FOUR DECADES OF LAND USE CHANGE IN MYSURU-NANJANGUD LOCAL PLANNING AREA, KARNATAKA,INDIA.

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Abstract: Mysuru-Nanjangud is kind of Polycentric cities which Nanjangud act as a satellite town for the city of Mysuru. Rapid expansion of population in a study area created a pressure on land use and land cover and tends to change from one year to another. To quantify the Spatio-temporal trends in LULC, Landsat satellite images were considered. Then image processing techniques were used to classify the image. Then it is found the land use status in MNLPA. It is evident that majority of agricultural land transforming to open space and open space were transforming to built-up areas in the peri urban fringes of MNLPA.

Keywords: LULC, Remote Sensing, GIS.

1. Introduction: Land use and Land Cover is a dynamic phenomenon, in which land use is a piece of land which is used by human for certain activities like residential, industrial and agricultural activities. Whereas Land cover is natural aesthetics which includes forests, vegetation's, Waterbody, open space and others. The product of land use and land cover maps will provide the required information regarding the past, present status to help the decision and policy makers for efficient management of regional landscapes. To see land use and land cover change over a period of time, it requires a multi- date land cover information. Through the information which is derived from satellite image, land use planners can able to know and evaluate the past management status and to obtain the current spatial dimensions of change for designing the better tomorrow through the development of scenarios.

Derivation of land use and land cover requires a satellite based or mid altitude imageries which is rectified with ground control points, lot of remotely sensed imagery are available to access in

internet such as landsat(USGS), IRS or LISS(IRSO), Sentinel(ESA) and others notable providers. Such imageries are tends to acquire freely for the research activities. Once the imageries are acquired, it contains the acquisition errors, viz. haze, dust, scattering effect and orientation effect. These effect are rectified before the processing of image. Then classification algorithms such as supervised classification ((Wojtaszek, Balázsik, Jancsó, Gulyás, & Meng, 2015; Zhang, Li, & Wang, 2014) unsupervised classification (Lu & Weng, 2007), object oriented classification, (Laliberte, A. S., Rango, A., Havstad, K. M., Paris, J. F., Beck, R. F., McNeely, R., & Gonzalez, A. L. (2004). Machine learning algorithm such as neural networks (Kubat, M., Holte, R. C., & Matwin, S. (1998)),(Kýnová & Dobrovolný, 2015), DeFries, R. S., & Chan, J. C. W. (2000) need to be applied to extract the thematic information's.

2. Study Area: Mysuru is the second largest city in the state of Karnataka, India. This Vibrant royal city of South, with a large area of heritage sites, has hit the fast track of urbanization off late, altering the landscape that will in the coming years go beyond recognition. With the government planning to develop this area under various Projects which has invited the surge of investors to invest heavily in this heritage city, especially the IT Companies. Realizing the importance, Mysore city planning authority was first constituted in the year 1966 for the LPA for Mysore city, which included entire Mysore City Municipal Area, 13 numbers of villages of Srirangapatna and 43 villages of Mysore Taluk. The LPA has been revised by government several times on the recommendations of the State Town Planning Board, in view of the need to bring these additional areas for regulation of development, from time to time. The development plans for these LPA have been prepared and enforced by the City Planning Authority as provided under the provisions of KTCP Act 1961. The present LPA includes Mysore City Corporation area, Nanjangud Town Municipal Council area, 84 villages within Mysore Taluk, 19 villages within Nanjangud Taluk and 14 villages within Srirangapatna Taluk. It covers an area of 509.03 km^2 (Figure 1).

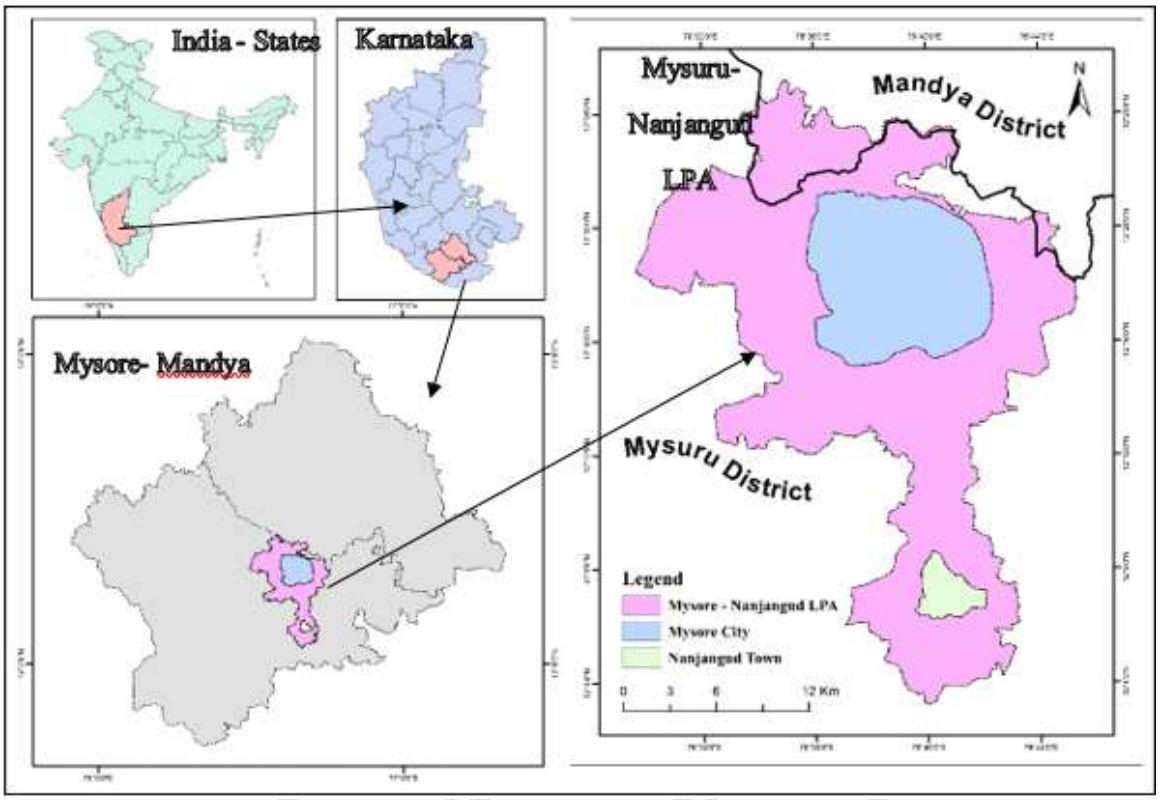

Fig. 1: *Mysuru-Nanjangud Local Planning Area. (Source: Modified after Vinay.M, 2017)*

3. Methodology: For the study, Level-1 processed data were used by considering the various factors such as spatial (pixel width), spectral (number of slices in wavelength), temporal (revisiting time), radiometric (encoding level) and the current research requires long term data based on the availability, and also cloud free images were acquired from Americas, USGS satellite image data repository (https://earthexplorer.usgs.gov) for the years 1977, 1987, 1997, 2007 and 2017 in MNLPA. For the current study, atmospherically corrected image were chosen as input and applied False Color Combination (FCC) by image layer mixing technique in eCognition Software. To proceed with image segmentation, homogeneity criteria of shape has been set to the value 0.05 (default=0.1), Higher the shape value then result leads to the lower the influence of color on the segmentation process and the homogeneity criteria of Compactness have set to the value 0.3 (default=0.5), Higher the compactness value results more compact image objects. The number iterations of algorithm cycles have set to the value 3, (default=1). Higher the value leads to increased number of repetitions in algorithms. By initiating all the parameter the Multi-resolution segmentation algorithm were executed and it produces enormous number of polygons based on pixel color and shapes associated along with its neighboring pixels. Second stage in image segmentation involves the interpretation

of features for the land use land cover classification, polygons for specific land use feature were determined for following features such as Water Bodies (WB), Sparse and Mixed Vegetation (SMV), Open Space (OS), Built-up (BU), Agricultural Land (AL), and Forest Area (FA), based in Visual Image interpretation techniques by utilizing the visual image interpretation keys. These keys are characterized by unit patches with various intensities in color, color combination with multiple bands, homogeneity in texture, heterogeneity in patches, geometrical orientation and shape, size with respect to area, association with neighbor land use feature and field knowledge. Third Stage involves manual classification of segmented polygons over MNLPA and accuracy assessment.

Results and Discussion:

Land Use and Land Cover

Land use are the human dominated structures and land cover are natural habitats that interplay the structure based on the key driving forces, to study the LULC change from one year to another, the landsat satellite images such as from Multi spectral sensor (MSS) for 1977, thematic Mapper(TM) for 1987, 1997 and 2007, and OLI for 2017 are considered for analysis. After successful segmentation and classification as mentioned in methodology, then it is found that, Fig 2: Table1: and Chart 1.

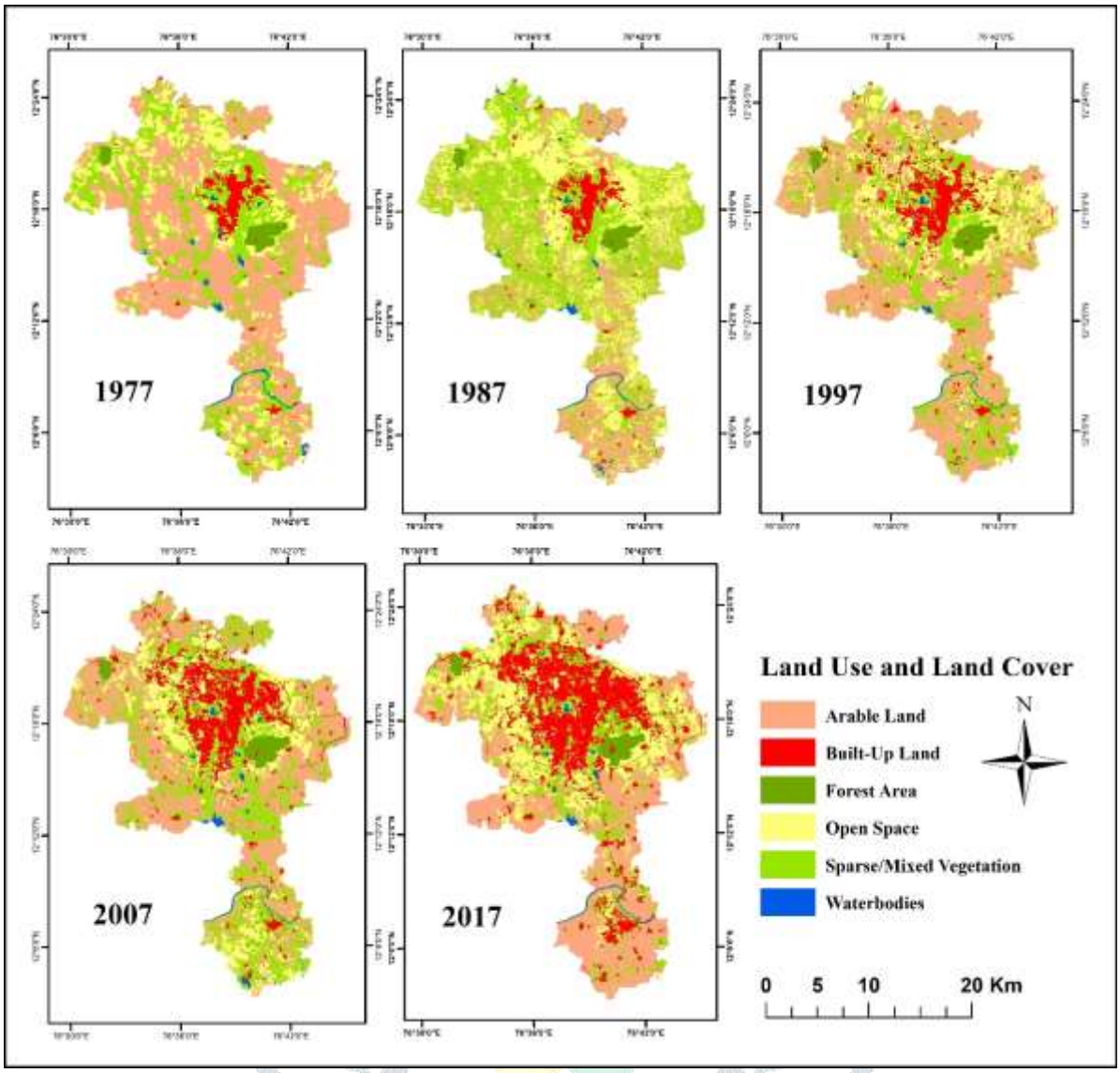

Fig 2: Land use and Land Cover Status in MNLPA (1977-2017)

It is evident that from the attribute information associated with the image, portrays the aerial distribution of the land use and land cover as mentioned in Table 1:, it the foreseen that arable/agricultural land faced a steady growth from year 1997 to 1987 and there is a large difference in the year 1997, which that majority of agricultural land contributed to the gain in open space. Built-up land facing the slow expansion during the initial decade of the study year then, built up area got two fold expansion in 1977 and trend continued up to 2017. There is no major changes in forest land as it is preserved by the forest department, but there in elasticity in boundary that increase-decrease in consecutive years. Open space is declined during first decade of the study, the it is gained from decline of agricultural land and majority of land become fallow. No major changes in water bodies and the ratio of water body is very less compared to other land use classes. Sparse and Mixed Vegetation is balanced over the years by there is a sudden fall from the year 2007 to 2017. The dynaimicity of changes in land use and land cover is uneven and accountability of landscape is necessary for regional development.

Table: 1 Distribution of Land Use and Land Cover in MNLPA

LULC	*LULC YEAR*				
	1977	***1987***	***1997***	***2007***	***2017***
Arable Land	249.02	290.20	209.30	179.11	170.55
Built-up Land	18.46	21.35	44.79	71.11	114.33
Forest Area	9.72	8.71	11.05	11.26	10.24
Open Space	89.53	81.63	103.44	89.09	121.41
Sparse/Mixed Vegetation	137.62	103.09	135.78	152.46	88.60
Water bodies	4.94	4.83	4.39	5.75	3.96
Classified Area	509.28	509.82	508.74	508.79	509.09
Actual Total Area	509.13	509.13	509.13	509.13	509.13
***Boundary Effect**	+0.15	+0.69	-0.39	-0.34	-0.04
*Note: Boundary effect varies with satellite imageries due to the changes in spatial scale of raster datasets.					

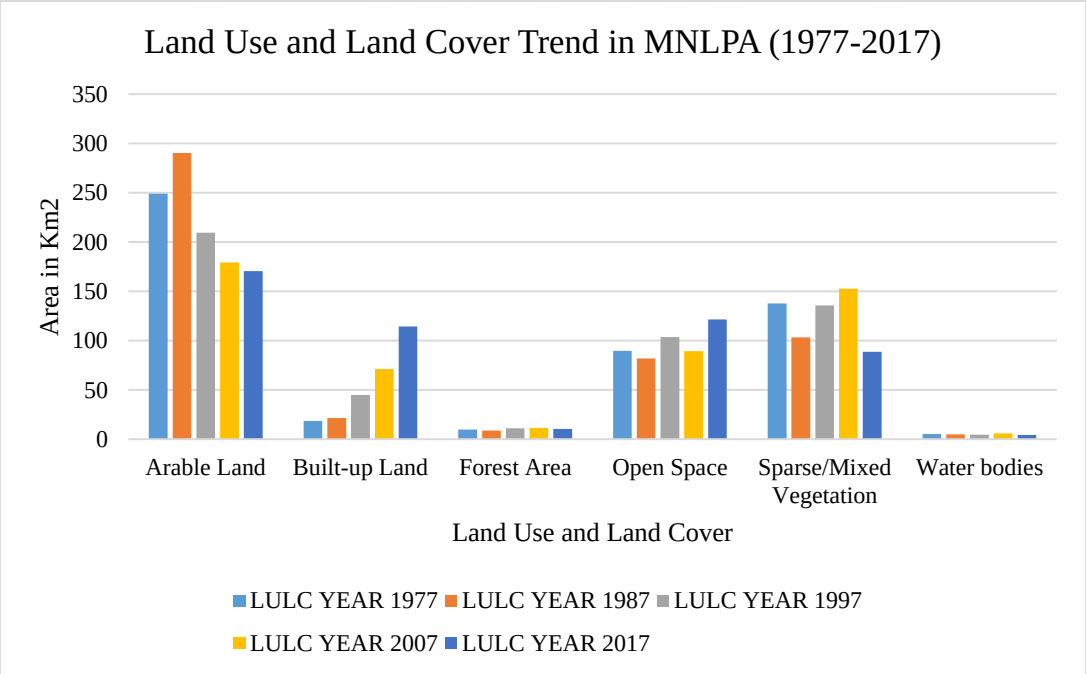

Chart 1: Land Use and Land Cover Trend in MNLPA (1977-2017)

Conclusion:

The study conducted to know the long term land use and land cover status and changes over a Spatio-Temporal years. Mysuru-Nanjangud Local Planning Area is going to become next hub for all types of economic and industrial developments. So, that pre-preparedness to plan the regional ecosystems, its status, trend, magnitude and all these will become important. Land Policy makers are the decision makers, need to use the up-to-date information derived through remote sensing and GIS are highly transparent and effective to use for betterment of the countries sustainable development.

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