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Abstract: Generally, Urbanization in developing countries like India has been characterized by a growing concentration of population within the existing urban centers. Such a concentration, which is most evident in metropolitan cities, has exerted a stress on urban infrastructure and services, leading to a degradation of physical environment and deterioration in the quality of life of residents. The acute problem of slum formation is found not only in the big cities but also in medium and small cities and towns "A slum is a contiguous settlement where the inhabitants are characterized as having inadequate housing and basic services"-. Because of the high, proportion of slum dwellers among the urban population, the problems of urban poverty areas are of particular concern. In most of the municipal areas proper up-to-date maps of slums along with proper database and genesis of its growth are not available which create problem in developmental process. We need resources for all our personal needs and development. The art of Geomatics technology has been the proven technology in mapping slum all assessment and also the temporal changes in the resources and environment, both due to various morphotechtonic and morph dynamic process. The phenomenal revolution in computer technology has provided such capabilities.

Keywords: Slum, Spatial and Non Spatial, Urban Planning, Geospatial Technology, High Resolution Image.

INTRODUCTION I.

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m U}$ rbanization in developing countries like India has been characterized by a growing concentration of population within the existing urban centers. Such a concentration, which is most evident in metropolitan cities, has exerted a stress on urban infrastructure and services, leading to a degradation of physical environment and deterioration in the quality of life of residents. Also the high potential of the surrounding regions around these metropolitan cities remains largely unexplored because of the unplanned developments/ urban sprawl which border these cities. The need of the hour is "New Planned Self-Sufficient Cities" with high-quality sustainable infrastructure which would also reduce the pressure on the existing cities.(Dhanabalan, 2008)

The term "slum" is used in this report in a general context to describe a wide range of low-income settlements and or poor human living conditions. There exists inadequate explanation about the definition of slums. "Slum" or "Slum Area" - is a compact settlement of atleast 20 households (for Special Category States it is 10-15 households),

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with a collection of poorly built tenements, mostly of temporary nature, crowded together usually with inadequate sanitary and drinking water facilities in unhygienic conditions. Typical examples are the inner-city slums of many towns and cities in both the developed and the developing countries. Slums also include the vast informal settlements that are quickly becoming the most visible expression of urban poverty in developing world cities, including squatter settlements and illegal subdivisions. The quality of dwellings in such settlements varies from the simplest shack to permanent structures, while access to water, electricity, sanitation and other basic services and infrastructure is usually limited or not available. Such settlements are referred to by a wide range of names and include a variety of tenure arrangements. The coverage of settlement types is even more complex when one considers the variety of equivalent words in other languages and geographical regions: chawlschalis (Ahmedabad, Mumbai), (Kanpur), katras (Delhi), bustee (Kolkata), ahatas (Maharashtra), cheris (Chennai).(TNSCB, zopadpattis August 2013). Based on the visual interpretation of the image and field survey slum maps can be prepared for the different physical parameters. To know the severity of the slums, a comparison can be done based on' the physical factors of a developed slum with the undeveloped slum and a map showing the severity of the slums can be prepared. A database for the slums is necessary so that the condition of each and every house can be known. Hence, a database can be prepared and labeled with the help of necessary socioeconomic information, ground checks etc. To decrease the affects by these slums, government need a database consisting the complete information focusing their life style and facilities. The slums have to be graded showing the condition of the slums. Hence, proper plans and suggestions can be made to improve the slum areas. By this work the slum maps can be updated along with proper database and can be used as a base map for many government and semi government organization in a very rapidly growing urban area. Based on these literature review methodology of present work has been prepared and as explained.(Kamal Kumar, May 2014). (Sumanta Das, May 2014) The present study is to map the various slums and identify the physical characters like spatial distribution and growth. The slum selected for the present study is Tiruchirapplliai district and case study (Indira nagar, Ponmalai zone);



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Is a under non notified slum in Tiruchirappalli Dt., boundary. High resolution image is used for mapping of Tiruchirappalli Dt. Non spatial data for these slums have been collected from the field survey with the Questionnaire. Slum spatial and non-spatial (field and survey) layers have been digitized for all the houses (total HH110nos) in GIS environment.(McDonnell., 1998).



Figure 1. Urbanization in Tamil Nadu

II. OBJECTIVE

The general objectives of the project are,

- Demarcation of Slum area identified in Tiruchirappalli region, Tamil Nadu and Mapping and analysis of prioritization of slums to taken up for development in a phased manner.
- To preparation of various thematic maps using geospatial technology such as slum tenability map, Existing land usemap, landowner Map, household property map, and case study for consolidated GIS-MIS integration for India nagar, Ponmalai zone, Tiruchirappalli region.

III. METHODOLOGY

Step by step assignment

- Task 1 Using high resolution satellite images and preparation of base maps for the whole Tiruchirappali city and its fringes was carried out. To Identification and inventory of all slum clusters of the zones carried out with the help of satellite image.
- Task 2 Questionaries' & Collection of details identification data of slum dwellers
- Task 3 Preparation of Various thematic maps and Data Model and GIS-MIS integration to

Development of Slum Map for every slum within the region and its fringes using GIS software with satellite images, collating spatial information with respect to plot boundaries, network of basic infrastructure like roads, slum boundary map zone wise and Utilitiesetc. and superimposing this on the satellite image and importing them into GIS platform.

Task 4– To Integrate GIS-MIS data baseband prepare Slum Households Information System. QA/QC and report.

A. Overview of City

Tiruchirappalli, rock city, called as Trichy is located in the central region of Tamil Nadu state, India, and situated on the banks of the river Cauvery, in the state of Tamil Nadu as shown in Fig.1. The geographic location is Latitude 10°48'38"N Longitude 78°40'52"E and Elevation: 85 m above MSL.





Figure 2. Tiruchirapplli Location Map

The connectivity of Air - Tiruchirappalli has an international airport at a distance of 6km from the city Centre. Road- Frequent bus services connect the city with important places of South India. And Rail- Important railhead of Southern Railway. The climate is Tropical -Max. 37.1°C Min. 26.4°C; winter- Max. 22°C and Annual Precipitation: 835 mm. The City Administrator is Tiruchirappalli City Corporation.

Tiruchirappalli City spread over to 167.23 Sq.km with four zones namely Srirangam, Ariyamangalam, Ponmalai (Goldenrock) and Ko. Abhishekapuram. The details of the wards and area of each Zone is shown in Table. There are 65 wards in Tiruchirappalli Corporation. The ward number from 1 to 65. Among the 65 wards the following wards no. 11, 12, 13, 16, 17, 18, 22, 24, 32, and 34 do not have any slums.

Table 1. Details of Zones, Wards, Households, Population and Area of Slums in Tiruchirappalli Region

Sl. No.	Zone	Wards	No of Wards	Wards in Slums	No of Slums	No of HH	No of Populati on	Area
1	Srirangam	1 to 6, 8 to 13, 16 to 18	15	1 to 6, 8 to 10	65	7820	29578	19.78
2	Ariyamangalam	7, 14, 15, 19 to 29, 33, 61, 62, 64	18	7,14,15,19–21, 23,25–29, 33,61,62,64	80	8741	35814	27.03
3	Ponmalai (Golden Rock)	30 to 32, 34 to 39, 42 to, 44, 46 to 48, 63, 65	17	30,31,35-39,42- 44,46-48,63,65	59	7054	29934	56.75
4	Ko.Abishekapuram	40,41,45, 49 to 60	15	40,41,45,49-60	60	5400	18211	63.67
		Total	65	55	264	29015	113537	167.23



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It can be observed that the total number of households in 237 slums around 22,524, catering to the needs of the 77,706 people. The topology of Tiruchirappalli is flat. It lies at an altitude of 78 m above sea level. The area of the city is

167.23 sq.km. While the urban agglomeration is spread over an area of 180 sq.kms. The river Cauvery flows along WNW-SSE direction through the city. Tiruchirappalli district lies at the heart of Tamil Nadu. The district has an area of 4,404 square kilometers. It is bounded in the north by Salem District in the northwest by Namakkal District, in the northeast by Perambalur District and Ariyalur District, in the east by Thanjavur District, in the southeast by Pudukottai District, in the south by Madurai District and Sivagangai district, in the southwest by Dindigul district, and in the west by Karur District. Kaveri river flows through the length of the district and is the principal source of irrigation and water supply.



Figure 3. Urbanization Boundary and Population

According to the 2011 Census, Tiruchirappalli City has a population of 8,46,915 roughly equal to the nation of Kuwait. This gives it a ranking of 146th in India (out of a total of 640). The district has a population density of 602 inhabitants per square kilometre (1,560 /sq. mi). Its population growth rate over the decade 2001-2011 was 12.22%. Tiruchirappalli has a sex ratio of 1013 females for every 1000 males, and a literacy rate of 83.56%, higher than the state's average. The city's population is predominantly Hindu (with both Saivaite and Vaishnavaite), and there is a sizable population of Christians and Muslims. Around 10 percent of the population is Christian and the city is known for the number of churches it contains. Sikhs and Jains are also present in smaller numbers. The dialect of the Tamil language spoken here is the standard version of the language with a blend of Kongu tamil. Other languages spoken here are English, Hindi and Sowrastra. Crawford is considered as one of the expensive areas in the city, and most of the people in this are Christians. Sowrastra people are also there in large numbers in Woraiyur etc.

IV. ANALYSIS AND REPORT

Task 1: Using high resolution satellite images and preparation of base maps for the whole Tiruchirappali city and its fringes was carried out. And Identification and inventory of all slum clusters of the zones carried out with the help of satellite image.

Task 2: Collection of secondary information (Non-spatial) plays a vital role in the planning process. The data collection shall cover the after review of all data collected, additional data requirements also identified and assessed and detailed survey program with timing to prepare.



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Task 3: Preparation of Various thematic maps and data base with GIS-MIS integration to Development of Slum Map for every slum within the region and its fringes using GIS software with satellite images, collating spatial information with respect to slum boundaries, existing land use, landownership details, Tenability map and network of basic infrastructure like roads, Drainages etc. and superimposing this on the satellite image and importing them into GIS platform.

Task 4: To Integrate GIS-MIS data baseand prepare Slum Households Information System. Based on the Outcome of rectified Image, they digitized the slum areas and other features at a scale. On-screening digitization method has used for digitations of maps. GIS based Arc GIS software has used for this purpose. Feature wise manuscripts has developed for the digitizing the maps and all features has stored as layer coverage with a separate ID or code number of respective features in the GIS data base. This is further catering to the slum area mapping using Geospatial The outcome of ground truth survey and Technology.

household survey will be integrated with the GIS data base at this stage. This has provided the comprehensive database, tables and graphs. The following activities taken:

- Checking the data values from field survey.
- Spatial and non-spatial data linking
- Unique id of building generated used for linking MIS and GIS data
- Integration of the final database for each slum with the base map database and updating the thematic layers of base map accordingly
- Final Geo-database preparation with all information
- Finally the Quality checking and Quality Assurance (QA) procedure ensures the highest accuracy to the deliverables. Final base map will be prepared for depends on scale with standard symbolizing and colours.

Based on the above tasks, the Final Base Map, Thematic maps and Reports are prepared.



Figure 4. Transportation Network and zone Boundary Map



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Figure 5. Existing Land use Map



Figure 6. Tenability Map



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Figure 7. Land Ownership Map



Figure 8. Slum Density map



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Figure 9. Land Value Range Map

OBJECTID	Shape	Photo	Ward_No_	Zone_No_	Topo_No	Remarks_	Slum_Name_	FamilyID_	Old_Family_	SlumCode	SlumName_	Location1	Street	DoorNo_	TopoNo_	FamilyHead_	Age_	Sex_	Caste
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Table 2. MIS Data Indira Nagar, Ponmalai zone, Tiruchirapplai DT

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Table 3. MIS Data Indira Nagar, Ponmalai zone, Tiruchirapplai DT



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Figure 10. Indira Nagar Slum-Non Notified Household Packets Details



Figure 11. Indira Nagar Slum-Non Notified House Hold Utility Details



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V. CONCLUSION

To study the condition of slum Indira nagar slum has taken. From the current work, the following conclusions have been drawn: These slum maps for different parameters make the users to analyze and understand the condition easily. Qualitative and Quantitative analysis has been done on different parameters and corresponding slum maps were generated. The present study is limited to one slum. It can be extended to all slums of the city and necessary development plans can be proposed. Prioritization of slums can be carried out to make government to start up development activities. Slum relocation studies can also be carried by studying the existing slums. Thisslum model can support quickly identification of features and attributes by simple querying. These slum models make the system so sophisticated and, easier for the users to update the necessary features. It also provides facilities to identify the problems during the operation and to rectify the problem by obtaining all the required information about the querying in GIS environment.

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