

# Agricultural Land Transformation using with Geospatial Technology in Ghatkesar Watershed, Medchal - Malkajgiri District, Telangana State, India

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**Abstract:** Now a day's changing life styles of people they are interested to go side of urbanization. Most of the people are interested to living in urban areas. So, in this scenario people are changes their lives. Most of the agriculture areas are converted to constructions like industries, residence purpose and other commercial purpose. It is one of the examples of land transformation. "Land Transformation is the transformation in Land use and Land cover. LULCC (Land use and Land cover change) is also known as land change (LULCC by) which is a general term for the human modification of Earth's surface, i.e., Land Transformation is a subset of land use and land cover."- Else Ellis; 18<sup>th</sup> April 2010.

**Keywords** —LULCC, Watershed

## I. INTRODUCTION

Now a day's changing life styles of people they are interested to go side of urbanization. Most of the people are interested to living in urban areas. So in this scenario people are changes their lives. Most of the agriculture areas are converted to constructions like industries, residence purpose and other commercial purpose. It is one of the examples of land transformation.

"Land Transformation is the transformation in Land use and Land cover. LULCC (Land use and Land cover change) is also known as land change (LULCC by) which is a general term for the human modification of Earth's surface, i.e. Land Transformation is a subset of land use and land cover."- Else Ellis; 18<sup>th</sup> April 2010.

Exactly it is the transformation of the Land in a Spatio-temporal context. It is the process of identifying differences between the features or state of any phenomena by observing it at different time periods. Land is in an unremitting state of transformation as a result of different natural and manmade processes. Land Transformation is imminent in every developing region and maximum in regions centering round growing cities, because of ever increasing need for the provision of urban amenities. The land transformation and this can be possible with the help of spatio-temporal study of the land use and land cover changes in an area. Land use and land cover is helpful in planning of an area. Thus it is important to study the land use and land cover change of an area to know the land transformation of that area as land transformation is completely dependent on land use and land cover.

## II. OBJECTIVES

1. To identify and mapping the Spatio-Temporal land use and land cover of the study area.
2. To detect the agricultural land transformation in Study area
3. To identify the changes in the agriculture land and its conversion into other Lands.

## III. DATABASE AND METHODOLOGY

Survey of India Top sheets of 56K/10 and 56K/11 are used for the research paper. The remote sensing data of path 144 and row 48 of LandSat-5TM of 1991 year and LandSat-8OLI of 2021 year are used for pertaining the land use and land cover and identification of Land Transformation in the study area. Geospatial tools like ArcGIS v10.8 and ERDAS imagine v2018 are used for mapping of land use and land cover and land transformation.

## IV. STUDY AREA

The Ghatkesar watershed geographical area is 109.48 km<sup>2</sup> bounded by 17° 26'59" N to 17° 34' 2" N latitude and 78° 33' 13" E to 78° 41' 36" E longitude. It lies in the Medchal - Malkajgiri District, Telangana State, India. The toposheets of 56K/10 and 56K/11 are covered in the study area. The study area has been shown in fig.1

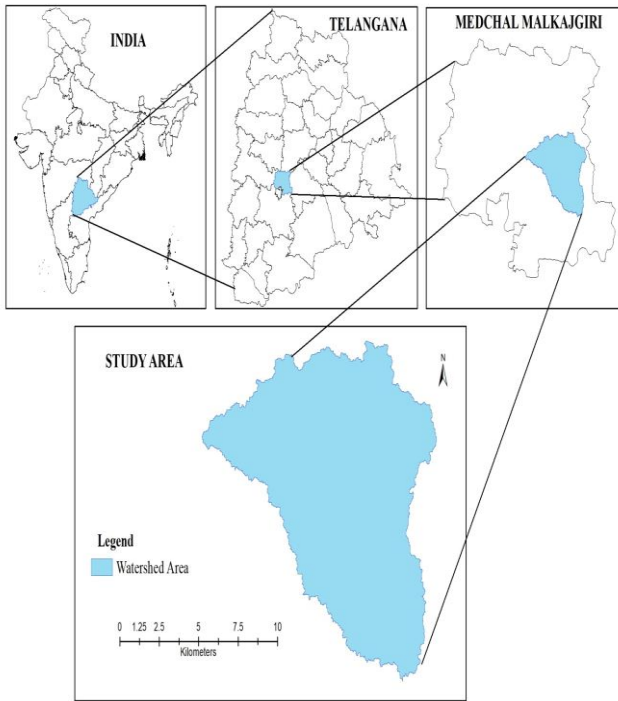


Fig. 1

**A. Land use and land cover**

The study area has been classified in to 5 classes, they are:

1. Agricultural land
2. Forest-area
3. Built up-area
4. Water bodies
5. Other lands

**B. Land use and land cover of 1991**

By seeing the land use and land cover of 1991 Map, things can be observed that, the spatial distributions of highest class is agricultural land the area is 37.40 sq.KMs it means the percentage is 34.16 of total geographical area, the second highest class is forest-area the area is 35.69 sq.KMs, the percentage is 32.60 of total geographical area, the lowest class is built up-area the area is 2.16 sq.KMs, the percentage is 1.97 of total geographical area, the second low class is Waterbody the area is 2.78 sq.KMs, the percentage is 2.54 of total geographical area and the other lands area is 31.45 sq.KMs, the percentage is 28.73 of total geographical area. Most of the forest area is covered in the northern side of the study area with high elevation; the agricultural area is covered in the central part of the study area with high drainage network density.

S.No	Land use and land cover	Area in Sq.KMs
1	Built up area	2.16
2	Waterbody	2.78
3	Other land	31.45
4	Forest area	35.69
5	Agricultural land	37.40
<b>Total Geographical area</b>		<b>109.48</b>

Table: 1 Land use and land cover - 1991

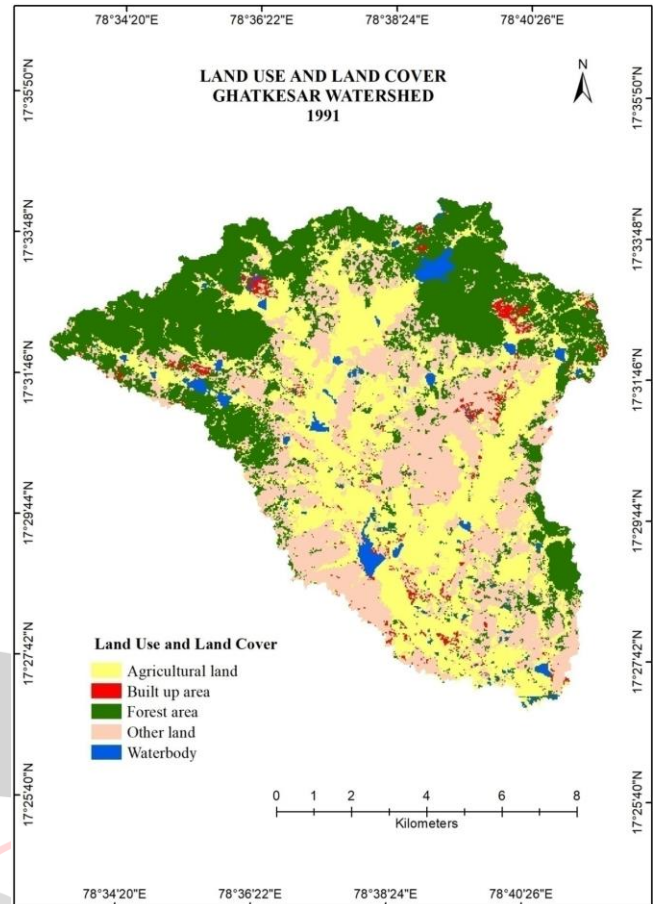


Fig.2

**C. Land use and land cover of 2021**

By seeing the land use and land cover of 2021 Map, things can be observed that, the spatial distributions of highest class is forest-area the area is 27.95 sq.KMs it means the percentage is 27.36 of total geographical area, the second highest class is agricultural land the area is 27.53 sq.KMs, the percentage is 25.15 of total geographical area, the lowest class is Waterbody, the area is 2.47 sq.KMs, the percentage is 2.25 of total geographical area, the second low class is other lands, the area is 23.94 sq.KMs, the percentage is 21.86 of total geographical area and the Built-up area is 25.59 sq.KMs, the percentage is 23.38 of total geographical area. Most of the forest area is covered in the northern side of the study area with high elevation; the agricultural area is covered in the central part of the study area with high drainage network density.

S.No	Land use and land cover	Area in Sq.KMs
1	Waterbody	2.47
2	Other land	23.94
3	Built up area	25.59
4	Agricultural land	27.53
5	Forest area	29.95
<b>Total Geographical area</b>		<b>109.48</b>

Table: 2 Land use and land cover – 2021

S.No	Land use and land cover	Area in Sq.KMs	Percentage
1	Waterbody	-0.32	-0.29
2	Other land	-7.51	-6.86
3	Built up area	23.44	21.41
4	Forest area	-5.74	-5.25
5	Agricultural land	-9.86	-9.01

Table: 3 Change Detection of Land use and land cover 1991 - 2021

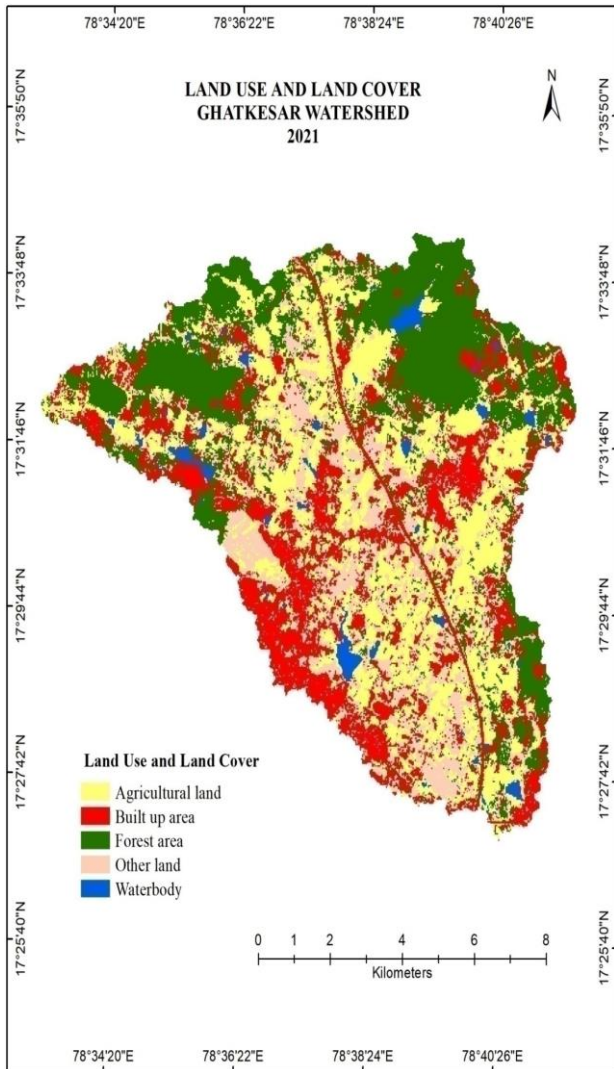


Fig.3

By seeing the change detection of land use and land cover table of 1991 - 2021, things can be observed that, all the land use and land cover classes have decreased except built-up area. The highest increased class is built-up area is 23.44 sq.KMs, which is 21.41 percentage of the total geographical area. The highest decreased class is agricultural land area is 9.86 sq.KMs, which is 9.01 percentage of the total geographical area. The second high decreased class is other land is 7.51 sq.KMs, which is 6.86 percentage of the geographical area, the forest area also decreased into 5.74 sq.KMs, which is 5.25 percentage and the lowest decreased class is waterbody area is 0.32 sq.KMs, which is 0.29 percentage.

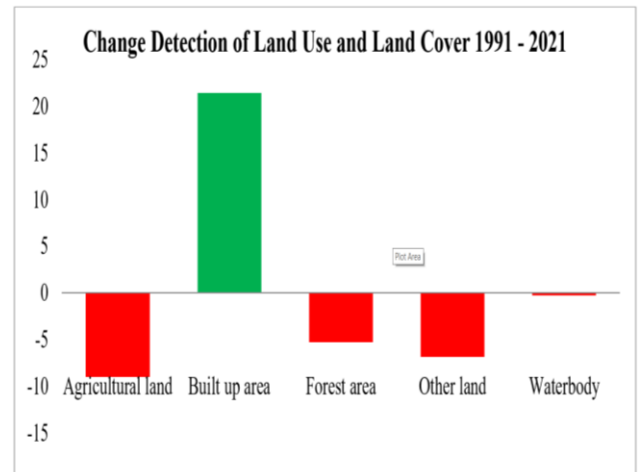


Fig.4

#### D. Agriculture Land Transformation (1990-2021)

S.No	Agriculture Land Transformation	Area in KMs
1	Forest area	2.93
2	Built up area	7.12
3	Other land	9.72
4	Agricultural land	17.30
5	Waterbody	0.32

Table 4 - Agriculture Land Transformation (1990-2021)

Detailed agricultural transformation is shown in Map.5 along with Table.4. Area under agriculture has decreased from 37.40 sq.km to 27.53 sq.km. The maximum transformation of agriculture land is in southwestern side, south side and center part of the watershed area. Agriculture area which has been transformed as otherlands can be seen maximum that is 9.72 sq.kms which is 26.00 percentage due to lake of ground water and the second high transformed area is built up area 7.12 sq.kms which is 19.05 percentage due to construction of residence areas, road constructions (ORR), industries and other commercial purpose construction in the study area. The agriculture land area which has been transformed as forest area that is 2.93 sq.kms which is 7.84 percentage due to programmers initiated by the government of Telangana like urban forestry, social forestry and Telangana Ku Haritha Haram etc. and the agriculture land area which has been transformed as waterbodies that is 0.32 sq.kms which is 0.84 percentage.



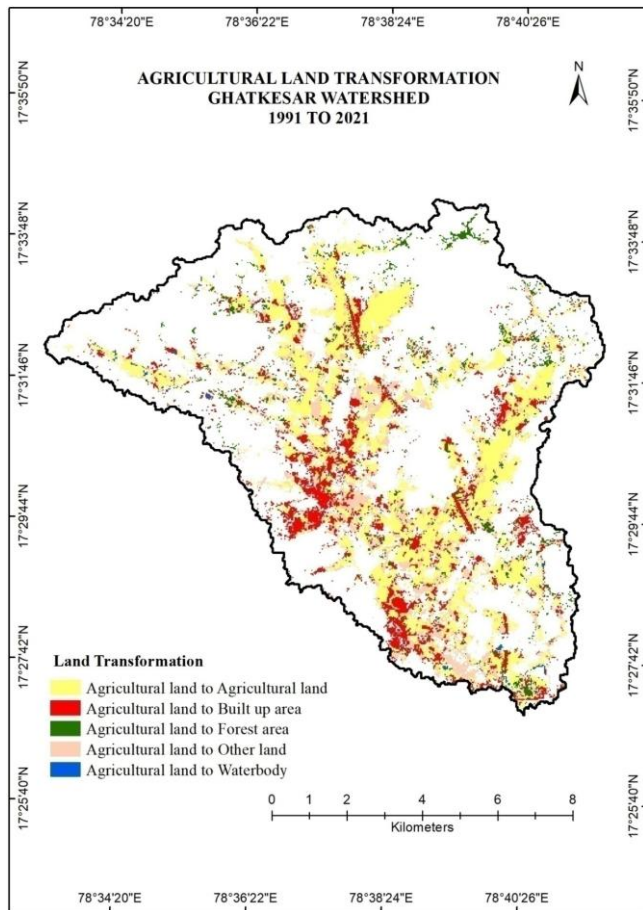


Fig.5

## V. CONCLUSION

This research paper focuses on land use and land cover, change detection and land transformation in Ghatkesar watershed, Medchal - Malkajgiri district, Telangana state, India, using remote sensing data and geospatial technology. This research study attests that integration of GIS and remote sensing technologies is effective tool for land use and land cover and land transformation. The results clearly show that land use and land cover changes were significant during the period from 1991 to 2021. There is decrease in agricultural area, waterbody, and forest land areas. On the other hand this research study clearly indicates there is significant expansion of built-up area and other-land area noticed.

There has been rapid conversion of agricultural areas to non-agricultural activates in the study area. The built-up area has increased in south and southwest directions because of the Hyderabad city urban sprawl has been expanded and city population rapidly growing. The agricultural land transformation is more in otherlands because of the amount of vacant land in and around the study area has increased considerably, largely as a result of the increasing demand for land for non-agricultural activates and the agricultural land owners' anticipation of increased land values as residential, commercial and industrial development. From the analysis it is concluded that the rate of agriculture shrinkage is increasing day by day.

To control the agricultural land transformation the government has to support and encourage the farmers for doing cultivation and not convert the agricultural land into other purpose, for those the new government policies have to implement like minimum support price policies, free power supply etc.

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