

International Journal of Scientific Research and Reviews

Spatio-temporal Changes of Land use and land cover in Bankura-I and Bankura-II C.D. Block, Bankura District, West Bengal

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ABSTRACT

The present study deals with the Spatio-temporal Changes of Land use and land cover in Bankura-I and Bankura-II C.D. Block, Bankura District, West Bengal. Here we have used geo-coded ortho-rectified Sentinel Satellite data and Landsat MSS data with having Path 149 and Row 044 for the year of 1972 and 2018 to investigate the land use and land cover change. We have found that the land use and land cover change of this region is going on and on. The forest cover of this region gets removed because of having huge population pressure and the demand of the forest woods and areas. The decrease of forest cover has also taken place due to conversion of forest land to cultivated land. Apart from this the built-up area of this region is increasing decade after decade. People of the surroundings are coming over here at Bankura town and its surroundings for having more and more facilities. At the initial stage (1972) the built-up area was 1.08% but now at present it has become 4.95% (2018) and the dense forest was 10.70% in 1972 now it has become 6.62% (2018).

KEYWORD: Land use and land cover, Bankura-I and Bankura-II, Landsat, Sentinel

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INTRODUCTION

¹ Land use and land cover (LULC) is related with terrestrial surface of earth where land cover means land encloses by bio-physical units (e.g. vegetation cover) and economic and social function of land is depicted land use. The land use and the land cover are not same things but interrelated to each other to complicated way. Grass lands is physical based land cover have a many socio-economic uses like, livestock production, recreation and turf cutting. ² A mixed farming farm is created for socio-economic uses by human but within the farm there have different cover like, grass land, cropped area and fallow land. LULC is related with terrestrial surface of earth where land cover means land enclose by physical and biological units and land use represent the human interacted cultural earth surface. ³ Land use land cover change or usually use lands change are generally temporal change of earth surface by environmentally or interferences of human. To appeasement their need, human constantly transformed the land to gain food, clothes and habitation from the very past to present. ⁴ LULC changes are linked with socio-economic development, rapid growth of population and technologies and environmental degradation and there are parallel relation to population growth and land changed. In recent decades, a huge amount of grass land, forest cover and wood land converted in to agricultural land and pasture land. ⁴ Human used land is 32% of total land of earth within which 30% is crops yield land 70% is pasture and settlement area. ³ Loss of Bio-diversity, climate changed, pollution and Ozone depletion are the consequence of Land use land cover changed. So, this concern instigated to study about LULC changes around the world. ⁵⁻⁶ Land use land cover change study has become experimental study in many diverse disciplines such as environment, ecology, hydrology, agriculture, forestry and its application key is monitoring agriculture land, degradation of forest, soil degradation, expansion of urban center, inland water change etc..

The classification land use land cover and to detected its changed is a scientific way to first step to mitigate the above problem also. Remote sensing (RS) and Geographic information system (GIS) are very efficient tools to monitoring the LULC changed and applied by a large number of researchers. ⁷ LULC pattern can be changed through environmentally or anthropogenically and measured by multi-temporal satellite image with the help of RS GIS techniques. ⁸ The Landsat series satellite data is one of the best in the sense acquired temporal earth observation data which have mostly used in LULC changed. ⁹ Using remotely sensed data with the help of GIS when a LULC pattern of an area is studied and mapped by the temporal comparison are called changed detection. ¹⁰ Several methods have been used for change detection these are change detection using write function memory insertion, multi-date composite image change detection, image algebra change detection, using univariate image differencing, manual on-screen digitization of change and vegetation index

differencing. ¹¹⁻¹² LULC change investigated is a dynamic process and it's identifying the process of environment change which is obstacle for long term sustainable development.

1.1 Study area

The present study area, Bankura-I and Bankura-II C.D. block is located in the centre part of the Bankura District of West Bengal state in India. The study area is enclosed with 23° 22' 57.41"N to 23° 09' 25.21" N latitude and 86° 53' 45.64" E to 87° 14' 16.01" E longitude. The area of this study area is roughly about 410.44501 sq. km. The present research area is bounded by five C.D. blocks namely Chhatna, Barjora, Gangajalghati, Indpur and Onda of Bankura district (Figure 1). Here in this present study area the climatic condition is with extremely hot at some stage in the month of April to June or summer season. The region is witnessed with an unusual precipitation. The annual average rainfall of the study area is nearly 1200 mm, maximum of which usually received by the south west monsoon nearly about 78% of the total. Agricultural production is the major problem of this study area. The primary crop of this region is paddy which undergoes utmost level of water scarcity.

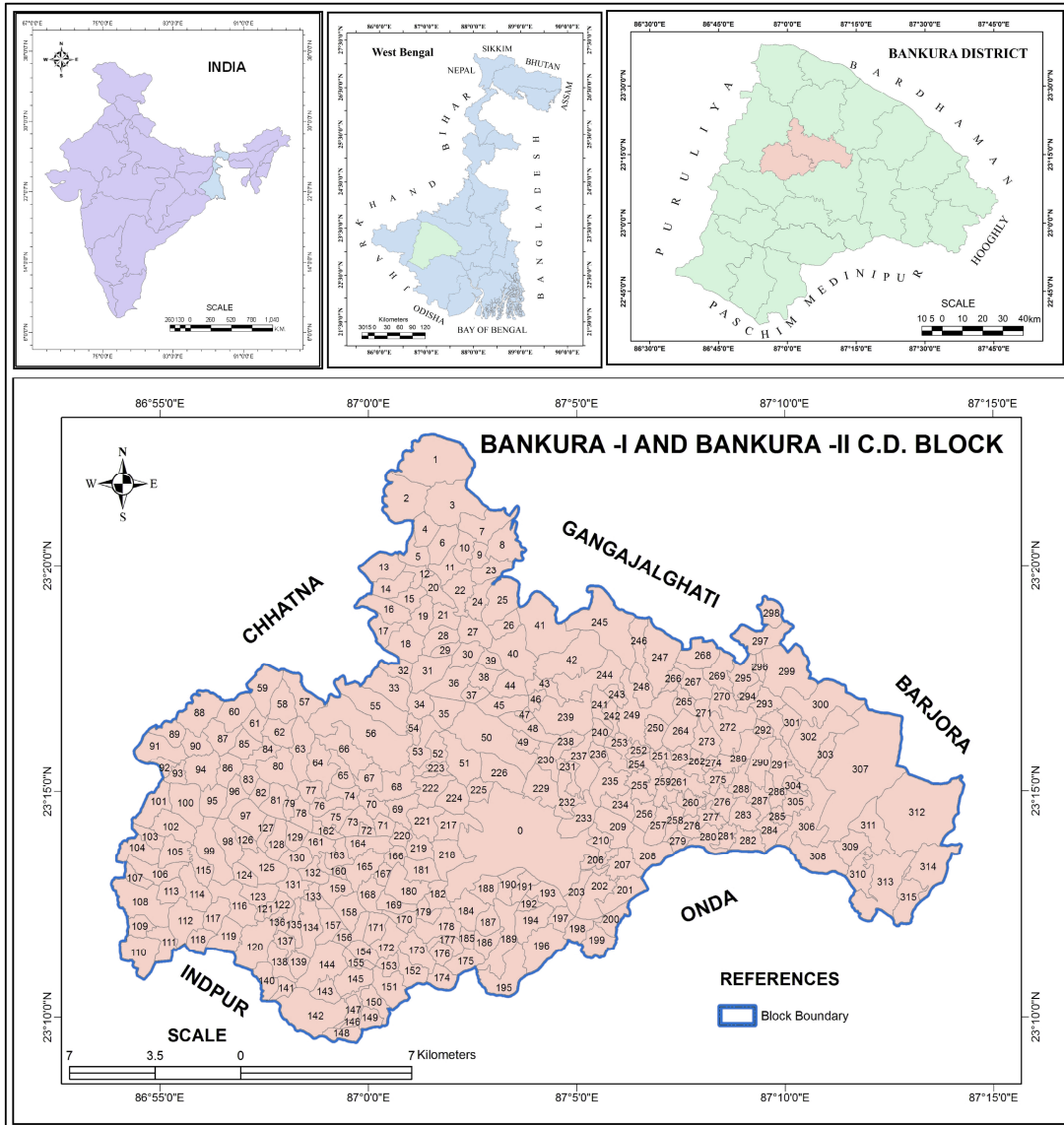


Figure 1: Location map of the study area

2. OBJECTIVES

The main objective of this work is to study the land use and land cover of Bankura-I and Bankura-II C.D. block and find out the spatio-temporal changes of existing land use and land cover within the region.

3. MATERIALS AND METHODS

In this study geocoded ortho-rectified Sentinel Satellite data of 2018 has been used. The visible bands and the infrared bands of Sentinel data are used for this change detecting study. The spatial resolutions of these bands are 10 meters. For historical studies geocoded ortho-rectified Landsat MSS satellite data with having Path 149 and Row 044 for the year of 1972 has been used. Here for detecting land use and land cover change only near infrared and visible bands have been used. The spatial resolutions of these bands are 30 meters respectively. Apart from that Survey of

India Topographical maps on 1:50,000 scale have been used. The tenure 1971 to 2016 has been selected for the purpose of showing the changing pattern of Land use and Land cover which is existing in this region. After *Panchayati Raj* how the cropping field and land use pattern has been changed drastically in accordance with anthropogenic involvement. The methodological steps of this study can be categories into three broad ways like pre-processing of image, image classification and change detection and image analysis and identifying spatio-temporal changes of land use and land cover.

Erdas Imagine 2014 version has been used for image processing and identification of spatio-temporal changes of existing Land use and land cover. Supervised classification using spectral angel mapping has been used executed on all the data set to find out the land use and land cover changes between the study area. The classification has been done after layer stacking and performing band combination for preparing and executing classification from standard False Colour Composite (FCC). For each class at least four samples were taken and later merged these to have one LULC class. In this way total near about 32 training sites were taken and ultimately eight LULC classes have been fined out. Land use and land cover map showing nine LULC classes namely dense forest, open scrub, water body, agricultural land, dry fallow, degraded forest, wet fallow land, sand and built-up land.

4. RESULTS AND DISCUSSION

4.1 Land use and Land Cover Change

The land use and land cover of Bankura-I and Bankura-II C.D. block under goes huge modification during last few decades. As the population pressure of this region is increasing year after year therefore the population induced activities like land use and land cover change is also going on here. We have noticed that the built-up area, dry fallow land and agricultural land of this region is increasing at the same time the area of dense forest, wet fallow land and the open scrub are decreasing because these forest areas and the wet fallow land actually converted as built-up area or the cultivated land to fulfil the demand of the people (Figure 1, Figure 2 and Figure 3). The forest cover of this region gets removed year after year or decade after decade because of having huge population pressure and the demand of the forest woods and forest cover areas. The decrease of forest cover has also been taken place due to conversion of forest land to cultivated land. It has been found that the dense forest initially was 10.70% in 1972 now in 2018 it has become 6.62% (Figure 3). Apart from this the built-up area of this region is increasing decade after decade. People of the surroundings are coming over here at Bankura town and its surroundings for having more and more

facilities. It has been noticed that during the initial stage (1972) the built-up area was 1.08% but now at present it has become 4.95% (2018).

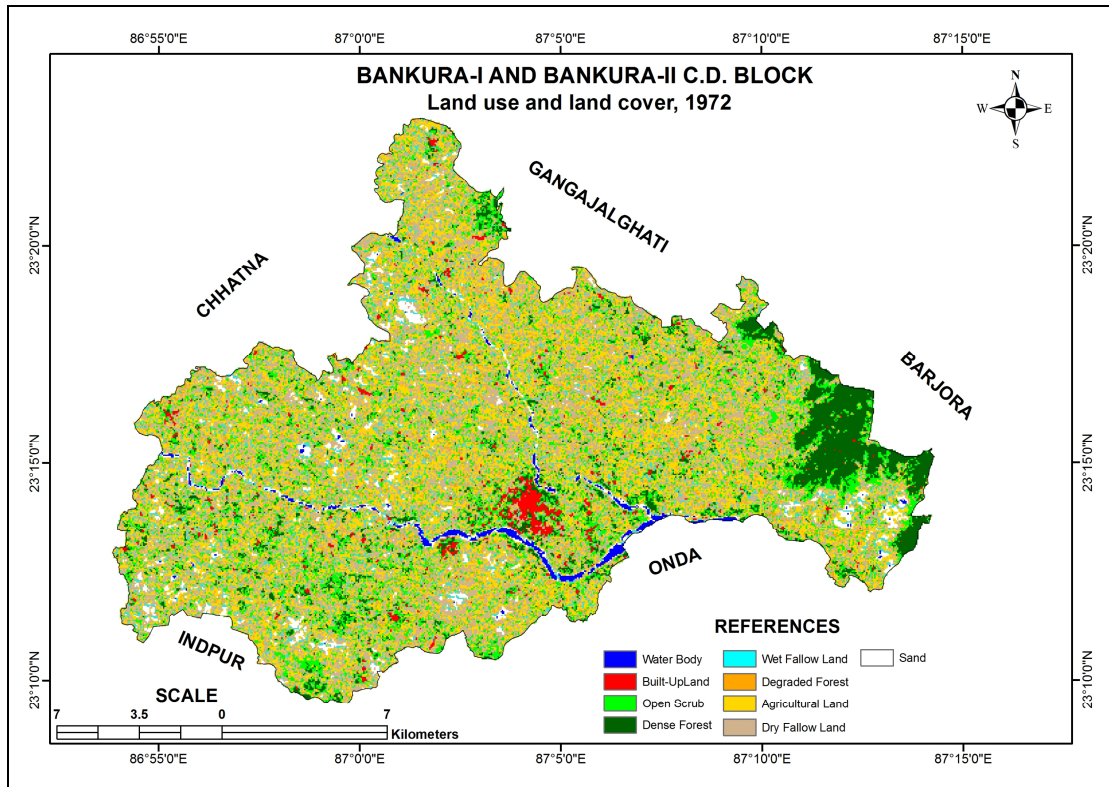


Figure 2: Land use and land cover map of 1972

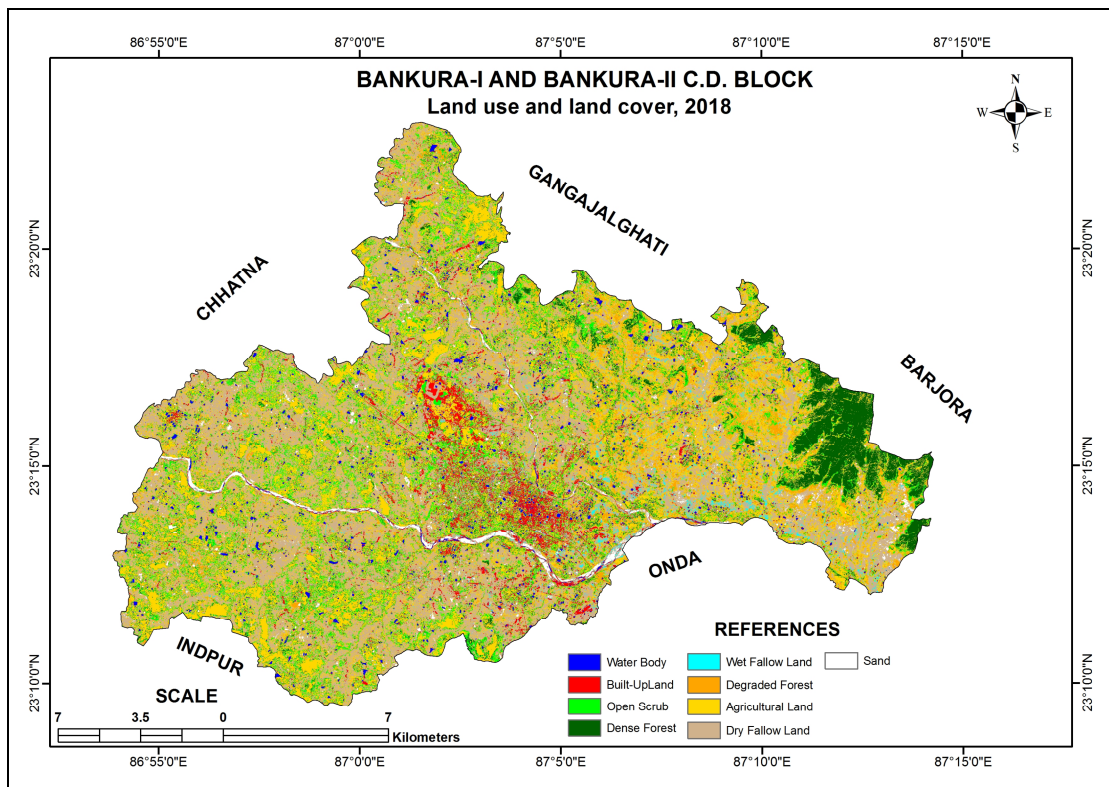


Figure 3: Land use and land cover map of 2018

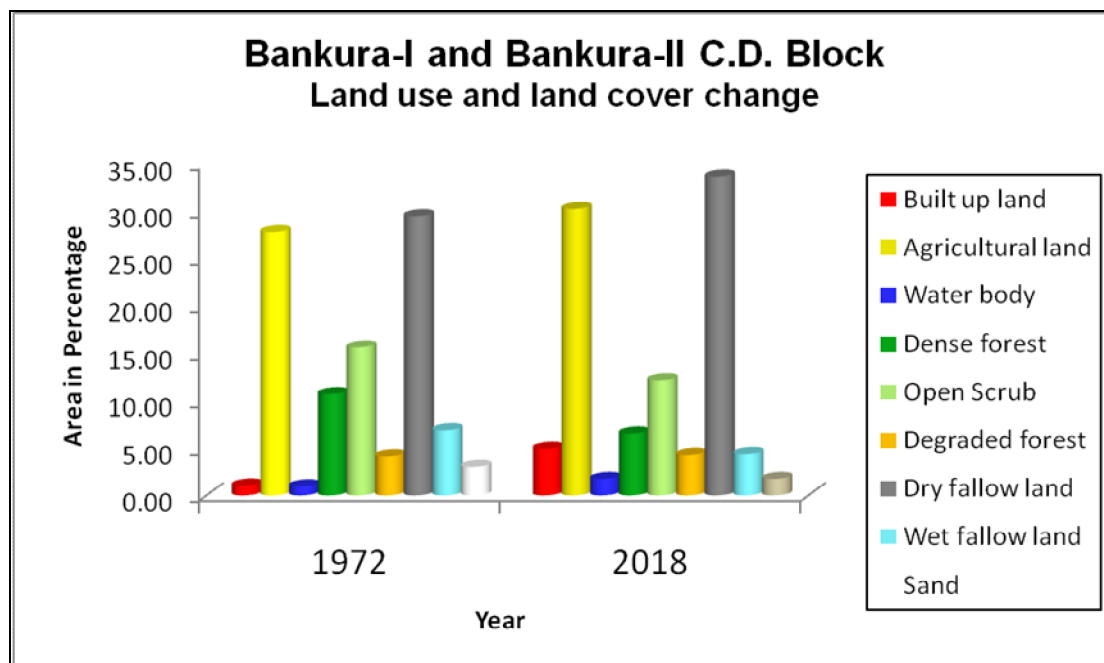


Figure 4: Land use and land cover change between 1972 to 2018

5. CONCLUSION

It is quite clear from the above study that the land use and land cover of Bankura-I and Bankura-II C.D. block is dynamic in nature which is continuously changing year after year therefore which eventually providing huge impact on human society because the degradation or deforestation of forest cover is putting huge pressure on the surrounding environment and of course on the forest ecosystem. So, it is the need of hour to understand the whole scenario and protect the valuable things like forest areas and its ecosystem and water bodies and its ecosystem etc. Moreover, we should restrict our activities like changing the land use and land cover in an accelerated manner so that the human society will not be suffered in future whatsoever.

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