GEO-EYE

A Geospatial Assessment of Land Use Land Cover Changes in Mysuru Taluk

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Abstract

The research places its emphasis on comprehending the intricacies and fluctuations in the utilization and coverage of land in Mysuru Taluk, a locale nestled in the southern reaches of India. The study uses Sentinel-2 multitemporal satellite data from the Esri to examine land dynamics in Mysuru Taluk between 2017 and 2022, employing ArcMap software for mapping and statistical techniques for quantifying variations in land cover categories such as built-up areas, agricultural land, and water bodies. The investigation endeavors to pinpoint the catalysts that have influenced the transformation of land utilization in this area, which encompasses the realms of urbanization, agricultural practices, and environmental shifts. The findings of this study unveil a decline in shrublands and agricultural land, while simultaneously witnessing an upsurge in vegetation and urbanized areas within Mysuru Taluk, spanning the years from 2017 to 2022. The dwindling of shrublands and agricultural land can be ascribed to alterations in natural vegetation patterns, land management methodologies, and land use policies, particularly those related to urbanization. Conversely, the augmentation of vegetation and urbanized areas signifies an escalating inclination towards afforestation, conservation endeavors, population expansion, and urban development within this region.

Keywords: Land use and land cover changes; Mysuru Taluk; LULC classification; Urban regions; Agricultural land; Natural habitats; Geographical information systems (GIS); Built up areas; Afforestation initiatives; Conservation efforts

Introduction

An essential component of geographical study is the investigation of land use and land cover, which yields important insights into the dynamic relationship between human activity and the environment. The southern Indian region of Mysuru Taluk serves as a microcosm of the world's various landscapes and human interactions with the land. Comprehending the land use and cover patterns in this region is crucial for efficient resource management, sustainable growth, and protection of the environment. Particularly in developing countries like India, the Land Use and Land Cover (LULC) classification provides crucial insights required for addressing socio-ecological challenges and guaranteeing the effective usage of land resources.

Urban regions, agricultural landscapes, and natural habitats are just a few of the many ecosystems that make up Mysuru Taluk, which is a portion of the greater Mysuru district in the state of Karnataka. The landscape is always changing due to the increase in human population and economic activity, which has an impact on how land is covered and used. An in-depth analysis of how patterns of land use and land cover develop over time is necessary due to the intricate interactions between natural processes and human interventions. Large areas of agricultural land have been turned into wasteland due to quick human involvement and unfavorable bioclimatic circumstances.

This study uses cutting edge analytical techniques and tools to investigate the temporal dynamics of land use and land cover in Mysuru Taluk. We seek to identify the patterns and trends that influence the evolution of land use in the area through the examination of historical data, satellite photography, and geographical information systems (GIS). A more complex knowledge of the processes influencing the landscape throughout time will result from the identification of important factors, such as urbanization, agricultural practices, and environmental changes.

The practical ramifications of this research for legislators, land-use planners, and environmentalists make it significant beyond the realm of academia. The results of this research will direct conservation efforts to preserve natural balance, support the creation of land-use policies, and inform strategies for sustainable development. Furthermore, developing a thorough grasp of the changes in land use and land cover in Mysuru Taluk can help similar places face the difficulties of rapid urbanization and environmental transformation by acting as a model.

We will travel through the complex landscapes of Mysuru Taluk in the pages that follow, learning about the subtle changes in land use and land cover throughout time. This research endeavors to offer significant perspectives into the wider discussion on sustainable development, environmental conservation, and the complex interplay between human communities and their surrounding environments by means of meticulous examination and interpretation.

Study area

Mysore Taluk is a region in Karnataka's Mysore district that consists of 140 villages and 10 towns. Its population, which is divided among 299,853 families, is 1,281,768.

There is a reasonable gender balance, with 50.35% of men and 49.65% of women. 9.94% of the population is under the age of six, which corresponds to a sex-ratio of 986, which is marginally higher than the state average of 973 for Karnataka. Over its 797 square kilometers, the area has a population density of 1,608 people per square kilometer. The majority of the population of Mysore Taluk is rural, with 20.87% living in urban areas and 79.13% in rural ones. According to
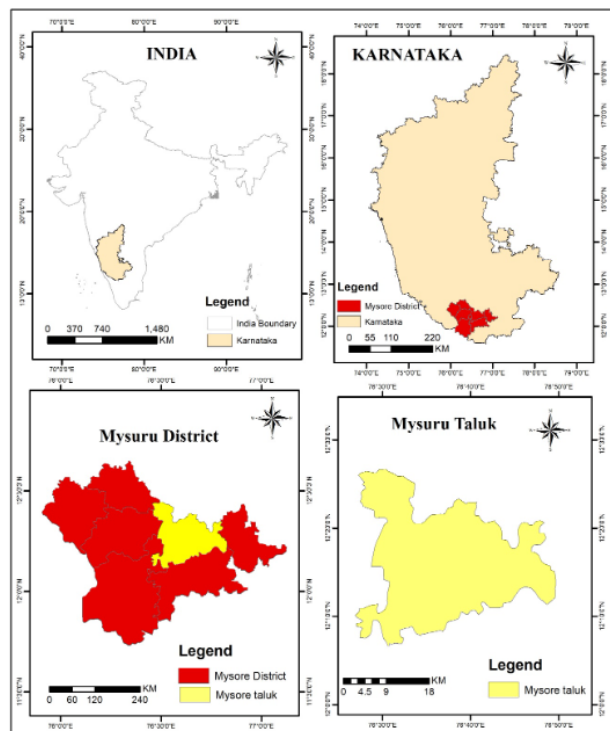

Fig. 1. Location map of study area

education data, 74.3% of people are literate, with 77.55% of men and 71% of women. The populations of scheduled caste and scheduled tribe make up 12.98% and 7.32%, respectively, of Mysore Taluk's sociocultural variety. Since 1951, there have been substantial changes in the Mysuru taluk's agricultural land use and urbanization. Urbanization has significantly increased while the use of agricultural land has been trending downward. The prioritization of urban development activities can be ascribed to this trend.

From 1951 to 2018, the population of the area under examination showed a steady rising trend, indicating a notable rise over the decades. 1,034,965 people made up the entire population in 1951, or 5.68% of the overall population. After increasing gradually, this percentage reached 8.73% in 2018 out of 15,902,293 total residents. The growth trajectory highlights the ongoing changes in the population over time by displaying a continuous development. The population growth rate from 1951 to 2018 shows a significant expansion, which is consistent with the changing dynamics of the area. These changes in the population highlight the importance of paying ongoing attention to population-related issues and the challenges they present for local planning and development.

The taluks that encircle Mysuru—Hunsur, Srirangapatna, Nanjanagud, Heggadadevan Kote, Krishna Raja Nagar, and Tirumakudlu Narsipur, among others—have made significant contributions to the taluk's urbanization. Urban regions are

growing from Mysuru city both inward and outward from surrounding taluks. For example, the western direction of Mysuru taluk is experiencing significant expansion, whilst the eastern route is developing at a somewhat slower rate. In addition to concurrent observations of concentrated growth in Tirumakudlu Narsipur taluk, this spatial variation is impacted by the developmental advancement in Hunsur taluk to the east. These patterns of agricultural land use change and urban expansion point to a dynamic and changing landscape in Mysuru taluk, influenced by both internal and external influences that contribute to the socioeconomic development of the area as a whole.

Objective

- To examine the LULC changes of Mysuru taluk between 2017 and 2022 and to make a comparative analysis.

Methodology

Sentinel-2 satellite data is used in this study to examine the land dynamics in the Mysuru Taluk between 2017 and 2022. The study records seasonal changes in land cover within the designated geographic area by using multitemporal satellite images from the Esri Sentinel-2 Land Cover Explorer. ArcMap software is then used to derive and examine thematic maps in order to find changes in land cover and use across the designated time periods. Essential land cover categories, such as built-up areas, agricultural land, and water bodies, are defined and evaluated using statistical techniques and graphical representations in order to efficiently quantify and illustrate these changes. This methodology guarantees a thorough evaluation of land dynamics and provides insightful information about how the environmental conditions in Mysuru Taluk have changed over the course of the study.

Results and Discussion

The changes in land cover and use in the Mysuru taluk from 2017 to 2022 show significant shifts in a number of areas. The overall area was 810.65 sq. km in 2017, of which 26.45 sq. km were covered by water bodies, 28.65 sq. km by vegetation, 499.41 sq. km by agricultural land, 171.77 sq. km by built-up areas, and 84.37 sq. km by shrubland. The overall area was almost unchanged in 2022 at 810.64 sq. km, although there were notable changes in some land use categories. The area covered by water bodies increased noticeably from 26.45 sq. km in 2017 to 34.32 sq. km in 2022. This might be explained by things like organic development or modifications done by humans to water bodies.

There was a significant increase in vegetation from 28.65 sq. km in 2017 to 59.46 sq. km in 2022. This points to a growing tendency in the amount of greenery, which may be the outcome of afforestation initiatives, conservation efforts,

or natural regrowth. The region's increased biodiversity and ecological balance may be facilitated by the increased vegetation. The area used for agriculture decreased from 499.41 square kilometers in 2017 to 450.85 square kilometers in 2022. This decrease could be a sign of modifications to land use policies, including urbanization or the repurposing of agricultural land. Analyzing the fundamental causes of this change and any potential ramifications for regional agriculture and food production is crucial.

Between 2017 and 2022, the built-up areas grew significantly, from 171.77 sq. km to 203.46 sq. km. This implies that Mysuru Taluk is becoming more urbanized and developing its infrastructure, whether as a result of economic activity, population growth, or urban planning initiatives. The increase in built-up areas begs the issues of sustainable development and the necessity of sensible land-use planning to strike a balance between environmental preservation and urban growth.
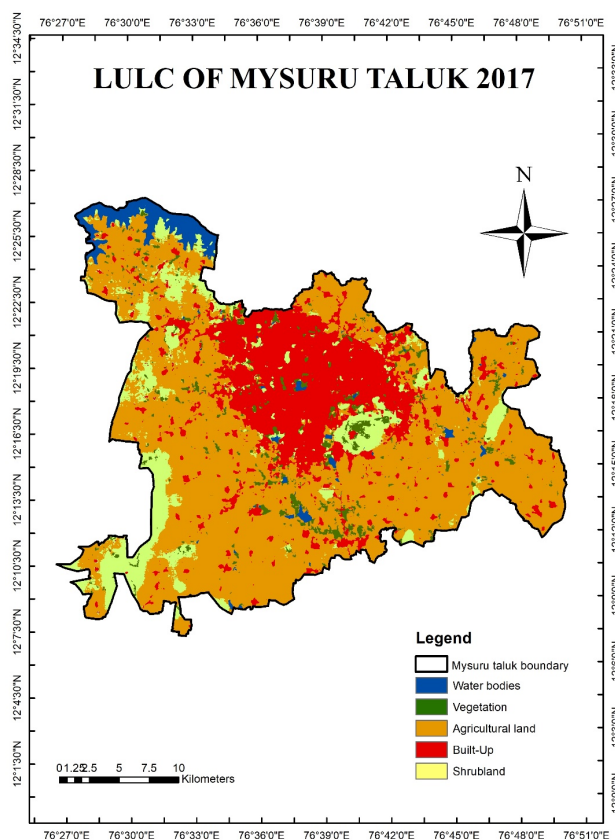

Fig. 2. LULC of Mysuru Taluk 2017

From 84.37 sq. km in 2017 to 62.55 sq. km in 2022, shrubland saw a decline. The decrease in shrubland could result from modifications to natural vegetation patterns or from adjustments to land management techniques. Assessing the effects on the regional environment and biodiversity requires an understanding of the causes of this reduction.
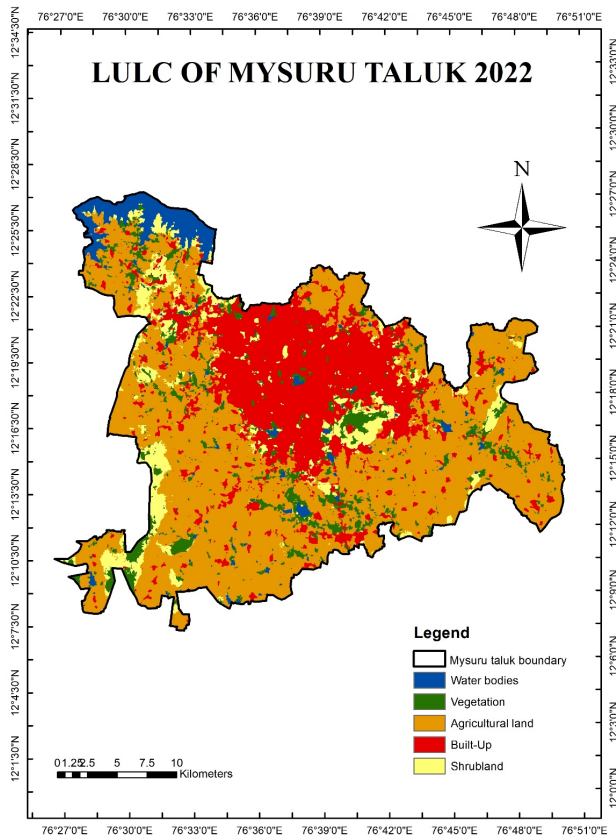
Fig. 3. LULC of Mysuru Taluk 2022

Table 1. Land Use Land Cover of Mysuru taluk, 2017 to 2022

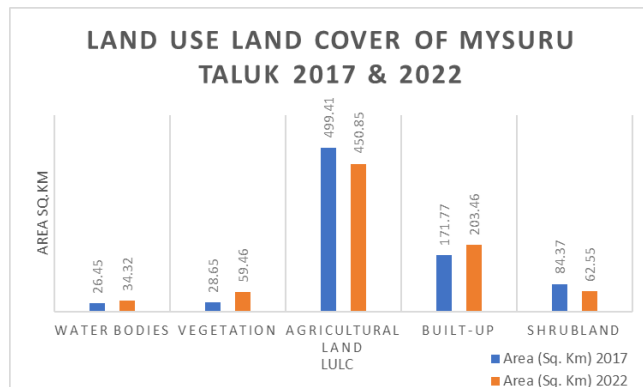| Sl. No	Land Use Land Cover	Area (Sq. Km) 2017	Area (Sq. Km) 2022
1	Water bodies	26.45	34.32
2	Vegetation	28.65	59.46
3	Agricultural land	499.41	450.85
4	Built-up	171.77	203.46
5	Shrubland	84.37	62.55
Total		810.65	810.64

Fig. 4. Land Use Land Cover of Mysuru taluk, 2017 to 2022

To summarize, the examination of land use and land cover data for Mysuru taluk from 2017 to 2022 shows dynamic shifts brought about by elements like urbanization, environmental initiatives, and modifications to farming methods. Planning for the future and sustainable land management require a thorough awareness of these patterns.

Scientific Interpretation

A closer look at the local context and additional research would shed more light on these trends. The overall area stayed relatively constant, with a slight decline from 810.65 sq. km in 2017 to 810.64 sq. km in 2022. The most notable changes were an increase in vegetation and water bodies, a decrease in agricultural land, and a notable increase in built-up areas. These changes suggest a dynamic interaction between environmental conservation efforts, urbanization, and changes in agricultural practices in Mysuru taluk over the five-year period.

Conclusion

In summary, the comparison of Mysuru Taluk's land use and land cover between 2017 and 2022 shows a dynamic and changing landscape. There have been significant changes in the area in a number of categories. The growth of plants and water bodies points to beneficial environmental processes that may have been affected by conservation initiatives. Nonetheless, a decrease in agricultural land might indicate changes in the economy or in the way land is used. The growing built-up regions, which show greater infrastructural development and population growth, are clear indicators of urbanization. There are concerns about possible effects on nearby ecosystems and prospective modifications to land management techniques in light of the decline in shrubland.

The tight balance between agricultural changes, environmental conservation, and urban expansion emphasizes the intricacy of regional development, even if the overall total area remained relatively unchanged. Accurate interpretation of these trends and development of long-term, sustainable land management plans for Mysuru taluk will require more research and a thorough grasp of regional features.

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