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GEOGRAPHICAL INFORMATION SYSTEM (GIS) OF YELDURTHY MANDAL, MEDAK DISTRICT, TELANGANA, INDIA- A TOOL FOR E-GOVERNANCE.

Environmental Science

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ABSTRACT

The effective information system is necessary to make available all kinds of data related to the Mandal, easily and concisely for planning at regional level. It helps in regular updation of database over the years to ensure better availability of Mandal information. The main objective of the study is to develop a Micro Level information system providing complete information for decision-making based on their existing resources and capabilities. Hence, an attempt has been made to assess the standard of each infrastructure facility in Yeldurthy mandal, Medak district. For this purpose, type of housing, roads, water supply and sanitation, electricity, telephone, transportation facilities have been identified as the major fields of the basic infrastructure. Detailed information about the infrastructure in Yeldurthy mandal has been used for the development of the information system in GIS environment. High-resolution satellite data from IRS-P6, LISS-IV –MX Resolution of 5.8m satellite has been used for the preparation of large scale base, drainage, transportation and land use/land Cover maps supported with extensive field survey

KEYWORDS

Planning, Micro Level information system, Remote Sensing, GIS.

1. INTRODUCTION

Planners and decision-makers at Micro level have to depend upon spatial and non-spatial data for optimal interpretation. Hence, the planners need to have at their disposal sophisticated data management systems to handle such spatially correlated data. Mandal level studies are one of the most efficient ways to understand the farming systems in rural areas and also help in identifying the socio-economic and institutional constraints faced by the farming community. The emergence of Remote Sensing and Geographic Information System as a powerful tool for spatial analysis and storage has in effect alleviated the problem by computerization of the spatial data. This new technology can reduce the time and cost to the planners in organizing the data in arriving at precise conclusion and decisions. Micro Level Information System, generated in the present project which integrates the spatial village maps with non-spatial or tabular information, has demonstrated its potential for grass-root level development planning taking into consideration the local needs and constraints.

2. IMPORTANCE OF MICRO-LEVELINFORMATION SYSTEM

Micro Level Information has been defined as the "process of recording and dissemination information about the villages resources information, census, utilities, land use and use of land its associated resources". A good administration system should permit the integration of village information and land use with sociological, economic and environmental data in support of physical planning. The availability of up-to-date large-scale spatial data provides the basic framework within which development schemes can be planned and assessed and acceptable designs implemented. Mandal level information system would allow planners and citizens to quickly and efficiently create and test alternative development scenarios and determine their likely impacts on future land use patterns vis-à-vis ever-increasing population allowing public officials to make more informed planning decisions. In short, use of (MLI) in local government administration would increase efficacy, save time, improve accuracy, generate revenue, automate tasks, provide better decision support as well as being economical.

3. STUDY AREA

Yeldurthy is a large village located in Medak district, Telangana with total 1717 families residing. The Yeldurthy village has population of 7713 of which 3858 are males while 3855 are females as per Population Census 2011. This Mandal lies between 17o 46' 22" and 17o 32' 32" North Latitude, 77o 26' 42" and 77o 42' 36" East Longitude. Yeldurthy village has lower literacy rate compared to Telangana. In 2011, literacy rate of Yeldurthy village was 54.99 % compared to 67.02 % of Telangana. In Yeldurthy Male literacy stands at 66.95 % while female literacy rate was 43.17 %.

3.1 LOCATION MAP OF THE STUDY AREA:

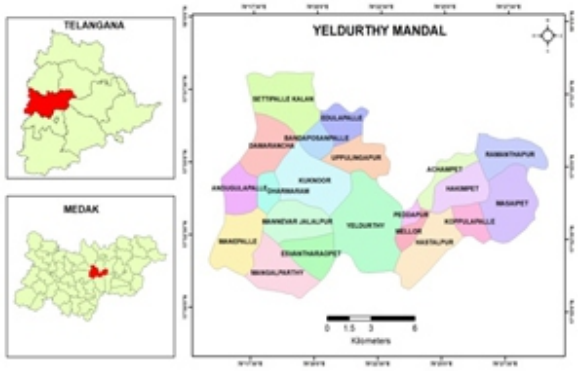

Fig.1: showing the Location map of the study area

4. OBJECTIVES

- To develop a standardized data model for Land use/Land cover for object oriented mapping of Yeldurthy Mandal.
- To prepare the digital thematic map namely, base, drainage, transportation and land use/ land cover, using satellite imageries on ArcGIS platform and to maintain a spatial digital database.
- To create a Micro-level Information System using GIS.

5. METHODOLOGY

For analysis and interpretation, two types of data products are needed, namely that is basic data and ground data

1. Basic data:
(a) Satellite data
(b) Toposheets
(c) Local knowledge
(d) Area map on any scale to transfer details
(e) Reports and other literature of the study area

2. Ground data: Ground data is very much essential to verify and to increase the accuracy of the interpreted classes and also to minimize the field work.

3. Data analysis: For analysis and interpretation of satellite data, the study can be divided into three parts:

A. Preliminary work
B. Field work
C. Post field work

A. Preliminary work includes:

- To see the limitation of satellite data
- To lay down the criteria for land use classification to be adopted
- To fix the size of mapping units, which depends upon the scale
- Interpretation of different land use/land cover classes
- Demarcation of doubtful areas
- Preparation of field land use/land cover map

B. Field work:

Type of ground data to be collected
Selection of sample area for final classification
Checking of doubtful areas
Change in land use/ land cover due to wrong identification, fresh development,nomenclature.

General verification C. Post field work:

Reinterpretation and analysis or correction of doubtful areas
Transfer of details on base map
Marginal information
Preparation of final land use/land cover map.

6. Creation of Mandal Information System (MIS) is structured by grouping all the activities into seven groups, the seven group activities are

Development of data model for LU/LC
Scanning and Digitization of Maps.
Georeferencing and Registration.
Field Work, Field data collection and GPS survey for GCPs.
Generation of Thematic Maps.
Data base Design and Management

7. Data Model for Land use / Land cover

A modern nation must have adequate information on many complex interrelated aspects of its activities in order to make decisions. Land use / Land cover is only one such aspect, but knowledge about land use and land cover has become increasingly important as the Nation plans to overcome the problems of haphazard, uncontrolled development, deteriorating environmental quality, loss of prime agricultural lands, destruction of important wetlands, and loss of fish and wildlife habitat. Land use data are needed in the analysis of environmental processes and problems that must be understood if living conditions and standards are to be improved or maintained at current levels.

8. Results

8.1 Base map

Base Map is prepared by using Survey of India topographic maps on 1:25,000 scale. All the settlements, road network, water bodies and forest areas are taken into consideration. By comparing the Survey of India topographic maps with that of the satellite image the size of all the settlements are increased and updated. The aerial extent of the study area is 181.24 sq.kms. Distance from district head quarter is 36 Km. (Fig.2)

8.2 Drainage

All the water bodies are divided into dry and wet areas. These wet (water spread) areas changes from time to time and some new tanks are found in the satellite images. For this reason, the drainage map is updated from the satellite. The drainage system existing is Dendritic Drainage pattern (Fig.3).

8.3 Transport map

In the study area all the settlements are connected either by Metalled road or Un-Metalled road and National Highway -5 is passing through this study area. The image shows (Fig.4)

8.4 Landuse/Land cover Map

The land use/land cover categories such as built-up land, agriculture, forest, water body and wastelands have been identified and mapped from the study area. Major part of the study area is covered with single crop and double crop (24%). About (1.6%)of the study area is under built-up land . From the satellite data the agriculture area (26%) could be clearly delineated as, single crop, double crop, vegetation and plantations. Though single crop and double crop has been observed at various parts of the study area and plantations are observed at some places of the study area (8%).Scrub Forest covers (20%), Water bodies occupied (7%). Under this category land with scrub (12%), land without scrub (0.5%) Based on the land use/land cover categories, infiltration rates of water are less at built-up land areas. Consequently groundwater potentials at these places are low, whereas the places where water bodies are present have high potentials and moderate potential at remaining categories (John R Jensen) Present land use/land cover map showing the spatial distribution of various categories and their aerial extent for the present study. The spatial distributions of various land uses are interpreted based IRS-P6, LISS III-MX (Resolution 5.8m) data. (Fig.5)

8.5 Major Crops in the study area

Paddy, Jowar, Cotton, Turmeric, Maize, Arhar, Chillies, Sugarcane and Sesame.

9. Database format developed for Micro- Level Information System & incorporated in GIS Software

1) Agriculture information 2) Land information 3). Industries information 4).Pensions information 5).Indirakranthi pathakam information 6).Indiramma pathakam information 7).Banks information 8).Basic village facilities 9).Birth and death ratio 10).Classification of workers 11).Distance from the nearest facility 12).Education information 13).Health & safety 14).Households information 15).Infrastructure utilities 16).Literacy information 17).Marketing details 18).Natural water resources 19).Population 20).Power supply 21).Ration cards details 22).Social welfare hostels 23).Telephone information 24).Watersheds information and other information

10. CONCLUSION

This research paper has demonstrates the ability of Remote Sensing and GIS in capturing spatial-temporal data. Attempt was made to capture as accurate as possible on 1:10000 scale, Classifying land use land cover upto Level-V and developed the common legend for land use land cover mapping. The information can be used to assess the capability of the area for its shortcomings and hence to improve the productivity capacity and this will play an increasing role in the way future environmental proposals and decisions are made, India has developed an operational mechanism for natural resources. Developments in space-based earth observation and weather watch capabilities in future may help refining existing models/approaches for prediction of such events and their management. Recent advances in satellite sensor spectral, spatial and radiometric capabilities have strengthened the operational scenario of remote sensed based land use / land cover change information at village and mandal level which is important for modelling the environmental changes. Hence high resolution satellite data IRS-P6 LISS-IV –MX Resolution of 5.8m has been used in this case study and database has been developed and incorporated in the software for "Development of Micro-Level information system using GIS".

E-Governance has emerged as one of the driving forces for the Government by enabling the administration to re-design and improve its existing processes, connect with citizens and facilitate interactions with and within the society. The combination of readily available Internet access and spatial information through GIS enables the government authorities to provide a new level of service to both businesses and the public. GIS-enabled Websites can provide services for the following:

- Government-to-business applications for economic development, land development, licensing, or permitting.
- Government-to-citizen applications for online information on government services and to streamline interaction for accounting and feedback.
- Government-to-government applications to improve the amount, quality, and speed of information exchange within and among various levels of government.
- Better communication to enable governments and citizens for using resources more wisely. In addition, it also allows agencies to collaborate on large-scale planning problems and respond to emergencies.

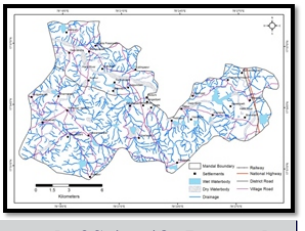

Fig.2: showing the Base map of the study area

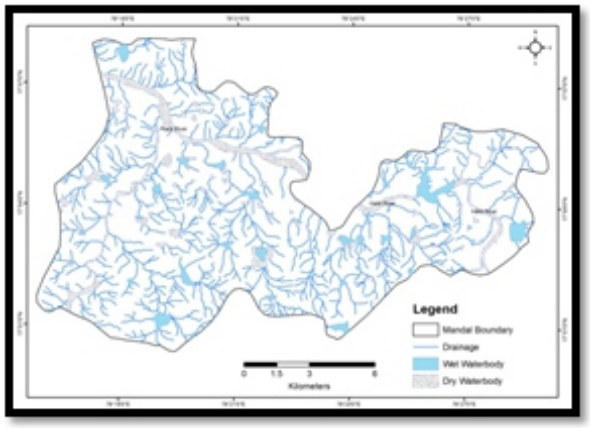

Fig.3: showing the Drainage map of the study area

Fig.4: showing the Transportation map of the study area

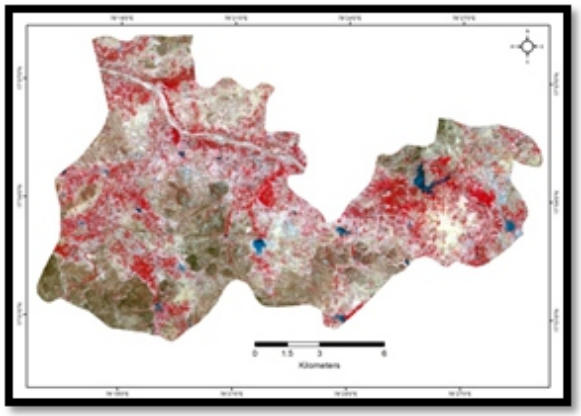

Fig.5: showing the Satellite map of the study area

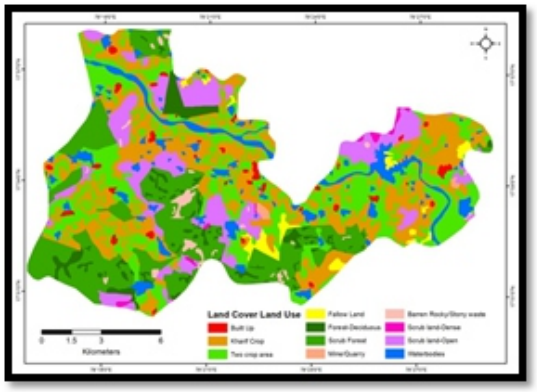

Fig.6: showing the LU/LC map of the study area

Table 1: showing the LU/LC Details of the study area

Land Use / Land Cover	Area in sq.km	% area
Kharif Crop	47.46	26.2
Two season crop area	44.83	24.7
Fallow Land	3.31	1.8
Built Up	2.81	1.6
Mine/Quarry	0.51	0.3
Forest Deciduous	7.41	4.1
Scrub Forest	36.72	20.3
Barren Rocky/Stony waste	2.29	1.3
Scrub land-Dense	0.88	0.5
Scrub land-Open	22.06	12.2
Waterbodies	12.96	7.1
Total	181.24	100

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