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SPATIO- TEMPORAL DISTRIBUTION OF MAJOR URBAN CENTERS IN TIRUCHIRAPPALLI DISTRICT OF TAMILNADU

Sakthivel.M[1], Murugesan.S[2]

Associate Professor[1], Research Scholar[2]

University of Madras, Chennai - 600025

Abstract: **Land use and land cover is dominant role in the part of urbanization and urban centers. As the rapid urbanization led various activities in a region and these changes generally takes place in the agricultural land and caused decrease of arable land .The satellite imageries LANDSAT- TM and LANDSAT- ETM data's are used. The scales are 1:50,000. 1991, 2001 and 2011 covering a period of 20 years the aerial distribution of the land use and land cover changes and population density has been observed. The changes were identified ,in which the decrease of Agricultural land, Natural vegetation, Educational infrastructures, Scrub land and Water body and increase of Built up land, Fallow land, River sand and Without scrub land. The land use and land cover maps are prepared by using GIS software to evaluate the changes and it is showed strong variation.**

Keywords: **Land Use Land Cover, Tiruchirappalli, Landsat, Population**.

I. INTRODUCTION

Urban centers are planning districts intended to provide a mix of housing, employment, commercial, and cultural amenities in a compact form. They support transit, walking and cycling. They are focal Points of vibrant city life and activity, as well as strategic locations for accommodating a significant share of future population and employment growth. Smaller cities may have one center, such as a downtown core, while larger cities may have multiple unique centers. This paper investigates urban growth of tiruchirappalli city, located in Tamil Nadu, India with an area of 148 Km2.Tiruchirappalli district is located at the Central part of Tamil Nadu surrounded by Perambalur district in the north, Pudukottai district in the south, Karur and Dindigul districts in the west and Thanjavur district in the east. It lies between 10o10' and 11o20' of the Northern latitudes and 78o10' and 79o 0' of Eastern latitudes in the centre part of the Tamil Nadu. The general slope of the district is towards east. It has a number of detached hills, among which Pachamalai Hill is an important one, which has a peak up to 1015m, located at Sengattupatti Rain Forest. Tiruchirappalli district comprised of eight taluks viz. Thuraiyur, Lalgudi, Musri, Tiruchirappalli, Thottiyam Manachanallur, Srirengam and Manapparai, which included 14 blocks, 408 Village Panchayats and 1590 Villages. This district consists of four municipalities namely Ponmalai, Srirangam, Thuraiyur and Manapparai. Tiruchirappalli is the only Municipal Corporation which is also the Head Quarters of the District.

II. AIM AND OBJECTIVES

Assessment of spatiotemporal distribution of the major urban centers in Tiruchirappalli district.

- To examine the Land use /land cover change deduction on the Tiruchirappalli district.
- To assessment of spatiotemporal distribution in the major urban Centres in Tiruchirappalli district.
- To analyse the spatial distribution of population diversity in the Tiruchirappalli district

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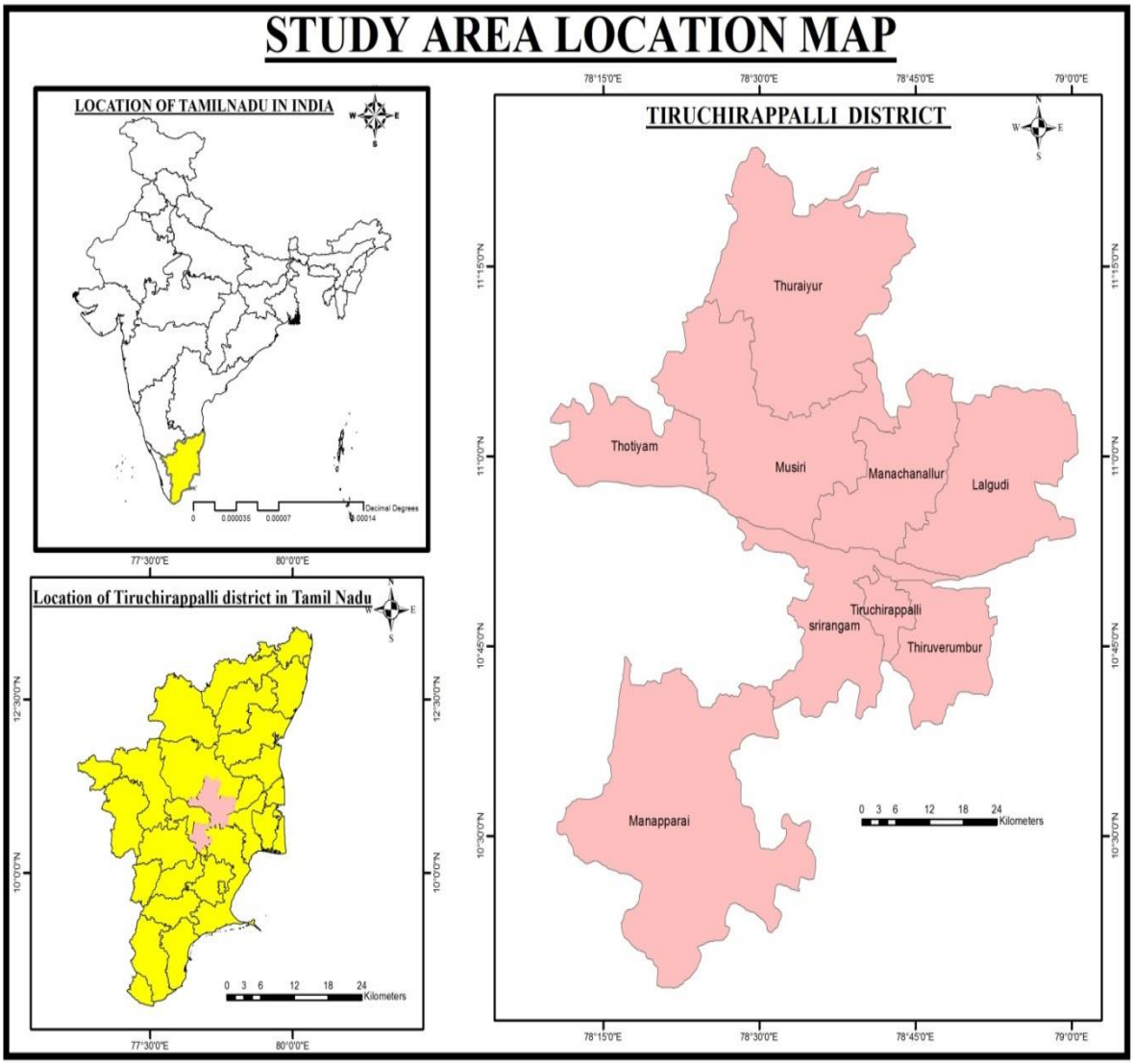
III. STUDY AREA

Tiruchirappalli district is located at the Central part of Tamil Nadu surrounded by perambalur district in the north, pudukottai district in the south, Karur and Dindigul districts in the west and Thanjavur district in the east. It lies between 10010' and 11020' of the North latitudes and 78010' and 7900' of Eastern latitudes in the center part of the Tamil Nadu. The general slope of the district is towards east. The district comprised of eight taluks viz. Thuraiyur, Lalgudi, Musiri, Tiruchirappalli, Thottiyam, Manachanallur, Srirengam and Manapparai, which included 14 blocks, 408 village panchayats and 1590 villages. This district consists of four municipalities namely Ponmalai, Srirangam, Thuraiyur and Manapparai. Tiruchirappalli is the only Municipal Corporation which is also the Head Quarters of the District.



IV. METHODOLOGY

The base map has been prepared from SOI toposheet on 1:50,000 scale with Survey and Land Records, Government of Tamil Nadu. The base map has been digitized and proper attribute data have given in the Arc GIS environment. Visual image interpretation technique has been used for the satellite data using ERDAS imagine 2010. The Remote sensing data for the year 1991, 2001 and 2011. Landsat TM and ETM image have been collected for the study. The changes of Land use/Land cover have been studied carefully by comparing these two periods and Land use/Land cover strategies have been suggested for the sustainable Land use development of the study area. Manual, or visual, classification of remotely sensed data is an effective method of classifying Land cover especially when the analysis is familiar with the area being classified. This method uses skills that were originally developed for interpreting aerial photographs.

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Limitation

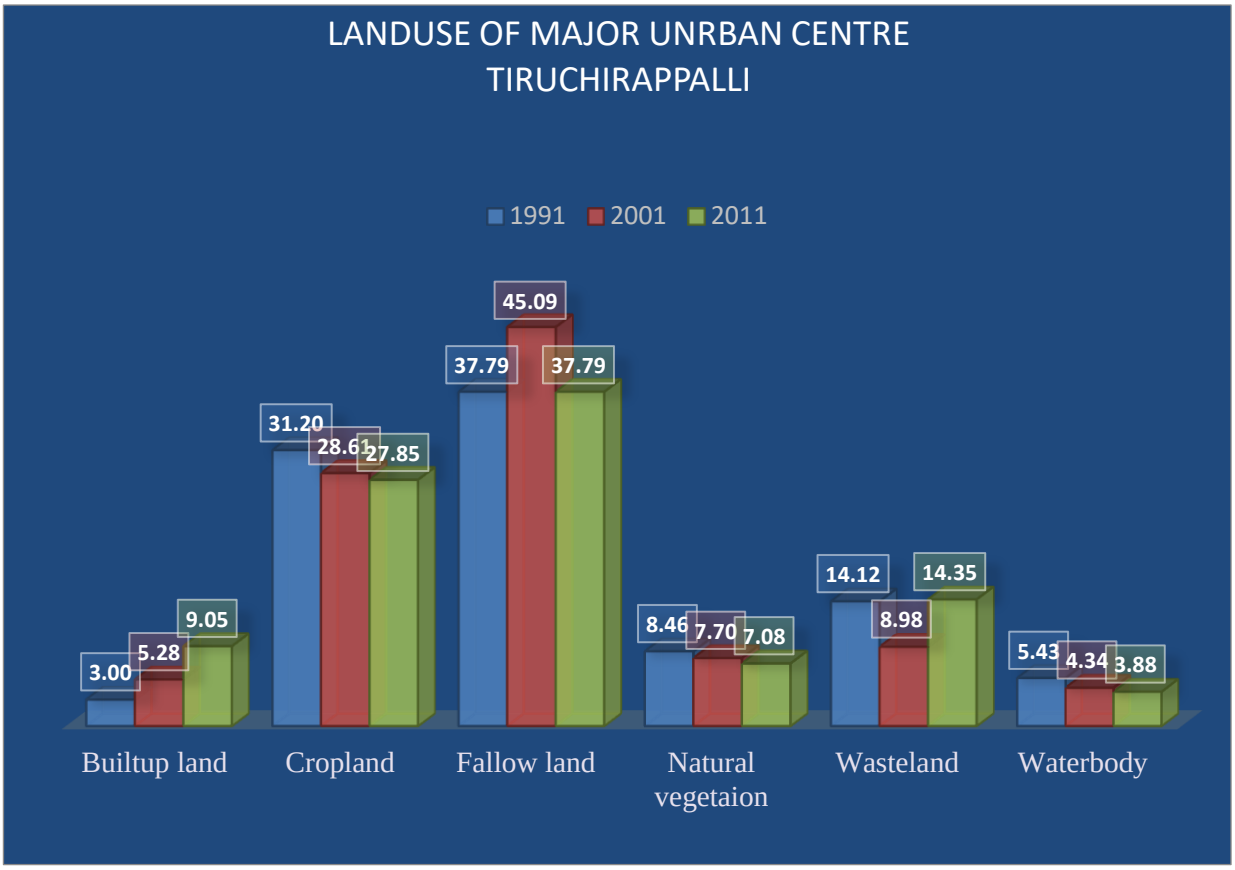
The study deals with the last three decade's population data but recent information after the census years are not available for the study.

Date base

The population data was collected from Census of India of year 1991, 2001 and 2011. The toposheet is extracted from Survey of India with scale of 1:50000. The satellite images were collected from USGS with resolution of 30 meters. The satellite data of LANDSAT TM and ETM was used of year 1991, 2001 and 2011.

V. RESULT AND DISCUSSION

Analysis of Land Use land Cover in Trichirappalli District Land use/land cover map for the year 1991, 2001 and 2011 have been created using ERDAS. The steps followed for the analysis are: (i) Using supervised classification tools. (ii) Displaying all the different classes in the same layer. (iii) Calculating the area of each class and (iv) Generating land use/land cover map for the year 1991, 2001 and 2011. From the study, it is seen that the agricultural land and natural vegetation have tremendously reduced, during the year from 1991, 2001 and 2011. Map shows during the year of 1991 crop land area was predominant throughout Tiruchirappalli when compared with other features such as built-upland or water body. The industrial zone of Tiruchirapalli is covered with built-upland. Built-up land and cropland has been equally distributed in the urban centres such as Srirangam. Waste land has been covered 40% to 65% in the urban centres of Thottiyam, Thiruverumbur, Manachanallur, Lalgudi, Musiri and Manapparai. Water body has been covered most of the urban centres of Thottiyam, Musiri, Manachanallur, Lalgudi, Trichy, Thiruverumbur and Srirangam as lakes and river flow. The analysis shows that the major changes are present in the settlement areas due to the rapid population and industrial growth in the urban centres. It is observed that agriculture land occupies 31.20% in the year of 1991. The settlement/Hamlet areas are increased from 3.0% to 9.05% in 2011. The central part of Tiruchirappalli urban area is densely populated and more.



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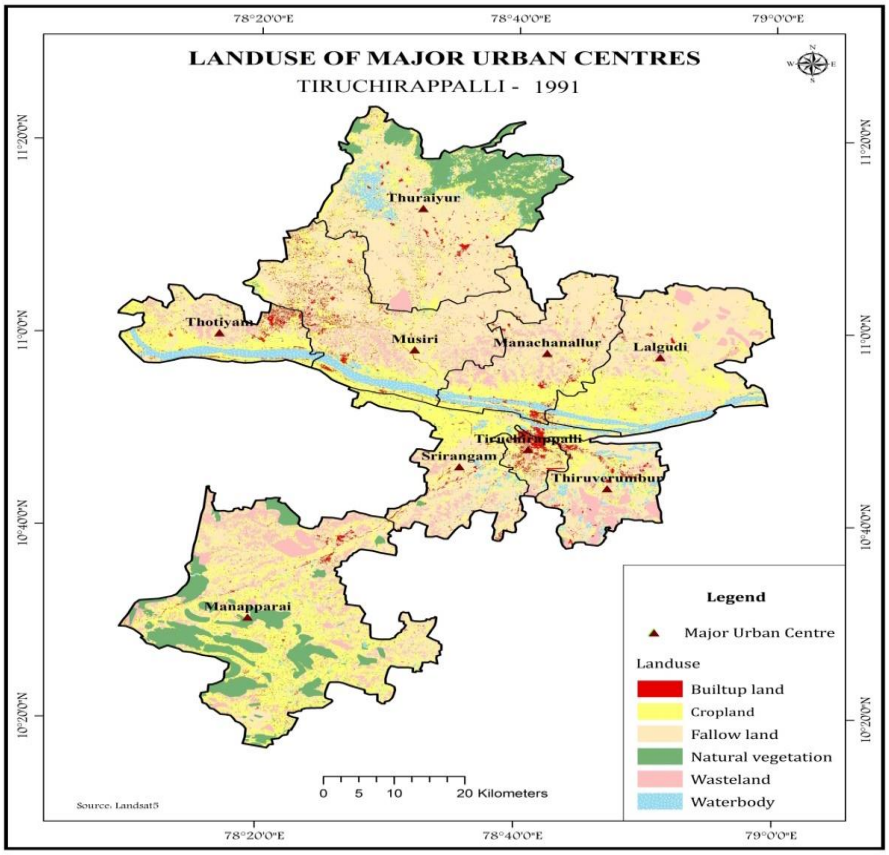

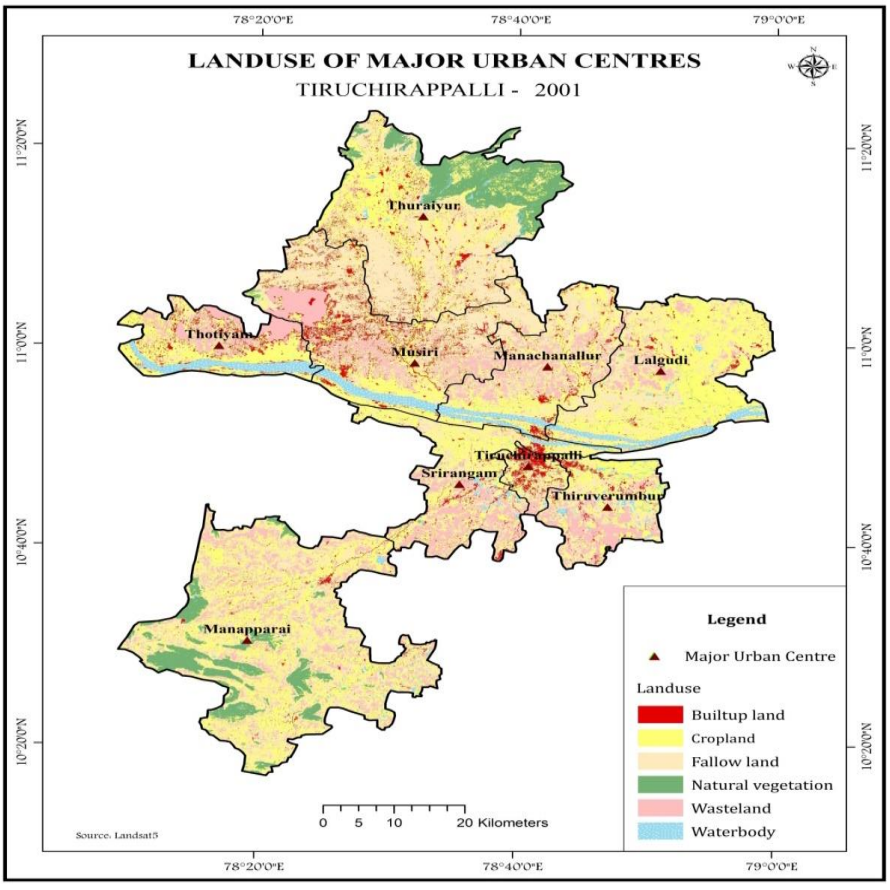

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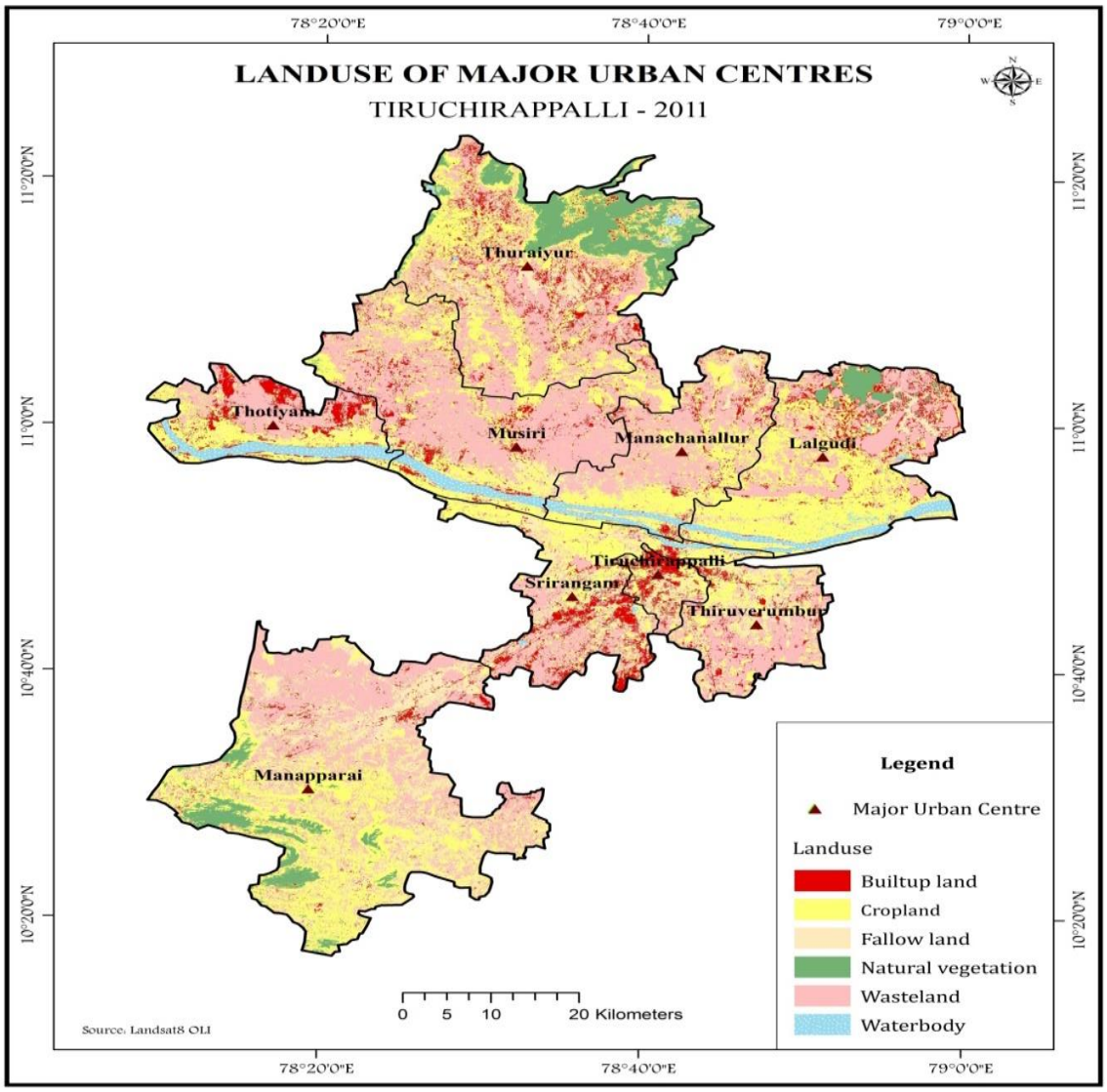

VI. ANALYSIS OF SPATIAO- TEMPORAL DISTRIBUTION OF MAJOR URBAN CENTERS IN TIRUCHIRAPPALLI DISTICT OF TAMILNADU

Land use/land cover map for the year 1991, 2001 and 2011 have been created using ERDAS. The steps followed for the analysis are: (i) Using supervised classification tools. (ii) Displaying all the different classes in the same layer. (iii) Calculating the area of each class and (iv) Generating land use/land cover map for the year 1991, 2001 and 2011. From the study it is seen that the agricultural land and natural vegetation have tremendously reduced, during the year from 1991, 2001 and 2011. Map shows during the year of 1991 crop land area was predominant throughout Tiruchirappalli when compared with other features such as built-upland or water body. The industrial zone of Tiruchirapalli is covered with built-upland. Built-up land and cropland has been equally distributed in the urban centres such as Srirangam. Waste land has been covered 40% to 65% in the urban centres of Thottiyam, Thiruverumbur, Manachanallur, Lalgudi, Musiri and Manapparai. Water body has been covered most of the urban centres of Thottiyam, Musiri, Manachanallur, Lalgudi, Trichy, Thiruverumbur and Srirangam as lakes and river flow. The analysis shows that the major changes are present in the settlement areas due to the rapid population and industrial growth in the urban centres. It is observed that agriculture land occupies 31.20% in the year of 1991. The settlement/Hamlet areas are increased from 3.0% to 9.05% in 2011. The central part of Tiruchirappalli urban area is densely populated and more.

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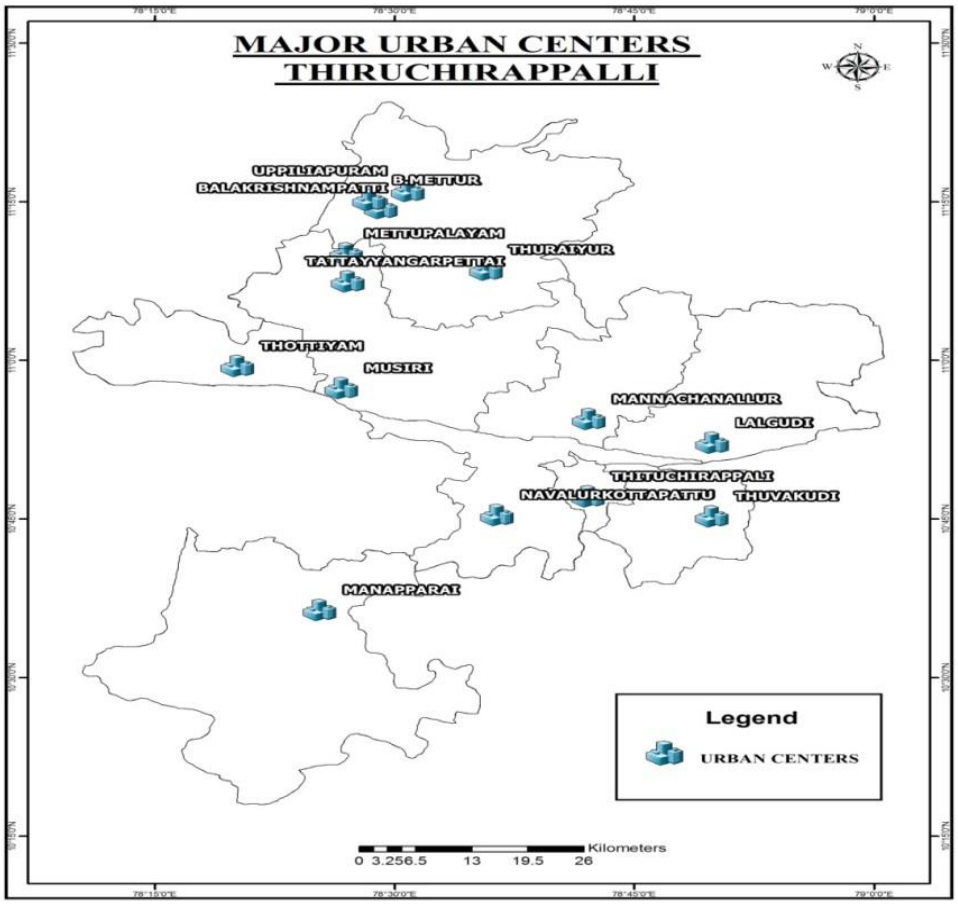

VII. ANALYSIS ON POPULATION DENSITY AND EXPANSION OF URBAN CENTRES

The above maps represent the expansion of urban centre with relationship to population explosion. The population of Tiruchirappalli district had increased rapidly since 1991 as there were increased number of industrial belts in urban centres such as Lalgudi, Manachanallur, Manapparai, Musiri, Srirangam, Trichy, Thiruverumbur, Thotiya and Thuraiyur. The establishment of major industries such as Bharat Heavy Electricals Limited, BHEL,Boiler Manufacturing Industries, Ordnance Factory Tiruchirappalli, Cement Factories, Light and heavy engineering. Major tourists' destinations have also resulted in the population growth and density rapidly. Lalgudi total population have increase from 19917 to 232740. In the same manner all the urban centres have gave rise to total population likewise Manachanallur, Manapparai, Musiri experienced higher density of population from 18611 to 25931, 31837 to 40510 and 22103 to 28727 respectively. Mukombu, Srirangam Ranganathaswamy temple, Erumbeeshwarar remple, kollimalai are few important tourist destination which had led to pull the population to a greater extent. The opportunity to employment had gradually increased in the urban centres of Tiruchirappalli had also lead to increase in total population from 1991 to 2011 for example the urban centres such as Srirangam, Trichy, Thiruverumbur, Thuraiyur's 2011 census population is 10743, 847387, 23156 and 32439 respectively. With this rapid population explosion it is mandatory to plan and organize the landuse and landcover pattern in Tiruchirappalli which should enhance the concern related to sustainability and eco-friendly development. Planning and organizing the upcoming infrastructure at the optimum location should focus on the development direction, which should include pin pointing the location of post offices, schools, police station, restaurants, residential complexes, educational institutions, public sector offices and other infrastructures like transportation such as road, rail and airways to be planned accordingly. Map below shows during the year of 1991, 2001 and 2011 the crop land has been converted to built-up land because of population density, especially in Trichy, Thuraiyur, Thotiyam and Srirangam. Built-up land has been gradually increased from 1991, 2001 and 2011 in the urban centres of Trichy and Thotiyam. Waste land also converted to buildup land and barren land distributed scatted in the urban centres of Manapparai in the year of 1991. Water body also decreased from 6% to 3% and it has been converted to built-up land

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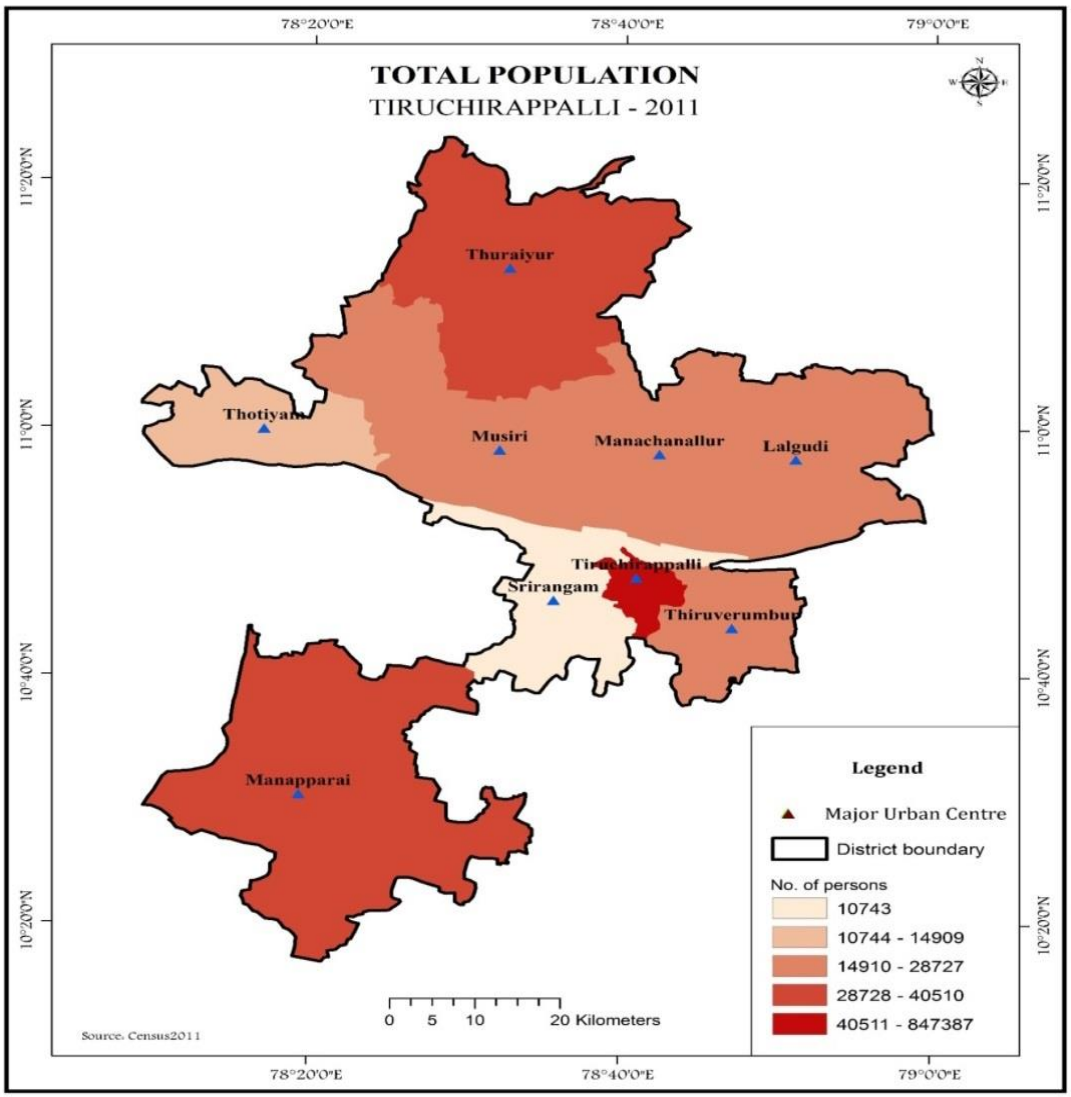
when compare from, 1991, 2001 and 2011 in the urban centres of Thuraiyur, Srirangam and Thiruverumbur.The cropland area gradually decreased from 30% to 27% during the year of 1991 to 2011. It is observed that the built-up land was increased from the year of 1991 due to rapid urbanization as the policies of government acted in favour. Waste lands have increased from 8 % to 15 % since 2001.



Built –up land was highly concentrated in this district. The built-up land was identified in entire study area. In this center portion was of urban areas which were highly developed. In this district some agriculture land fields were converted in to fallow land and after few days the land was converted to Real Estate land and industrial areas were newly created in National high way lines. This district has well developed transportation facilities.

The built-up lands were not only settlements but also Govt offices, Education Institutions and Pharm productions and industries were identified in this district. Such places were identified in the blocks Andanallur, Musiri, Manachanallur, Pullambadi, Thiruverambur, Thottiyam, Uppiliyapuram, Vaiyampatti, Marungapuri, Manikandam, and Manapparai. Built –up lands show a considerable increase in area. In 1991 compare to 2001 the years of built-up land (3 %) and it has been increased. In 2001 to 2011 the ten year period the built-up land (5%) and show an increased in this district. In 1991 compare to 2011 the built –up land (9.5%) and has a total increased. Over all built-up lands increase 17.5% in this district. So many agriculture lands were transformed to fallow lands. The fallow lands were converted to build up lands real estate lands and industries areas. The village people need to infrastructural facilities so people move in rural to urban. These are reasons built –up land was increased in this district.

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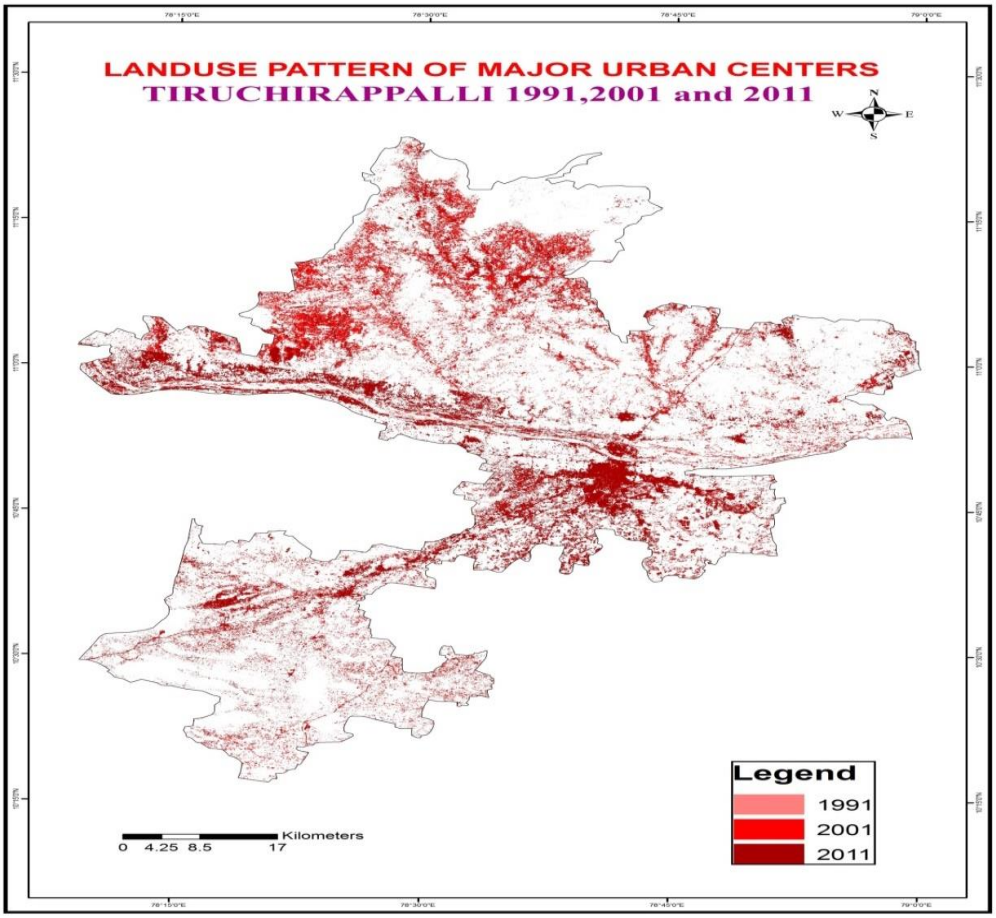

VIII. RESULT

Land use of the tiruchirappalli changed dramatically between 1991 and2011, and a large amount of agricultural land had transformed to urban area. In these 20 years, the urban land of tiruchirappalli increased by 9.5%. The urban expansion was dramatically different in the three phases and the percentage of the total urban expansion in each phase was 9.5% from 1991 to 2001, 5% from 2001 to2011, 9.5%, and the annual growth rates of the urban land were 10.29%, 1.59% and 5.18%, respectively. There-fore, urban land expanded more dramatically in 1991–2001 and2001–2011.The trajectories of urban expansion reflected the economic development and policy scenarios. A large number of laws, regulations, and decrees on land use, land protection and urban expansion were promulgated by the Congress or the State Council, for example. The rapid urban expansion resulted in the cropland loss and threatened the food security. From 1991 to 2001, the urban land of the trichy, Manachanallur, Manapparai, Musiri and metropoli-tan areas expanded more dramatically than those of trichy and srirangam areas. The urban growth, size distribution and spatio-temporal dynamic pattern of the trichy region.

IX. CONCLUSION

The present study of Land Use and Land Cover change detection in Tiruchirappalli District, Tamil Nadu, India using remote sensing and GIS has been undertaken primary and secondary to appreciate the type of land use land cover and nature of changes taking place in the chosen area period of study. Land use and land cover change is a phenomenon, which is of serious concern and needs immediately attention in all the growing rural and urban around solid areas. The nineteen years period shows many drastic changes in agriculture lands. Particularly these lands were converted to real estate land and built-up lands. The built-up lands include Govt offices, private offices, Educational institution, different type of industries and settlements. The pressure of the needs of increasing population is the major reason for this change. The agriculture land, water bodies and Natural vegetation have been decreased in all blocks. The built-up land has increased at the cost of crop land, fallow land, and scrub without scrub land. All these lands have been converted in to

settlements and more industries. The study reveals that remote sensing and GIS techniques have a unique capability to detect the changes that have occurred in land use and land cover over a period of time. The analysis shows about the land use land cover in 1991, 2001, 2011 using satellite image of 3 decades population and vegetation change happen. Because of population density increase urban centers also increased. This population density used by census data from census of India, it can be shown the exact changes. From the overall result shows that increase in population leads to land use land cover of 2 decades. Settlements lead to main reason for increase in urban centers tiruchirappalli.

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