'LAND USE AND LAND COVER CHANGES DUE TO ANTHROPOGENIC ACTIVITY ALONG COASTAL STRETCH OF KANCHIPURAM DISTRICT, TAMILNADU'

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ABSTRACT

The land use/land cover pattern of a region is an outcome of both natural and socio-economic factors and their utilization by man in time and space. Land is becoming a scarce commodity due to immense agricultural and demographic pressure. The field of Geoinformatics plays an important role in generating information about the latest land use-land cover pattern in an area and its temporal changes through times. The main objective of the present research paper is to study the land use and land cover change occurred due to the anthropogenic activities. Landsat MSS – 1980, Landsat TM – 1991, Landsat TM – 2000 imageries download from GLCF website and IRS 1D LISS – III -2009 data obtained from NRSC, Hydrabad, India. The collected data is analyzed with the help of Erdas Imagine 9.1 and Arc GIS 9.3 software's. The study reveals that the land use changes were determined the main changes were identified in the buildup land has been increased because of the exponential population growth in taken place. The agricultural land and barren land has been rapidly decreased, its shows that the urbanization activities are made in the study area.

Key words:. *Land Use, Land Cover, Anthropogenic, Geoinformatics, GIS, Remote Sensing, Spatial Data, Non-Spatial Data, Landsat, GLCF,*

1.0 INTRODUCTION:

The land use/land cover pattern of a region is an outcome of both natural and socio-economic factors and their utilization by man in time and space. Land is becoming a scarce commodity due to immense agricultural and demographic pressure. Hence, information on land use/land cover and possibilities for their optimal use is essential for the selection, planning and implementation of land uses schemes to meet the increasing demands for basic human needs and welfare.

Remote sensing plays an important role in generating information about the latest land use-land cover pattern in an area and its temporal changes through times. The information being in digital form can be brought under Geographical Information System (GIS) to provide a suitable platform for data analysis, update and retrieval.

2.0 THE STUDY REGION:

For the present research paper, 10 Km buffer along the continental part of the Kanchipuram district's coastline (Tamil Nadu, India), is selected as a study region. It is located between 79^0 57' 27.02" to 80^0 12' 1.518" north latitudes and 12^0 15' 19.72" to 12^0 58' 21.739" east longitudes. Villages, which fall fully within the buffer zone, have selected as study area. There are 172 villages comes in the 10 Km buffer zone, in that 28 lies in Tambaram taluk, 56 lies in Chengalpattu taluk and 88 lies in Maduranthagam taluk. Over this long time, Saidapet taluk have bifurcated as Tambaram and

Maduranthagam have bifurcated as Thirukazhukundram and Cheyyur in study area, to make the common boundary of taluk in all years.

3.0 OBJECTIVES:

- The main objective of the present research paper is to study the land use and land cover change occurred due to the anthropogenic activities in the study region.

4.0 METHOD AND MATERIALS:

Landsat MSS – 1980, Landsat TM – 1991, Landsat TM – 2000 imageries download from GLCF website and IRS 1D LISS – III -2009 data obtained from NRSC, Hydrabad, India. It should be mentioned that the issuer has already corrected the satellite data atmospherically, radiometrically and geometrically. Land use/land cover classification scheme suggested by National Remote Sensing Agency Hyderabad (NRSA 1989) was adopted for land use/land cover mapping. Twelve land use/land cover categories identified and mapped based on supervised method using Erdas Imagine 9.1 software, the same software used to find out the changes in land use / land cover in study area.

Village boundary map obtain from Census of India and geo-referenced by using Arc GIS 9.3 software and vector layer creation and thematic map preparation have done in the same, to manipulate population data SPSS 17 have used. Fig: 1 shows details methodology adopted for the research.

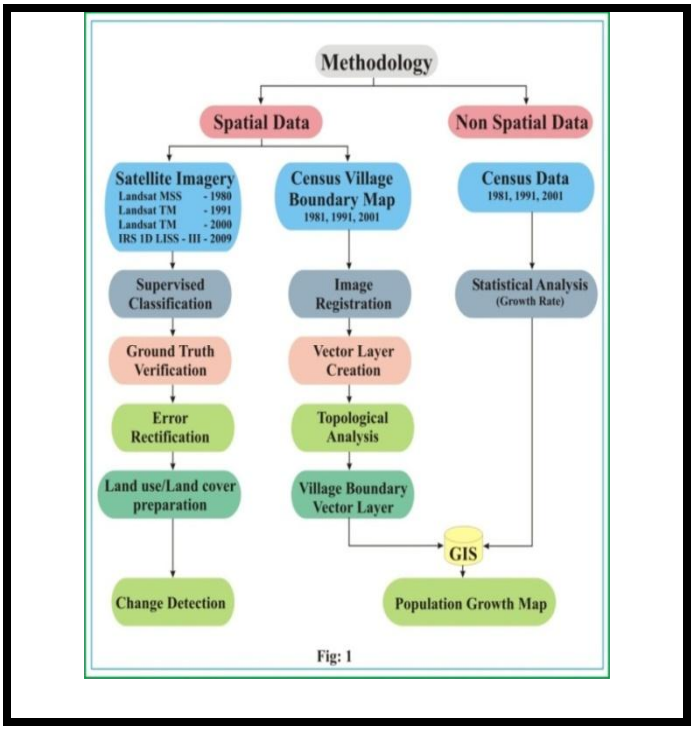
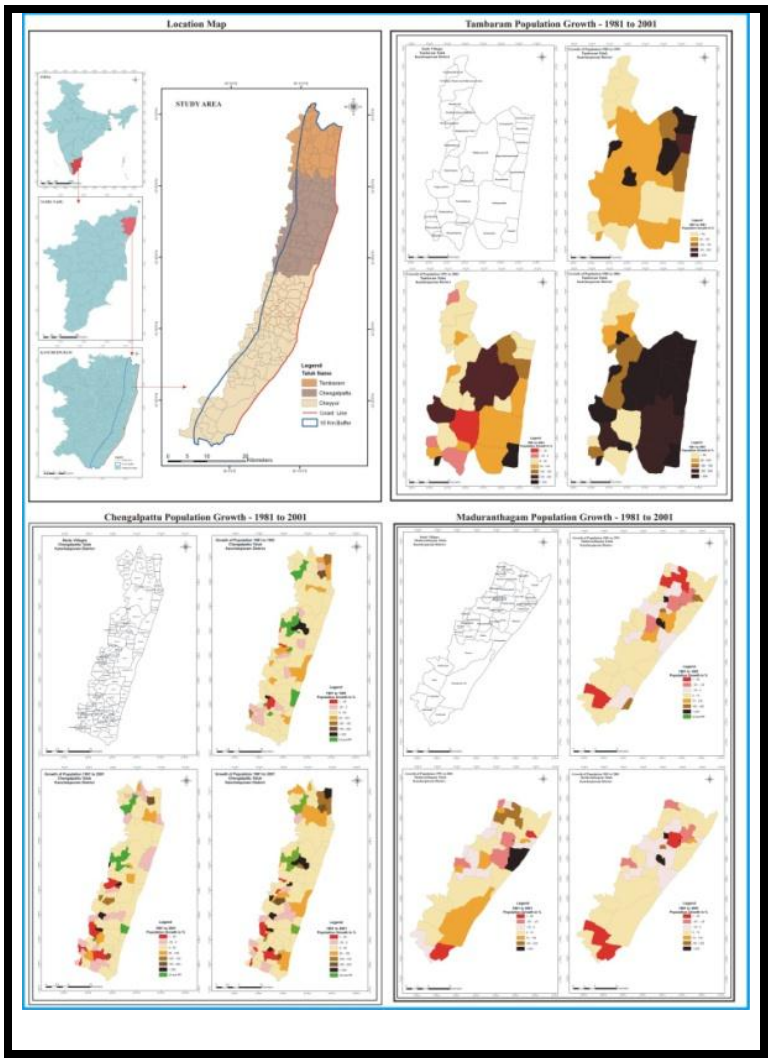
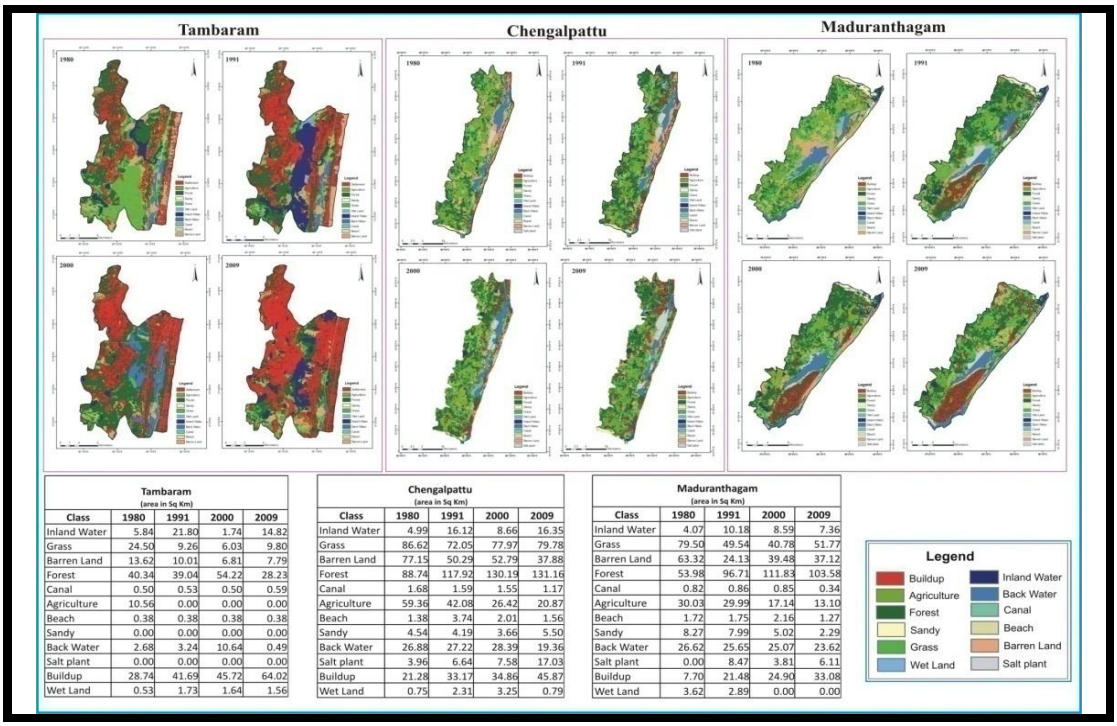


Fig: 1

5.0 RESULTS AND DISCUSSION

The land cover (LC) is defined as the observed physical layer including natural and planted vegetation and human constructions, which cover the surface of the Earth. In this inventory, water bodies, barren land, or sand surfaces are also listed. Land cover classification is a tool that provides significant information for natural resource managers, decision makers, and stakeholders. It serves to categorize natural ecosystems, managed crops, and urban areas. As a general form, land cover classifications provide the fundamental information to appraise the impact of human interactions within the environment and to assess scientific foundations for sustainability, vulnerability, and resilience of land systems and their use (Han et al. 2004).





Tambaram (area in Sq Km)

Class	1980	1991	2000	2009
Inland Water	5.84	21.80	1.74	14.82
Grass	24.50	9.26	6.03	9.80
Barren Land	13.62	10.01	6.81	7.79
Forest	40.34	39.04	54.22	28.23
Canal	0.50	0.53	0.50	0.59
Agriculture	10.56	0.00	0.00	0.00
Beach	0.38	0.38	0.38	0.38
Sandy	0.00	0.00	0.00	0.00
Back Water	2.68	3.24	10.64	0.49
Salt plant	0.00	0.00	0.00	0.00
Buildup	28.74	41.69	45.72	64.02
Wet Land	0.53	1.73	1.64	1.56

Chengalpattu (area in Sq Km)

Class	1980	1991	2000	2009
Inland Water	4.99	16.12	8.66	16.35
Grass	86.62	72.05	77.97	79.78
Barren Land	77.15	50.29	52.79	37.88
Forest	88.74	117.92	130.19	131.16
Canal	1.68	1.59	1.55	1.17
Agriculture	59.36	42.08	26.42	20.87
Beach	1.38	3.74	2.01	1.56
Sandy	4.54	4.19	3.66	5.50
Back Water	26.88	27.22	28.39	19.36
Salt plant	3.96	6.64	7.58	17.03
Buildup	21.28	33.17	34.86	45.87
Wet Land	0.75	2.31	3.25	0.79

Madurathagam (area in Sq Km)

Class	1980	1991	2000	2009
Inland Water	4.07	10.18	8.59	7.36
Grass	79.50	49.54	40.78	51.77
Barren Land	63.32	24.13	39.48	37.12
Forest	53.98	96.71	111.83	103.58
Canal	0.82	0.86	0.85	0.34
Agriculture	30.03	29.99	17.14	13.10
Beach	1.72	1.75	2.16	1.27
Sandy	8.27	7.99	5.02	2.29
Back Water	26.62	25.65	25.07	23.62
Salt plant	0.00	8.47	3.81	6.11
Buildup	7.70	21.48	24.90	33.08
Wet Land	3.62	2.89	0.00	0.00

Table-I Areal Changes of different land use/land cover features

	Tambaram (area in Sq Km)				Chengalpattu (area in Sq Km)				Maduranthagam (area in Sq Km)			
Class	**1980-91**	**1991-2000**	**2000-09**	**1981-09**	**1980-91**	**1991-2000**	**2000-09**	**1981-09**	**1980-91**	**1991-2000**	**2000-09**	**1981-09**
Inland Water	15.96	-20.06	13.08	8.98	11.13	-7.46	7.69	11.36	6.11	-1.58	-1.23	3.29
Grass	-15.23	-3.24	3.77	-14.70	-14.58	5.92	1.82	-6.84	-29.96	-8.76	10.99	-27.73
Barren Land	-3.61	-3.20	0.98	-5.83	-26.85	2.49	-14.90	-39.27	-39.19	15.35	-2.36	-26.19
Forest	-1.30	15.18	-25.99	-12.11	29.18	12.27	0.97	42.42	42.73	15.12	-8.25	49.60
Canal	0.03	-0.03	0.09	0.09	-0.09	-0.04	-0.38	-0.51	0.04	-0.01	-0.52	-0.48
Agriculture	-10.56	0.00	0.00	-10.56	-17.28	-15.66	-5.56	-38.49	-0.04	-12.85	-4.04	-16.93
Beach	0.00	0.00	0.00	0.00	2.37	-1.73	-0.45	0.18	0.03	0.42	-0.89	-0.45
Sandy	0.00	0.00	0.00	0.00	-0.35	-0.53	1.84	0.96	-0.28	-2.98	-2.73	-5.98
Back Water	0.56	7.40	-10.15	-2.19	0.34	1.18	-9.03	-7.52	-0.97	-0.57	-1.46	-3.00
Salt plant	0.00	0.00	0.00	0.00	2.68	0.94	9.45	13.07	8.47	-4.66	2.30	6.11
Buildup Land	12.95	4.03	18.30	35.28	11.89	1.69	11.01	24.59	13.78	3.42	8.18	25.38
Wet Land	1.20	-0.09	-0.08	1.03	1.56	0.94	-2.46	0.04	-0.73	-2.89	0.00	-3.62

Changes in land use and land cover are key factors for global environmental change (Bürgi 1999). Growing human population causes land scarcity and the conversion of wild lands to agriculture and other uses and, thus, land use/land cover change. Population growth can push the rural poor onto marginal lands. Other important determinants of changes in land use and land cover include several types of policy: human settlement and land tenure policy, fiscal policy, trade policy, and agricultural policy. In addition, changes in technology (e.g., road building), culture, power, and political/economic institutions can influence land use/land cover change (Reid et al. 2000).

Data obtained from the evaluation of remotely sensed data and image classification analysis were carried out according to Mathuranthagam, Chengalpattu and Tambaram taluks of the Kanchipuram District landcover classes. Land cover database which were classified according to the Kanchipuram in the years 1980, 1991, 2000 and 2009 satellite images are presented in Fig. 1. The classification of the map consisted of twelve classes in the respective years such as Inland water, Grass, Barren land, Forest, Canal, Agriculture, Beach, Sandy, Backwater, Saltpan, Buildup land and wetland. The result of the year 2009 classification is presented in Fig 2. Eleven classes instead of the twelve were determined following the classification in the year 2009 for the Mathuranthagam whereas on the other areas all twelve class are presents in the respective years. The twelfth class that is unavailable was the class of wetlands in Mathuranthagam. Classification of the area of interest derived from the analyses of the satellite images is presented in Table-I. Class counts, land use of every class, total area of every class, and percentages of every class in total area of research area for the years 1980, 1991, 2000 and 2009 were calculated. In addition, percent changes in the percentage of Kanchipuram District classes in the whole research area between 1980, 1991, 2000 and 2009 were calculated using the data from the satellite images. Because of the analyses for changes of percentages and proportions for every class of land use class is presented below:

5.1 CHANGES IN MATHURANTHAGAM:

(1980 TO 1991)

The following results were identified in the year 1980, the extend of the individuals were calculated in km^2: Inland water (4.07), Grass (79.50), Barren land (63.32), Forest (53.98), Canal (0.82), Agriculture (30.03), Beach (1.72), Sandy (8.27), Backwater (26.62), Buildup land (7.70) and wetland (3.62). During the year 1991, the extend of the individuals were calculated: Inland water (10.18), Grass (49.54), Barren land (24.13), Forest (96.71), Canal (0.86), Agriculture (29.99), Beach (1.75), Sandy (7.99), Backwater (25.65), Buildup land (21.48) and wetland (2.89). It is identified that there is a increasing trends towards inland water (6.11 km^2), and forest is about (42.73 km^2) and also a significant reduce of Grass land (29.96 km^2), Barren land (39.19 $km^{2)}$). There is new artificial feature was created in this area for the occupational purposes that is saltpan is about 8.47 km^2 which is created in the barren land near the backwater region.

(1991 to 2000):

In the year 2000, Inland water (8.59), Grass (40.78), Barren land (39.48), Forest (111.83), Canal (0.85), Agriculture (17.14), Beach (2.16), Sandy (5.02), Backwater (25.07), Saltpan (3.81 Buildup land (24.90). The changes for the taken place there is less changes have been made by this region the main changes is forest has increased about 15.12 and also barren land has been increased about 15.32 but the agricultural land was decreased about 12.85 sq. km this is due to increase of barren land resulted decrease the agricultural land.

(2000 to 2009):

During the year 2000, Inland water (7.36), Grass (51.77), Barren land (37.12), Forest (103.58), Canal (0.34), Agriculture (13.10), Beach (1.27), Sandy (2.29), Backwater (23.62), Saltpan (6.11) Buildup land (33.08). It is identified that there is an increasing trends toward the buildup lands. It is because of due to the population growth. The buildup lands are increasing and other features are decreasing trends.

5.2 CHANGES IN CHENGALPATTU:

1980 to 1991

The following results were identified in the year 1980, the extend of the individuals were calculated in km^2: Inland water (4.99), Grass (86.62), Barren land (77.15), Forest (88.74), Canal (1.68), Agriculture (59.36), Beach (1.38), Sandy (4.54), Backwater (26.88), Saltpan (3.96) Buildup land (21.28) and wetland (0.75). During the year 1991 the changes is Inland water (16.12), Grass (72.05), Barren land (50.79), Forest (117.92), Canal (1.59), Agriculture (42.08), Beach (3.74), Sandy (4.19), Backwater (27.22), Saltpan (6.64) Buildup land (33.17) and wetland (2.31). It is identified that there is a decreasing trends towards Barren land, agricultural; the grassland is decreased about five by increasing the inland water, forest areas has been increased by decreasing the barren land.

1991 to 2000

During the year 1991 the changes in Inland water (16.12), Grass (72.05), Barren land (50.79), Forest (117.92), Canal (1.59), Agriculture (42.08), Beach (3.74), Sandy (4.19), Backwater (27.22), Saltpan (6.64) Buildup land (33.17) and wetland (2.31). During the year 2000 the changes in inland water (8.66), Grass (77.97), Barren land (52.79), Forest (130.19), Canal (1.55), Agriculture (26.42), Beach (2.01), Sandy (3.66), Backwater (28.39), Saltpan (7.58) Buildup land (34.86) and wetland (3.25). It identified that where is reduction in the inland water (8.66 km^2) agricultural land (26.42 km^2) there is always increase of built-up lands.

2000 to 2009

During the year 2000 the area under Inland water (8.66), Grass (77.97), Barren land (52.79), Forest (130.19), Canal (1.55), Agriculture (26.42), Beach (2.01), Sandy (3.66), Backwater (28.39), Saltpan (7.58) Buildup land (34.86) and wetland (3.25). Inland water (16.35), Grass (79.78), Barren land (37.88), Forest (131.16), Canal (1.17), Agriculture (20.87), Beach (1.56), Sandy (5.50), Backwater (19.36), Saltpan (17.03) Buildup land (45.87) and wetland (0.79) was present during 2009. The inland water has been increased about eight sq. km and barren land is reduced about 14 $km^{2.}$ It is clearly shows the strong relationships between inland water and barren land. The agriculture land also reduced and it has become a residential area. There is back water has reduced about 10 km^2 and saltpan is increased about 10 km^2 its clearly shows the relationships between saltpan and Backwater.

5.3 CHANGES IN TAMBARAM:

1980 to 1991

During the year 1980 the land use were determined they are follows, Inland water (5.84), Grass (24.50), Barren land (13.62), Forest (40.34), Canal (0.50), Agriculture (10.56), Beach (0.38), Backwater (2.68), Salt pan (3.96) Buildup land (28.74) and wetland (0.53). During the year 1991 the changes is Inland water (21.80), Grass (9.26), Barren land (10.01), Forest (39.04), Canal (0.53), Agriculture (0), Beach (0.38), Backwater (3.24), Buildup land (41.69) and wetland (1.73). its shows that the inland water were increased by decreasing the grass land, The agricultural land fully vanished by increasing the settlement in the agriculture are its shows the urbanization activity are made in the study area.

1991 to 2000

During the year 1991 the changes is Inland water (21.80), Grass (9.26), Barren land (10.01), Forest (39.04), Canal (0.53), Agriculture (0), Beach (0.38), Backwater (3.24), Buildup land (41.69) and wetland (1.73). During the year 2000, the changes are Inland water (1.74), Grass (6.03), Barren land (6.81), Forest (54.22), Canal (0.50), Agriculture (0), Beach (0.38), Backwater (10.64), Buildup land (45.72) and wetland (1.64). It has identified that grasslands and inland water is decreased its results forest is increased about 15.18. Backwater and buildup land also increased.

2000 to 2009

During the year 2000, the changes are Inland water (1.74), Grass (6.03), Barren land (6.81), Forest (54.22), Canal (0.50), Agriculture (0), Beach (0.38), Backwater

(10.64), Buildup land (45.72) and wetland (1.64). During the year 2000, the changes are Inland water (14.82), Grass (9.80), Barren land (7.79), Forest (28.23), Canal (0.59), Agriculture (0), Beach (0.38), Backwater (0.49), Buildup land (64.02) and wetland (1.56). It is identified that the forest has decreased by increasing the inland water and grassland. The buildup land has rapidly increased in this region its shows that the exponential of population growth.

6.0 CONCLUSION:

In the present research paper, land use changes were evaluated in Kanchipuram District by using Landsat Satellite images of the 1980, 1991, 2000 and 2009. The study reveals that the land use changes were determined. The main changes were identified in the buildup land has been increased because of the exponential population growth in the study region. The agricultural land and barren land has been rapidly decreased, its shows that the urbanization took place in the study area. The forest also increased by decreasing the inland water, because of the inland water areas are now becomes the forest. Finally it has identified that due to the over growth of population all agricultural and barren land becomes the settlement.

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