## SPATIAL ANALYSIS OF LAND USE LAND COVER OF BAGALKOT CITY: USING GEO-SPATIAL TECHNOLOGY

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ABSTRACT

The land use/land cover (LULC) pattern of a region in time and space is an outcome of natural and socio–economic factors and their utilization by man. The towns and cities of India have played a major role in the emergence of India as an important industrial and political power in the world. They have acted as focal points in the cultural landscape of India. The characteristics of structure or urban land use pattern vary from one city to another. These cities have several points within it. The layout refers to the general frame on which the city is built. It includes all the basic structures, buildings, roads, location of market places and service centres. The introduction of planning to Indian cities has been the most recent phenomena. The creation of linguistic states necessitated the construction of planned cities, some of them completely fresh. This included Chandigarh, the most notable example, Bhubaneshwar, Gandhinagar, Dispur and Bokaro, for administrative purposes and Navi Mumbai, New Bangalore, Noida for catering further expansion of the city. Navanagar Resettlement plan consists of acquisition of lands for locating the new Bagalkot town and making all arrangements to provide basic infrastructure in the new town. The plan of new township provides adequate and reasonable resettlement for the project displaced families and also allows sufficient scope for further development of the town for additional population. Hence, The Understanding of Land Use through supervised and unsupervised classification of Land use by using RS and GIS technology help in understanding the driving mechanism that causes land use change. Therefore, an attempt is made to prepare LULC map of Bagalkot city, Karnataka by using Supervised and unsupervised classification. The classification developed through unsupervised classification approach found prominent features of the area together occupies 66.28% Resveor followed by agriculture land 20.51% and minimum 0.01% under mining area. However, analysis of supervised classification from satellite imageries estimated 14 land use/ land cover.)*
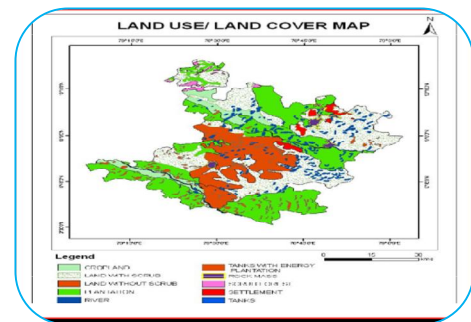
KEYWORDS: *GIS technology, supervised , unsupervised classification, Lnad-Use Land-cover.*

1.INTRODUCTION

The land use/land cover (LULC) pattern of a region in time and space is an outcome of natural and socio–economic factors and their utilization by man. Study on Land use and land cover become a central component in current strategies for sustainable management of natural resources and monitoring environmental changes in the territory land use system is not a homogeneous process. Hence, land use manipulation by human beings is widespread and become a serious threat to

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watershed services including stream flow regulation, soil erosion control and low-flow augmentation at both micro- and macro-level catchments. In the recent time, changes in land use and land cover have become one of the important components in monitoring watershed services especially hydrological services of the region. Further, change detection of vegetation patterns at the watershed level helps in enhancing the capacity of local governments to implement sound watershed management practices. New technologies like satellite Remote Sensing (RS) and Geographical Information Systems (GIS) provide a modern foray into the issues of resources management at regional and national scale. Further, these advanced geospatial technologies have improved the efficiency of mapping of land use land cover types at the landscape level. The Understanding of Land Use through supervised and unsupervised classification of Land use by using RS and GIS technology help in understanding the driving mechanism that causes land use change. In addition, they are valuable for a scientific base of the regional management, decision making and sustainable use of land and water (Fredrick et. al, 2013, LI Rui et. al., 2002). Thus, an integrated approach is essential and these combined techniques form a potential tool for land use land cover change detection analysis at both regional and local scales. Therefore, an attempt is made to prepare LULC map of Bagalkot city, Karnataka by using Supervised and unsupervised classification. The towns and cities of India have played a major role in the emergence of India as an important industrial and political power in the world. They have acted as focal points in the cultural landscape of India. The characteristics and structure of urban land use patterns vary from one city to another. These cities have several points within it. The layout refers to the general frame on which the city is built. It includes all the basic structures, buildings, roads, location of market places and service centres. The introduction of planning to Indian cities has been the most recent phenomena. The creation of linguistic states necessitated the construction of planned cities, some of them completely fresh. This included Chandigarh, the most notable example, Bhubaneshwar, Gandhinagar, Dispur and Bokaro, for administrative purposes and Navi Mumbai, New Bangalore, Noida for catering further expansion of the city. Navanagar Resettlement plan consists of acquisition of lands for locating the new Bagalkot town and making all arrangements to provide basic infrastructure in the new town.

2.LOCATION OF STUDY REGION

Bagalkot, is a city in the state of Karnataka, India, which is also the headquarters of Bagalkot district. It is situated on branch of River Ghataprabha about 481 km (299 mi) northwest of state capital Bangalore, 410 km (255 mi) southwest of Hyderabad, and about 570 km (354 mi) southeast of Mumbai. The population of the urban agglomeration was 111,933[2] according to the provisional results of 2011 national census of India, and the city is spread over an area of 49.06 square kilometres (18.94 sq mi)[2] with an average elevation of 532 m (1,745 ft) above MSL. Bagalkot is located at 16.18°N 75.7°E.[4] It has an average elevation of 533 metres (1,749 ft). It is situated on the bank of the river Ghataprabha.
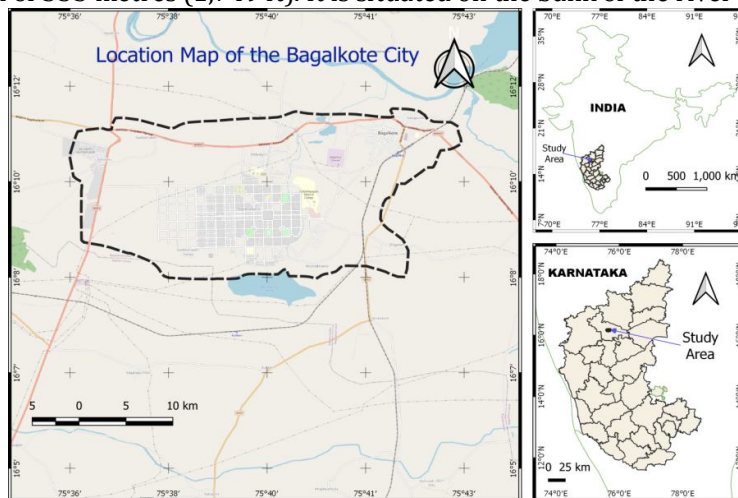

Fig.1 Location Map of study area

3. SPECIFIC OBJECTIVES

➢ To prepare land use/ land cover map of Bagalkot city of Bagalkot district by using Remote Sensing and GIS applications
➢ To compare the results of supervised and unsupervised classification map.

METHODOLOGY:

Land use and land cover map is prepared by using the following parameters Google Earth's Satellite Image Landsat / Copernicus dated on 31st December 2016 at the elevation of 610 m, image processing is done using QGIS, and Google Earth. Model / Layout map is prepared by using Auto Desk MAP 2011.
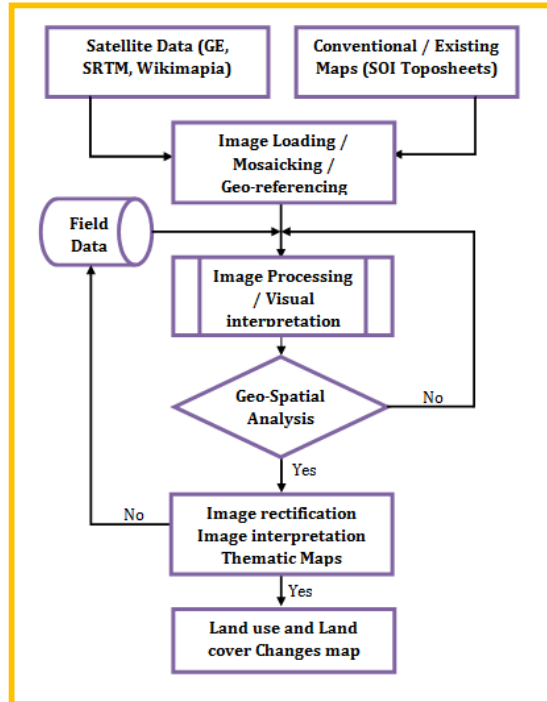

Fig.2 Flow Chart of Methodology
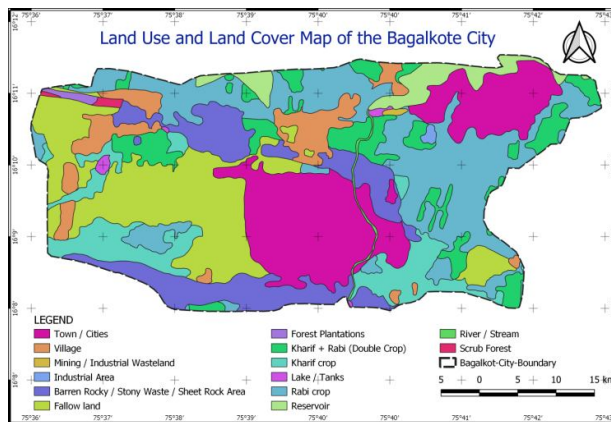
Bagalkot City Land Use Classifications

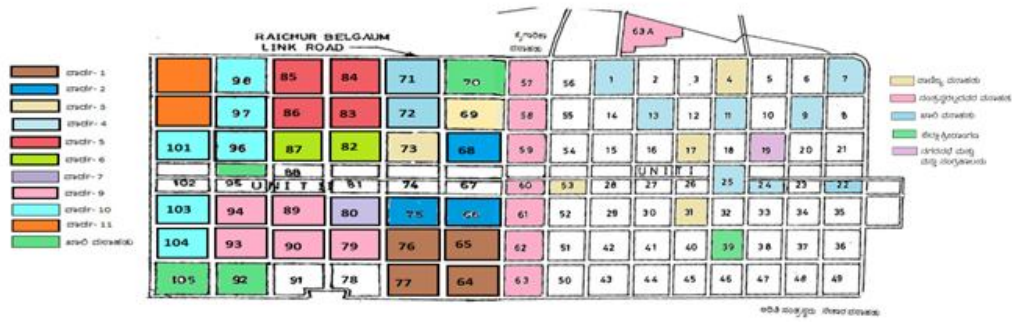**Fig.3.Land Use Land Cover of Bagalkot city**

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3

Fig.4 Navanagar Morpological Structure (Source BTDA website)

Land Use Land Cover in Bagalkot city

Sl. No.	Land Classification	Area		
		Sq. Meter	Sq. KM	LULC in %
1	Barren Rocky / Stony Waste / Sheet Rock Area	11349362.81	1.13	1.97
2	Fallow land	11332423.23	1.13	1.97
3	Forest Plantations	229489.47	0.02	0.04
4	Industrial Area	108190.38	0.01	0.02
5	Kharif + Rabi (Double Crop)	13421023.59	1.34	2.33
6	Kharif crop	21756567.19	2.18	3.78
7	Lake / Tanks	2134659.35	0.21	0.37
8	Mining / Industrial Wasteland	67838.51	0.01	0.01
9	Rabi crop	117931750.38	11.79	20.51
10	Reservoir	381174235.15	38.12	66.28
11	River / Stream	185537.62	0.02	0.03
12	Scrub Forest	199924.93	0.02	0.03
13	Town / Cities	11292032.92	1.13	1.96
14	Village	3947135.09	0.39	0.69
Total		575130170.62	57.51	100.00

Table 1.Land Use Land Cover Bagalkot City
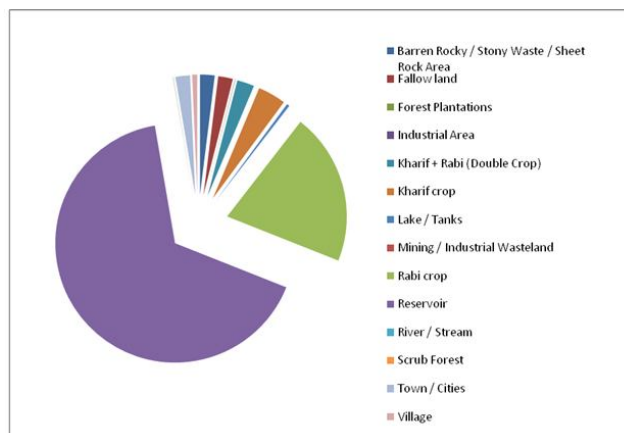
Fig.4 Pie diagram of Land Land Cover of Bagalkot City

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4

4. Land Use and Land Cover of Bagalkot city

Bagalkot is divided into Navanagar or new Bagalkot, and old Bagalkot. The new town was created to mitigate the submergence of the old town with the Almatti Dam. Navanagar is a properly planned town with every basic amenity and lots of cultivated greenery. This town is located on the banks of Ghataprabha River.

The corresponding areas used under each classification were recorded as in table- 1 The land usage for Reservoir make 66.28 % of the total study area, which gives an indication of major portion of the land being used for Krishna back water. This classification supports city statistics on share of net land sown to be 58.93 In classifying Agricultre, horticulture crops like mango, papaya, banana, sapota etc., were ignored as they were spread across the study area in tiny spots and inseparable from the adjacent vegetation. Hence they might have been included under vegetation which has a share of about 9% (district average 5%). Built up area obtained in the study area was 1.96% .

5. Accuracy assessment of LULC detection

To assess the reliability of the obtained LULC map, accuracy assessment is carried out to prove the completeness of image classification. Hence to ascertain the accuracy of classification, a sample of pixels was selected on the classified image and their class identity is compared with the ground reference data. This process of evaluating quality of classification result is an integral part of remote sensing as it gives evidence of how best the classifier is able to extract the desired objects from the image. Generally confusion matrix is used as a widely accepted measure of overall accuracy. The confirmatory technique used for accuracy assessment is the KAPPA analysis Unlike overall accuracy, kappa provides error bounds on accuracy by weighing cells in the error matrix according to the severity of misclassification. It is also known as kappa coefficient (KHAT Statistic, denoted by k).

i.e., Overall Accuracy =   --------- (i) and **k** = ---------- (ii)

Further to ascertain the sensitivity and specificity of classification, users accuracy and producer's accuracy in % is calculated and tabulated in the confusion matrix.

Following table presents a confusion matrix followed by the user's accuracy, producer's accuracy, overall accuracy and kappa coefficient.

SUMMARY WAY FORWARD

The towns and cities of India have played a major role in the emergence of India as an important industrial and political power in the world. They have acted as focal points in the cultural landscape of India. The characteristics and structure or urban land use pattern vary from one city to the another. These cities have several points within it. The layout refers to the general frame on which the city is built. It includes all the basic structures, buildings, roads, location of market places and service centres. The introduction of planning to Indian city has been the most recent phenomena. The creation of linguistic states necessitated the construction of planned cities, some of them completely a fresh. This included Chandigarh, the most notable example, Bhubaneshwar, Gandhinagar, Dispu and Bokaro, for administrative purposes and Navi Mumbai, New Bangalore, Noida for catering further expansion of the city. Navanagar Resettlement plan consists of acquisition of lands for locating the new Bagalkot town and making all arrangements to provide basic infrastructure in the new town. The plan of new township provides adequate and reasonable resettlement for the project displaced families and also allows sufficient scope for further development of the town for additional population. Land use land cover map prepared for the study area using IRS temporal data. In Bagalkot city Statistics on water bodies shows a steady decline in the regions. The agricultural activities are more along the watercourse of the river and its tributaries in both eco-climatic regions. Thus conserving these valuable natural assets is essential for eco-hydrological services. Additionally, the study found that using satellite imagery and application of RS and GIS is a cost-effective and time-saving way to reveal the historical

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5

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land cover states and trends. Such an approach can be used to construct missing information and data sets sufficient for mapping of LULCC for watershed management.

Application of Remote Sensing (RS) and GIS in land use/land cover change mapping and assessment found Cost effective and time-saving procedure in identifying a critical area for assessing the hydrological impact due to land use land cover change in the Central part of Karnataka. QGIS are much effective high resolution tools over other such platforms in monitoring and controlling the land use and land cover changes from time to time in order to maintain good ecological balance amidst fast changing human needs and deforestation.

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