
LAND USE/LAND COVER CHANGE ANALYSIS, CENTRAL TAMIL NADU COAST

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ABSTRACT:

Land is major source of the human being and also the pressure of the population and increasing variety of demand on land resources exert pressure and strain on the available resources. The present study area part of the central Tamil Nadu coast, between Vedaraniyam and Adirampattenam carried Various land use characters and land forms with several years for the study of land use and land cover analysis. The Remote sensing techniques used for the present land use and land cover change study

Keyword: Land use and Land cover, change detection, coastal Land use, Remote sensing and GIS

INTRODUCTION

Land is the chief source of the sustainable of mankind, and supports the plants and animals providing food, fiber and shelter. The growing pressure of population and increasing variety of demand on land resources exert extra pressure and strain on the available resources. Raghavan (2000), studied spatial distribution of land use and land cover pattern of coastal and hinterland and karwar west coast of India, The included various parameters of Buildup land, crop land, forest, Sandy area and river system and Mulder(1979), studied integrated water resources and land use planning of the study area. Therefore, it is necessary to understand the present or existing use of land for its optimum use. Land use refers to “mans activities and various uses which are carried on land” Land cover refers to “natural vegetation, water bodies, rock/soil, artificial covers and others are resulting due to land transformation. The terms land use and land covers are closely related and interchangeable. Gnappagasam (2002) have carried the work of coastal geomorphology of the study area.

Study area

Vedaraniyam, Kodyakari and Adirampattinam, many land use patterns are recognized. The land cover is also occupied by backwater and coastal wetland. There is no systematic account on the

land use pattern of the study area, and at the same time, the area is subjected to changes owing to various activities both natural and manmade.

In view of these factors, an attempt had been made to recognize land use pattern of the area using Survey of India Toposheets of 1974 (Fig) and IRS 1C understanding of land use pattern changes from 1974-1997.

Objectives

To study land use and land cover characteristic of the palkstrait coast through various approaches.

To prepare baseline information, maps with theme layers 1970, 1997 and 1998, in different seasons.

To integrated all the land use and land cover of the study, find the change variation of coastal land, with socio-economic status with the study area.

Data Base and Methodology

In the present study, land use map had been produced for which the following data are used (1) Primary data collected from field studies during 2000-2001 (2) Survey of India Toposheets of 1974 in the scale of 1:50,000 (3) IRS 1C LISS III FCC on 1: 50,000 of 1997 and Auto CAD with Arc View GIS software are used. Based on the recognition elements shape, size, tone, texture, pattern, site and association, the imageries were interpreted for the recognition of land use types. The images recognition days are given in the table with this background information, six major land use/land cover categories were recognized as outlined in the Table. These classes are divided into sub classes. This was followed by detailed field mapping of the area in the scale of 1:25,000. These interpretations are transferred to the base map prepared from Survey of India Toposheet (1974) of 1:50,000. From the Survey of India Toposheets of 1974, land use information has been extracted. The areas falling each category were calculated using digital Planimeter. These land use/land cover map had been prepared, using Survey of India Toposheet of (1974) and IRS 1CLISS III images of 1997. The maps thus produced of 1:50,000 scaled had been reduced photographically using AUTOCAD with Arc View GIS software of required photographically using 1(SOI) and Fig (Images). The data on each category at two periods (1974&1997) have been analyzed pictorially and statistically to unravel the pattern and caused of changes.

Result and discussion:**Land use Types (1974 & 1997)**

In 1999, Ramkumar studied in changing land use/ land cover pattern of Gateman sector in guava delta. By the through field investigation with analysis, to delineated the changes variation of the Godavari. Six land use type are recognized for the year 1974 using Survey of India Toposheet and for the year 1997 using IRS 1C LISS III satellite imagery. These are (1) Build-up land (2) Agriculture land (3) Forest land (4) Waste land (5) Water bodies land and (6) Other land use. The land use pattern changes between 1974 and 1997 are analyzed. There are described below;

Table 1. Land use Type (Survey of India Toposheet 1974.)

S.No	Land use types	Area in sq.km	% of area
1.	Build-up land	15.96	2.35
2.	Agriculture land	75.00	22.03
3.	Forest land	161.50	23.76
4.	Waste land	164.27	24.16
5.	Water bodies	102.80	15.14
6.	Other land use	160.27	23.56

Table 2. Land use IRS 1C LISS III 1997

S.No	Land use types	Area in sq.km	% of area
1.	Build-up land	19.9	2.92
2.	Agriculture land	114.36	16.82
3.	Forest land	81.45	11.98
4.	Waste land	313.39	46.09
5.	Water bodies	34.32	5.05
6.	Other land use	116.58	17.14

Source: Compiled by author

Build-up land

Build-up land refers to all types of settlement both urban and rural. These are clearly recognized in the toposheet and satellite imagery and accordingly the maps for the respective years are prepared. In the year 1974, its aerial extent is 15.965 sq.km and 1997 its aerial extent increased to 19.9 sq.km. The increase may be 0.57 percent in its total aerial extent. This may attribute towards population increase and urbanization. This refers to urbanization of three places Vedaranniyam, Muthupettai and Adirampattinam. These are places known for dominant population with settlement. It is also evidence from the of Census of India 1991. The census data are published only

up to 1991. The dates in terms of person's decade variation and decade variation in percentage up to 1991, is given in the Table. From the table it follows, this area is upgraded from the Panchayats status to Town Panchayats status in the year 1991 on account of increase in population. With regard to Adirampattinam, increase in population through, 1971, 1981, and 1991. Is 4823, 3047 and 5466 respectively.

There is a general trend towards increasing population. Similarly in the Muthupet area, there is an increase in population through decades. These are represented in the table. It holds well with regard to Vedaranniyam also. In addition, in the Kodyakkarai area, Games Sanctuary and Tourist centre were developed during the last decade. All these factors clearly indicate an increase in the settlement and population. This had resulted in the increase of build up land as shown by the land use map of 1974-and 1997. The increasing population is also due to salt-based industries in this area. The increase of build up land is only 0.5.7 percent from 1974-1997. However, the increasing build up land is not considerable as compared to population increase and other activities.

Agricultural land:

The Agricultural land includes crop, plantation and fallow land. Krishnamoorthy was studied in 1993, have mapped the coastal land use in Tamil Nadu as which they identified better site for coastal agriculture. They have also stated that the soil of the parts have salinity and alkalinity problems. There is a substantial area of Agricultural land -75 sqkm to 114.36 sq.km. By this, the increase in area in term of percentage is from 11.04 to 16.82. This has recorded 5.78 percent increase in agricultural land. The increase may be activated towards (1) demands owing to population increase, (2) increase irrigation facilities extended by the government. It is observed tank and canal irrigation had been increased in the northern side resulting in the increasing land. Further the main occupation of local population is agriculture. There are only two-rainfall stations in the study area, the rainfall data recorded from 1996 to 2000 are table given it is observed that the mean annual rainfall 5 years from 1996-2000 at the station, thiruthiraipondi and Adirampattinam are 1333 mm and 1315 mm respectively, even though 1997 is drought year for Adirampattinam (625.2mm). Overall rainfall is adequate and therefore agricultural land area had increased through time. It is to be noted that the agricultural activities is not has profitable like other activities and, inspire, the agricultural land area had increased. In this aquaculture is also included. In Adirampattinam and Kodyakkarai on the eastern side, aquaculture is popular in the recent years as it facilities good craning and export activities. Incidentally, aquaculture acts as a buffer zone between marine activities and the land. This in way protect marine erosion along the coastland reduce the aerial extent of wasteland.

Forest land

Shailsh Nayak(1994), carried ecosystem of mangroves forest and given the suggestion of conservation of the forest genetic resources and. In the study, forestland represents an important land cover. Groom (1996), have explained the techniques of improving land cover mapping of mangrove resource and used Remotely sensed data. In the year 1974, its aerial extent is 161.50 sq. km, forming 23.76 percent of the study area. Through a period of years (1974-97), there was a drastic loss of forest cover as evidenced form IRS IC LISS III Imagery (Fig no). The forest area was reduced from 161 . 50 [1974] to 81. 45 sq. km in the year 1997. About 80 sq. km of the forest area was lost and its aerial extent had been reducing from 23. 76 percent to 11. 98 percent. It records percentage change variation of 11.98 through this tine and there is a periodical deforestation. The two maps are compared and the following are inferred. On the eastern side forest area was converted to fallow Lands, in the northern side and western side also, the same had been observed. Thus the forest area was converted into agricultural activity, this being observed western side also. The reason for the conversion of forest land (open scrub) in the western side to fallow land is attributed towards low irrigation facilities as the canals were deprived of water continuously for many years. Moreover in the year 1997, the rainfall was also abnormally low due to monsoon failure. Along the northern margin the forest land in the form of open scrubs were converted to fallow lands and plantations and by this the Agricultural land areas are also increased Thus scrubs are converted into agricultural crop land and later changed to fallow land in view of low fertility of soil. Further in the scrub areas, plantation in the form of coconuts is practiced. In addition the forest areas are converted into waste land in the form of mudflats. In general deforestation was caused by built-up land, agricultural land, and waste land. On the eastern side it is the form of reserved forest and this was converted into fallow land. The forest land along the coast in the western side has not undergone any changes. Overall, the cause for deforestation was agricultural activity for the development of the area.

Wasteland

The wasteland refers to salt affected areas, waterlogged and marshy/swampy sandy areas. In the study area during 1974 its aerial extent, is 164.27 sqkm and relatively less (46.09 percent) during 1997. The waste land area had increased to more than three times and the aerial extent is 313.39 sq.km this may be primarily attributed to the dynamic nature of the sea along the coast. Further, the annual rainfall is appreciable and very much confined to the periods of N-E monsoon representing a short period of about three months; The monsoon rain provides easily 60 percent of annual rainfall, mostly in the form of cyclonic rainfall. On account of this factor, the coastal area is

waterlogged, swampy and marshy, and making the land as wasteland. The primary reason for the increase of wasteland area is the local rainfall. Moreover, the coastal area is having a low topography in the form of extensive plain ground, there are no mountains, hills and the surface is covered by the soil of fine sediments. The local geology in this way facilitates the developments of wasteland. There are number of salt producing activities and Aquaculture practices. These are being practiced and also discontinues leading to the development of salt affected wasteland, during high tide, many places seawater enters to the land making them as salt affected land. It is evidenced by small creeks, lagoons and backwaters along the coast. It is inferred that the wasteland areas may increase in the coming years. If no preventive measure is taken to arrest effect of heavy rainfall or severe rainfall and tidal action. wastelands will increase. Moreover there is no participation from the local inhabitants and Govt on account economic constrains.

Water bodies

It refers to river systems, lakes, tanks and canals. In the study area rivers, canal and lakes are present. These are great decrease from 102.80 sq.km to 34.32 sq.km from 1974-97 indicating negative change in the Water bodies resources. It is also to e noted that 1997 has recorded severe drought and the rainfall is only around 45 percent of the normal rainfall. It may be also responsible for lesser area of Water bodies in the IRS 1CLISS III imagery taken during the year 1997. It is also observed that some lakes were converted in to energy plant and aquaculture activities. This commonly observed during the field visit and it is increasing every year, Overall area is not affected by severe water shortage.

Table Land/Land covers change variation 1974-1997

S.No	Land use Types	1974	% of area	1997	% of area	% change variation
1	Built up land	15.96	2.35%	19.9	2.92%	.57%
2	Agriculture land	75.00	11.03%	114.36	16.82%	5.79%
3	Forest land	161.50	23.76%	81.45	11.98%	11.78%
4	Water bodies	164.27	24.16%	313.39	46.09%	21.93%
5	Waste land	102.80	15.14%	34.32	5.05%	10.09%
6	Other land use	160.27	23.56%	116.58	17.14%	06.42%

Other land use

It includes mangrove, salt pans, coastal wetland, and inland wetland. The area some salt pan is increasing, and mangrove are gradually decreasing inland wetland are converted for fish breeding and prawn culture, thereby reducing areas of other land use.

Conclusion

The land use pattern of the study area is interesting because of all the major land use types are observed within a narrow stretch of coastal area. It is interesting to note that the use pattern is diverse and complex. There is spread of water represented by water bodies, marine erosion, forest, agriculture land, backwaters and marshy land. A positive correlation is observed with reference to built up land, agriculture land, indicating the general growth and prosperity of the area. With regards to waste land there is an increase to the tune of 34.61 percent indicating poor management and non-observation of preventive measures on the part of the people and Govt. This may be attributed towards poor literacy rate and economic conditions. It is imperative for the local people to acquire, aesthetic outlook and improved living condition. The negative correlation observed is with regard to forestland cover, Water bodies and other land use pattern, Deforestation in the form of development of fallow land, waste land and buildup land. This

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