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GIS Based Land Information System for CMR Group of Institutions

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Abstract— *This research work is dedicated to create a land information system on areas of CMR GROUP OF INSTITUTIONS, Medchal Road, Hyderabad. The main task of the work is to establish a land information database which is based on an Open Source Geographic Information System. The main function of the work is starting with acquisition of existing geo data and information, maintenance, utilization and transferring of data. This research work will be helpful to establish a structured database, multi user access to the database, avoid data redundancy of different organization and follow international standards for geographic information. In this paper, applications of Remote Sensing and GIS for various advance classification techniques together with their accuracy based on performance evaluation, on land use studies are given emphasis. The study has been conducted on CMR GROUP OF INSTITUTIONS, a part of Rangareddy district, Telangana, INDIA. The results obtained have been used to generate final land use map of the college. The framework of a national land use and land cover classification system is presented for use with remote sensor data. The establishment of a land information system for CMR GROUP OF INSTITUTIONS will contribute to the National Land Information System. The project demonstrates that Land Information Systems can be created using Open Source GIS software. Promoting the use of Open Source GIS software, enhancing data quality and knowledge exchange are the main aims to be followed further. The results will promote good governance and provide fact based information to decision makers and government.*

Keywords— Remote Sensing, Open Source GIS, Land Valuation, Land Information System, Geo-spatial database.

I. INTRODUCTION

It is important to learn and use Geographic Information Systems and Remote Sensing data for our profession nowadays. Modern technologies like geo-data processing and earth observation data processing and analysis are needed for young researchers and students. This research work is dedicated to create a land information system of CMR GROUP OF INSTITUTION. The main task of the work is to establish a land information database which is based on an Open Source Geographic Information System. The main function of the work is starting with acquisition of existing geodata and information, maintenance, utilization and transferring of data [1-3]. This research work will be helpful to establish a structured database, multi user access to the database, avoid data redundancy of different organization and follow international standards for geographic information.

II. HEADINGS

Remote sensing technique is defined as – The science and art of acquiring information about objects from measurements made at a distance without any physical contact with the objects. In modern usage, the term generally refers to the use of aerial sensor technologies to detect and classify objects on earth (both on the surface and in the atmosphere and oceans) by means of propagated signals (e.g. electromagnetic radiation emitted from aircraft or satellites). Remote sensing makes it possible to collect data on dangerous and inaccessible areas. Remote sensing applications include monitoring deforestation, depth sounding in coastal regions stand-off collection of data about dangerous border areas for military purposes, land use studies etc[3,5]. Remote sensing also replaces costly and slow data collection on the ground, ensuring in the process that areas or objects are not disturbed.

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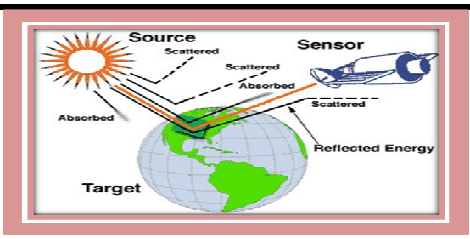

Fig.1: Remote Sensing Technology

GIS: In the strictest sense, a GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations. Practitioners also regard the total GIS as including operating personnel and the data that go into the system.

A Geographic Information System (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. The acronym GIS is sometimes used for geographical information science or geospatial information studies to refer to the academic discipline or career of working with geographic information systems and is a large domain within the broader academic discipline of Geoinformatics [6]. In the simplest terms, GIS is the merging of cartography, statistical analysis, and computer science technology.The elements of Geographic Information system are shown in the table 1.

Table 1: Elements of Geographic Information System

S. No	Elements of GIS	Details
1.	Hardware	**Type of computer platforms:** Modest personnel computers High performance workstations Minicomputers Mainframe computers **Input devices:** Scanners, Digitizers, Tape drivers, CD, Keyboard, Graphic monitor **Output devices:** Plotters , Printers
2.	Software	Input modules Editing Manipulation/Analysis modules Modelling capability
3.	Data	Attribute data Spatial data Remote sensing data Global Database
4.	Live ware	GIS trained personnel i.e; people responsible to digitize and implement the methodologies

DATA MODELS:

It represents the linkage between the real world domain of geographic data and computer representation of these features. Data models are of two types: Raster and Vector. In raster type of representation of the geographical data, a set of cells located by coordinate issued; each cell is independently addressed with the value of an attribute[6,7]. Vector data model uses line segments or points represented by their explicit x, y coordinates to identify locations. Connecting set of line segments forms area objects. Vector data models require less storage space, outputs are appreciable.

1.2.3 DATA SOURCES

Primary Data sources are:

1. Remote sensing data
2. Aerial Photographs
3. Global position System

Secondary Data sources:

1. Topographic Sheet

III. DESCRIPTION OF THE STUDY AREA

3.1 LOCATION AND EXTENT

CMR Group Of Institutions of Rangareddy district is located in the Telangana State , situated within the geographic co-ordinates of 17° 35' to 17° 36' North latitude and 78° 29' to 78° 30' Eastern longitude. CMR Groups of Institutions is located in the North-Western part in the Google map. The details of the areas are given in the following table (Table 3.1)

DETAILS:

1.Ground
2.Canteen
3.Parking
4.Basketball Ground
5.Blocks
6.Free space
7. Technical Campus
8.Post office Shed CMR shed
9.Girls hostel
10.Main Area
11.Auditorium
12.Bus bay

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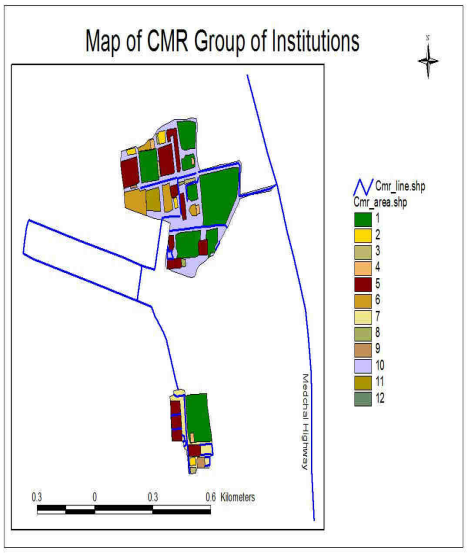

Fig 2:Base map of CMR Groups of Institutions

DETAILS:

1.Ground
2.Canteen
3.Parking
4.Basketball Ground
5.Blocks
6.Free space
7. Technical Campus
8. Post office Shed
CMR shed
9. Girls hostel
10.Main Area

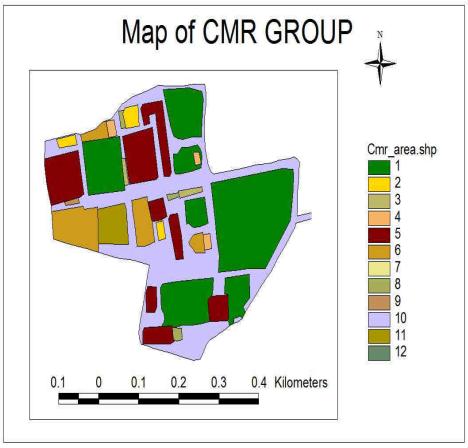

Fig.3: Map of CMR Group

DETAILS:

1.Ground
2.Canteen
3.Parking
4.Basketball Ground
5.Blocks
6.Free space
7. Technical Campus
8.Post office Shed CMR shed
9.Girls hostel
10.Main Area
11.Auditorium
12.Bus bay

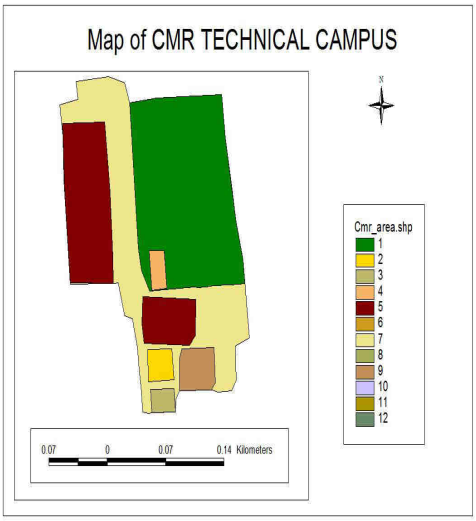

Fig.4. Map of CMR Technical Campus

3.2 PREPARATION OF BASE MAP:

The base map is the essential requirement for any mapping using remote sensing techniques or by ground methods. It is the map which is used for collection and representing the thematic (resource) information on a common uniform scale. The major features like important town or villages, rivers, reserved forest area and transport network are required to trace. The base map has been prepared mainly using the geocoded satellite imagery and SOI toposheets on 1:50,000 scale. The detailed base map of the study area is shown in figure (Fig 3.1).

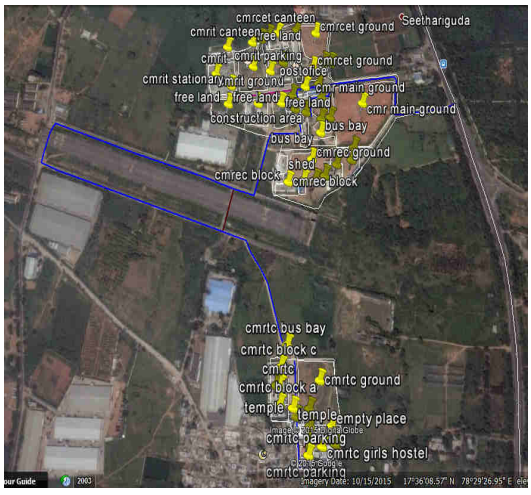

Fig.5 Satellite image of study area

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3.2.1 PHYSIOGRAPHY

The study area has an altitude of about 602 metres (1975 ft.) above sea level. In terms of topographic features, the area is mostly flat with gentle slopes. The higher elevation points and drainage pattern can be easily spotted on the satellite image[16]. The groundwater availability is about 2275 ha.m.

3.2.2 AGRICULTURE

There is more agriculture land surrounded by the CMR College. In agriculture land rice is cultivated mostly. So this again proves the college gives the pleasant atmosphere. So college is surrounded by some fresh air.

IV. BACKGROUND LITERATURE AND DATA USED

4.1 BACKGROUND AND LITERATURE

RangaReddy District was formed on 15th August, 1978 by carving out some portion of Hyderabad Urban Taluks & the merger of the entire Rural and Urban Areas of the remaining Taluks of Erstwhile Hyderabad District. This District is primarily the rural hinterland for Hyderabad City feeding the powerful commercial centre with various raw materials, agriculture produce and finished products. It was named after Deputy Chief Minister of Andhra Pradesh Sri K.V. Ranga Reddy.

RangaReddy District is at the cross roads of India geographically, historically and has been the meeting ground for the fusion of various civilisations, religions, races, cultures, languages and traditions with the twin cities of Hyderabad and Secunderabad as itscore.Prior to 25-5-1985, the District was administered with 3 Revenue Divisions and 11taluks . These Taluks had been further sub-divided into 42 Firkas, each of which in turn consists of a Number of Villages. However 11 erstwhile Taluks were delimited into 10 PanchayatSamithis, almostcoterminus with the taluks except for a few minor changes in respect of Medchal, Hayathnagar, Ibrahimpatnam, Maheshwaram and RajendranagarTaluks.

4.2 DATA SETS USED

a) IRS ID LISS III FCC Scale 1:50,000
b) Published Reports and Literature.
c) Ground Data.

4.3 SOFTWARES USED

A general idea regarding the different kinds of software's that were brought into use for the present study can be perceived below:

a) ArcGIS 9.3.1
b) Global Mapper
c) Google Earth.

Geocoded IRS – 1 D LISS III standard false color composite generated from bands 2,3 and 4 on 1: 50, 000 scale and Survey of India toposheets have been used to prepare the integrated maps[15].The satellite image was interpreted by using standard interpretation keys such as color / tone, texture, composite, pattern of drainage and size, shape to prepare land use / land cover map. We can find the satellite image of the study area in the given figure **(Fig.5)**

All the conventional information collected during the field checks were used in the finalization of the maps. The selected field checks were carried out for the validation of the results.

4.4 GLOBAL MAPPER

Global Mapper is a geographic information system (GIS) software package developed by Blue Marble Geographic that runs on Microsoft Windows. The GIS software competes with ESRI GeoMedia, Manifold System, and MapInfo GIS products[8]. Global Mapper handles both vector, raster, and elevation data, and provides viewing, conversion, and other general GIS features. Global Mapper has an active user community with a mailing list and online forums.

4.5 GOOGLE EARTH:

Google Earth is a virtual globe, map and geographical information program that was originally called Earth Viewer 3D, and was created by Keyhole, Inc, a Central Intelligence Agency (CIA) funded company acquired by Google in 2004. It maps the Earth by the superimposition of images obtained from satellite imagery, aerial photography and GIS 3D globe. The product, re-released as Google Earth in 2005, is currently available for use on PC windows 2000 and above, Mac OS X10.3.9 and above, Linux Kernel 2.6 or later (released on June 12, 2006), and Free BSD. Google Earth is also available as a Browse plug-in which was released on May 28, 2008. The release of Google Earth in June 2005 to the public caused a more than tenfold increase in media coverage on virtual globes between 2004 and 2005, driving public interest in geospatial technologies and applications [9, 10]. Google Earth supports managing three-dimensional Geospatial datathrough Keyhole Mark up Language (KML/KMZ). Google Earth is simply based on 3D maps, with the capability to show 3D buildings and structures (such as bridges), which consist of users' submissions using Sketch Up, a modelling program software. Google Earth can be used to view areas subjected to widespread disasters if Google supplies up-to-date images. One can create custom image overlays on handheld GPS units. The main methodology of the research is to prepare thematic maps with the application

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of remote sensing and GIS software. The flow chart showing the methodology of land resources analysis is given in **Fig.4.1.**

Fig 4.1: Flow chart of the methodology followed in the preparation of report

The handling of spatial data usually involves processes of data acquisition, storage and maintenance, analysis and output. For many years, this has been done using analogue data sources, manual processing and the production of paper maps. The introduction of modern technologies has led to an increased use of computers and information technology in all aspects of spatial data handling.

4.6 BASE MAP

Base maps are provided by governments or commercial firms in digital format for use in GIS. We can get base map layers in unprojected, geographic coordinates of latitude and longitude[11-13]. These can be projected on any flat projection surface. It is a map showing certain fundamental information, used as a base upon which additional data of specialized nature are compiled or overprinted and also, a map containing all the information from which maps showing specialized information can be prepared [17-18].

V. RESULTS AND DISCUSSIONS

On the basis of the image interpretation and limited field checks, thematic maps such as land use/land cover was prepared to study the various land resources in the study area.

5.1 LAND USE/ LAND COVER OF THE CMR GROUP OF INSTITUTIONS

The land use/ land cover categories of the study area have been explained by taking every college as consideration such as CMR Technical Campus, CMR College Of Engineering and Technology, CMR Institute Of Technology, CMR Engineering College and CMR Pharmacy College.

CMR COLLEGE OF ENGENDERING AND TECHNOLOGY

This college consists of two blocks. It consists of ground in which students can play cricket, football etc. It consists of many classrooms and labs. It has an auditorium in which we conduct conferences, guest lectures etc. It has a big canteen and stationary. For vehicles parking it has separated the parking area into four wheeler parking and two wheeler parking.

CMR INSTITUTE AND TECHNOLOGY

This institute is located at the back side of CMRCET. It has several areas like ground which is used to play. It has many classrooms and labs. It has seminar hall and parking area is also have. Stationary and canteen also located in this area.

CMR TECHNICAL CAMPUS

This college has four blocks namely A,B,C,D. In the block A all first year classes, admin office, director room, chairman room, exam cell etc. In block B all class rooms and labs as well as in C also. In block D it has library, all MBA related classes, auditorium, seminar halls etc. Apart of this it has a big ground which is exactly in front of college. In this college CMR Girls hostel is also present. Canteen facility and stationary also ATM facilities are there. For bus parking also available. Two wheeler and four wheeler parking is available in this college.

CMR ENGINEERING COLLEGE

This college is also have ground area and two blocks which have classrooms, labs, library, seminar hall etc. It has stationary and also canteen facility is available as the data took in the year 2014-2015.

CMR PHARMACY COLLEGE

This college consists of two blocks and it has very wide ground that is used to park all the busses. In this pharmancy block one is used for training and placement block mean in that block all placements will be happened. It has also canteen and stationary facility.

VI. CONCLUSIONS

The present study reveals that in the study area the land use-land cover pattern fall under the broad categories of built-up land, agricultural land, forest land and waste land. The important point to be considered in this study is, there is16 per cent of scrub forest and forest plantation. The area covered by forest is drastically decreasing in the last few years because people use this forest for fuel, fodder purposes and over grazing of the animals. Therefore fencing of the forest boundary is much needed. Agro forestry system has been suggested on hilly terraces, and some waste land areas to meet the needs of local people for fuel and fodder. In the study area some of the villages are without proper roads and the situation is worst in the case of communication facilities. So provision of basic infrastructure for socio economic development is much needed.

REFERENCES

[1] Basics of Remote Sensing and GIS - S. Kumar.
[2] 2. Dr. M. Sunandana Reddy Optimal Land Use Planning by using GIS A case study of cuddapah district IJARF Volume 2, Issue 1, January 2015.
[3] 3. Dr. M. Sunandana Reddy Image Processing and DEM of Spatial Information Technology in Landslide

https://dx.doi.org/10.22161/ijaers/si.7 *ISSN: 2349-6495(P) | 2456-1908(O)*

Vulnerable Mapping IJECCE Volume 4, Issue (6) NCRTCST-2013, ISSN 2249–071X.

[4] Murthy, J.VS., 2000, A Textbook of watershed management in India by New Age International, New Delhi.

[5] Anderson, James R., 1971, Land use classification schemes used in selected recent geographic applications of remote sensing: Photogrammetry .Eng., v. 37, no. 4, p. 379-387.

[6] Murali Krishna, I.V.: Spatial Information Technology (Remote Sensing & GIS).

[7] Burley, Terence M., 1961, Land use or land utilization: Prof. Geographer, v. 13, no.6, pg. 18-20.

[8] Augustine M.F., Clemens L.E. and Shaw K.A. (1995)- Performance Evaluation of Texture Measures for Ground Cover Identification In Satellite Image By Means of Neural Network Classifier. IEEE Trans. On Geosciences and Remote Sensing. Vol33(3),pp 616-625.

[9] B.S.Dayasagar (1994). Application of Remote Sensing, Mathematical Morphology, and Fractals to study certain surface water bodies. Ph.D thesis, Dept of Geoengineering and Resource Development Technology, College of Engineering, Andhra University Vishakpatnam, A.P.

[10] Encyclopedic District Gazetters of India.

[11] Gong P and P Howarth Frequency base classification and grey level vector reduction for land use identification. PE&RS, Vol.58, No.4, April 1992, PP.423- 437

[12] Kai-Yi-Huang and P.M.Mausel.(1994) Comparing a Piecewise Linear Classifier with Gaussian Maximum Likelihood and Parallelepiped Classifiers In terms Of Accuracy and Speed PE&RS, Vol.LX,No.11,Nov.1994 pp.1333

[13] Mallat,S(1989) A theory of multiresolution signal decomposition: the wavelet representation .IEEE train. PAMI, Vol.II, No.7.PP.572-693

[14] S.Sudhakaret,al.(1999). Techniques of Classification for Landuse/Landcover with special reference for Forest type mapping in Jaldapara Wild life Sanctuary. Journal of the Indian society of Remote Sensing, Vol. 27.No.4, 1999 .

[15] P. J. Curran: 1988, Principles of Remote Sensing.

[16] Gis Based Land Information System For MandalSoum, SelengeAimag Of Mongolia B. Tuul Commission VI, WG VI/4

[17] Manual of Nationwide Land use / Land cover mapping using satellite imagery; Part – I, National Remote Sensing Agency; Dept. of Space; Govt. of India ; 1989.

[18] Aronoff F. S 1989, Geographic Information System; A Management Perspective, Ottowa, WDL Publications.

Table.3.1: Details of the entire area

NAME	ENCLOSED_A	FLOORS	CATEGORY
bus bay	2219.6 sq m		12
cmrtechincal campus	40177 sq m		7
main area	178570 sq m		10
main ground	28586 sq m		1
pharmacy ground	2422 sq m		1
pharm baketbal court	455.15 sq m		4
empty land	1043.9 sq m		6
Pharmacy	1395.9 sq m	4	5
Cmrec	2157.6 sq m	3	5
CMREC Basketball court	550.81 sq m		4
CMREC ground	9376.6 sq m		1
cmrec ground	3872.9 sq m		1
CMREC New Block	1185.5 sq m	3	5
cmrec block	2229.8 sq m	3	5
CMRG New Auditorium	4812.7 sq m		11

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pharm canteen	574.83 sq m		2
free space	3486.3 sq m		6
placement block	1807.3 sq m	3	5
main parking	640.55 sq m		3
Postofice	262.54 sq m		8
Shed	484.51 sq m		8
cmritbasktbal court	568.24 sq m		4
cmrit ground	8767.1 sq m		1
cmrit parking	443.02 sq m		3
Cmrit	7084.3 sq m	3	5
cmrit stationary	292.93 sq m		9
free land	1376 sq m		6
cmrit canteen	797.27 sq m		2
Cmrcet	6481.8 sq m	3	5
cmrcet new block	3700.1 sq m	3	5
CMRCET canteen	1296.1 sq m		2
cmrcet shed	339.83 sq m		8
cmrcet ground	7261 sq m		1
cmrcet ground	2804 sq m		1
cmrcet basketball court	303.34 sq m		4
Cmrtc	6395.3 sq m		5
cmrtc ground	16683 sq m		1
cmrtcbasktball ground	528.46 sq m		4
cmrtc D block	2198.9 sq m		5
cmrtc girls hostel	1330.3 sq m		9
cmrtc parking	499.18 sq m		3
cmrtc canteen	715.15 sq m		2

Table.3.2: Details about the line measurement

NAME	**LENGTH**
cet campus to it campus	184.79m
CMREC	295.7 m
Construction	119.36m
shed 3	33.884m
cmrtc bus bay	58.324m
cmrtc block c	48.363m
cmrtc block A& B	48.823m
generator room	40.57 m
empty place	156.17m
construction site	77.128m
Temple	26.882m
medchal road	3.053km
Main entrance to Cmrcet	496.65m
cmrcet to bus drop Rd	122.02m

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cmrcet to Pharm Rd	209.23m
pharm to cmrtc Rd	1.979km
pharm to cmrtc shortcut rd	112.49m
ccmrtc main gate to second gate	240.98m

Flow Chart of the Proposed System

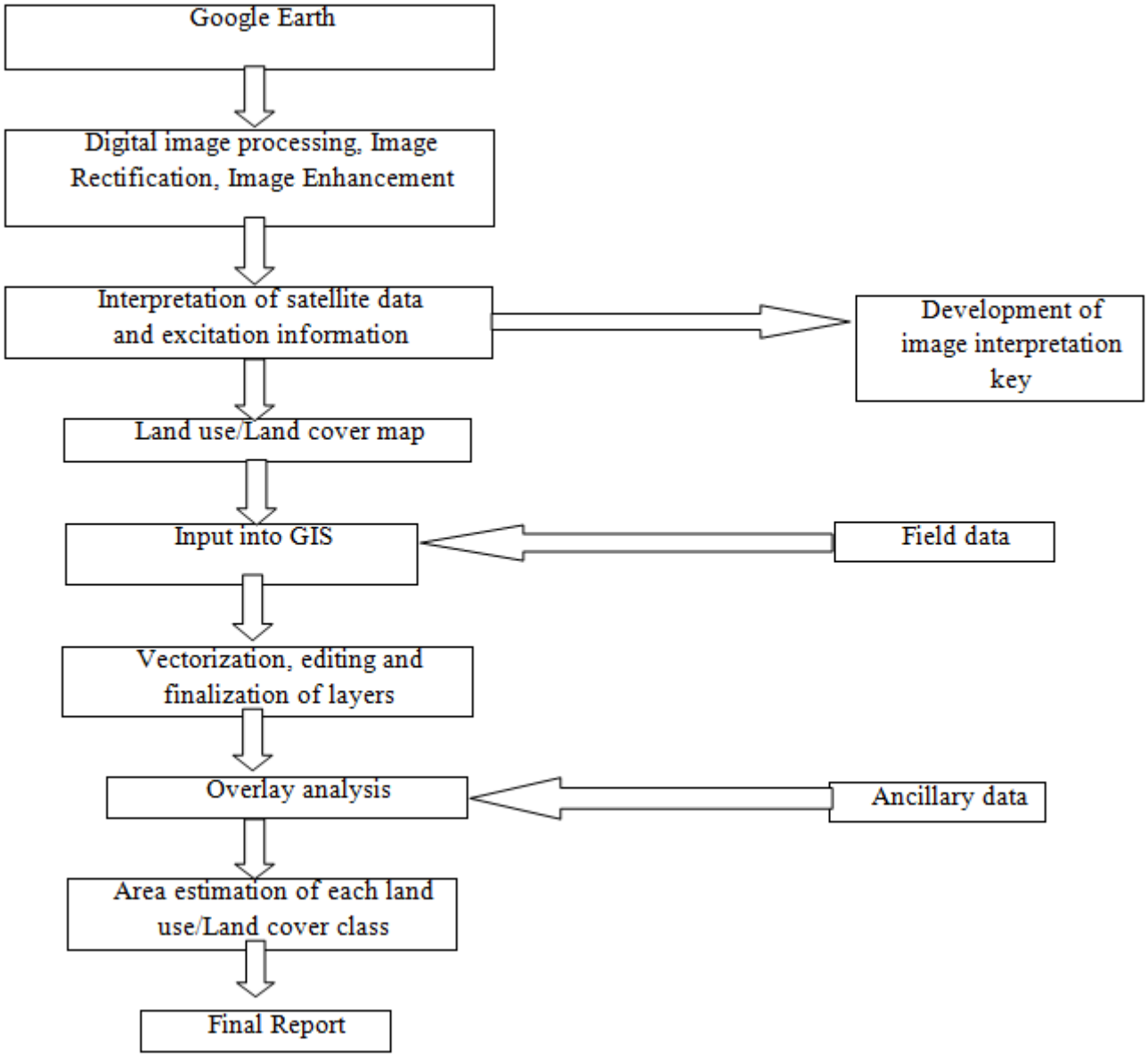

Fig.4.1: Flow chart of the methodology followed in the preparation of report