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LAND USE CHANGE AND PERCEPTION MAPPING ON THE DYNAMICS OF LIVELIHOODS IN THE SATELLITE TOWN, SRIPERUMBUDUR, CHENNAI

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ABSTRACT

There has been tremendous uncontrolled growth on the population worldwide due to various developmental activities happening due to industrial and commercial developments in the urban areas. These developments have in turn affected the air, water and soil quality of the region. Unplanned growth in the urban areas otherwise called as sprawl has affected the urban green spaces which act as major lung spaces of the city. They help us in improving the air quality, providing shade and shelter for the birds and some animals. They are the major source of oxygen and also provide various recreational and aesthetic qualities. Cities and peri -urban settlements must be prepared to meet the challenge of unplanned settlement or slum formation. The move towards satellite cities promises to bring greater automation, intelligent routing and transportation, better monitoring and better city management. As this planned town is located in the suburbs of Chennai, rapid growth of commercial, industrial and residential developments take place in this region. The development of the satellite town will create an enormous change in the land use which in turn will create a disturbance in the local rural inhabitants. Hence an effort was taken to understand the changing pattern of the land use and the impact of the change on the local people. Due to increase in commercial and functional activities agricultural lands have converted for these purposes. There has been an increase in the migratory population from other parts of Tamil Nadu and from different parts of the country as well. At first demographic structure and its related changing occupational pattern have been analysed and a perception survey has been undertaken by the authors to measure the level of satisfaction/dissatisfaction and to explain the factors behind it. Various methods including mapping of land use/ land cover change and statistical analysis have been used for this perception mapping to give some understanding on the role of geo-informatics to be used for future planning. A careful study has been made to observe the effect of land use change on the socio-economic conditions of the satellite city, Sriperumbudur in Chennai.

KEYWORDS: Geo-Informatics, Perception Mapping, Livelihood Dynamics, GIS, Satellite City, Remote Sensing

INTRODUCTION

Urbanisation has led to land degradation. Degradation is caused by over cultivation, over grazing, deforestation, inefficient irrigation and industrialization.(Anderson et al,1976). In the recent times productive lands are converted to Special Economic Zones (SEZ) by the government for the benefit of the society (Carotto et al, 1992). Kanchipuram district has been chosen to be favourable destination for SEZ considering the facts like nearer to the Chennai city, harbour, airport and cheap labour. Interesting fact is that the entire district is an agriculture productive district, surplus irrigation is available by means of rainfall, number of tanks with surplus water, number of tube well and bore wells. Whereas recent development

of SEZ in Kanchipuram District has ruined most of the productive areas / zones covering taluks like Sriperumbudur, Tambaram, Kanchipuram and Cheyyur. It covers an area of 48.21 sq.km.

The Sriperumbudur town panchayat in Kancheepuram district has been chosen as a satellite town under the Centrally-sponsored scheme of Urban Infrastructure Development. (Bigman et al, 2000). The satellite city is been developed to reduce the pressure caused by surplus urban agglomerations by developing infrastructure facilities in satellite towns and sustain them by implementing reforms such as energy and water audit, cost-effective technologies and capacity enhancement for improved operation and maintenance.(Agarwal et al 2006, Joy Karmakar et al, 2015). Due to this urbanisation a huge amount of agricultural land has been transformed into urban utilities. For this reason more than 85% of agricultural labour and cultivator are now in other occupational activities like security guard, construction labour etc. So it is necessary to know the socio economic condition of the existing rural population of the region.

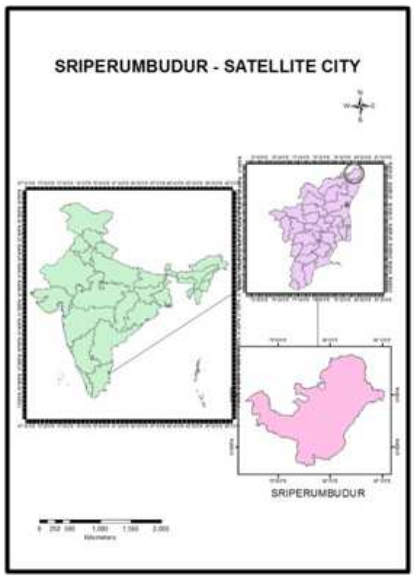

Figure: 1

STUDY AREA

Chennai city has grown tremendously over the past 20 years. A preliminary investigation was carried out to understand the growth trend in the satellite township, for choosing Sriperumbudur Taluk as the study area. Drastic change has occurred in the LULC pattern in Sriperumbudur in the last decade. Sriperumbudur covers an area of around 808.84 sq.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 town / taluk, located in Kanchipuram district, in the northeast of TamilNadu state. It is proximity to Chennai (capital of Tamil Nadu) and located around 13˚1’ N and 79˚51’E to 13˚3’and 80˚11’. Since 2000, Sriperumbudur has seen rapid industrialisation, 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, Jabil, Dell, Hyundai and Samsung 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. Lack of basic infrastructure to support this migrating population is a big problem faced by the planning authorities.

OBJECTIVE

Due to rapid urbanisation in the study area, there is a significant change in land use and land cover and as well as in demographic structure. The following are the objectives of the study:

- To provide quantitative information about the Landuse / Land cover change.
- To analyse people's perception about this development of satellite city and
- To find out occupational transformation of dwellers.

METHODOLOGY

Data Acquisition

IRS satellite images LISS III data of Sriperumbudur town were obtained for the years 2009 and 2012 from National Remote Sensing Agency (NRSA).

Image Pre-processing

The satellite images obtained were georeferenced and projected to UTM with WGS84 as datum. The area of interest (AOI) is subset from the 2009 and 2012 images.

Supervised Classification of Landuse of Imageries of 2009 And 2012

Supervised classification was performed on both images using Maximum Likelihood algorithm in ERDAS 14. From there the land use and land cover maps were derived. From there the land use and land cover maps were derived with the following six classes: 1. Agricultural land, 2. Built up area 3. Water bodies, 4. Fallow land and 5. Others.

Primary Data Collection

A questionnaire is prepared to get the primary data basically demographic information like age, sex, occupation, income pattern, occupation and satisfaction and dissatisfaction levels regarding low compensation, change in income, loss of job, pollution, enhancement of facilities, and various problems arising due to the change. Based on the data acquired the index of satisfaction for various factors was found out. Satisfaction Index for the change in income levels was found out.

Weighted score was calculated for various enhancement facilities and problems were found out based on the reply got from the respondents. Spider gram was prepared from the results obtained. From the results obtained the perception mapping was carried out linking the change in land use with the factors.

RESULTS AND DISCUSSIONS

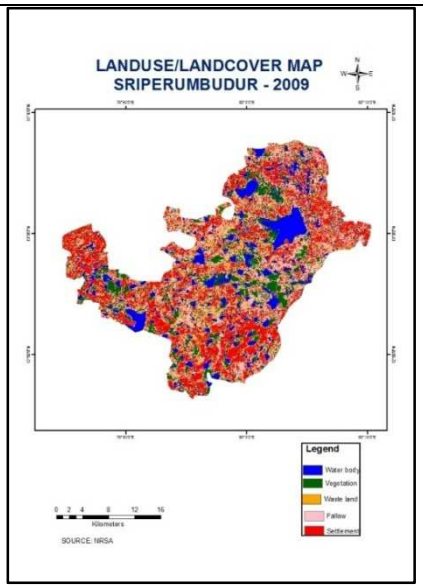

Figure 2: LULC Sriperumbudur 2009

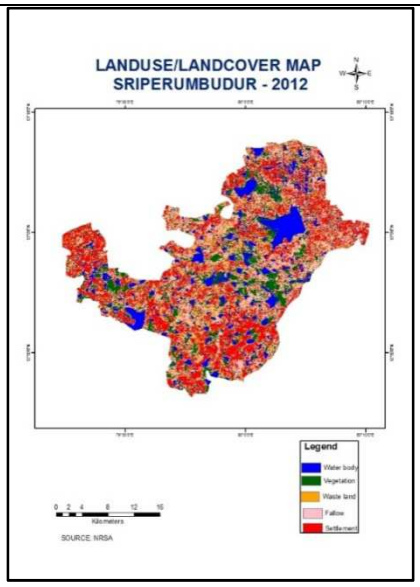

Figure 3: LULC Sriperumbudur 2012

Figure 3: Landuse / Landcover of Sriperumbudur2009

By comparing the 2009 and 2012 satellite images, it shows a considerable change in the land use and landcover

The vegetation has been reduced from 15% to 10%. All the land use categories have shown a reduction in area except for built up area which has increased from 35% to 55%. This shows that most of the fallow land and waste lands have been used for commercial purposes and other building activities. The reduction in the water bodies also shows increase in urbanisation activities in the satellite town. Though there are few agricultural activities prevalent in the area, the existing green cover has considerably reduced. The star diagram revolves that people are satisfied regarding improvement in transport facilities, electrification, industrialization, employment opportunities. On the other hand people of existing

rural population mostly face job insecurity and unemployment problems. This is mainly because of people who were engaged in agricultural activities and they have poor knowledge of technology or employment in newly developed service sectors. At present they are mostly engaged as daily labour.

Figure 4: Landuse/Land cover of sriperumbudur - 2012

Landuse Change

Landuse / Landcover Classes	Area in Sq. Kms	
	2009	2012
Vegetation	121.33	80.884
Built Up	283.1	444.862
Fallow Land	202.21	145.6
Waste Land	121.33	80.884
Water Body	80.884	56.62

Impact of Landuse Change

A questionnaire survey of the house hols was done to understand the impact of land use and land cover change on the socio economic condition of the population.

A questionnaire is made to get the following information.

Demographic information about the respondents. a) Age; sex b) Education c) Occupation d) Income.

Figure 5: Satisfaction Index of Different Factors in Satellite town

Satisfaction / Dissatisfaction regarding a. low compensation b. Loss of job and c. Change in Income.

Based on the opinion of the respondents the facilities are listed as follows:

- Transportation and communication
- Health Care
- Education
- Banking
- Employment
- Electrification and
- Industrialisation

Index of satisfaction (IS) = Fs – Fd / N is calculated.

Where Fs = Number of satisfied respondents

- Fd = Number of dissatisfied respondents
- N = Total Number of respondents

Change in Occupational Pattern

As agriculture is affected due to expansion there are more people involved in business, daily labourers, suppliers and other activities.

Income and Satisfaction and Dissatisfaction Levels

In the perception survey it has been found out that the people who belong to the low income group and low education level as well, they are highly dissatisfied. The reason could be the lack of technical skill to get a good job in urban activities. The high income group could be the employees in the neighbouring industries or due to good business in newly developed market potential area. Daily workers get good jobs in different offices or in commercial activity

Figure 6: Different Income Level and their Satisfaction and Dissatisfaction Levels

Figure 7: Weighted Score of Different Enhancement Facilities in Satellite Town

Facilities and Problems

Authors get a database (priority wise) on perception regarding facilities and problems. The Weighted scores are given based on the respondent's views collected by the questionnaire.

Normalized Weighted Score of Facilities

$$NWSF = \sum Pi\ ri\ /\ P1\ R$$

Where,

NWSF= Normalized weighted score of facilities Pi (Priority) = 7- i, i= 1 6

ri= number of respondents who have chosen a particular facility as their priority.

P1= Maximum number of priorities,

R= Total number of respondents.

Normalized Weighted Score of Problems

$$NWSP = \sum Pi\ ri\ /\ P1\ R$$

Where,

NWSP= Normalized weighted score of problems

Pi (Priority) = 6 - i, i= 1 5

ri= Number of respondents in the i^{th} priority for the particular problem.

P1= Maximum number of priorities, R = Total number of Respondents

Figure 8: Weighted Score of Different Problems

CONCLUSIONS

The analysis has shown that the Sriperumbudur has undergone some vigorous developments in population composition: household land size holding; and household land use changes leading to declining significance of agriculture. Thus non – farm activities have become common among most households. The infrastructural developments. (eg. Roads, schools, electricity, telephone etc.,) together new business establishments were the main reasons that changed the mind-set of the people to look out for a better income opportunities other than agriculture.. However most of these developments are limited to the financially constrained informal sector and hence cannot provide sufficient high income opportunities to lift majority of the population from poverty.(Lunetta Ross et al, 2006) Therefore, the possibility for peri-urban development to accomplish a reduction in the poverty for the households will not only depend on the infrastructural developments but rather the socio-economic opportunities that arise from the developments which will be dependent on the developers involved and the government policy.

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