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DECLINING TREND OF AGRICULTURE DUE TO URBANIZATION IN PERI-URBAN AREA OF SOUTH CHENNAI

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ABSTRACT
Land use and land cover change has become a central component in current strategies for managing rend resources and monitoring environmental changes. In the present study, land use/land cover mapping and changes detection analysis of peri-urban villages in Kattankulathurblock of Kancheepuram district, was done using remote sensing and GIS. The peoples are migrated towards the peri urban villages which lead to the increases of land prices. So, most of the agricultural lands are sold by the farmers, these lands are changed to residents and the apartments. The study analyzed the impacts of urban expansion agriculture land use change in Chennai peri-urban area; the land use maps for the years 2005, 2010, 2015 and 2019 were prepared using the Google earth satellite images. The results obtained shows considerable land use changes was found that agricultural area has been reduced from 11.6 sq.km to 4.2 sq.km and built-up area has increased from 2 to 8.7 sq.km within 15 years. Generally, the decline of agricultural activities varied from 51.9% to 95.6% between 2011and 2018, which shows the urban impact. So, the agricultural workers are migrated towards the others works, so the increase in settlement area to the rapidly growing migrate population.

Keywords:
Land use change, Peri-urban area, Agricultural land, GIS.

I Introduction
Human research on the global environment as well as landuse-landcover (LULC) change detection began decades ago [1]. Land use refers to human interference or utilizes the land of nature [2]. During the past 140 years, India has experienced remarkable land use and land-cover changes including deforestation, cropland changes and urban expansion [3, 4]. Increased population and human activity increase the demand on water resources, agricultural land, forest urban land uses and industries. The LU/LC changes from population growth and migration of poor rural people to urban areas for economic opportunities. Urban expansion has brought the losses of agriculture land, vegetation land in the recent years. The land changes, according to the purposes of human demand, by recreation, shelter, material extraction and processing for the sake of economic purposes [5]. Due to population growth, human encroach on forest and agricultural land that foe human basic needs like forest cover and shelter. Growth of population, land under cultivation can no longer provide the needs of people and therefore, more lands are needed to be cultivated which in long terms will results in a decrease in quality and quantity of natural resources [6.7]. India is facing serious LULC change mostly due to over use of natural resources for agriculture and human settlement. Land is used for various purposes such as agriculture, built up areas etc., most of inhabitants depends on agriculture for subsistence [8]. Land use land cover mapping will help to take up clear strategies for managing natural resources and monitoring environmental changes. Urban expansion has brought serious losses of agricultural land, vegetation land in the recent years. The term land cover and land use play different roles. The land utilized by humans is called land use (LU) and land cover (LC) indicates the physical land type [9]. Land cover can be taken as what covers the surface of the earth naturally and land use is how the land is used by human beings. Land cover classes included water, forest, grassland, snow, bare soil, hilly areas etc and land use included built-up and agricultural land etc [10]. The images provide the information about the land use pattern of the study area. Identification

process includes categories of land use and land cover. The cyan colour shows the built-up area, blue colour shows the water bodies, dark green colour shows forest deciduous, maroon shows plantations, magenta colour shows cropland, yellow shows waste land and brown colour shows evergreen forest. To see the change over the years, land cover maps for several different years are needed. Collected information about the study area assists to understand the present condition of existing land resources. Based on human activities associated with the LULC data, the corresponding changes can be controlled by an efficient planning and execution [11].The conventional records and remote sensing data provide high resolution data for better assessment of LULC. LU/LC changes of critically linked to the intersection of natural and human influences on environmental changes. LULC in different periods can be mapped, observed and accurately evaluated from satellite information obtained from land information [12]. Mapping and monitoring of land use/land cover is important for many management and planning activities as it is considered as an important element for understanding the earth and its whole system. The detection of changes in the land use and land cover is very helpful to understand, monitor and regulate cultivated area, urban expansion, and landscape utilization. Land cover data documents shows that how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types. The present study shows how well LU/LC classification and its change analysis of the years 2005, 2010, 2015 and 2019 of the study area can be carried out using remote sensing and GIS technology

1.1 Study Area:

The Southern part of the Chennai metropolitan area is chosen for conducting the study. It comes under the administrative boundary of the St. Thomas Mount, Tiruporur and Kattankulathur Blocks of Kancheepuram District, Tamil Nadu, and it is located immediately adjacent to the Chennai city

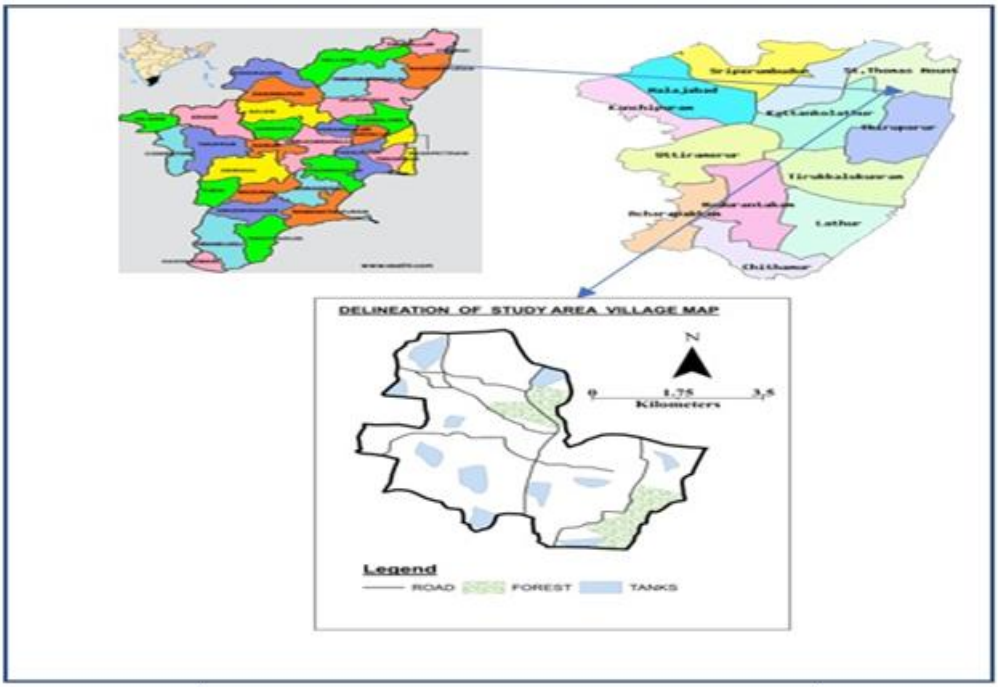

Figure.1 Location of the Study Area

boundary. The study area (Figure.1) chosen as consequent nine villages of these blocks, and lies between the east longitudes 80°08′19.1″ to 80°12′11.52″ and the north latitudes lies between 12°49′35.59″ to 12°54′2.37″. The aerial extent of the study area is 30.9 km^2. It comprises nine village panchayats. Figure.1 shows the location and the boundary map of the study area. The general slope is towards the east and north eastern direction. In the north-western, central western and south-western

corners, there are hills and reserve forests. There are no major rivers or system tanks other than some medium and small tanks, and some of the are well connected and form a drainage network. Most of the surplus during the heavy monsoon floods these areas, and finally goes to the Pallikaranai swamp, stretching from north to south. The study area located in Kancheepuram district, generally it experiences hot and humid climatic conditions. Most of the precipitation in the Kancheepuram district occurs in the form of cyclonic storm caused due to the depressions in Bay of Bengal chiefly during northeast monsoon period. Average relative humidity in the morning and evening is 74 and 64%. The minimum and maximum temperatures are 20°C & 37°C. The exposures of charnockite are found along the western and south-western periphery of the study area in the form of low hills and hillocks.

II Materials and Methods:

Land Use and Land Cover Map

The fundamental data required by urban planners and policy makers is accurate information on current land use practices in a city or town and how it changes over the past for carrying out various urban planning and management activities. The free satellite imagery provided in global landcover facility (GLCF) which can be used to prepare the land use maps as attempted in many studies has certain limitations. The images are of lower or medium resolution type and in many cases; it may not be possible to obtain the latest image. To overcome this, one must buy latest high-resolution satellite image which is more expensive to purchase and sometimes it may not be possible to get the data due to security reasons. An alternative solution is to utilize Google earth imagery which is open source and provides clear view of buildings, roads, etc. and hence can be best utilized for urban related applications. In this study LULC map is prepared with Google earth with the help of Elshayal smart GIS software for the years 2005, 2010, 2015, and 2019.

Google Earth and its Limitations

The advantage of using Google earth is that it provides the latest satellite imagery having spatial resolution less than 1m. In recent years, most popular image processing and GIS software like ERDAS IMAGINE, ENVI, ArcGIS, etc. have provided tools to visualize and import Google earth images. Another advantage of Google earth is that it provides images taken at different time periods which will be very useful for urban planners to perform land use change detection studies. Even though it has more advantages, only very limited studies have performed on the use of this excellent data source for land use map preparation. The only limitation of Google earth is that it may not be possible to obtain the original multispectral band data and hence image classification using unsupervised or supervised techniques cannot be carried out. However, as the spatial resolution is very high, it is possible to visually see on the image, buildings, roads, water bodies, etc. and on-screen digitizing in GIS can easily be performed to prepare the landuse map.

III Results and Discussion:

Land Use Classification

The images provide the information about the land use pattern of the study area. The red colour represents the urban built-up area, dark green colour shows the agricultural area, blue colour shows the water bodies, tan colour shows the barren land and light green colour shows the vegetation like shrubs and grassland. The land use classes that were considered in the present study were built-up area, barren land, agricultural land, water bodies, vegetation, and forest. The built-up area includes all buildings and roads; barren land includes barren, rocky, scrub land and residential layouts; agricultural land comprises cultivable and currently uncultivable land; Water bodies consist of, ponds and tanks; vegetation land includes thick vegetation and trees. Once the land use map preparation is over, the area of individual land use classes was calculated. An important advantage of Google earth is that it provides images taken at different time periods which can be used by urban planners to perform landuse change detection analysis.

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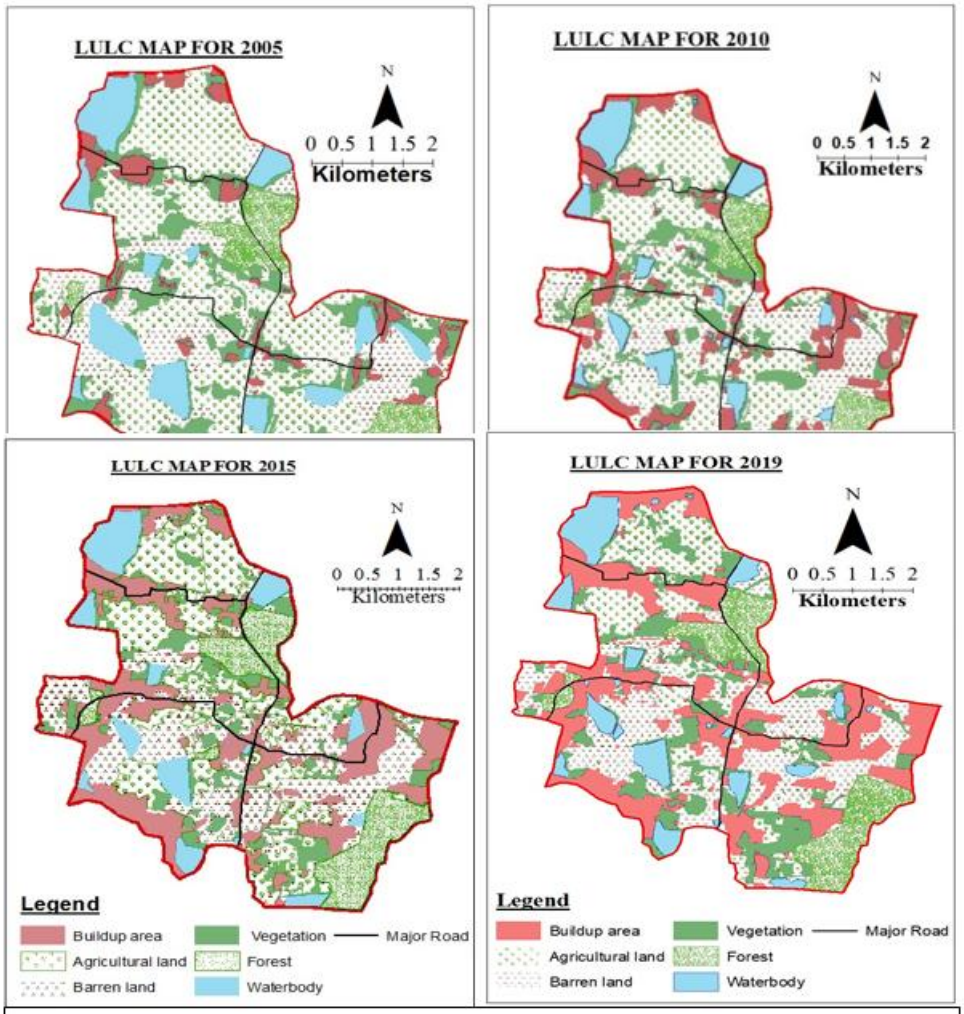

Figure.2 LULC Maps for the Years2005, 2010, 2015 and 2019

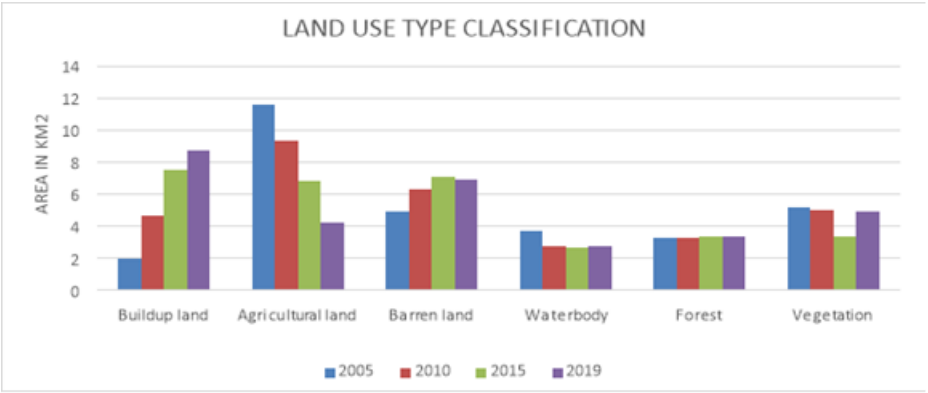

Figure.3 Land Use cover changes between 2005. 2010. 2015 and 2019

Table 1: land use changes south peri urban Chennai between 2005, 2010, 2013 and 2019				
Land use category	Area in % 2005	Area in % 2010	Area in % 2015	Area in % 2019
Agricultural land	38	30	22%	14%
Build-up land	7	15	24	28
Vegetation	17	16	11	16
Forest	11	11	11	11

Water body	12	9	9	9
Barren land	16	20	23	22

Urban expansion has reduced agricultural lands available, which has had a significant impact on farmers, who are sometimes stay with little or no land to cultivate, increasing their new residential development in the study area. Because major urbanization the agricultural land reduction, due to rapid growth in population and economic development, resulting in dramatic changes in the peri-urban land us and land cover pattern. Generally, the greater the degree of urban expansion, the greater the loss of agricultural land. The area of various land use classes was prepared using land use map and change detection analysis was carried out for the years 2005, 2010, 2015 and 2019 (Figure.2 & 3) it shows that there is a rapid increase in the build-up area and decrease in the agricultural land, it was found that agricultural area has been reduced from 11.6 sq.km to 4.2 sq.km and built-up area has increased from 2 to 8.7 sq.km, which shows that urbanization impact over the study area because of the proximity of the city. According to Tabl.1, the built up (settlement) area has been increases 7% to 28% since 2005 to 2019. This indicates the percentage of population increased along with development activities, so agricultural land as well as exposed area has been changed into built up area. The land use maps will contribute to both the forecasting possible further changes in growth patterns and for the development of sustainable urban land use. The urban expansion of the city has destroyed agricultural land which cannot be recovered.

Farming gradually became a minor occupation as urbanization changed the land use. Table.2 shows the order of the decline of agriculture in the water marketing villages. This declining trend of agriculture and the depletion of the water table force the people to move out in search of employment opportunities and vice versa. Land use policy or law should be made by government authorities. Changes in land use and land cover impact cover both environmental quality and the quality of life. The land use map is forecasting possible future changes in growth patterns and also for the development of sustainable urban land use.

Impact of Urbanization

Due to their proximity to the city and improved transportation facilities, the agricultural labourer's shifted to other places and changed their occupation. The decline of agriculture varied from 51.9% to 95.6% during 2011–2018, as shown in Table 2. Farming gradually became a minor occupation as urbanization changed the land use. Table 2 shows the order of the decline of agriculture in the water marketing villages. This declining trend of agriculture and the depletion of the water table force the people to move out in search of employment opportunities and vice versa

Table.2 Dynamic of land use Change between 2005 and 2019

S.no	Land use type	Area in 2005 (km^2)	Area (%)	Area in 2019 (km^2)	Area (%)	Difference
1	Build up land	2	6	8.7	28	**22**
2	Agricultural land	11.6	38	4.2	14	**-24**
3	Barren land	4.9	16	6.9	22	**6**
4	Waterbody	3.7	12	2.8	9	**-3**
5	Forest	3.3	11	3.4	11	**0**
6	Vegetation	5.2	17	4.9	16	**-1**

IV Conclusion

The conversion of agricultural lands is one of the results of progress in the developments. The land use maps for the years 2005, 2010, 2015 and 2019 were prepared using the Google earth satellite images. It was found that agricultural area has been reduced from 11.6 sq.km to 4.2 sq.km and built-up area has increased from 2 to 8.7 sq.km within 15 years, which shows the urban impact over the

study area. However, with Google earth images, one can able to clearly see the individual buildings and hence it becomes possible to perform land use change detection analysis even at the small level, which will help the planners and policy makers for carrying out various urban planning and management activities.

Due to urbanization impact, the agricultural labourer's shifted to other places and changed their occupation. The decline of agriculture varied from 51.9% to 95.6% between 2011and 2018 Farming gradually became a minor occupation as urbanization changed the land use. This declining trend of agriculture and the depletion of the water table force the people to move out in search of employment opportunities and vice versa

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