by rapid urban expansion and extensive reduction of barren land, accompanied by an increase in agricultural extent.

Tumakuru local planning area (TLPA)

In TLPA, barren land was the largest class in 1995 (117.13 km²), followed by agriculture (87.33 km²) and vegetation (80.51 km²). By 2025, built-up land had increased from 30.29 to 75.69 km², recording a gain of 45.40 km². Although lower in absolute magnitude than the increases observed in MNLPA and SBLPA, the change represents a substantial expansion relative to the initial built-up area. Barren land declined by 64.91 km², while agricultural land increased by 24.50 km². This indicates considerable transformation of barren areas into productive and developed land uses. Vegetation and waterbodies showed relatively small reductions of 2.75 and 2.24 km², respectively. The overall pattern therefore indicates moderate urbanisation accompanied by substantial restructuring of barren and agricultural land.

Comparative LULC transformation

The comparison reveals that built-up expansion was the dominant and common trend across all three LPAs. SBLPA recorded the highest absolute increase (71.68 km²), closely followed by MNLPA (68.61 km²), while TLPA recorded a lower increase (45.40 km²). However, when considered relative to their respective initial built-up areas, SBLPA experienced the most pronounced proportional expansion.

Agricultural trajectories differed substantially. MNLPA recorded a decline of 45.07 km², whereas SBLPA and TLPA recorded increases of 43.65 and 24.50 km², respectively. This contrast suggests stronger urban pressure on agricultural land in MNLPA, while agricultural expansion was more prominent in SBLPA and TLPA.

Barren land declined in all three LPAs, with the greatest reduction occurring in SBLPA (111.66 km²), followed by TLPA (64.91 km²) and MNLPA (54.66 km²). Vegetation increased substantially only in MNLPA, whereas it remained relatively stable in SBLPA and TLPA. Waterbody extent declined across all three LPAs, although the magnitude of change was comparatively small.

The results demonstrate progressive urban expansion and substantial reorganisation of the landscape between 1995 and 2025, but with distinct trajectories. MNLPA shows urban expansion coupled with agricultural loss and vegetation increase; SBLPA exhibits the strongest built-up growth and the largest reduction in barren land; while TLPA

represents a comparatively moderate urbanising landscape with expansion of agriculture and reduction of barren land. These differences provide the basis for examining whether the observed LULC changes have also altered the spatial configuration, fragmentation, diversity and connectivity of the landscape, which is assessed using the landscape-level metrics in Table 3.

4.2. Changes in landscape-level pattern and fragmentation

The analysis further examines whether changes in LULC composition have resulted in corresponding changes in landscape structure. Selected landscape metrics, including CONTAG, DIVISION, SPLIT, MESH, SHDI, and SHEI, are used to assess changes in landscape aggregation, fragmentation, patch division, effective mesh size, diversity, and evenness. A comparative assessment helps identify differences in the structural response of MNLPA, SBLPA, and TLPA to LULC transformation.

The CONTAG values provide an indication of landscape aggregation, while DIVISION and SPLIT describe landscape fragmentation and subdivision. MESH represents effective mesh size, whereas SHDI and SHEI describe landscape diversity and evenness, respectively. Together, these metrics provide a more comprehensive understanding of the structural consequences of the LULC transformations identified in Table 2.

Table 3. Comparative Landscape-Level Metrics of the Three Local Planning Areas, 1995-2025

Landscape Metric	MNLPA		SBLPA		TLPA	
	1995	2025	1995	2025	1995	2025
CONTAG	29.6295	18.6378	31.1085	29.5196	23.4885	24.2051
DIVISION	0.9858	0.9796	0.9221	0.9819	0.9803	0.9806
SPLIT	70.2407	48.9726	12.8330	55.1622	50.7123	51.4325
MESH	720.7862	1033.8121	3261.4984	758.7567	626.8391	618.0622
SHDI	1.4010	1.4699	1.3210	1.3253	1.3812	1.4110
SHEI	0.8705	0.9133	0.8208	0.8235	0.8582	0.8767

While Table 2 demonstrates what changed in terms of LULC composition, the landscape-level metrics in Table 3 provide insight into how these land-cover classes became spatially arranged, fragmented, or aggregated between 1995 and 2025.

Mysuru-Nanjangud LPA

In MNLPA, CONTAG decreased substantially from 29.6295 in 1995 to 18.6378 in 2025, indicating a decline in landscape aggregation and greater spatial disaggregation of land-cover patches. The decline in CONTAG is consistent with the substantial expansion of built-up land and the redistribution of other LULC classes across the landscape.

The SPLIT index decreased from 70.2407 to 48.9726, while MESH increased from 720.7862 to 1033.8121. These changes indicate a modification in the degree of landscape subdivision and patch structure. At the same time, SHDI increased from 1.4010 to 1.4699, and SHEI increased from 0.8705 to 0.9133, indicating greater landscape diversity and a more even distribution among LULC classes in 2025. Thus, the MNLPA landscape became more diverse and spatially heterogeneous, accompanied by a marked reduction in contagion.

Shivamogga-Bhadravati LPA

SBLPA recorded a relatively small decline in CONTAG, from 31.1085 to 29.5196, suggesting a modest reduction in overall aggregation. However, the DIVISION index increased markedly from 0.9221 to 0.9819, while SPLIT increased from 12.8330 to 55.1622. These changes indicate a substantial increase in landscape subdivision and fragmentation.

The most striking change is observed in MESH, which declined from 3261.4984 to 758.7567. The sharp reduction in effective mesh size indicates that the landscape became considerably more subdivided by

2025. This pattern corresponds closely with the strong increase in built-up land and the extensive restructuring of barren and agricultural areas identified in Table 1. SHDI increased only slightly from 1.3210 to 1.3253, while SHEI increased from 0.8208 to 0.8235. Therefore, although landscape diversity and evenness changed only marginally, the spatial configuration of the landscape underwent considerable fragmentation.

Tumakuru LPA

TLPA presents comparatively limited changes in landscape configuration. CONTAG increased slightly from 23.4885 to 24.2051, suggesting a small increase in landscape aggregation. DIVISION remained almost unchanged, increasing from 0.9803 to 0.9806, while SPLIT increased marginally from 50.7123 to 51.4325. MESH decreased slightly from 626.8391 to 618.0622, indicating only a minor increase in landscape subdivision. In contrast, SHDI increased from 1.3812 to 1.4110, and SHEI increased from 0.8582 to 0.8767, indicating a moderate increase in landscape diversity and evenness.

Comparative landscape-level response to LULC transformation

The landscape metrics indicate distinct structural responses among the three LPAs. SBLPA experienced the greatest increase in landscape fragmentation, MNLPA showed notable changes in landscape aggregation and diversity, while TLPA exhibited comparatively stable landscape configuration despite changes in LULC composition. These findings indicate that changes in LULC composition do not necessarily result in similar changes in landscape structure, as the spatial arrangement and distribution of land-cover patches strongly influence landscape-level patterns.

5. Conclusion

The comparative analysis of LULC dynamics in the Mysuru-Nanjangud, Shivamogga-Bhadravati, and Tumakuru Local Planning Areas shows substantial landscape transformation during 1995-2025. Built-up land increased considerably in all three LPAs, although the magnitude and nature of change varied across the areas.

Mysuru-Nanjangud LPA experienced a marked increase in built-up land along with a decline in agricultural land and an increase in vegetation. Shivamogga-Bhadravati LPA recorded the highest built-up expansion and greatest reduction in barren land, accompanied by an increase in agricultural land. Tumakuru LPA showed comparatively moderate urban expansion, with increases in agriculture and reductions in barren land. Waterbodies declined in all three LPAs.

The landscape metrics indicate different structural responses to these LULC changes. SBLPA experienced the strongest fragmentation, MNLPA showed notable changes in aggregation and diversity, while TLPA exhibited comparatively stable landscape configuration. These findings demonstrate that changes in LULC composition do not necessarily produce similar changes in landscape structure, as the spatial arrangement of land-cover patches also influences landscape patterns. The findings emphasise the importance of integrated land-use planning and landscape-sensitive development to manage urban expansion while conserving agricultural land, vegetation and water resources in the rapidly changing planning areas of *Karnataka*.

References

- Turner BL II, Lambin EF, Reenberg A. The emergence of land change science for global environmental change and sustainability. *Proceedings of the National Academy of Sciences*. 2007;104(52):20666-20671.
- Lambin EF, Geist HJ, Lepers E. Dynamics of land-use and land-cover change in tropical regions. *Annual Review of Environment and Resources*. 2003;28:205-241.
- Seto KC, Fragkias M, Güneralp B, Reilly MK. A *meta*-analysis of global urban land expansion. *PLoS ONE*. 2011;6(8):e23777.
- Seto KC, Güneralp B, Hutyra LR. Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. *Proceedings of the National Academy of Sciences*. 2012;109(40):16083-16088.
- Bharath A, *et al.* Evaluation of land use/land cover changes due to urban sprawl in Bengaluru Rural, *Karnataka*, India. *Discrete Dynamics in Nature and Society*. 2023;2023:8077644.
- Lakshmiipathi TL, Nagendra HN, Konikar GSM, Kavyashree UA. Spatiotemporal analysis of land use and land cover changes in Bengaluru Metropolitan Region (1990-2023) using GIS and remote sensing. *Journal of Geography, Environment and Earth Science International*. 2025;29(2):113-127.
- Nooji S, Kini S, Holla MR. LULC transformation and urbanization impacts on thermal and ecological dynamics in the medium-sized coastal cities of Mangaluru and Udupi, *Karnataka*, India. *Discover Applied Sciences*. 2025.
- Sharma M, Kumar V, Kumar S. A systematic review of urban sprawl and land use/land cover change studies in India. *Urban Science*. 2024.
- Roy PS, Roy A. Land use and land cover change in India: A remote sensing & GIS perspective. *Journal of the Indian Institute of Science*. 2010;90(4):489-502.
- Manjunatha CS, Chandrashekara B. Assessment of changing land-use and landcover pattern in the Mysore Local Planning District (LPD) using remote sensing and GIS. *Science, Technology and Development*. 2020;9(10):206-216.
- Manjunatha CS, Dhanaraj K, Chandrashekara B. Tracing and analysis of urban footprint and its future implications in an emerging metropolis of Mysuru, India, using geoinformatics techniques. *Geographical Analysis*. 2023;12(1):1-12.
- Herold M, Couclelis H, Clarke KC. The role of spatial metrics in the analysis and modeling of urban land use change. *Computers, Environment and Urban Systems*. 2005;29(4):369-399.
- Jaeger JAG. Landscape division, splitting index, and effective mesh size: New measures of landscape fragmentation. *Landscape Ecology*. 2000;15:115-130.
- Barman S, Roy D, Sarkar BC, Almohamad H, Abdod HG. Assessment of urban growth in relation to urban sprawl using landscape metrics and Shannon's entropy model in Jalpaiguri urban agglomeration, West Bengal, India. *Geocarto International*. 2024;39(1).
- Mansingh A, Pradhan A, Rath LP, *et al.* Spatio-temporal analysis of fragmentation and rapid land use changes in an expanding urban region of eastern India. *Discover Sustainability*. 2025;6:131.
- Urban Growth Analysis Using Multi-Temporal Remote Sensing Image and Landscape Metrics for Smart City Planning of Lucknow District, India. *Engineering Proceedings*. 2024.
- Bindajam AA, Mallick J, Alshayeb MJ, Poddar S. Understanding urbanization and its expansion process in Bengaluru through geo-statistical models for landscape management. *Advances in Space Research*. 2026;77(3):2855-2880.
- Beuria R, Sahu SC, Nandi D. Decoding urban sprawl in Bhubaneswar (2000-2025): A spatio-temporal LULC and landscape fragmentation analysis. *Advances in Space Research*. 2026;77(9):8804-8826.

How to cite this article: Krishnaswamy HP, Manjunatha CS. Comparative analysis of land use/land cover dynamics and landscape pattern changes in three local planning areas of South *Karnataka*, India (1995-2025). *International Journal of Geography, Geology and Environment*. 2026;8(9):227-234. doi: <https://www.doi.org/10.22271/27067483.2026.v8.i9c.883>