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Changing of Land Use/Land Cover Patterns of Arambagh Municipality in Last Two Decades by using Remote Sensing and GIS Techniques

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Abstract: ***Land use/land cover changes are exceptionally normal in late time as a result of the over the top populace weight around the world. Remote sensing and GIS technology is exceptionally backed up to perfectly distinguish the changing situations of land use/land cover of this study region. Diverse satellite images of two years 1991 and 2011 have been utilized for this study. Some product like ERDAS Imagine 2014 and Arc GIS 10.1 are utilized to induce the mapping of compatible changes from 1991 to 2011.The consequence of this study is inconceivable in most recent 20 years. There is an extreme transmutation in the developmental range and for the expanding developed region the horticultural area and normal vegetation scope are managing. This is the other purpose behind augmenting the measure of decrepit area. Due to over populace injunctive approval of victuals builds; the settlement scope hampers the farming region. So the extravagant weight in a specific area misfortune the richness of the area quickly. The primary point of this paper is to investigate the spatial-fleeting land use/land spread changes in 20 years in the Arambagh Municipality range.***

Keywords: Land use/Land cover, Remote Sensing and GIS, Satellite Images, Horticultural Area, Settlement

1. Introduction

Land use/land cover changes of a locale are a prime witness in the investigation of human association with nature. It is more considerable to comprehend the cooperation between human movement and its going around environment. Land use/land cover change is a noteworthy issue of ecumenical environmental change (Prakasan, 2010). The land spread alludes to the physical material on the world's surface. Then again, arrive use implies the area which is used by individuals in both time and space. Land use changes allude to the fascination of the area, spread starting with one class, then on to the next classification and alteration of condition inside a class. (Mill operator and Turner, 1992). The distinctive classes of the area spreads are water body, meadow, woodland, developed area, and so on. Land utilize and arrive spread is discrete terms; they frequently utilized reciprocally (Dimyati et.al, 1996). The idea of area use/land cover is changing in nature. Such changes may be the cause of populace amplification. The environment of a region is most influenced via land use, land cover changes. As of late, GIS has a significant part in the examination of area utilize and land spread in a specific locale. Use of Remote detected information made conceivable to concentrate on the transmutation in area use, land spread in less time, requiring little to no effort and with better exactness (Kachhwala, 1989). Space borne remotely detected information might be especially valuable in creating nations where later and dependable spatial data is deficient with regards to (Dong and Alessandra et al, 1997).

Arambagh is a town and a municipality in the Hooghly region in the state of West Bengal, India. Arambagh is the most sizable voluminous subdivision in Hooghly region. The most extreme temperature amid summer is up to 42 °C, while least temperatures amid the winter comes down to 8 °C. Normal yearly precipitation is 1600 millimeters. An endeavor is made in this study to investigate the spatial-transient land use/land cover changes between 20 years in the Arambagh Municipality range.

2. Study Area

Arambagh region is the study zone in the northwestern piece of Hooghly locale. The most extreme temperature amid summer up to 42 °C, while least temperatures amid the winter comes down to 8 °C. Normal yearly precipitation is 1600 millimeters. Darakeswar waterway streams in the western piece of this district. All out populace 76,320 in this district territory.

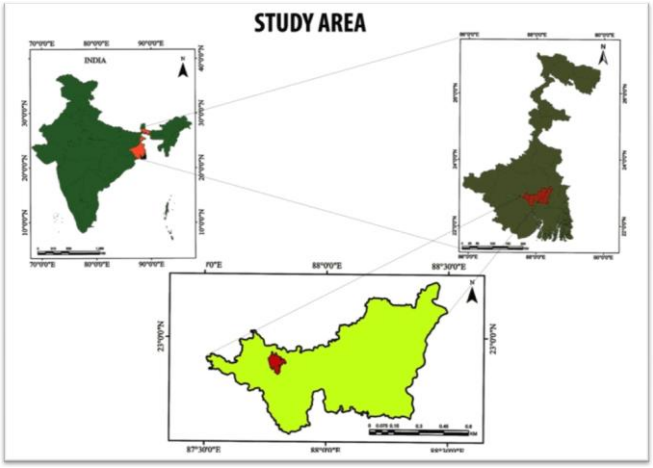

Figure 1: Location of the Study Area

3. Material and Methods

The land use/land cover grouping of Arambagh region is made taking into account LANDSAT 5 Thematic Mapper (TM) from 1991 and LANDSAT TM map information from 2011. Land Maps of scale 1:50000 are utilized for ground

confirmation. These two years images are downloaded from the USGS site. Multi-spatial image arrangement is a standout amongst the most utilized techniques to extricate topical data from satellite images (Sharma et. Al, 2008) Radiometric corrections of these images are made in ERDAS IMAGINE 2014 software. At that point LULC maps were created for these two years multi-spectral images, LANDSAT TM of 1991 and LANDSAT TM of 2011. At that point subset is produced using these images to study zone. Five land use/land cover classifications are distinguished from these two transient pictures.

Table 1: Satellite Data & information

Satellite & Sensor	Date of Acquisition	Resolution	Path/Row	Cloud Cover
Landsat-4TM	30/04/1991	30m	139/44	20%
Landsat-5 TM	04/03/1991	30 m	139/44	30%

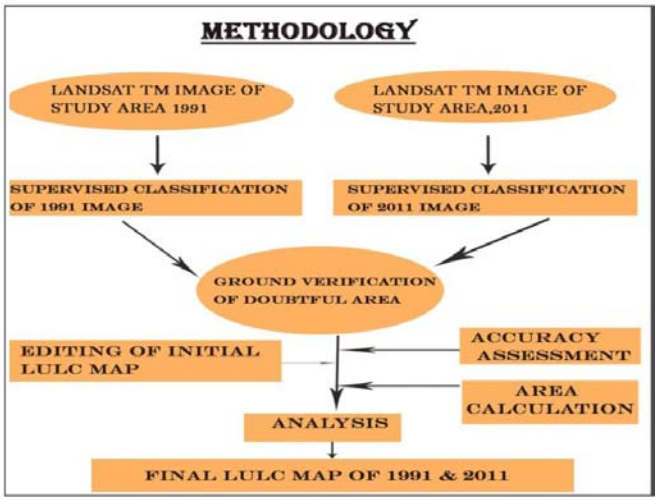

Figure 2: Flow chart of Methodology

4. Result and Discussion

From the LANDSAT images of 1991 and 2011, it is significant how the area utilizes and develops the territory step by step. In 20 years, from the images of 1991 and 2011 it is extremely transpicuous that the aggregate developed territory, rural area, characteristic vegetation, fallow land area are moderate.

4.1 Land use / Land cover Status

Precision evaluation of the Land use/land cover results acquired demonstrated a general exactness of 88.40 % in 1991 and 91.16% for 2011.These information uncovers that in 1991, the quantum of water body is 7.17% (2.68 Sq. km),Natural vegetation covers 22.6 % (8.49 sq. km), where the acknowledge developed region is 21.9 % (8.29 sq km) and the aggregate of fallow land area is 22.7 % (8.52 sq km) Amid 2011 the territory under these area classes was found around 8.6% (3.22 sq km) under the water body, horticultural area is 19.2 % (7.26 sq km), characteristic vegetation 20% (7.51 sq km), developed range 26.2 % (9.82 sq km) and the fallow land is 20 % (9.79 sq km).

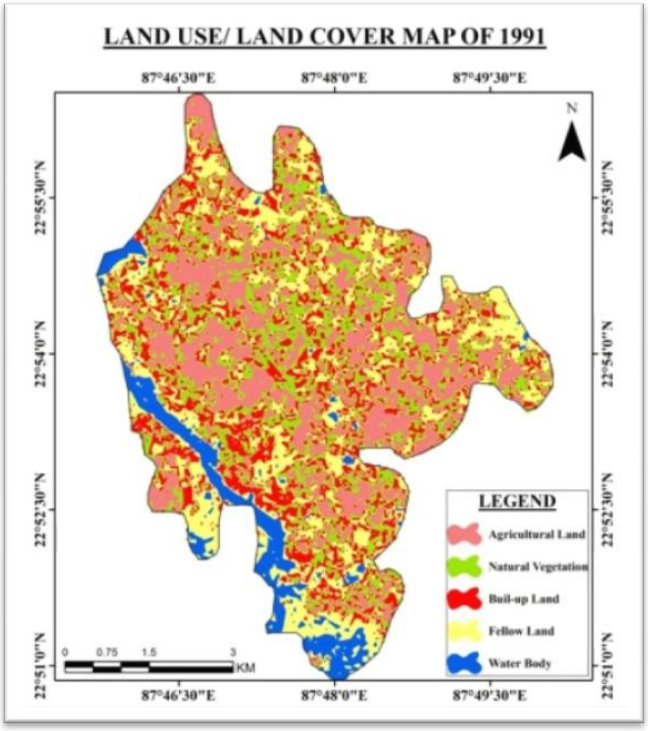

Figure 3 : Classified image of 1991

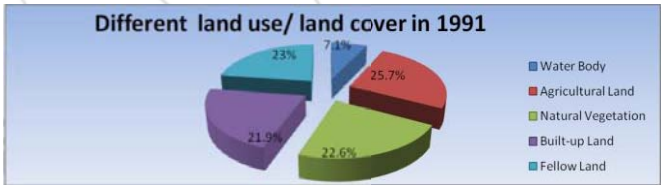

Figure: 4 Land use/Land cover Area in %

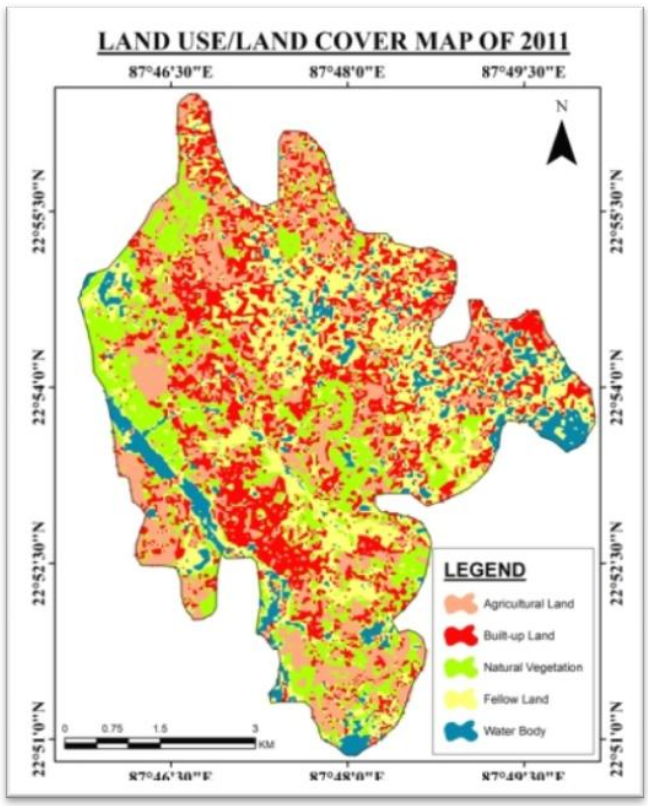

Figure 5: Classified image of 2011

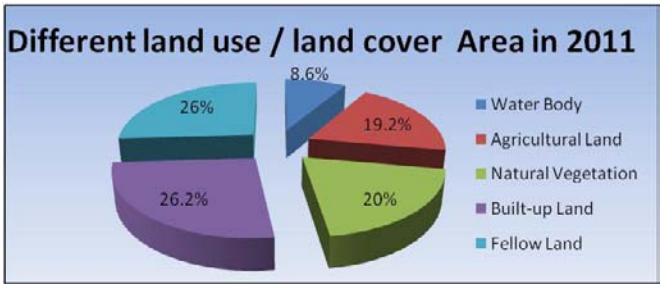

Figure 6: Land use/Land cover area in %

4.2 Land use /Land cover change

From the Table: 2 obviously both positive and negative changes happened in the land use/land cover are example of the Arambagh Municipality. Amid the most recent Built-up land developed area in the study territory has expanded from 8.29 km^2 in 1991 to 9.29 km^2 in 2011 which records for 4.3 % of the aggregate study zone. The agricultural land has diminished from 9.69 km2 in 1991 to 7.26 km^2 in 2011 which represents - 6.5 % of the earlier year. The water body has expanded from 2.68 km^2 in 1991 to 3.22 km^2 in 2011 which represents 1.5% expanded. The aggregate sum of Fallow land likewise expanded in the study region from 8.52 km^2 in 1991 to 9.79 in 2011 which represents 3.3 % expanded. The Natural vegetation has been diminished from 8.49 km2 in 1991 to 7.51 km^2 in 2011. This reduction in Natural Vegetation represents -2.6 %.

Table 2: LULC area and relative change in two decades

Land Use/ Land Cover	AREA (1991)		AREA (2011)		Relative Change (1991-2011)	
	Km^2	%	Km^2	%	Km^2	%
Water Body	2.68	7.1	3.22	8.6	+0.54	+1.5
Agricultural Land	9.69	25.7	7.26	19.2	-2.43	-6.5
Natural Vegetation	8.49	22.6	7.51	20	-0.98	-2.6
Built-up Land	8.29	21.9	9.89	26.2	+1.6	+4.3
Fallow Land	8.52	22.7	9.79	26	+1.27	+3.3
TOTAL	37.67	100	37.67	100		

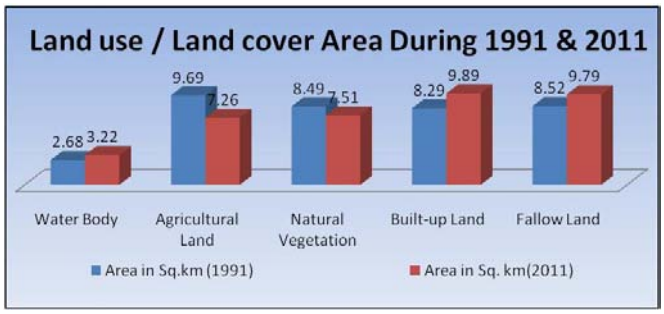

Figure 7: Land use/Land cover Change

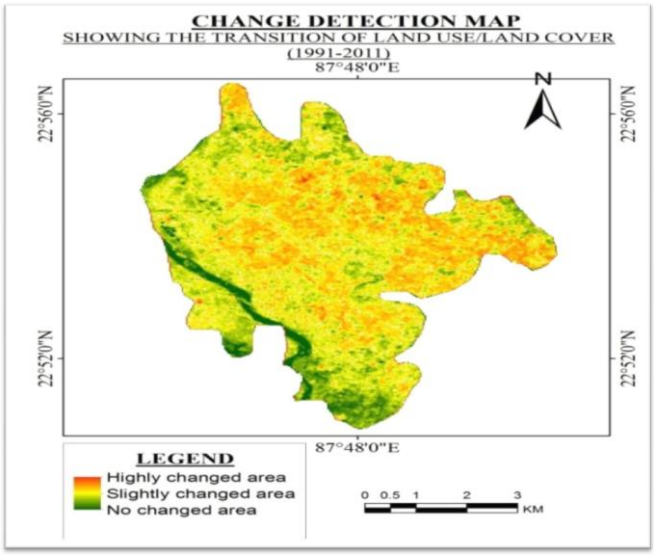

Figure 8: Change detection Map

5. Conclusion

This paper deals with a status report of land use/land cover changes of Arambagh municipality. For fulfilling the needs for settling down in this study area the built-up area or settlement area increased which hampered the extension of agricultural land and natural vegetation cover. The man had change the manufacturing procedure and they used fertilizer and other hand for the better production, which affected the agricultural land area as a result it, stepped up the % of fallow land. This scenario is perceptible from the LANDSAT images 1991 and 2011. The total extension of agricultural and natural vegetation, land is diminished near about 43% and 98% respectively. On the other hand the total built-up area rises 1.6% (9.82 sq. km) and fallow land elaborate up to 1.27 % (9.72). As a result, we must conclude that through the help of technology the land utilization of this municipality is increased towards urbanization.

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