DETECTING LAND USE CHANGE ON PRANTIK TOWNSHIP, SSDA, WEST BENGAL USING GIS

Pramila Nandi*

ABSTRACT

Land resources are the most important natural wealth of any region and their proper utilization is a matter of utmost concern to its people (Codjoe, 2007). Changing pattern of land use is not a new phenomenon rather this is a constant process which has been continuously taking place over time and space. Spatial pattern of Land use changes have been studied in the Prantik Township by using two periods (1992 – Township Layout by SSDA & 2011 – Google earth image) and with the support of GIS. Using GIS, the study for Prantik Township, Sriniketan Santiniketan Development Authority (SSDA) clearly marks the awaiting problems that are caused by land-use changes. The resultant statistics also gives the scope for the future planning of land-use.

KEY WORDS : Land use , SSDA , Township , Planning

INTRODUCTION

Land use is referred to as man's activities and the various uses which are carried on land. Land use is influenced by economic, cultural, political, and historical and land – tenure factors at multiple scales. The socio-economic and technical organizational factors are interacting one another over time and the result of which is reflected on the land use pattern (Chunxiao, Zhiming & Nan, 2008). In metropolitan and urban areas, the problems relating to rapid transformation in terms of land-use are now very pronounced. As a result, the availability of detailed, timely information on urban areas is of considerable importance to both the management of urban activities and to forward planning. Prantik Township was proposed by Sriniketan Santiniketan Development Authority (SSDA) with an aim to achieve a perfect balance in modern and scientific town planning preserving the cultural and environmental heritage of Santiniketan in tune with the visualizations of the Gurudev Rabindranath Tagore. In this paper, over 1992-2011 years period, land use changes in Prantik Township were examined through GIS. Changes in land use classes were exposed. Urban land use characteristics were combined here with some plans aiming at development of township and thus it is proposed for future land use decisions to local authorities.

STUDY AREA

Now in India, urbanization process is continuing through occupying vacant land of rural people at a low cost and making of new housing complexes and township (Narayanan & Hanjagi, 2009). In case of the study area (Fig. 1), land has occupied from the rich villagers of Taltore. The study area that is Prantik Township (named after the title of a group of poems written by Rabindranath Tagore) was inaugurated in December, 1994 and it was executed by Sriniketan Santiniketan Development Authority (SSDA). Township locality is spread over 57 acres land of Taltore mouza within Bolpur C. D. block of Birbhum District. The township is extended from 23° 41' 29.24" N to 23° 41' 53.46" N and 87° 41' 38.54" E to 87° 41' 53.77" E. It is surrounded with Taltore and Mahishadal village in the north, Santiniketan and Uttar Narayanpur village in the south, Goalpara and Shyambati in the west and in the eastern part, it has Bondanga tribal village. In the north, within ½ km. of the Prantik Township there is Bolpur-Rajgram road, a branch of which has gone towards Labpur from Bondanga tribal village.

*Pramila Nandi, *Research Officer, ICSSR Research Project, Dept. of Geography, Visva-Bharati, Santiniketan - 731235

OBJECTIVE

The objective of this paper is to produce land use map of Prantik township at different years in order to detect the changes that have taken place in land use pattern between proposed layout of the township provided by SSDA at the time of distribution of lease of plots in 1992 and the existing land use from Google Earth GeoEye imagery of 2011.

DATABASE & METHODOLOGY

The study is based on layout map of Prantik Township (proposed by SSDA in 1992) and Google Earth GeoEye imagery of the township dated 01/09/2011. Both the images have been georeferenced by the author. Land use mapping has been prepared using ArcGIS 9.3 software. Raster to vector conversion for 1992 image has been carried out through digitization from the drawing of SSDA in ArcMap as .shp file and land use classes have been done according to SSDA's information. The land use classes for 2011 have been created using manual identification and onscreen digitization using Google Earth software as .kmz file format and different land use classes have been converted into vector layers (Arc view shape file) in ArcGIS 9.3 software. Then land use statistics of the two years (1992 & 2011) have been obtained from the software and ground reality has also been checked by the author through field survey.
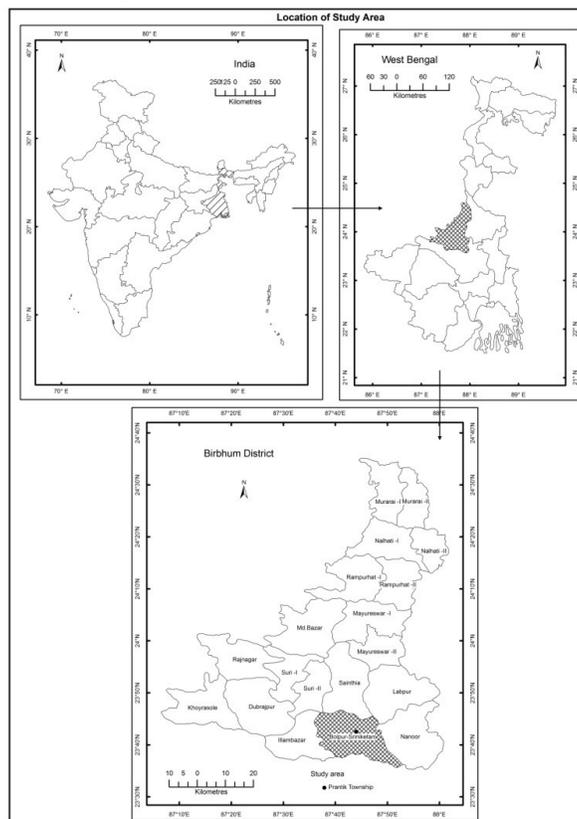

Fig. 1

RESULTS & DISCUSSION

The resultant land use maps (Fig. 2 & 3) show the land use dynamics of the study area. It includes 6 land use categories such as residential area, commercial area, institutional area, park/green belt/open space, utility services and roads and terminals. The allocation of area in different land use classes for the year 1992 and 2011 has been summarized in table 1. Figure 2 & 3 and table 1 depict the spatial variation of each land use class over time.

Change in Residential Area

Residential areas in the Prantik Township have been increased from 1992 to 2011 at 5.37percent. In the latter, above half of the total area of the township (57 acres) has become residential. Residential plots distribution does not seem much planned in 2011 land use map as it is in the proposed land use map of 1992 and figures show that many other plots have been converted to residential plots. Increasing or expanding in residential area is a common trend of urbanization in our country due to huge population pressure and this township is not an exception.

Change in Commercial Area

Commercial area in total has increased 0.04percent from 1992 to 2011. Commercial plots were 5 in number and they were well distributed over the township in the proposed land use of 1992. Though commercial area has been increased but from the 2011 land use map, it can be said that there is only one market place made by SSDA and the plot size is very large in comparison to 1992 which is not an indication of proper planning. The commercial service for the township people has been neglected by the concerned authority.

Change in Institutional Area

In the township, an educational institution (Techno India Public School) has been set up and the school has up to 10th class. This is the only institutional area within the township as the land use map of 2011 reflects. From 1992 to 2011, institutional area has been increased 0.21%.

Change in Park/Green Belt/Open Space

This land use category over a period from 1992 to 2011 shows tremendous change. The land use class has been doubled from its proposed area within the township. But that doesn't mean increase in greenery in the township; due to lacking of proper implementation of SSDA, many plots have been remained vacant. There is one park within the township and it is maintained quite well. The existing green belt of 1992 land use map has been degraded a lot and there are no such big trees, only bushes have remained.

Change in Utility Services Area

2.79 percent have been increased in the area of the utility services from 1992 to 2011.The condition of the utility services is quite similar as of the commercial area. In the proposed layout of the township, the utility services includes a nursing home, a community hall etc. The field survey by the author reveals that there is a *Durga Mandir* within the township but no such nursing home or community hall.

Change in Roads & Terminals Area

Area in roads and terminals shows a sharp decrease (22.88 percent) from 1992 to 2011 land use map and the only land use class which has decreased over mentioned period. In 2011 land use map, the township roads include metal and laterite-morrum roads as it was in the information brochure of SSDA on the township and most of the roads are metallic. Figure 3 indicates that there is no terminal or parking areas for buses and cars in the township at present (figure 2).

TABLE 1: LAND USE CHANGES (1992 - 2011)

Sl. No.	Land use Category	Area (in acres)		Percentage (%)	
		1992*	2011**	1992	2011
1	Residential	26.79	29.85	47.00	52.37
2	Commercial	3.42	3.44	6.00	6.04
3	Institutional	4.56	4.68	8.00	8.21
4	Park/Green Belt/Open space	7.41	15.66	13.00	27.47
5	Utility Services	1.14	2.73	2.00	4.79
6	Roads Terminals	13.68	0.64	24.00	1.12

*Source: Sriniketan Santiniketan Development Authority, Bolpur, 199
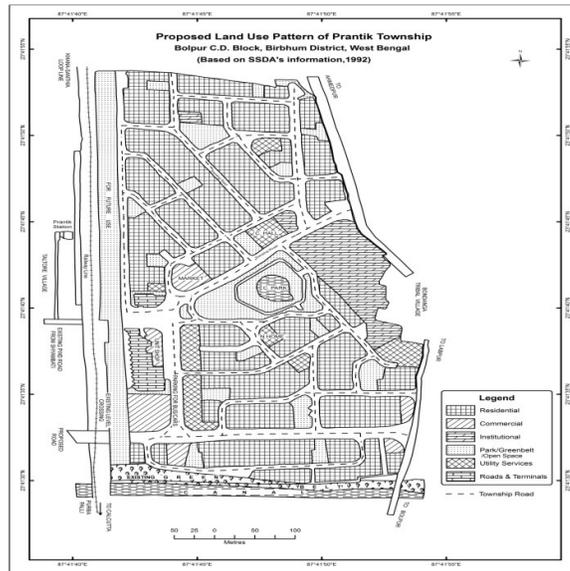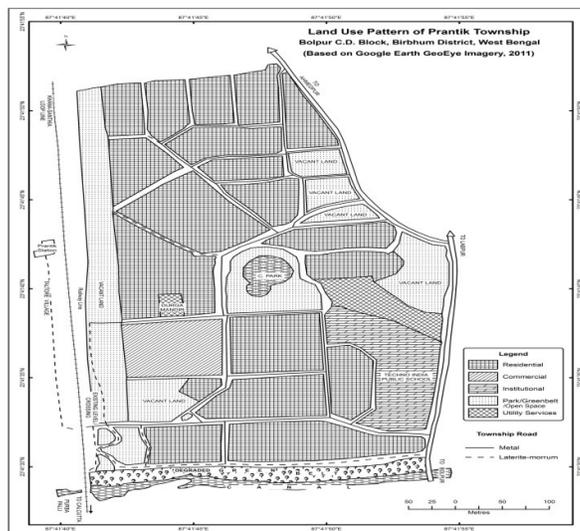**Source: Google Earth GeoEye

Fig.2

Fig.3

CONCLUSION

Prantik Township was proposed to provide a unique blend of culture and responsive environment supported by modern planning techniques and amenities which are not available in any other similar ventures in the area. The land use pattern of the township was made by SSDA keeping in mind the above. But the ground reality shows that there is a big gap in planning and execution of the township by the concerned authority and the study area experiences a notable change from its proposed land use map of 1992 (Figure 2) and land use map of 2011(Figure 3). Residential area has been increased and in between residential plots, there is no space for green. Many plots have been remained vacant due to lack of proper execution of township planning. In the township, mostly retired people live but there is no health centre till now though plot has been allocated for nursing home as

figure 2 reflects and figure 3 shows that this plot has been converted to residential. Same situation remains for community hall also. A bus/car terminal is needed. So the vacant land should be properly utilized by the concerned authority to make the township integrated and self-sufficient.

REFERENCES
Chunxiao Z., Zhiming L. & Nan Z. (2008). Using Remote Sensing and GIS to Investigate Land Use Dynamic Change in Western Plain Of Jilin Province. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. Vol. XXXVII. Part B7.
Codjoe S. N. A. (2007). Integrating Remote Sensing, GIS, Census and Socioeconomic Data in Studying the Population–Land Use/Cover Nexus in Ghana: A Literature Update. Africa Development, Vol. XXXII, No. 2, 2007, pp. 197–212
Narayanan, P., Hanjagi, A. (2009). Land-Use Change in Urban Bangalore Using GIS and Remote Sensing. University Of Craiova Series: Geography Vol. 12 (new series)