

Land Use and Land Cover Change Detection in Sriperumbudur Taluk, Kanchipuram District

Dr. R. Shyamala¹, E. Hemavathy²

¹(Assistant Professor), Department of Geography, Bharathi Women's College (A), Chennai-108, India

²M.Phil (Research Scholar), Department of Geography, Bharathi Women's College (A), Chennai-108, India

Email: dhanamr40@gmail.com

Abstract: *The spatial dimensions of land use and land cover needs to be known at all times so that policy-makers and scientists will be amply equipped to take decisions. The most important thing is the changing pattern of land use and land cover reflects changing economic and social conditions. In order to consider these factors this research focusing the change detection in land use and land cover for three decades. In this paper analyzed the three decade land use and land cover status of Sriperumbudur. The land use change detections for the period from 1998 to 2008, 2008 to 2018 over all land use changes from 1998 to 2018 are analyzed under GIS environment. Finally this paper concluded with some remedies for further environmental management.*

Keywords: Land use, Land cover, GIS, Satellite imagery, Spatial dimensions, remedies

1. Introduction

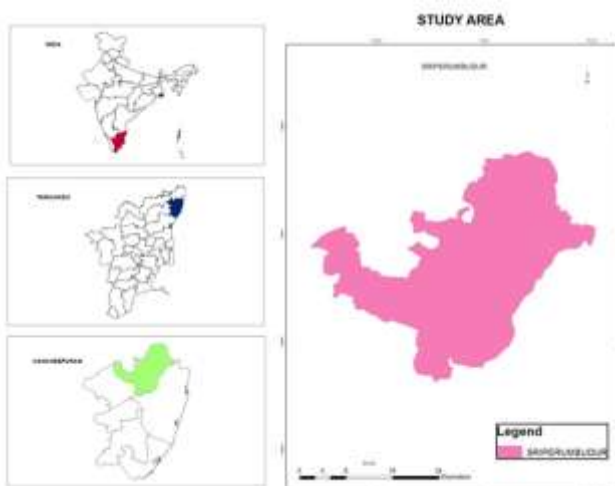
Land is the most critical normal assets on which all activities are based. The increase in the population and human activities are expanding the interest on the constrained land and soil assets for agribusiness, woodland, urban and modern area employments. Information on the rate and sort of changes in the utilization of area assets is crucial for legitimate arranging, administration and to regularize the utilization of such assets. India is confronting a significant issue of natural resource scarcity, particularly that of water in perspective of population development and monetary improvement. Thus the Land use, Land Cover (LULC) change has turned into a point of gigantic enthusiasm inside the human measurements of the Environmental change research group. Subsequently, measuring and understanding the degree and spatial dissemination of LULC is a critical significance to the investigation of Environmental change at different scales. Besides, this sort of analysis gives a valuable tool to build the productivity of land cover and area utilization, and to decrease the negative environmental and societal effects identified with LULC. Land use alludes to "man's exercises and different uses, which are carried ashore, for example, farming, settlements, industry and so on." The land cover alludes to the material present, e.g. vegetation, water bodies, rocks/soils and other resulting because of area changes. Despite the fact that land use is by and large deduced taking into account the cover, yet both the term land use and land cover being firmly related are exchangeable. Change detection is one of the landscape ecological aims. Planning landscape Characteristics maps can help to determine the change detection. All rural, creature and ranger service preparations rely upon the profitability of the land. Understanding landscape examples, changes and associations between human activities and common marvel are fundamental to the appropriate land management and decision improvement. Land Cover, characterized as the gathering of Biotic and abiotic segments on the world's surface is a standout amongst the most critical properties of the Earth framework. The land cover incorporates water bodies, snow, prairie,

backwoods, and exposed Soil. Land Use incorporates a developed area, agrarian area, recreation region, wild life administration zone, and so on. Remote Sensing (RS) and Geographic Information System (GIS) are currently giving new devices to cutting edge biological system administration. For effective management and planning, satellites are the best assets to give the information in a timely manner. Identifying, outlining and mapping land cover is vital for global monitoring studies with the component of resource management and planning activities. The gathering of remotely sensed data encourages the succinct investigations of Earth - system function, designing, and changes in the neighborhood, provincial and worldwide scales after some time; such information likewise gives a vital connection between concentrated, confined natural exploration and national, territorial and global preservation and administration of organic differing qualities. Spatial examples of land use/land cover over various time periods specifically can be methodically mapped, observed and precisely evaluated from Satellite information gained by ordinary ground information. This study is to delineate the status of land use, land cover of Sriperumbudur between 1998 and 2018 with a perspective to recognize the progressions that has occurred in this status, especially in the urban land in order to anticipate conceivable changes that may happen in this status in coming years utilizing both Geographic Information System and Remote Sensing data.

2. Study Area

Sriperumbudur is a class IV town which is located about 45km, southwest of Chennai, Tamil nadu on Chennai-Bangalore NH-4, Sriperumbudur covers an area of around 808. 84sq.Kms. According to the 2011 census, the taluk of Sriperumbudur had a population of 486, 063 with 246, 416 males and 239, 647 females. Sriperumbudur is an industrial taluk. Sriperumbudur has seen rapid industrialization, attracting huge investments due to its proximity to Chennai port, infrastructure growth and availability of quality manpower. Sriperumbudur was declared as a special economic zone by 2008. It harbours various companies like Flextronics, Foxconn, dell, Hyundai,

Samsung etc with an investment of around \$2 million. Due to the sudden increase in these companies the migration of the population happens from urban to rural areas.



3. Aim and Objective

The aim of this study is to produce a land use/ land cover map of Sriperumbudur Taluk so as to detect the changes that have occurred over a given period utilizing change detection technique. The following specific objectives are listed to reach the aim.

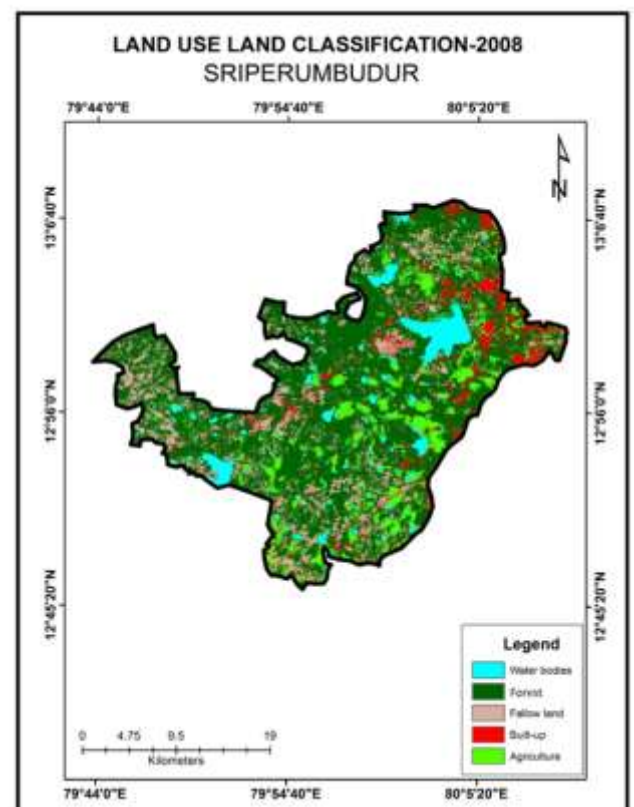
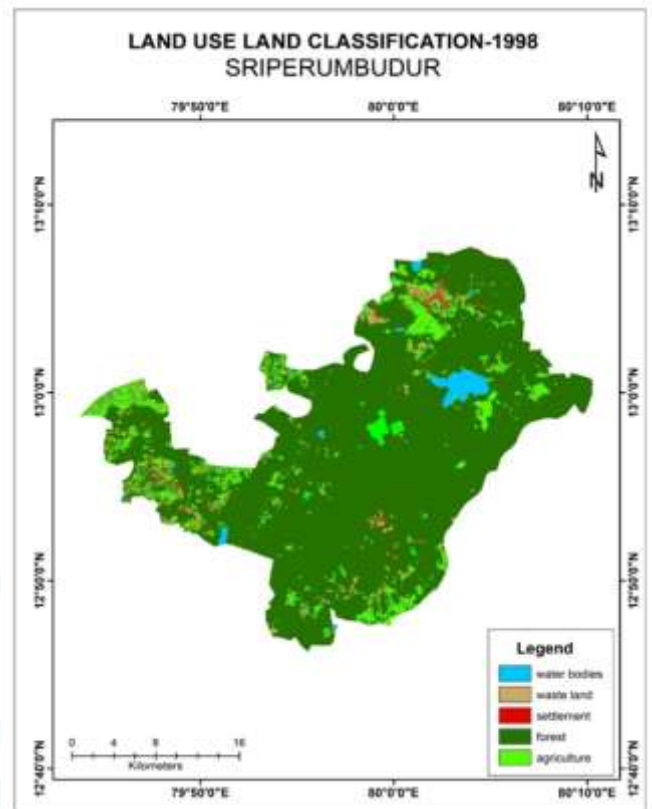
- To create a land use/land cover classification scheme.
- To Quantify the Land use and land cover (LULC) changes for the year 2013 to 2016 utilizing multi-temporal satellite imagery for Sriperumbudur Taluk.

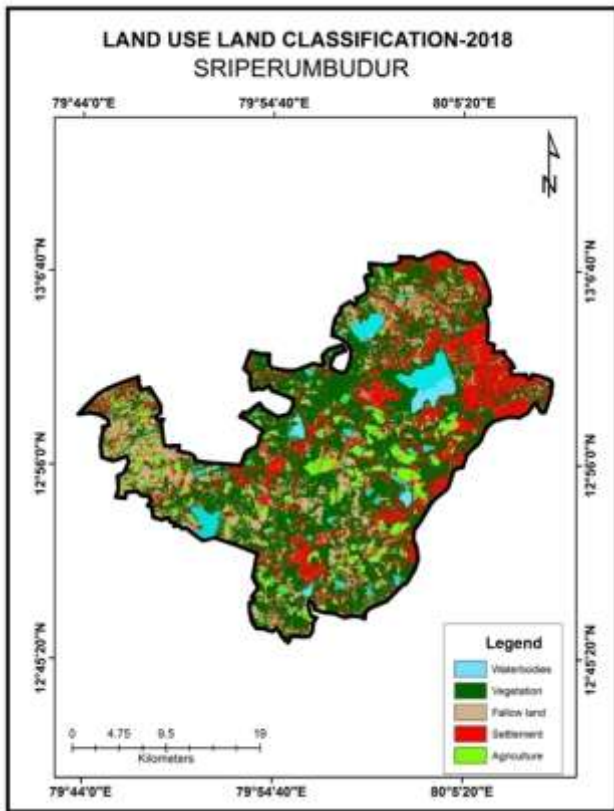
4. Methodology

The base map has been prepared from SOI Toposheet on 1:250, 000 scale. The base map has been digitized and proper attribute data have given in the ArcGIS 10.3. Visual image interpretation technique has been used for the satellite data using ERDAS imagine 2014. data for the year 1998, 2008 and 2018 Landsat image have been collected for the study. The changes of Land use/Land cover have been studied carefully by comparing these three Landsat images 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.

5. Results and Discussions

The general area utilization or land use of a range delineates a thought of general overall usage of assets, characteristic or social. In this paper, changes in the land use and land cover of Sriperumbudur Taluk are assessed from the contrasts between Three years of period (2013-2016).

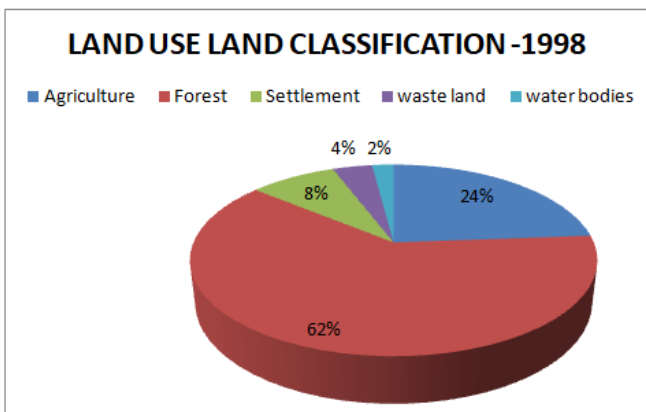




5.1 Land use/Land cover changes during 1998

During the year 1998 the Land use /Land cover categories have been classified into 5 classes as per NRSA level 1 classification. The categories are Agriculture, Forest, settlement, waste land, water bodies. it covers 62 percent of forest of total area, agriculture covers of 24 percent of total area, settlement covers 8 percent of total area, waste land covers 4 percent of total area and water bodies covers 2 percent of total area.with this LULC forest covers larger area in the Sriperumbudur taluk in the year of 1998.

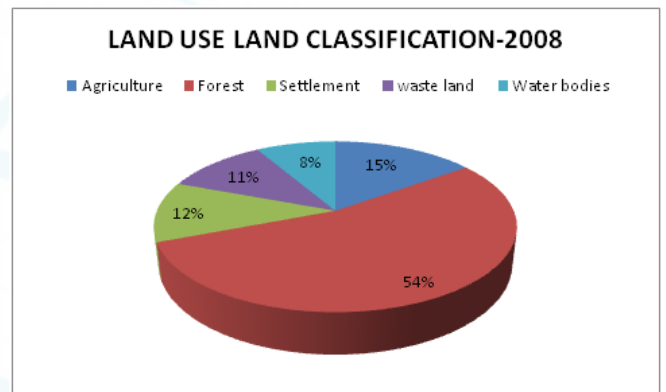
Land Use Land Classification 1998		
Class Name	area in hectare	area in percentage
Agriculture	19164.5	24 %
Forest	50012.4	62 %
Settlement	6615.5	8 %
Waste Land	3031.89	4 %
Water Bodies	1652.22	2 %
Total	80460.64	100 %



5.2 Land use / Land cover changes during 2008

Land Use Land Classification 2008		
Class Name	Area in hectare	Area in percentage
Agriculture	13294.16	15 %
Forest	47524.6	54 %
Settlement	10095.88	12 %
Waste Land	9546	11 %
Water Bodies	7456.46	8 %
Total	80460.64	100 %

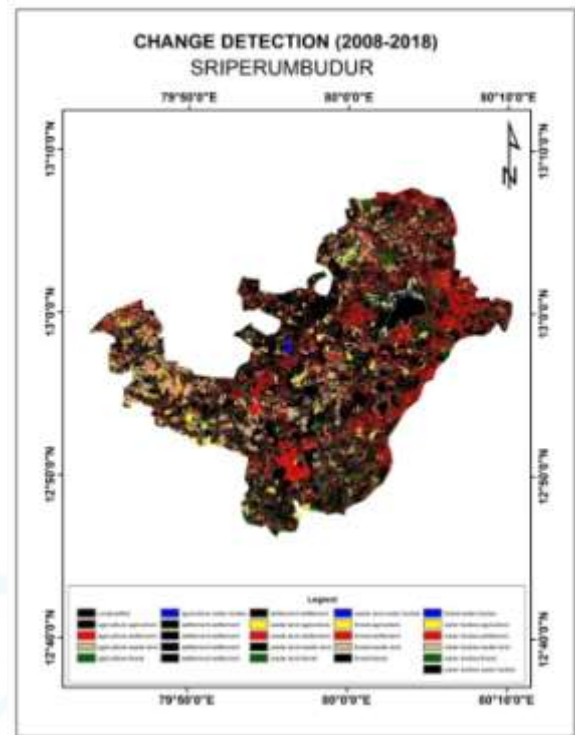
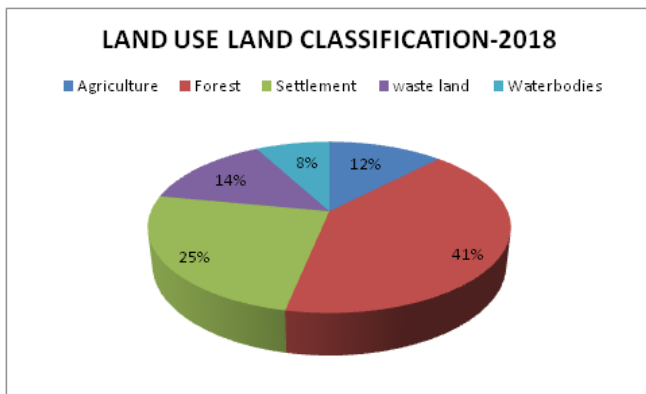
During the year 2008 the Land use /Land cover categories have been classified into 5 classes as per NRSA level 1 classification. The categories are Agriculture, Forest, settlement, waste land, water bodies. it covers 54 percent of forest of total area, agriculture covers of 15 percent of total area, settlement covers 12 percent of total area, waste land covers 11 percent of total area and water bodies covers 8 percent of total area.with this LULC forest covers larger area in the Sriperumbudur taluk in the year of 2008.



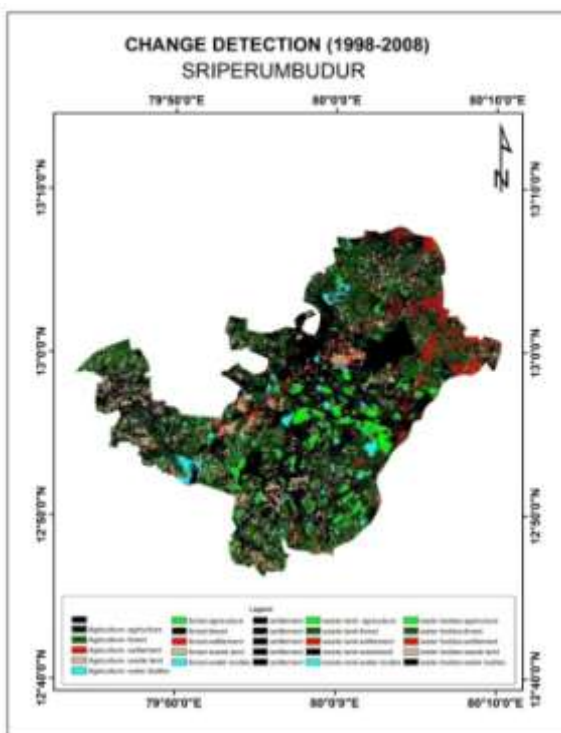
5.3 Land use/Land cover changes during 2018

During the year 2018 the Land use /Land cover categories have been classified into 5 classes as per NRSA level 1 classification. The categories are Agriculture, Forest, settlement, waste land, water bodies. it covers 41 percent of forest of total area, agriculture covers of 12 percent of total area, settlement covers 25 percent of total area, waste land covers 14 percent of total area and water bodies covers 8 percent of total area. With this LULC forest covers larger area in the Sriperumbudur taluk in the year of 2018.

Land Use Land Classification 2018		
Class Name	Area In Hectare	Area In Percentage
Agriculture	9840.56	12%
Forest	32979	41%
Settlement	19907	25%
Waste Land	11360.6	14%
Waterbodies	6334.18	8%
Total	80421.34	100%



6. Land Use Land Change Detection



6.1 Land use/Land cover changes from 1998-2008

During the year 1998 agriculture was 24 percent whereas in the year of 2008 agriculture was 15 percent it decreases 9 percent of total area. In 1998 forest cover was 62 percent and in 2008 it was 54 percent it decreases 8 percent of total area. Settlement was 8 percent in 1998 and 7 percent in 2008 it increases 4 percent from the total area. Waste land was 4 percent in 1998 and 11 percent in 2008 it also increases 7 percent of total area of land and water bodies was 2 percent in 1998 whereas 8 percent in 2008, so, it increases 6 percent of total area of land.

6.2 Land use/Land cover changes from 2008-2018

During the year 2008 agriculture was 15 percent whereas in the year of 2018 agriculture was 12 percent it decreases 3 percent of total area. In 2008 forest cover was 54 percent and in 2018 it was 41 percent it decreases 13 percent of total area. Settlement was 12 percent in 2008 and 25 percent in 2018 it increases 13 percent from the total area. Waste land was 11 percent in 2008 and 14 percent in 2018 it also increases 3 percent of total area of land and water bodies was 8 percent in 2008 whereas in 2018 also it was 8 percent so water bodies has not changed during 2008-2018.

Class Name	1998 area in (%)	2008 area in (%)	2018 area in (%)
Agriculture	24	15	12
Forest	62	54	41
Settlement	8	12	25
Waste Land	4	11	14
Water Bodies	2	8	8

7. Conclusion

From the analysis it has been identified that there is a rapid change in Land use and about 41% of total study area remains Industrial. Since the area lies in the periphery of Chennai metropolitan area, there is more organic growth, which ultimately pressures on the urban furniture. The Change detection would give an idea of transformation of land use from lower order to higher order. The change detection will also help in prediction of future land use of the study area, which will be more helpful in planning of infrastructure facilities in the towns. There is also requirement of change policies before establishing industrial areas, an impact Study need to be done and the required infrastructure facilities to be planned in advance, so has to facilitate a planned development in nearby newly Developing industrial areas. Special development Regulation needs to be formed for the Influence Areas due to the planned industries. Proper Environmental mitigation measure needs to be done before beginning operations.

its Impact on Natural Environment in and around Jaipur city, Rajsthan, India."

- [11] Sudhira, H. S., T. V. Ramachandra, and K. S. Jagadish. (2004) "Urban sprawl: metrics, dynamics and modelling using GIS." *International Journal of Applied Earth Observation and Geoinformation* 5, no. 1: 29-39

Reference

- [1] Bhattacharya, Prabir C. (1993) "Rural-urban migration in economic development." *Journal of economic surveys* 7, no. 3:243-281.
- [2] El Garouani, Abdelkader, David J. Mulla, Said El Garouani, and Joseph Knight. (2017) "Analysis of urban growth and sprawl from remote sensing data: Case of Fez, Morocco." *International Journal of Sustainable Built Environment* 6, no. 1: 160-169.
- [3] Hu, Zhiyong, and C. P. Lo. (2007) "Modeling urban growth in Atlanta using logistic regression." *Computers, Environment and Urban Systems* 31, no. 6: 667-688.
- [4] Jat, Mahesh Kumar, P. K. Garg, and D. Khare. (2008) "Modelling of urban growth using spatial analysis techniques: a case study of Ajmer city (India)." *International Journal of Remote Sensing* 29, no. 2: 543-567.
- [5] Langlois, Paul. (2006) "A GIS Approach for Evaluating Municipal Planning Capability: Residential Built Form in Markham and Vaughan, Ontario." Master's thesis, University of Waterloo.
- [6] Mosammam, Hassan Mohammadian, Jamileh Tavakoli Nia, Hadi Khani, Asghar Teymouri, and Mohammad Kazemi. (2017) "Monitoring land use
- [7] Change and measuring urban sprawl based on its spatial forms: the case of Qom city." *The Egyptian Journal of Remote Sensing and Space Science* 20, no. 1: 103-116.
- [8] Rahman, Atiqur, Sunil Kumar, Shahab Fazal, and Masood A. Siddiqui. (2012) "Assessment of land use/land cover change in the North-West District of Delhi using remote sensing and GIS techniques." *Journal of the Indian Society of Remote Sensing* 40, no. 4: 689-697.
- [9] Shekhar, Sallekhana. (2004). "Urban sprawl assessment entropy approach." *GIS Development, Noida*
- [10] Singh, Rajpoot Pushpendra, Kumar Ajay, and Pandey Gyanendra Kumar. "Assessment of Urban Sprawl and