

LAND USE/LAND COVER CHANGES IN BARABANKI DISTRICT USING GEOSPATIAL TECHNIQUES

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ABSTRACT

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India is one of the developing countries of the world, with the rapid development in different parts of the country Land Use Land Cover (LULC) is drastically changing this is due to speedy urbanization, industrialization etc., with these change the occurring in the society, natural landscapes are transforming into man-made structures like residential and commercial buildings, various industries and factories, roads and surface paths etc., these structure are undoubtedly contributing towards the development of our society as a whole but is also influencing the ecosystem adversely, therefore current study has been focused on studying these changes occurring in the LULC changes in BARABANKI district using the integrated technique of remote sensing and GIS. Generated output shows the rapid growth in built-up land since last three decades while there was decreasing trend of water body and vegetation land.



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INTRODUCTION

Many studies have already been performed on different areas of the world by researchers from different fields and on the basis of those studies it can be demonstrated that the only few parts of the countries are left in their natural state (Department of geography and state), most of them are already been either fully been transformed into some new feature or is being partially transformed as per the need. Hence, changing LULC pattern is purely due to the socio-economic factor, with the increasing population and demands of urbanization as a result of it unplanned development of land is taking place giving rise to scarcity of resources. Therefore, it is very important to study the adverse effects of such development and on the basis of it contribution can be made towards the healthy and sustainable measures for the environment with proper steps of urban planning and development. Remote Sensing and GIS plays a major role in performing the change detection analysis as under the GIS platform one can work with the spatio-temporal data set. II.

STUDY AREA

Barabanki is a city and the administrative headquarters of Barabanki district in the state of Uttar Pradesh state in India. The city is about 30 km east of Lucknow, the state capital. The city is center of Sufi saint Waris Ali Shah at Deva Sharif.

BARABANKI lies in the state of Uttar Pradesh is one of the most developing district, It is located in the center part of the state with area of about 3891.5 Sq. Kms and is sub-divided into six Tehsils named: Nawabganj, Fatehpur, Ramsanehi Ghat, Haidergarh, Ram Nagar and Sirauli Ghauspur. District is bounded Faizabad in east. Fatehpur from west. LUCKNOW is in the south of district and in the north by Rae Bareilly. Geographical extent of the district lies between 26°30' and 27°19' North Latitudes and 80° 58' and 81°55' East Longitudes. River GHAGHARA is the main river flowing through the district and is the main source of water supply throughout the district. Study area map is represented in Fig.1 below:

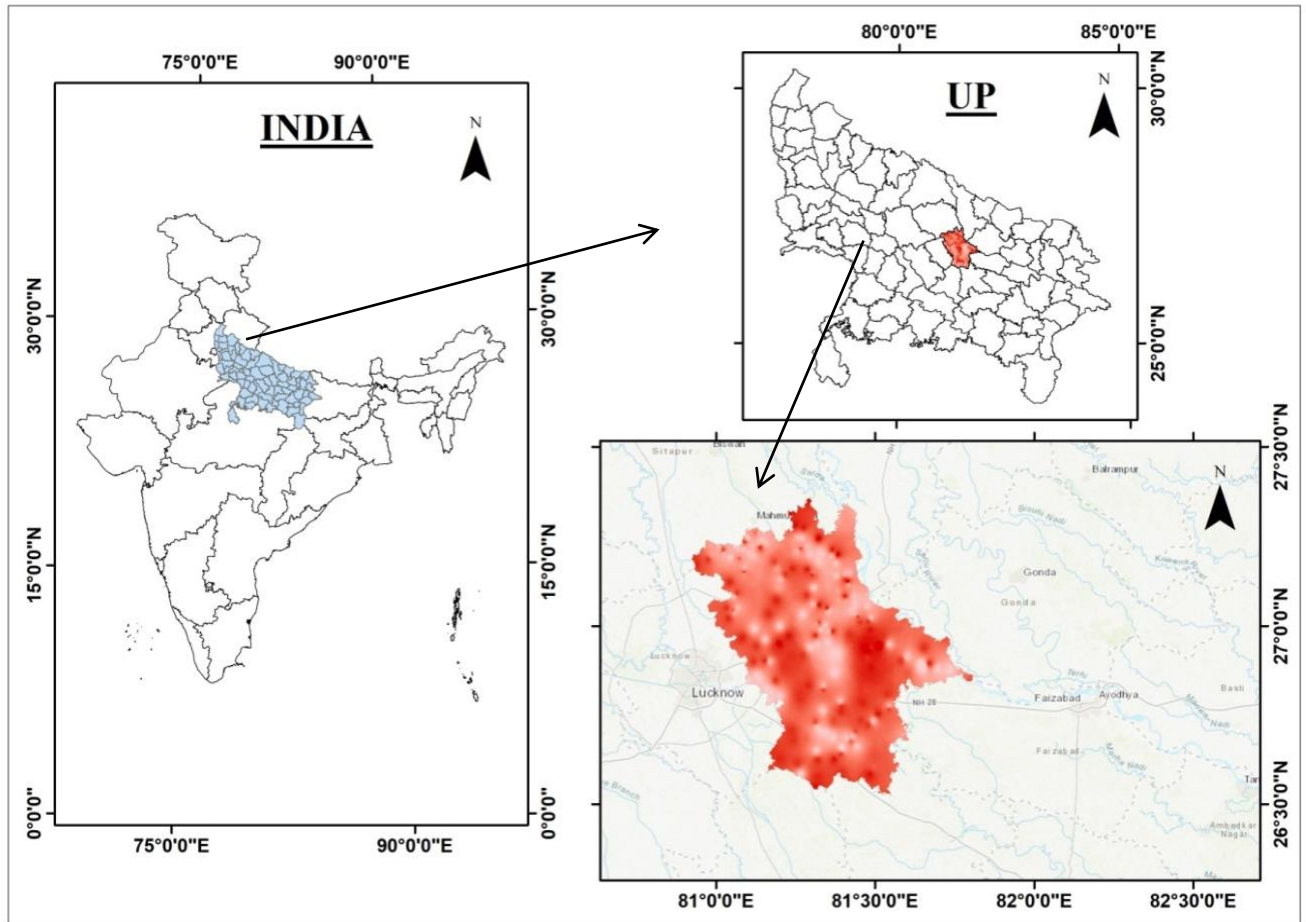


Fig. No. 1:- Map of Study Area

OBJECTIVES OF THE STUDY

Study has been performed to attain following objectives:

- Preparing the LULC maps for different time series.
- Calculating the rate of change for different LULC class between 2018 to 2021.
- Preparation of LULC change based on the performed study.

DATA USED AND METHODOLOGY

Data used

For this study, SOI Toposheet of the year 2018 and sentinel satellite data for the 2019 were used for extracting LULC. For the analysis Satellite images free from cloud cover were selected. BARABABANKI boundary procured using SOI Toposheet at the scale of 1:50000 and SRTM DEM with 30-meter resolution. Table - 1 and 2 give details of the Toposheets and Satellite data used for LULC.

Table: – 1 Details of Toposheets

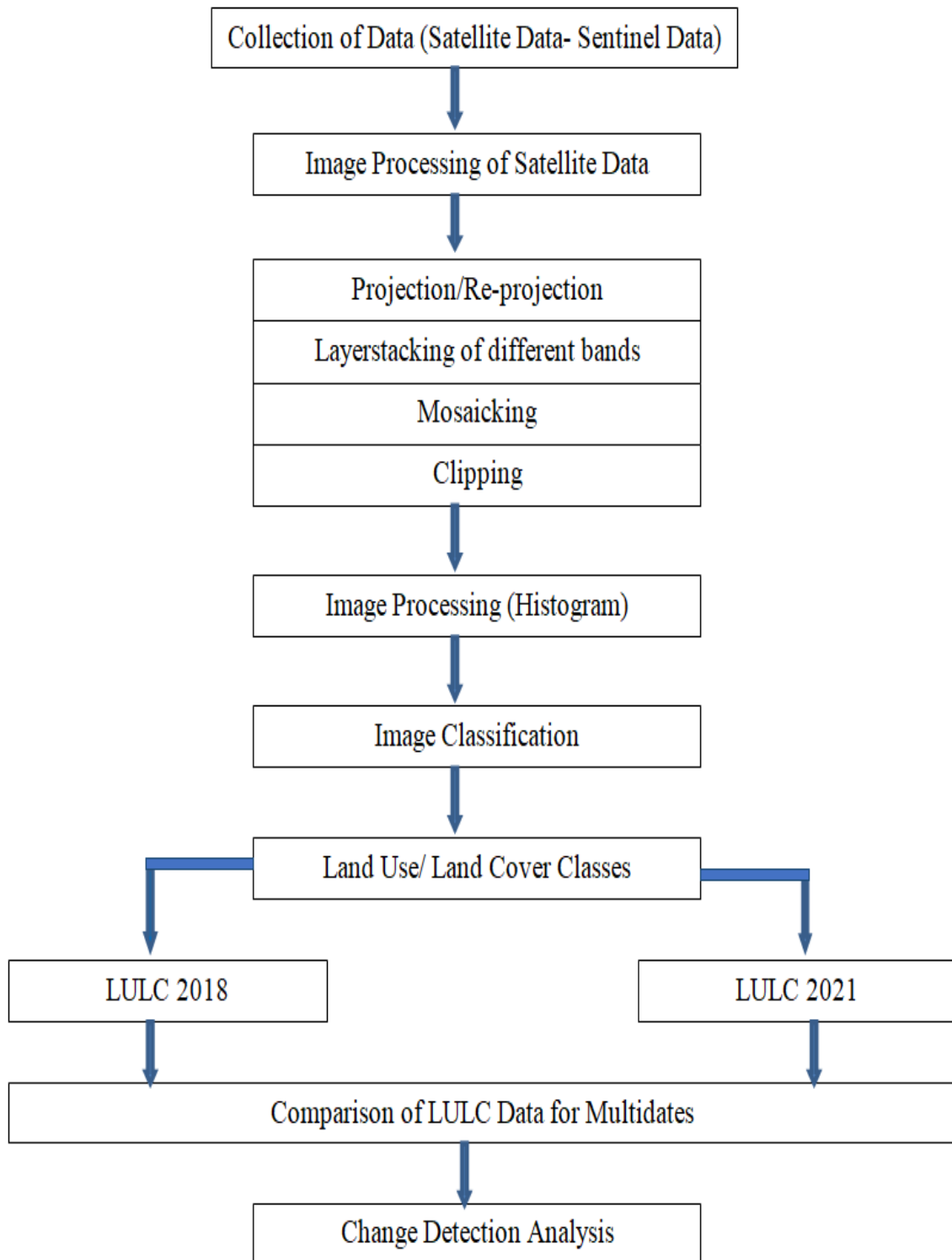
S. NO.	TOPOSHEET NUMBER
1.	63F/2
2.	63F/9
3.	63F/5
4.	63E/8
5.	63E/12
6.	63E/7
7.	63E/3
8.	63E/16
9.	63A/16
10.	63F/1
11.	63F/13
12.	63F/6
13.	63E/4

Table: – 2 Details of Satellites

Sr. No	Sensor	Path-Row	Date of Pass
1.	SENTINEL-2A	T44RMR	09/04/2018&13/04/2021
2.	SENTINEL-2A	T44RNR	09/04/2018&13/04/2021
3.	SENTINEL-2A	T44RNQ	09/04/2018&13/04/2021
4.	SENTINEL-2A	T44RMQ	09/04/2018&13/04/2021

METHODOLOGY

LULC represents biotic abiotic assets captured by the thematic classifications of the earth's exterior and the environmental circumstance of land areas are stressed, helps for the conservation of water and land resources management in a basin. The data of SOI toposheets for (2018) have been used for the LULC. SENTINEL-2A satellite data for the (year2021) have been used for Land use/Land cover. The methodology used in the study has been represented in the flowchart as shown in Chart –1



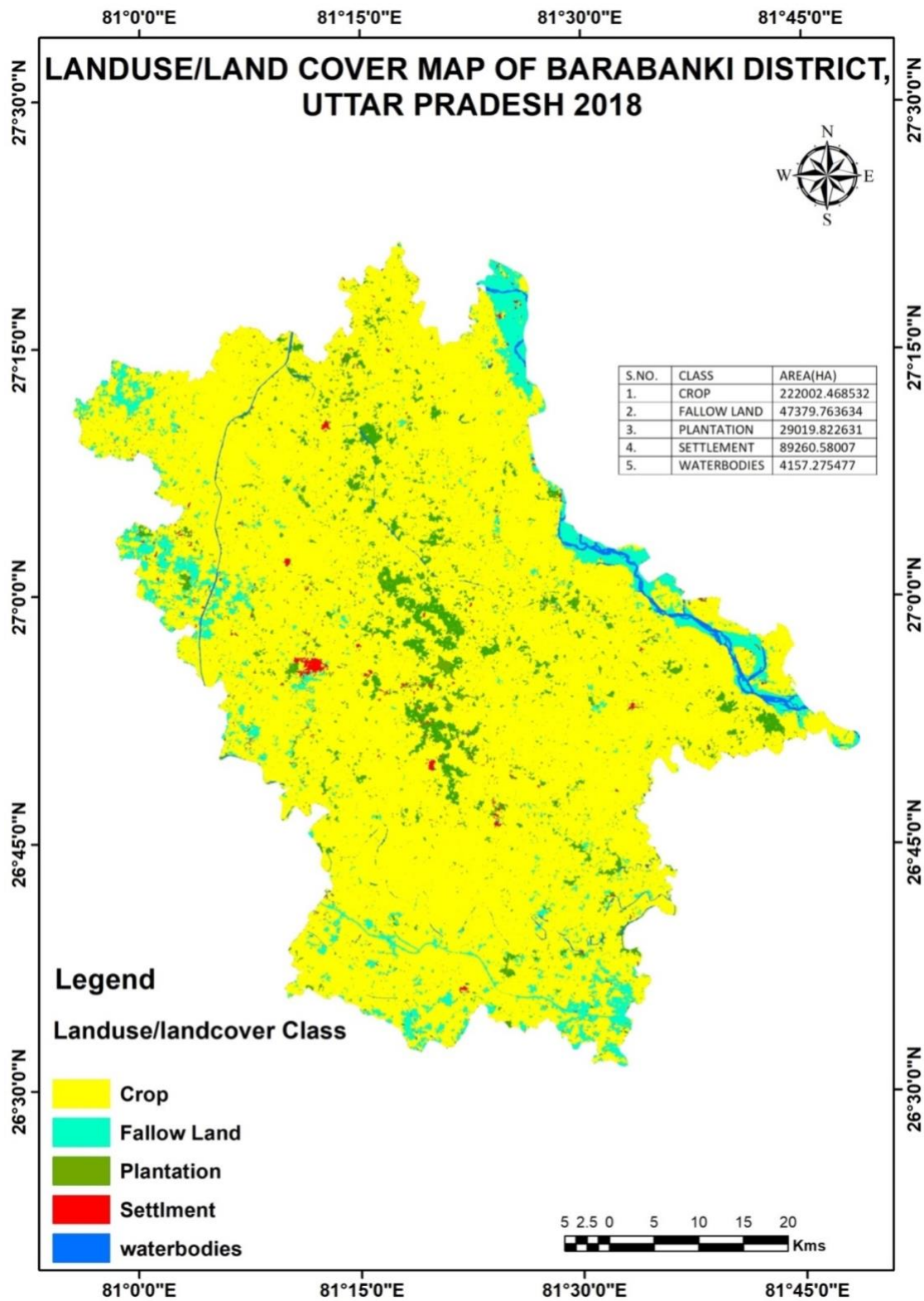


FIG:2 LULC OF BARABANKI DISTRICT(2018)

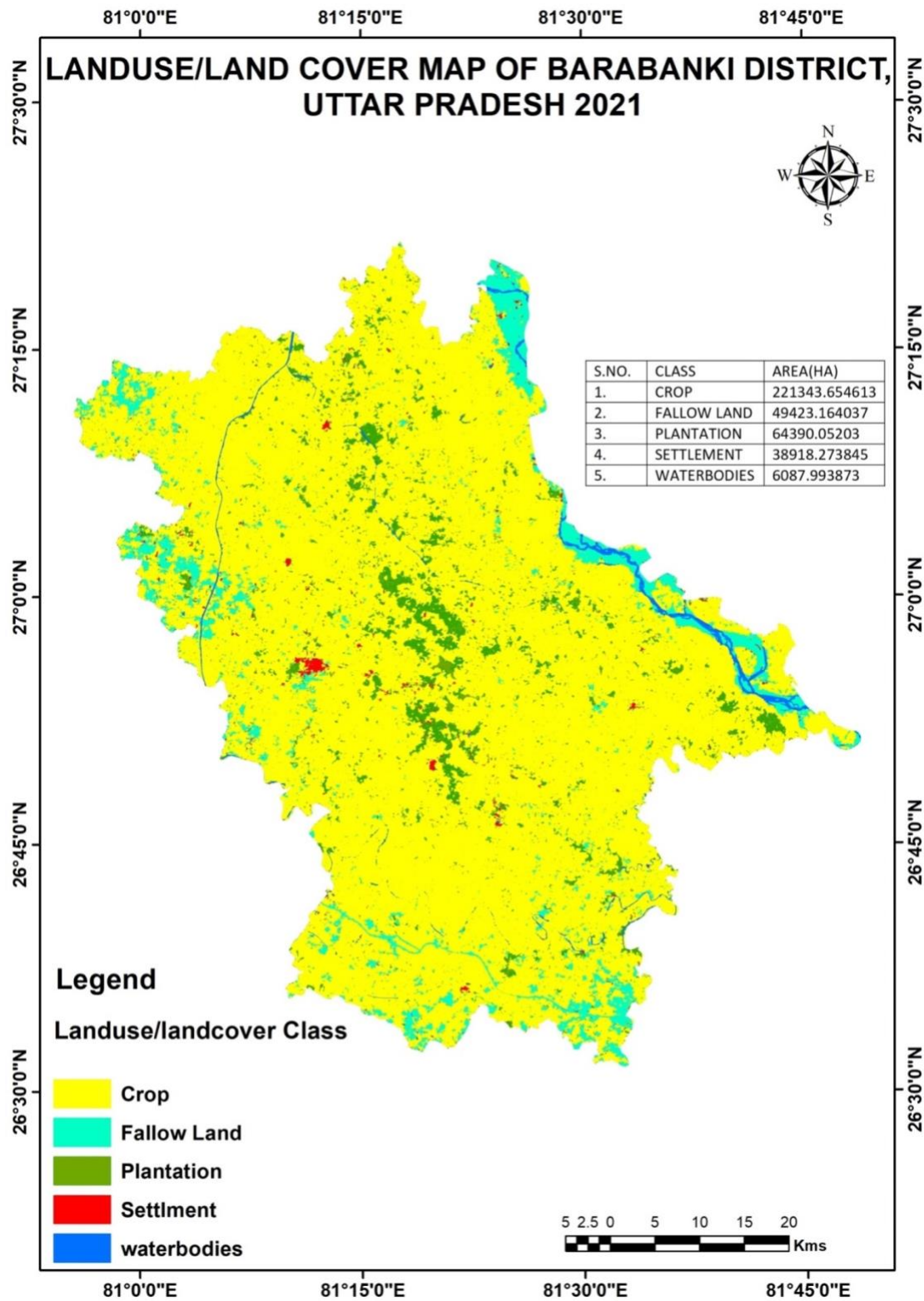


FIG:3 LULC OF BARABANKI DISTRICT(2021)

RESULTS

Land use / Land cover has considerable impacts at the watershed level. The maps were generated under different classes in GIS environment using on screen digitization technique was used for the land use land cover map of the year 2018 and supervised classification method is used for the land use land cover map of the study area. By using these techniques data of 2018 and 2021 were classified into Cropland, Fallow land, plantation, settlement and waterbody. There are large scale decreases in the area of waterbody, cropland and Fallow land classes. On the other hand, significant positive changes are observed in the areas of plantation and settlement from 2018 to 2021. It is interesting to note that the name 'Barabanki' is used as a major drainage to carry city sewage underwent drastic changes from 2018 to 2021.

gives the statistical results of LU/LC changes. It is evident from the table that the almost -46.4419% from 4157.275477ha in year 2018 to 6087.993873ha in year 2021 area of the water body has been transgressed between 2018 to 2021. These changes are attributed to eutrophication and decreases in the built-up around the river. The decrease of fresh water due to direct use for drinking and other purposes. Unavailability of fresh water puts pressure on ground water. As per report by Ground water board the no of wells increased and depth of ground water level has increases over study area.

Interpretation of satellite data indicates that built-up area is decreased considerably up to -17.58.835 i.e., from 47379.46ha in year 2018 to 38918.27ha in year 2021 area has been transgressed between 2018 to 2021. This urban expansion and population increase has put an adverse effect on agriculture and plantation area and this drastic increase in built-up area is attributed to increase in population over study area.

We also report a decrease of about -0.29676% in 221343.7 cropland area from of basin area is slightly decreased from 222002.5ha in year 2018 to 168932.502 ha in year 2021. Decrease of cropland is attributed to reduction in waterbodies over study area. Our observation is consistent with a previous study which reported that decline in water caused reduction in cropland area.

Decrease of cropland shows quite increase in Fallow land area about -70.3083 from 29019.82ha in year 2018 to 29019.82ha in year 2021. Increase of plantation area may lead in overuse of water resource in basin area. In our study we find out that there is small increase in plantation area with -0.002786% from 89260.58ha in year 2018 to 64390.05 in year 2021.

S.NO.	LULC	2018 AREA (Ha)	2021 AREA (Ha)	Change 2018 - 2021 (in Ha)	% Change from 2018 - 2021 (in Ha)
1	CROP	222002.5	221343.7	-658.814	-0.29676
2	FALLOW LAND	29019.82	29019.82	-20403.3	-70.3083
3	PLANTATION	89260.58	64390.05	24870.53	0.002786
4	SETTLEMENT	47379.46	38918.27	8461.19	17.85835
5	WATERBODIES	4157.275	6087.994	-1930.72	-46.4419



CONCLUSION

The present study incorporates extensive changes in LULC and their linkages with socio-economy over study area. The significant changes in Land use land cover like decrease in settlement area increase in Fallow land and between 2018 to 2021 in terms of loss of natural vegetation cover expansion of urban areas with industrial garbage has given rise to protect river bank erosion, degradation of water resources and water quality. Consistent increase in the area of plantation, includes commercial plantations which is normally the area close to human habitations indicates that plantation increase due to extra commercial plants are planted in these decade. Precipitation patterns are change due to warming over study area. Increase in ground water level over study area may have significant impact on crop production. Significant changes in LULC have distributed the natural ecosystem of study area are causing serious issue to inhabitants.

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