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Land Use And Landcover Change In Coastal Area: A Case Study Of Talsari To Udaypur Coastal Tract In East Coast Of India

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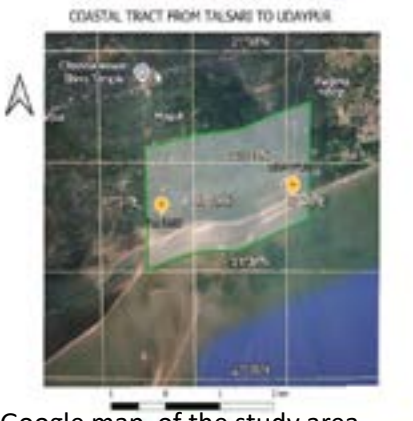
ABSTRACT

Coastal land is very dynamic in nature. It can experience change due to natural and anthropogenic activities. If the area is a popular tourist destination, then it emerges more rapidly than other parts. Land use and Landcover analysis depicts all in them. The present paper is about those changes in the selected tract of coastal land along east coast of India. It is based on secondary data like satellite images majorly. It depicts periodic change in land use and landcover from Talsari to Udaypur (1932 -2022). The LULC of different time frame shows the nature of change in the area.

Introduction:

LULC is the spatial expression of the economic practices, cultural believes and environmental limits. It gives information about the cumulative effect of development (*James D etl,2017*). The coastal ecosystem is also fragile (Paul.A,*2022*) to certain activities. All reflects in the LULC of the area. India has a long coastline of around 7516 km surrounded in its three sides. Where East coast is dynamic and versatile in nature (*Tiwari & Rao,2024*). It has several river mouths, estuaries, active sedimentation, frequent cyclonic effects and crowded tourist destinations as well. So, the nature is constant in the process of aggradation and degradation in selected part of the present tract. The tourism development has modified these places as well. It is noticeable in the landscape in different ways, sometimes it is by encroachment to the natural habitat or regeneration (*Meher. SS et.al, 2025*) of certain LULC. Hence the periodic change in LULC is quite significant (*Mondal & Tiwari, 2025*) for the diverse nature of the selected section from Talsari to Udaypur area. Both are very popular tourist destinations in Odisha state at the vicinity of Digha of West Bengal.

Study Area:



Google map of the study area

The broader area confined between 21◦35′N to 21◦ 38′N and 87◦ 27′E to 87◦ 30′E segment area Green marked area: 6 km² area included 500m distance from coastline towards sea and 1500m distance towards land.

A stretch of the coastal land between Talsari and Udaypur is selected as the study area.The administrative boundaries are not considered in selection of the study area as they are more coherent with nature rather than administrative units. The

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surrounding area is also included for better understanding of the LULC changes from 1932 to 2022(Fig;1)

Problems identified

Land use and Landcover change is the concern of the present part of the research work. This spatial landscape is one of the most significant changes to study in the spatial correlation. It explains the impact of human activities over the time as well as the active natural phenomenon over that space. Tourism is nodal entity for change in this section. Coastal tourism can be defined as a process in which tourists visit people and places along the coasts (*Ghosh.P & Chakravarty. T, 2023 p01*).

So, the places around Digha, which is a very attractive tourist spot in east coast. Talsari and Udaypur are the adjoining places to Digha. Hence to promote the tourism the places have been modified a lot over the years. The modifications are drastic and abundant. Not only tourism, some natural processes like deposition, frequent cyclone is also proactive in this part, It all transformed the area into a different area through the passage of time. This has been portrayed in the land use and landcover. So, the present research work concentrated with the objectives to map the area into land use and landcover map of different time period for better understanding the problem of concern.

Data Sources

The work is entirely based on secondary data. It is based on geospatial data and SOI data. The topographical sheets of SOI have been the base of the study. Apart from the topographical sheets Satellite images have been incorporated to investigate the phenomena of change in land use and landcover.

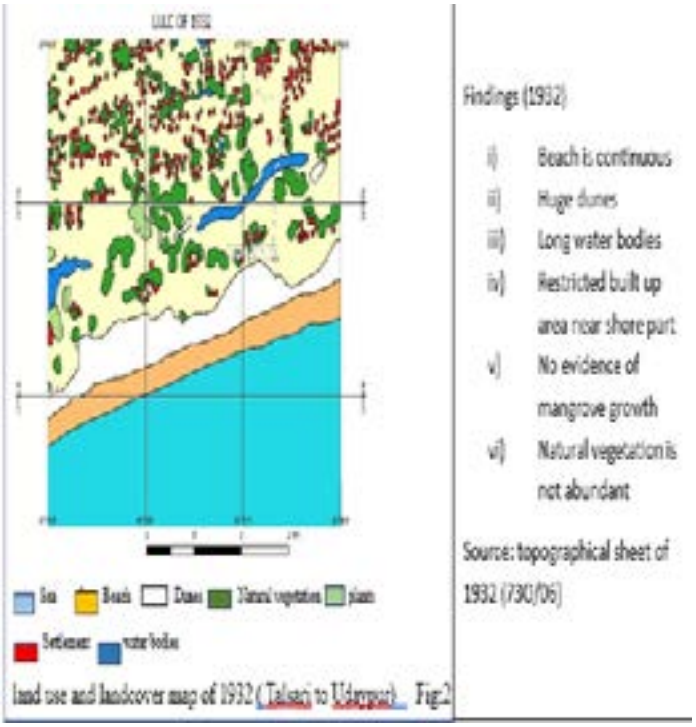
Table: 1 Secondary data used for the study

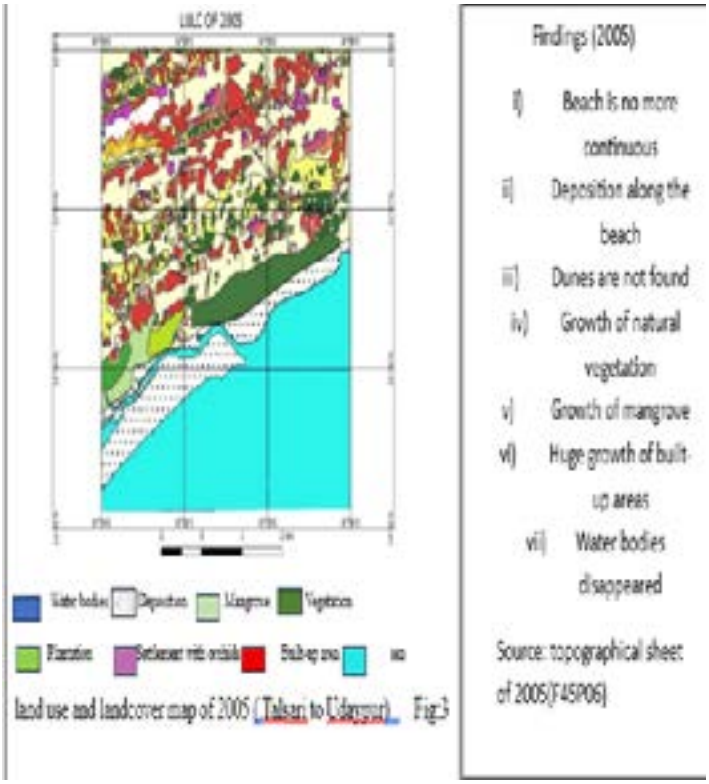
Type	Data	Year	SOURCE
Topographical sheet	73O/06	1932	SOI
	F45P06	2005	SOI
Satellite images	LISS-III IRS (Resourcesat)	2008	BHUVAN
	LISS-III IRS(Resourcesat)	2019	BHUVAN
	LISS-III IRS (Resourcesat)	2022	BHOONIDHI

Methodology and Analysis

The methodology is based on geospatial technology after collection of data. Data downloaded from the Bhuvan geoportal and the Bhoonidhi geoportal for required the period. The make use of LISS-III Resourcesat-2 for LULC because of their all-wind sensitivity experiments in LULC (*Mondal A.K et. al, 2025*). After the download, they have been georeferenced and are rectified geometrically for use in analysis. After the correction the required area of interest have been marked over the titles. Then the LULC classifications have been performed on the raster data based on training set as this represents concept of information entropy (*Kumari.P et al,2023 p202*). The LULC classes have been assigned as required. The classes have been assigned based on standard LULC class divisions of NRSC. It is based on the 3rd cycle of standard classification NRSC,2019. These classification gives major 7 standard LULC classes and their sub classes. The final mapping has been done after a vivid investigation of the DN values and merging the values (*Priya. K. et al,2023*) as required for the given standard of classes (*Sarathi.P,2010)*. Apart from the satellite images the Topographical sheets were prepared for the study after georeferencing of the topographical sheets to WGS 84 datum. The LULC classes are assigned to the vector-based data for the particular area of interest based on the index of the sheet as well as the standard classification.

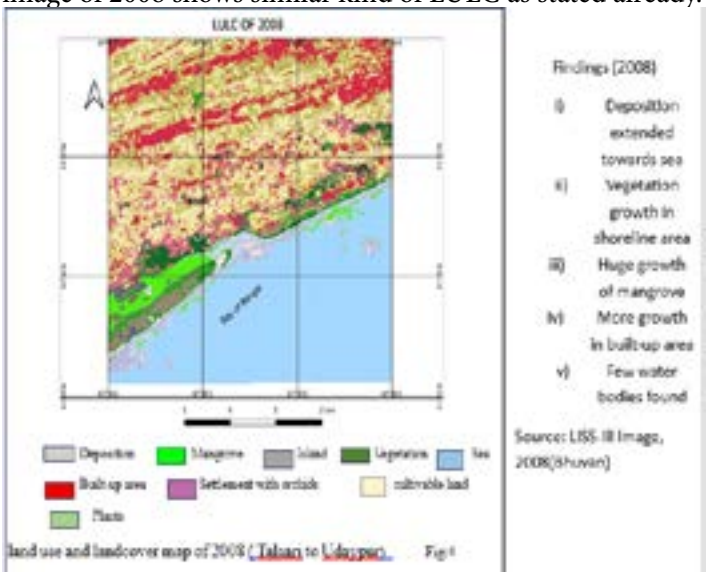
Results and Analysis Of LULC





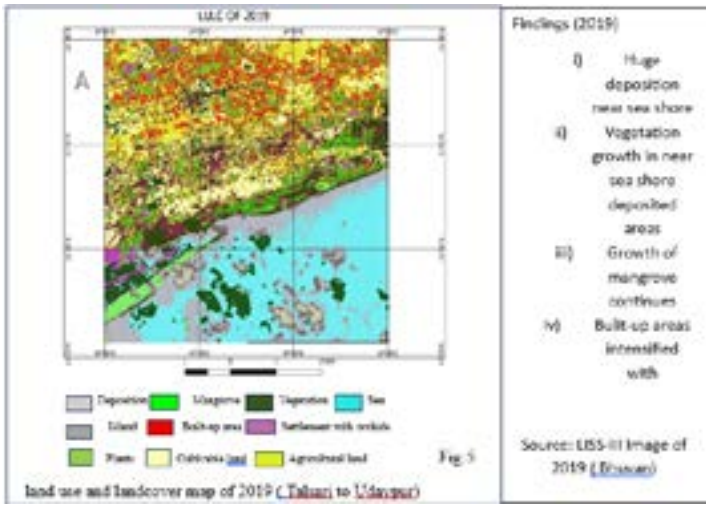
land use and landcover map of 2005 (Talsari to Udaypur) Fig:3

Land Cover is defined as observed physical features on the Earth's Surface whereas land use is more anthropogenic in nature.Major classes of such are; built-up land, agricultural land, forest, grazing land, wastelands, wetlands/water bodies, snow and glaciers. The comparison says many things about the change in the land use pattern. There are certain positive aspects in the change noticed. The most positive is the growth of mangrove forest which was not visible in 1932. But the negative aspect of the chage is that the water bodies somehow vanished absolutely. Same way the dunes got abolished almost in 70 years of period. Dunes have been quite continuous and huge around 1932(fig:2) but there is no trace of such huge dunes(fig:3) along the coastline of Tallsari-Udaypur tract any more. The map prepared from image of 2008 shows similar kind of LULC as stated already.

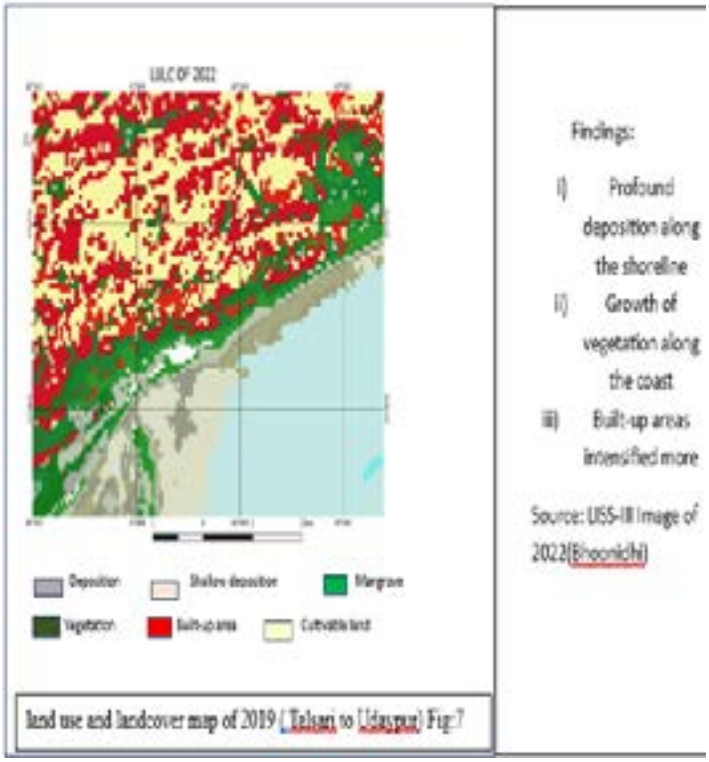


land use and landcover map of 2008 (Talsari to Udaypur) Fig:4

Another LULC map prepared from 2019 image which is after 10 years from 2008(Fig:5). It shows prominent deposition pattern along the high tide zone of the coast. They are permanent and with lush vegetation. The growth of vegetation is promoted well along the coast no doubt but the elongated water bodies and dunes have been vanished. The dunes are partially occupied by built up area or by plantation. The selected tract is now a well-developed build-up area with roads and network. The LULC map prepared from the 2022 image (Fig:6) is also showing similar pattern of deposition in nearshore area. The deposition seems to be more prominent and they are visible during low tide in the region. The pattern of growth is from west to east of the coastline. So, the Talsari area is experiencing more deposition than Udaypur. The western section of Talsari is growing gradually into a profound land area in nearshore part. Certain portion is also occupied by mangrove growth. As they are very



land use and landcover map of 2019 (Talsari to Udaypur) Fig:5



land use and landcover map of 2019 (Talsari to Udaypur) Fig:7

near to Subarnarekha River as well hence it may have the sediment supply for the growth of mangrove. Apart from the mangrove growth the entire part of the section has the growth of vegetation along the Coastal tact. The marked enclosed area from the coastline (towards sea(500m) and towards land 1500m) is that area which has changed drastically. Some of the landcover is not visible at all in the recent LULC map which have been quite prominent in previous years for a larger area. Certain landcover has grown over the periods. The land use is no doubt has changed a lot over the periods. Built up areas are more prominent than any other land uses in all the maps prepared.

Conclusion

LULC is not just a map, it says many things about the spatial change. So, it does for the selected part of the land under investigation. The present piece of coastal land changed a lot over the periods. It is 90 years period of investigation (1932 to 2022), when the change has been noticed in space through LULC. The growth of built-up area was inevitable as the area is a place of tourist attraction. Though some of the changes have been beyond the expected level of change like the Dunes. Talsari has changed more than Udaypur. Talsari the land of Tal(palm) or Vegetation and red crab is under huge deposition and modifications. It may influence the natural habitat of many flora and fauna communities of the coast. The increasing rate of deposition is also quite alarming in the near shore area. It may be because of human encroachment to the shoreline which has restricted the growth of dunes and deposition towards the land area. It also may be due to slope bunding with boulders and protection wall. It may have restrict the natural process of coastal geomorphic processes. Although the growth of mangrove is all above the most positive sign of the change in LULC.

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