
Urban Land Use of Namakkal Town, Tamilnadu, Using Remote Sensing and GIS

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Abstract:

Urban land use is one of the major fields of research in the modern times and as such, it is studied in various academic fields, especially by urban geographers, sociologists, economists as well as planners. Emphirical studies have analyzed the functions and land use patterns of the city, and various models and theories have been propounded to arrive at an understanding of urban characteristic. The present paper have carried about the Urban Land use in Namakkal Town, Namakkal District, Tamilnadu, Using Remote Sensing and GIS.The include study of urban status, growth, development in the various decades 1971-2011.

Keywords: *Urban Land use, changing pattern, Growth by the Population, Remote sensing and GIS*

Introduction:

The classical urban studies concentrated much on the land use patterns in the cities and also formulated various models. The concentric zone model was proposed by the sociologist Burgess(1925), and is based largely on his studies of the Chicago region.He states that land use distinct features and are used for different purposes. Homer Hoyt(1939) propounded sector theory

in his study of urban layout based on the structure and growth of residential neighborhoods in American cities. He proposed a model of urban structures, based on data specifically related to residential land use pattern in most of the cities which are not built around a single center, as postulated in the aforesaid model; rather, they have developed into separate zones called sectors within the urban areas. As the present study deals with the urban development and the land use pattern of the city.

Namakal is, a Grade II Municipality and the district head quarter of Namakal district is located at a distance of 3 km east from the National Highway - 45 between Salem - Tiruchirappalli. The area of the town is 371.03 sq.km and the population is 122326 as per census 2001. It is well connected by road and rails to the surrounding urban centers. Namakal, the district head quarter town is an industrial centre, serving as a node in the southern railway network with basic facilities in administration, education, healthcare, commerce, agriculture etc. to offer to the predominantly rural hinterland. Its location on the railway line and state highways, with a substantial industrial base, is expected to boost the economic development of the town.

Study area

Namakal, is one of the major town in Tamilnadu and district headquarters of the namkkal district is located at a distance of 3 km south from the National highways-45 between Salem-Tiruchirappalli(Fig.2.1). The area of the town is 371.03 sq.km and the population is 122326 as per the census 2011.The Geographical area of the district is 3363, 35 K.m. which lies between 11.00 and 11.360 North Latitude and 77.280 and 78.300 East Longitude.It well connected by road to the surrounding urban centres. Namakkal town is one of the district in Tamilnadu state. It is popular in egg production with Lorry body construction. For administrative purpose, the district has been divided into 2 Revenue Divisions, 4 Taluks, 30 Revenue firkas and 454 Revenue Villages (Including group Villages). For local arrangements, the district has been divided into 5 Municipalities, 15 Panchayat Unions,19 Town Panchayats and 331 Village Panchayats.

Namakkal district is underlain entirely by Archaean Crystalline formations with Recent alluvial deposits occurring along the river courses and Colluvium at the foot hills. The prominent geomorphic units identified in the district through interpretation of Satellite imagery are 1) Structural hills, 2) Bazada zone, 3) Valley fill, 4) Pediments, 5) Shallow Pediments and 6) Deep Pediments. A number of hill ranges are located in the eastern and northeastern parts of the district, whereas the southern, western and northern parts of the district are plain to undulating, dotted with a few isolated hillocks. The soils of Namakkal district can be broadly classified into 5 major soils types viz., Red Soil, Black Soil, Brown soil, Alluvial and Mixed Soil. Major part of the district covered by Red Soil. Block soils are mostly seen in Namakkal taluk. . The hot weather begins early in March, the highest temperature being felt in April and May. Weather cools down progressively from about the middle of June and by December, the mean daily maximum temperature drops to 30.2°C, while the mean daily minimum drops to 19.2°C and 19.6°C in January in Salem and Mettur Dam respectively. The important wards 35, 33,31,34, are the highest population showing the lowest population in the study area .The area is one of the most important for the Tamil nadu one and gradually developing urban town. The Namakkal town one of the taluk in the Namakkal district in Tamilnadu. The town well connected transport from Salem, Karur, and Tiruchirappalli district. The NH 45 passing via the Namakkal town.

Objectives

- To study the Urban Land use changing pattern over the year 1971-2011, through geospatial Techniques.

- To Interpret the various Urban Land use like Residential, Commercial and Trade, Transport, Education and Health use in various decades
- To analysis the overall changes of the Namakkal Urban town.

Research Methods

Present paper is based on the remote sensing spatial as well as the non-spatial data available from the various sources for different periods. Urban growth of the study area for 1971 - 2011 has been mapped with the help of Landsat satellite data. To measure the areal extension of city different time MC map has been used. The changes in land use pattern have also been assessed and mapped with the help of Arc GIS 9.3. Field verification was performed throughout the study area using GPS. The paper focuses on interpreting city's land use change pattern and growth based on spatial and non-spatial data. LISS III 2002 and 2011 satellite data are used to identify different patterns of land use changes and growth of the study area. Analysis of Namakkal growth over a period of 10 years allows a good understanding of urban development.

Result and Discussion

Introduction

Urban growth refers to the route of growing concentration of people inside a town or city which commence from a small dot and after that it spreads in dissimilar ways with varying intensity of growth from one urban place to another. (Paul and Dasgupta, 2013). The rapid urban growth through economic development has been an issue of concern to the planners in all over the world. (Singh, A.L., 2012). The rapid urbanization has changed the Indian scenario also and the landscape has felt the consequence of land conversion. Various causes of urban expansion for example population growth, economic development, migration and infrastructural innovations are resulting in transformation of villages into towns, towns into cities and cities into metro cities (Singh, et.al, 2008).

The intention of this study is to create historical land use database for Namakkal which can be used to understand urban growth and predict its direction for the same area. The potential land use will be presented using detailed classification scheme with high resolution. Therefore the following lands use classification system. i.e. residential, commercial, agriculture, industry, educations, parks, government, highway, main roads, local roads, further objectives this research are to identify and asses socio- economic data to characterize the integration of high resolution satellite remote sensing imagery and ancillary data in providing data particularly for urban growth.

Urban Land use

Land use refers to man activity and the various uses which are caused on land (Anderson, 1976). The classical urban studies concentrated much on the land use patterns in the cities and also formulated various models. The concentric zone model was proposed by the sociologist Burgess (1925), and is based largely on his studies of the Chicago region. It is the surface utilization of all developed and vacant land on a specific point at given time and space. Land use is also related to conversion of land from one major use to other general use. The present paper have discussed Urban Land use of Namakkal Town through the Land sat TM images in the various decades .

Residential Use

Marble etc at 1959 has proposed a series of models in which a residential site selection measured by land values in hypothesized as a function of location within the city, in relation to its centre, and other major business nuclei. The locational pattern of land arrangement of activities at strategic points which have provided a theoretical base and frame work for most of the current research work, not only in western countries but also in a developing country like India. Gibbs P.Jack (1961) states that most studies of the internal, spatial structures of urban areas are concerned with the nature of the distribution of a phenomenon in the area or the association between the distribution of two or more classes of Phenomena.

Land under residential area forms a major use of the total urban land in Namakkal town. About 50 percent of the total developed land is under this category. The present pattern of residential land use shows a mixed charter of both planned and unplanned growth in the town. Like other towns or cities of the state, the heart of the inner zone is highly congested. The peripheral areas have very low density of houses. Existing physical features like hillocks have played an important role in influencing the pattern of residential area. Although the area under residence in rural villages has also increased, a principally large area has gone under residence and housing complexes in the urban centers.

The residential development is spread over 15 sq.km. High density residential development is finding in the old parts of the town especially in the areas around Namakkal Town. While the newly developed residential areas are well planned with regular street pattern, well shaped plots and spaces for public use, the old are devoid of public spaces and a street pattern.

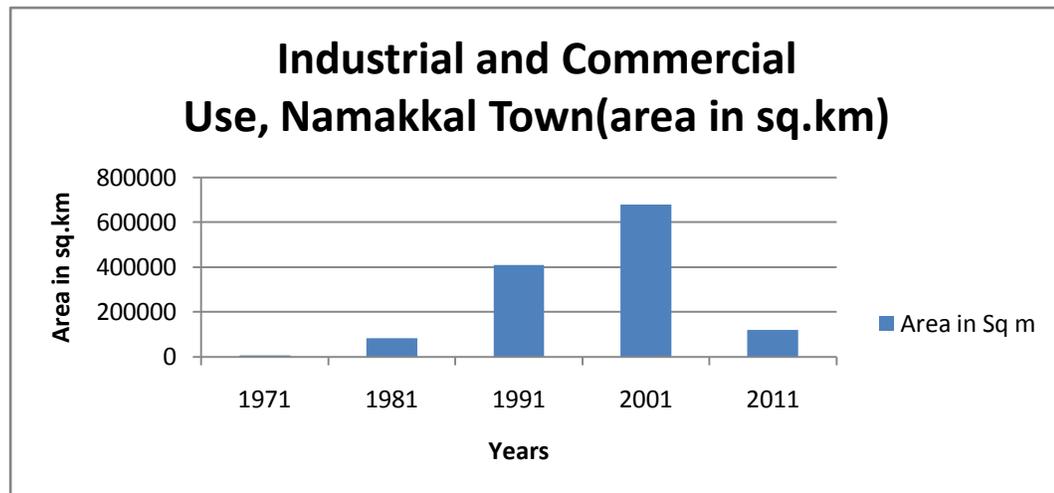
The various decadal Residential use were find through Landsat Image TM, in 1971, the uses concentrated high and extended towards north-north and north-west direction. In 1981 is slightly improved the residential zone and 1991, is have double the amount of the population growth with facilities. The residential zone was randomly seen and growth the entire Urban town. In 2001 year, the growth of the use south-SW wards and 2011 year, the growth of the use all surrounded urban zone.

Industrial and Commercial Use

Namakkal finds a place of importance in the map of India because of its Lorry body building industry, a unique feature of the town. More than 150 Lorry body building work shops and a number of subsidiary industries of auto body works are operating since 1960. There are Lorries, Trailers and L.P.G. Tanker Lorries in Namakkal district. Therefore it is called as **“Transport City”**. Namakkal is the major producer of Egg in Southern Region. Hence, called as **‘ Egg City ‘**. The formation of Railway route from Salem to Karur is soon to be completed at the end of this year. The famous Tamil Poet” Namakkal Kavingnar Ramalingam Pillai” was born in this district. In memory of the poet, the State Government has established an arts and science college for women. One of the most famous Government Veterinary College is also situated near by Namakkal Town. More and more private educational/technical institutions are coming up in recent years which is a blossom for the district.

Table No. Industrial and Commercial Use

S.No	Years	Area in Sq m
1	1971	6404.058493
2	1981	82111.83996
3	1991	410564.488
4	2001	679853.8581
5	2011	118644.1



Educational Use

The town has various educational institutions around the Namakkal like Government and Private sector, Engineering, Science and Arts Colleges, and other Technical Institution. The school education is dominant in the district especially in the in and around of the town. The schools in the town are like metric and non-metric schools are situated the district. From the Landsat image find the location of the educational points in radial pattern, developed various decades.

Transport and Communication Use

In the past few decades, the growth of transport, use of the population, developed the infrastructure, facilities, trade and commerce and other facilities in the Namakkal urban town. The Urban town is one of the major industrial zone in the tamilnadu, connected SH. NH like salem-Tiruchy, Salem-Karur passing through the town.

Recreational Use

As per the secondary data information with field visit, check the Urban Land use of the Namakkal Town, various use, with in the land the heart of the town were attracted the Children park, Lake and other Recreational plays benefit to the people of the town. The Urban Land use delineated through the Landsat TM Images, identify the Recreational use. The most of the land use scattered in the town, particularly centre portion, and east showing the Theaters, Temples, and park.

Mixed/Open Land Use

The Urban land use of Namakkal town is rapidly developed due to the Industrial and commercial activities, concentrated in the mean centre, and along the highways. The mixed/Open land use, either waste land or land without scrub/ for uses to the burial ground in the various community peoples. From the Land sat Images, identify the open land in the east ward of the town.

Urban Land Use change Between 1971-2011

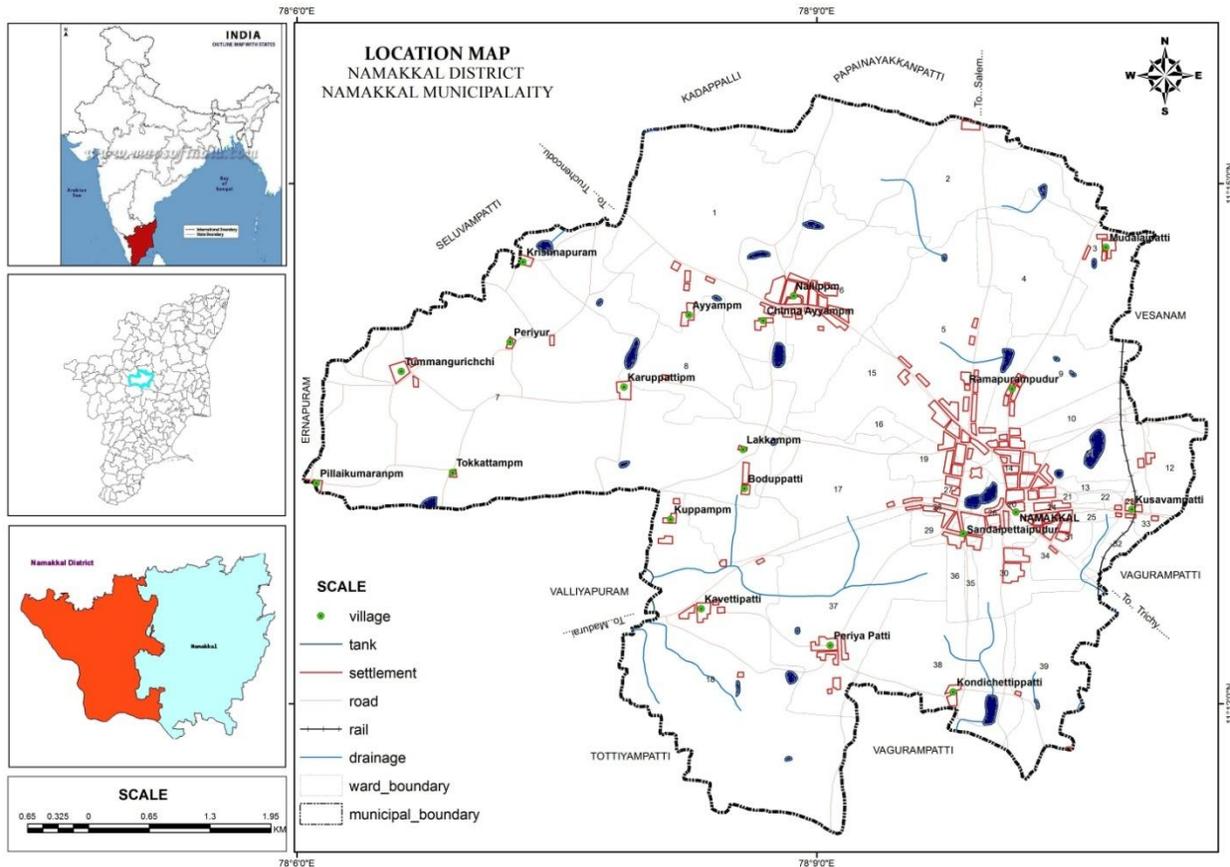
In general, every place developing any one of the factor, may be the growth of industrial activities, or infrastructure, economic importance of the activities, in other factors for better

employment, education, and almost the commercial points one. Namakkal is one of the growing industrial sector among the Tamilnadu. We state in the previous chapters about the industrial activities in and around of the Namakkal town. The present paper, have studied the urban Land use, with Land sat images in various decadal . The overall concentration between 1971-2011, based on the Land sat image, in 1971, based on the SOI , the concentration of the settlement in the core portion of the town, seen scatterly in radial pattern, than 1981, just few places only expanding toward in the S-W direction. In 1991 year, the growth means were randomly seen in the entire urban town. Again the 2001, S-S, S-W direction and 2011, is comparatively more concentration of the growth in the all direction. In other uses like, education, health, Recreational is more concentration the core of the town. The overall the urban land use, transport and pattern of settlement is concentration around the Namakwa fort and southern portion of the town.

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Map No.1 Study area, Namakkal Town



Map No.2 Urban Land Use, Namakkal Town

