

Urban Sprawl and Land Use Change Analysis Using Geospatial Technique

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Abstract- *The Bhubaneswar great town of Orissa has experienced a quick of a town expansion over the past 2 decades because of, in relation to increased in rate of money and goods growth. This paper reports an observations into the application of the joined as complete unit of far away, widely different sensing and geographic knowledge systems (GIS) for sensing of a town growth and valuing its force of meeting blow on top temperature in the field, range. Far away, widely different sensing techniques were used to do land use/cover change discovery by using multitemporal Landsat ideas, lines connection mapper facts. Of a town growth designs were broken down by using GIS-based making copies to scale view. The joined as complete unit of far away, widely different sensing and GIS was further sent in name for to look at the force of meeting blow of a town growth on top temperatures. The results let be seen an interesting/noted and uneven of a town growth in the work-place part.*

Keywords- Urban sprawl, Land use, Bhubaneswar

I. INTRODUCTION

Topography, plants, weather, condition, water table, and even the coming from human acts activities all are acted-on by of a town's growth through different apparatuses. With the increase of group day by day it becomes necessary to lease up the right of a town idea to arrive to an ability to keep going conditions of without change, unmoving of a character. Quick growth of the process of building up land in company with poor idea and uncontrolled to do with industry activities causes unclean, diseased things on top as well as land-water. In of a town geomorphology man act as a physical process to change the natural land to cityscape of a town geomorphology is the top part of town geology and forms the important subfield of conditions of geology. Thither is a need to acquire through knowledge the force full effect on one another between the different views of a town expansion as an elaboration of the built-up part, building activities over natural features which have amusement and destruction of aquifers, and the special geomorphic features of the of a town character. The sprawl normally takes place in radial direction around the city centre or in linear direction along the highways. Usually sprawl takes place on the urban fringe, at

the edge of an urban area or along the highways. The study on urban sprawl (The Regionalist, 1997; Sierra Club, 1998) is attempted in the developed countries (Batty et al., 1999; Torrens and Alberti, 2000; Barnes et al., 2001, Hurd et al., 2001; Epstein et al., 2002) and recently in developing countries such as China (Yeh and Li, 2001; Cheng and Masser, 2003) and India (Jothimani, 1997; Lata et al., 2001; Sudhira et al., 2003). These changes lastly acts on the rate of geomorphic process such as weathering and rubbing away process of building up land is a grouping process having related to physical growth of a town area which outcome in group growth increases of the built-up part, a high measure of space between parts of the group and also the physiological stage of a town way of living. Statistical techniques along with remote sensing and GIS have been used in many urban sprawl studies (Lo, 2001; Lo and Yang, 2002; Weng, 2001; Cheng and Masser, 2003; Sudhira et al., 2004; Chabaeva et al., 2004; Jat et al., 2006). Far away, widely different sensing and GIS system is a most important apparatus for making or put right things using it, we can easily make out and old flat warship the of a town expansion within a great town or across the great town.

II. STUDY AREA

Bhubaneswar also named Bhubaneshwar is the by death of the Indian state of Odisha. India is located in Indian country in the great town place group with the GPS orders of 20 17' 45.8124" N and 85 49' 28.3404" E. Bhubaneshwar. Odisha India getting-higher is 46 meter high levels that are equal to 151 feet. It is the largest great town in Odisha and is middle of money and goods and with a strong feeling of religion's importance in Eastern India. Bhubaneswar gave another in place of Cuttack as the by death on 19 August 1949, 2 years after India made its self direction from Britain. The of-the-day great town was planned by the German buildings designer Otto Konigsberger in 1946. Along with Jamshedpur and Chandigarh it was one of-the-day India's first made system design great towns. Bhubaneswar and Cuttack are often having relation to as the '1 of 2 cities of odisha' The of a chief town part formed by the 2 cities had a group of 1.7 million in 2011. Bhubaneswar is categorized as a great town. A coming-to-be-important knowledge, technology (it) and

education middle part (of wheel), Bhubaneswar is one of the country's fastest-developing great towns.

1. HISTORY

The basis of the modern Bhubaneswar city was laid in 1948, although the areas in and around the city have a history extending back to 1st century BCE or earlier. Dhauli, near Bhubaneswar is the website of the Kalinga War (262-261 BCE), in which the Mauryan emperor Ashoka invaded and annexed Kalinga. -261 BCE), in which the Mauryan emperor Ashoka invaded and annexed Kalinga. One of the most complete edicts of the Mauryan Emperor, Ashoka, dating from between 272–236 BCE, remains carved in rock 8 kilometers (5.0 mi) to the southwest of the modern city. After the decline of the Mauryan empire, the area came under the rule of Mahameghavahana dynasty, whose most well-known role is Kharavela. His Hathigumpha inscription is located in the Udayagiri and Khandagiri Caves near Bhubaneswar. The area was subsequently ruled by several dynasties, including Satavahanas, Guptas, materials, and Shailobhavas.

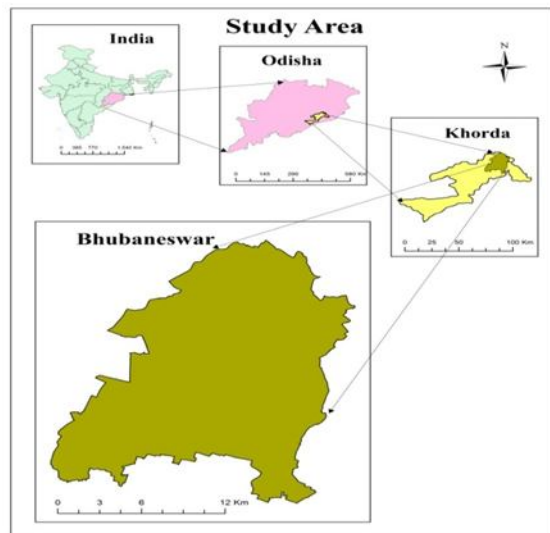


Figure 1.

2. PHYSIOGRAPHY-

On the basis of homogeneity, continuity and physiological characteristics, Odisha has been divided into five major morphological regions:

- 1) The Odisha Coastal Plain in the east
- 2) The Middle Mountainous and Highlands Region
- 3) The Central plateaus
- 4) The western rolling uplands
- 5) The major flood plains.

3. CLIMATE –

Bhubaneswar has a tropical savanna climate, designated Aw under the Köppen climate classification. The annual mean temperature is 27.4 °C (81.3 °F); monthly mean temperatures are 22–32 °C (72–90 °F). Summers (March to June) are hot and humid, with temperatures in the low 30s C; during dry spells, maximum temperatures often exceed 40 °C (104 °F) in May and June. Winter lasts for only about ten weeks, with seasonal lows dipping to 15–18 °C (59–64 °F) in December and January. May is the hottest month, when daily temperatures range from 32–42 °C (90–108 °F). January, the coldest month, has temperatures varying from 15–28 °C (59–82 °F). The highest recorded temperature is 45 °C (113.0 °F), and the lowest is 12 °C (54 °F).

Rains brought by the Bay of Bengal branch of the south west summer monsoon lash Bhubaneswar between June and September, supplying it with most of its annual rainfall of 1,542 mm (61 in). The highest monthly rainfall total, 330 mm (13 in), occurs in August.

4. ECONOMIC STRUCTURE-

Bhubaneswar is an administrative, information technology, education and tourism city. Bhubaneswar was ranked as the best place to do business in India by the World Bank in 2014. Bhubaneswar has emerged as one of the fastest-growing, important trading and commercial hub in the state and eastern India. Tourism is a major industry, drawing some 1.5 million tourists in 2011. Bhubaneswar was designed to be a largely residential city with outlying industrial areas. The economy had few major players until the 1990s and was overlooked by retail and small-scale manufacturing. With the economic liberalization policy adopted by the Government of India in the 1990s, Bhubaneswar received investment in telecommunications, information technology (IT) and higher education.

5. Population Resource

According to the 2011 statistics of India, Bhubaneswar had a population of 837,737. Talking about population, in order to check out the population of Bhubaneswar in 2017, we need to have a look at the population of the past 5 years. They are as per the following:

2012	– 843,202
2013	– 858,009
2014	– 879,211
2015	– 891,624
2016	– 905,339

Taking a look at the population of Bhubaneswar from the year 2012-16, it has been noticed that there has been an increase of 62,137 in the past 5 years. Therefore, it has been seen that every year the population increases by 12,427. Hence, the population of Bhubaneswar in 2017 is forecasted to be $905,339 + 12,427 = 917,766$. So, the population of Bhubaneswar in the year 2017 as per estimated data = 917,766.

III. RESULT & DISCUSSION

1. Digitization of Urban Sprawl-

ArcGIS 10.1 software used for digitization for urban sprawl. Total, 11 years selected for analysis for urban sprawl of Bhubaneswar.

Following map is showing the urban sprawl of Bhubaneswar city. (1930 to2005)

The growth group and quick process of building up land causes great changes in the center of the capital town and the hard question of the expansion of the great town inside middle is complex by the fact that, it must take place inside the built-up part which is not possible. Hence the forces to execute about the unbroken stretch growing great town inside middle gradually change the all round, nearby general condition and parts of township. Altogether over the place in comfort generally says something roughly to some sort of development with blows such as loss of farming land, open quad, and ecologically sensitive habitats. In simpler language, as the group increases in a part or a great town undergoes growth to afford place for the development; this expansion is carried into account as all over the place in comfort. Commonly sprawls take place on the of a town edge, short front hair, at the edge of an on a town part or on the highways. The coming after the maps are viewing the of a town all over the blank space in comfort from 1930-2005. (Figure 2, 3, 4, 5, 6, 7, 8, 9,10)

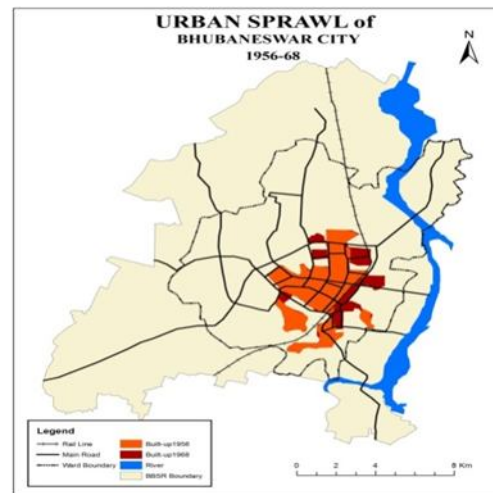


Figure 2.

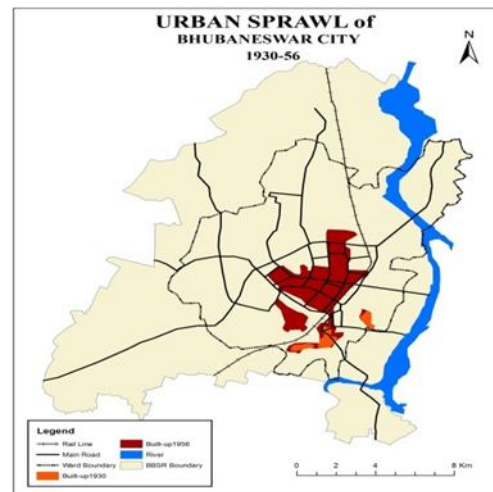


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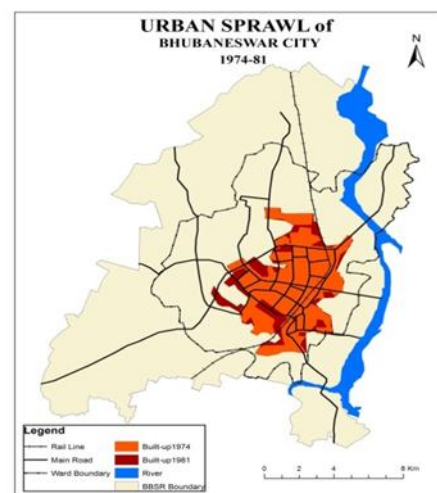


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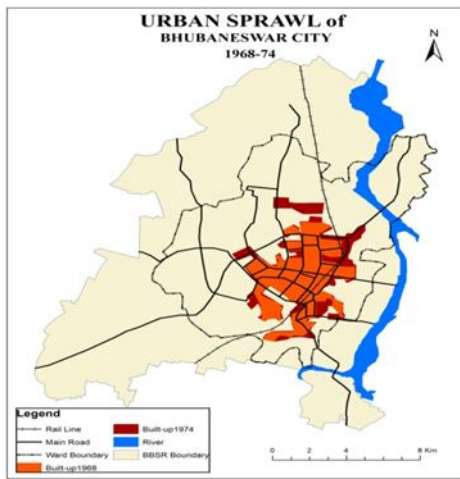


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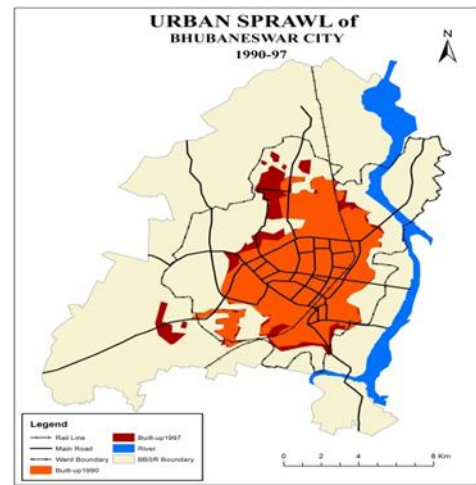


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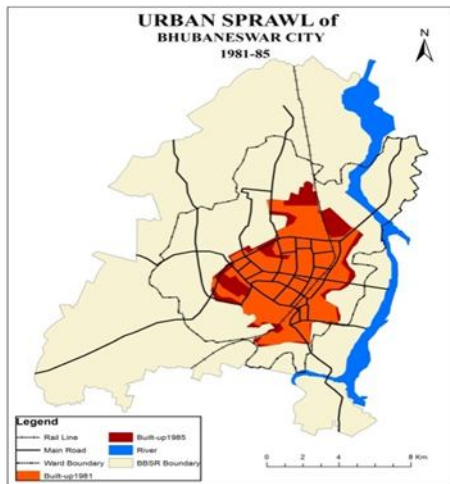


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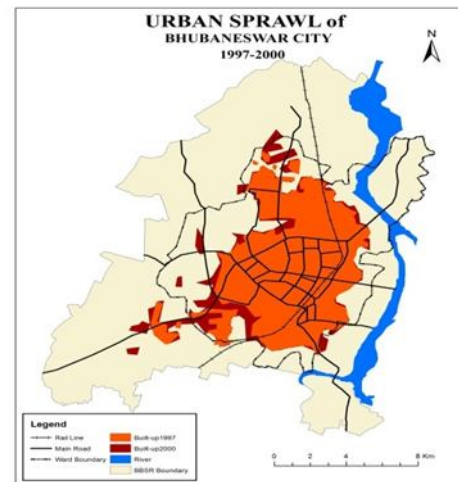


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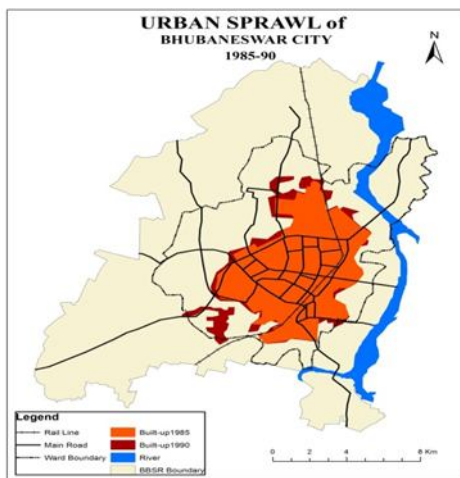


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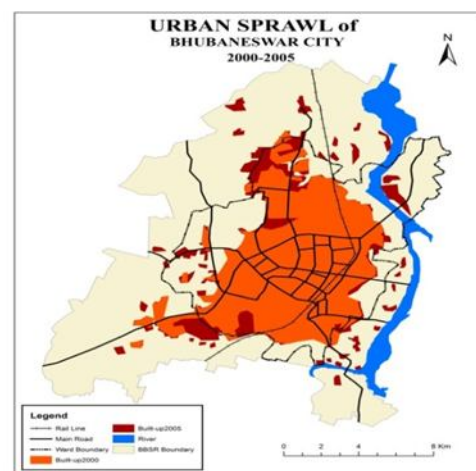


Figure 10.

2. Land Use/Land Cover Map –

Land Use/ Land Cover map showing man-made as well as a natural feature of Bhubaneswar. For this city here

used 3 year visa. 1990, 2000 and 2011 which shows the temporal changes of feature, for Bhubaneswar city prepared 6 feature classes these are Agriculture Land, Forest, Mixed Settlement, Urban Settlement, Water body, Scrub Land. Following table showing year wise area of the feature class.

Table 1.

Features	Area Sq km	Area Sq km	Area Sq km
	1990	2000	2011
Agriculture Land	145.13	139.66	132.25
Forest	43.32	33.79	26.66
Mixed Settlement	15.68	16.53	11.16
Urban Settlement	51.81	66.67	113.64
Water body	17.17	16.35	16.42
Scrub Land	56.64	56.76	29.62

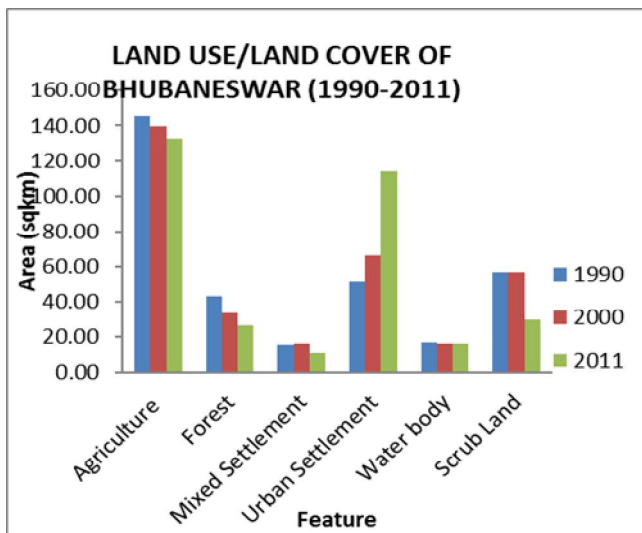


Figure 11.

This bar graph shows the year wise area of different feature. Total agriculture area was 145.13 sq.km in the year 1990. This is decrease 6 sq.km in the year 2000 and compared to 2011 it decrease 13 sq.km. The Urban settlement was 51.81 sq.km. in the year 1990 which is increase 14.86 sq.km in the year of 2000 and compare to 2011 settlement is increased 46.97 sq.km.

Following map showing the Urban Land Use/Land Cover-

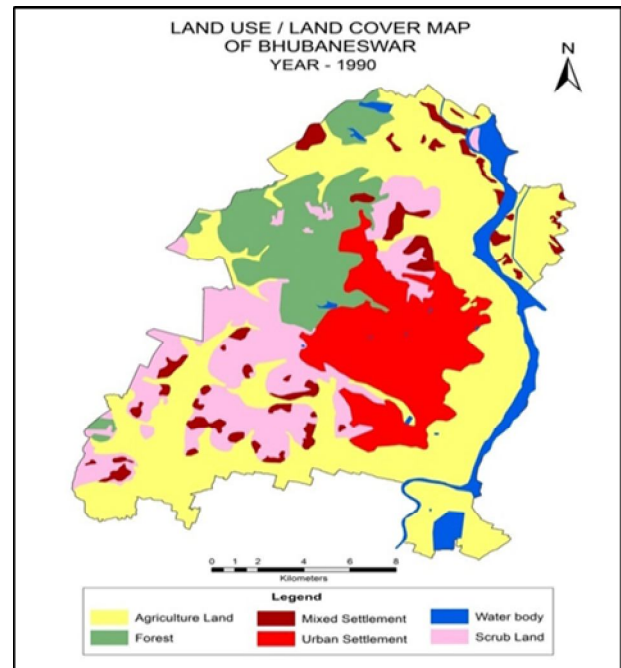


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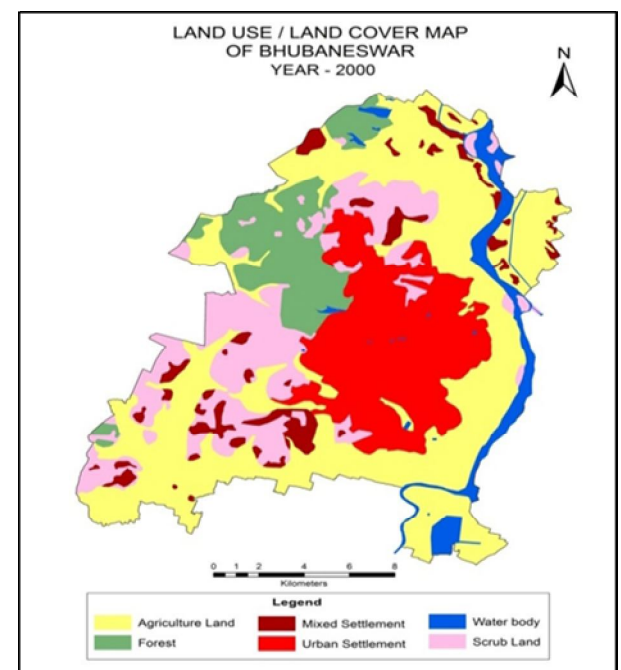


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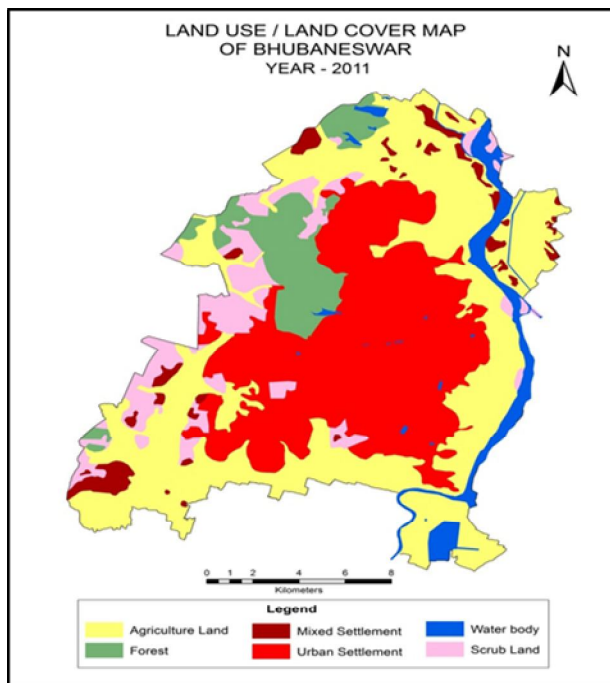


Figure 14.

ANALYSIS OF DATA:

Of a town all over the blank space in comfort says something about to the partial expansion of a town strong amount beyond what they have been. Of a town all over the blank space in comfort can be of three types-continuous, ribbons or check wide shot. The above table explains the partial development of large towns in different time times. The coming after observations are built from the above trend. During 1930-1956 the building of great town was started and during 1930-56 many of a town facilities were on condition that apart from greatly sized scale building of private houses quarters, so that the group growth is four times less the of a town part growth. Thither is a Total being a way of statement in law of areas for a number of a town activities such as to do with industry, governance and so along. Which were not envisaged. During 1956-68 the group growth rate is four times the part growth, as during this stage in time employees of different, departments came to live in of private houses quarters, building for the government employees. During 1968-74 the group growth and with a town part growth are in relation. During 1974-81 the group growth rate has made 2 times made a comparison to of a town part growth. From 1981 forwards even though the group growth is in relation to of a town part growth. The areal growth is constantly increasing, whereas the group growth is always decreasing. The growth during 1885-1990 is more in outer periphery part i.e. 7.5 kilometer to 10.5 kms. From 1997-2005 showed very great move higher with the built up from forming part, plants and open places. The capital town has its middle of the center voice, heart fields. Though, the great town as first started

becoming in rectangular form of a network iron good example from the privileged, now it is growing mostly in the direction of north, northwest and south-west direction along the main transport mode.

LAND USE/ LAND COVER CHANGE:

Bhubaneswar today, is one of the tightly growing cities in India, the land usage of the big town over a stage in time from 1998-2005 showed very great gets up in the built-up-form from forming part, plants and free nation. The large town today has its middle of the center voice, heart fields. Though, the great town as first started becoming in rectangular form of a network iron good example out-wise from the inner. Today it is growing mostly in the direction of north, northwest and south-west direction along the main transport sends. The route structure of the great town has not had to do with to support the changing good example in the big town and the support its group events. At that place was enough farming and plants, land in outside the of a town character. At this stage in time to time to do with industry and of private house areas were chiefly undergoing growth. The land use/land cover maps were getting ready for the year 2000 and 2005. These 2 maps were then overlaid to identify the land use/land cover change from year 2000-2005. (Say something about table) the measure of land usage change from farming and Forest of other land uses were found

IV. CONCLUSION

This study amply demonstrates the role of Remote sensing and GIS to study the urban sprawl mapping and detect changes of urban land use/ land cover through different year. Satellite data are found to be useful in mapping and quantifying the extent of urban area in different time periods. New urban, regional development growing largely towards north, north-west and south-westward direction along the primary transport route of the metropolis. New urban development takes place mainly on vegetation and farming country.

The above study provides a methodology for better estimation of urban growth and population using various land uses with time. Geographical information system (GIS) and satellite images have been utilized in this field to provide spatial inputs and test the statistical model describing growth. The model originated in this work can be used for predicting the future land uses even when not much of old land use data are usable. This is utilitarian for the urban planning agencies in developing rural areas where land use information is not available regularly. GIS and Remote

sensing can help a lot in monitoring urban sprawl compared to conventional techniques.

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