Land Use/Land Cover Mapping Using Geospatial Technology for Environmental Management

K.Mariadas, M.V.Raju, SS Asadi

Abstract: The aim of the attempt was to study the Land use/Land cover attributes for environmental management planning for socio economic growth of study area. Evaluation of Land Resources in given study area by Remote sensing and Geographic Information System (GIS) technologies help to generate the spatial information to study the current conditions deliberate to the past conditions data and estimate the future requirements. The IRS-P6 satellite Imagery and Survey of India toposheets data, visual interpretation technique, Arc/Info and Arc View GIS software's are used to prepare the final Land use/Land cover information. This data is useful for environment and natural resources development management. This type of land information study helps to prepare the Land and water Resources Action plans for conservation of suitable cropping patterns, and improved productivity of the study area and to provide the primary requirements of farmers, to enhance their background conditions and help to develop or enhance decision makers for sustainable development.

Keywords: Land use/Land cover information system, Sustainable development. RS and GIS.

I. INTRODUCTION

Land use means the man's moments and various uses are accomplished on land. The Rock and soil, artificial cover, green vegetation, water sources may be rain, fog, mist, snow hails ,etc and others resulting due to land transformation is called Land cover. Land use information is useful to estimate the trends of change its helps national planning to face up to the problems associated with the haphazard. An effective land use action plan is need for estimate that will be timely, enough affordable and suitable for national and state level different needs. The Remote sensing technology is useful to prepare the large area land use and land cover data. The land use and land cover data is useful the estimation of environmental status and consequences and useful to understood the living conditions and standards and to improve or maintain as per the current requirements

A. Basic Land use Concepts

The basic concept of land use classification is its give the all the possible classes of land use within possible limitations. Its gives the information about relationship between various tracts of land and location, Activity on that particular land, Natural qualities of land like vegetative cover, surface and subsurface characteristics,

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Intensity of usage of land activity per unit area, ownership of land, coast and market activity of land, economic and social activities relation of that land

B. Classification of Land Use / Land Cover

In 1970 the USGS introduced remote sensing based land use and land cover classification system. Still today the basic concepts and structure this valid. They are followed some of the criteria's

1. The accuracy of interpretation minimum level using satellite data at least 85%.
2. The interpretation accuracy for several classes should be about equal.
3. One interpreter to other interpreter repeatable results should be obtainable.
4. over extensive areas the classification system should be applicable
5. Depending on the land cover types, the categorization of land use is should permit.
6. The satellite imaginary data got at different times of the year for classification system should be suitable.
7. Based on the large scale imagery or ground survey only classification should be capable of being into more detailed subcategories
8. Possible for future land use and land cover Comparison study and recognized by Multiple uses.

USGS classification, based on the interest of users who require data on a nationwide, interstate, or statewide. Based on resolution Level III and IV classification can utilize for regional or local planning and management action plans preparation purposes. The land use information provides allocating new land use practices. to know the accurate demographic, economic and environmental impacts in that particular area, to identify suitable for future expansion for possible to determine special areas like industrial parks, IT parks. Land use/ land cover map will give the basic information for monitoring land use change and useful for preparation of integrated action plan for agricultural and industrial development purposes.

C. Remote sensing & GIS techniques for land use/land cover

1. Using space technology to prepare land use map gives accurate information.
2. Using satellite imagery only possible to prepare the large scale and spatial distribution of synoptic view
3. Satellite techniques useful for change detection study at regular intervals.

4. Small scale and large scale land use mapping is possible by satellite techniques.
5. Space technology gives in electromagnetic spectrum different bands data it's provide different color composite data.
6. To prepare the Land use mapping possible for to apply both visual interpretation technique and digital interpretation technique.

II. OBJECTIVES

➢ Merging of IRS-ID PAN and LISS-III data Preparation of stranded satellite Image.
➢ To prepare the Land use/ Land cover map using visual interpretation technique.

III. METHODOLOGY

Merging of IRS-ID PAN and LISS-III data and SOI toposheets to prepare the Land Use / Land Cover information map. The major classes of Crop land, plantations, forests and water bodies were interpretive using visual interpretation Technique.

A. Visual Interpretation

An image interpreter systematically examines using image and terrain elements to interpret the images for delineation of different Land Use / Land Cover classes. Other supporting data like Attribute data collected from various departments and field data used to increase the accuracy of interpretation.
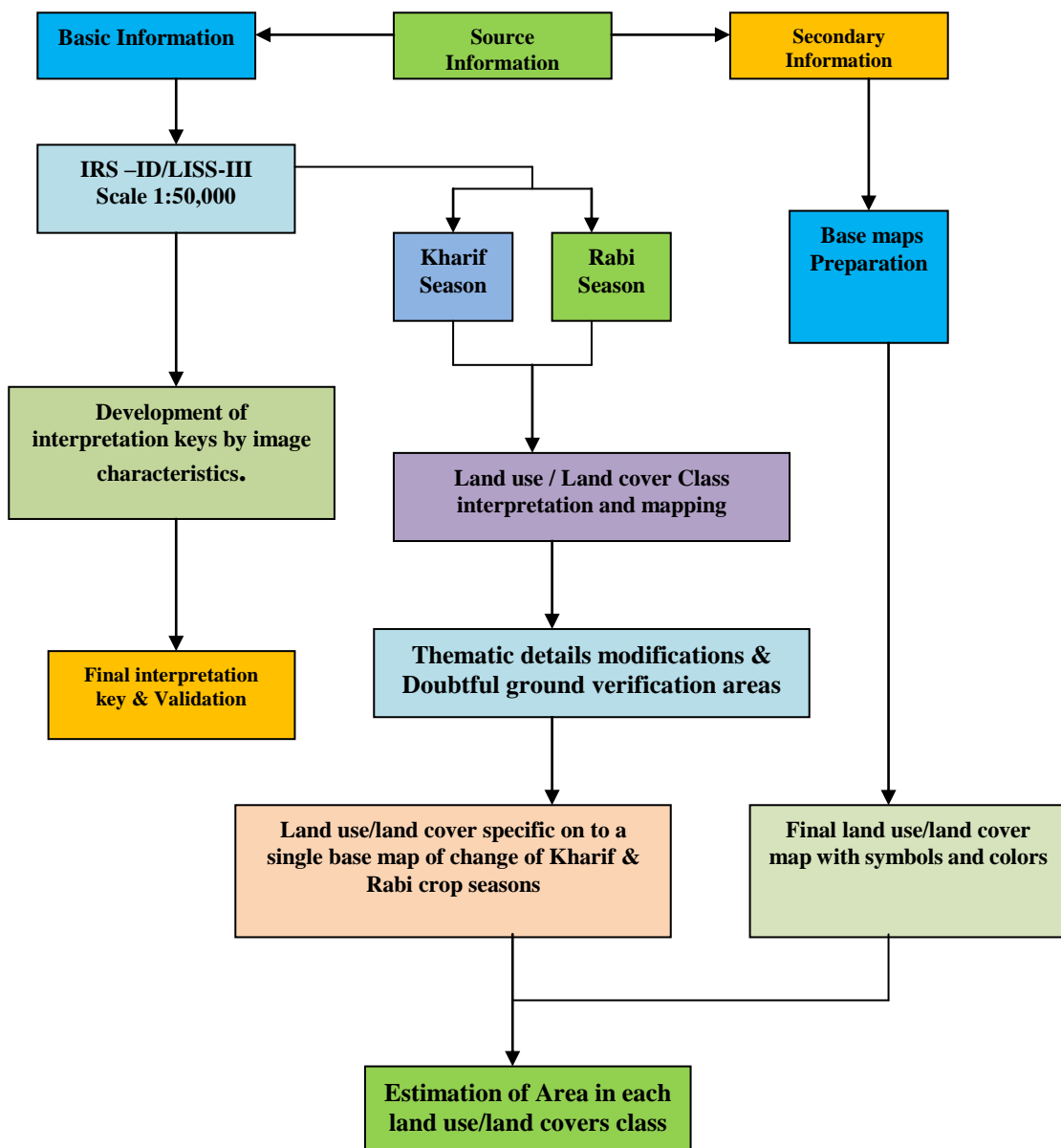.

Fig.1 Methodology shows the Step by Step processing

B. Elements of Image Characteristics

The Visual Interpretation of the imagery, the Image elements, resolution and season are key components. By understanding the image characteristics of each of the thematic class, an image interpretation key has been evolved. This will enable the image to identify different features on satellite imagery. However, VIP, also, depends upon the season, scale, spectral bands, spatial resolution, overall image contrast and quality of the data.

The Methodology Flowchart is given in Fig.1

For preparation of LU/LC map two types of data are required:

   1. Basic data 2. Field data

a. Basic data includes:

- Satellite Imagery

- SOI Toposheets

- Local details

- Literature

b. Fiekd data:

- Field data is required to improve the accuracy to
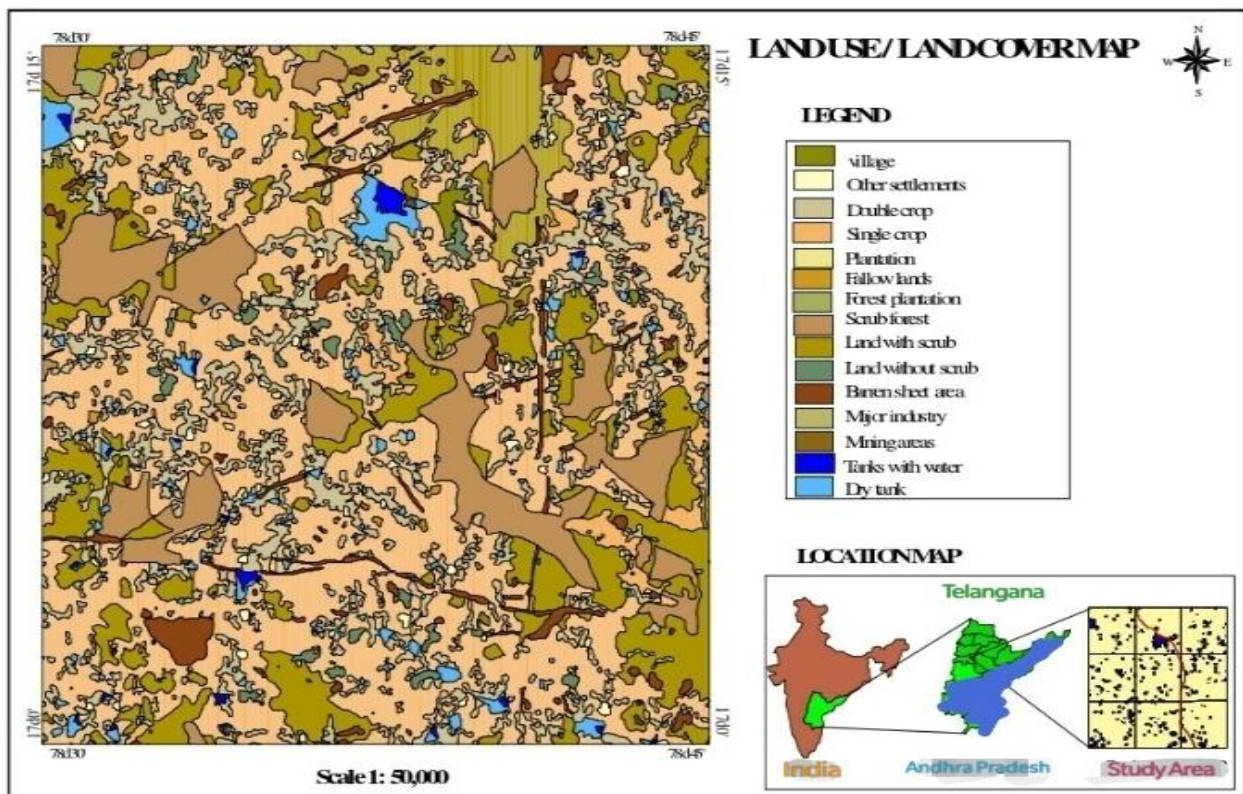
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Fig.2 Land use/Land cover map

C. Data analysis

Data analysis is three parts:

    a) Preliminary Analysis
    b) Field Analysis
    c) Post field Analysis

a. Preliminary work includes:

- Quality of satellite data
- Level of land use classification
- the scale of map
- Identification of land use/land cover classes
- Identification of doubtful classes
- Planning for field work

b. Field work:

- Identification of data required to collect in the field

- Check the doubtful classes
- Identification of new developments in study area
- General observation

c. Post field work:

- Modify the doubtful areas
- incorporate the of details on map
- Generation of final output of Land Use/Land Cover map

Fig.3 Pie chart showing Distribution of LU/LC categories of study area
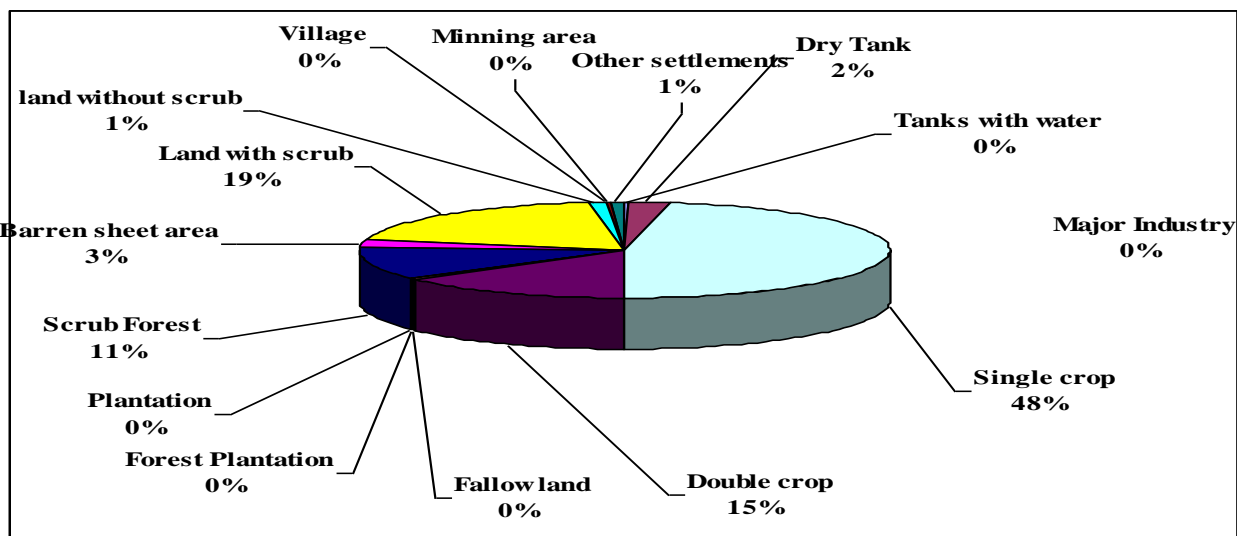
Sl.No.	Land Use / Land Cover CLASS	Area (Km^2)
1	Tank with water	2.60
2	Dry tank	17.79
3	Major Industry	0.06
4	Single Crop area	347.26
5	Double Crop area	107.21
6	Fallow land	2.04
7	Plantation	0.89
8	Forest Plantation	0.93
9	Scrub Forest	79.92
10	Barren sheet area	20.90
11	Land with scrub	141.46
12	Land without scrub area	7.85
13	Mining covered Area	0.07
14	Village	1.80
15	Other settlements	6.14

IV. RESULT&DISCUSSIONS

The final output of land use/land cover map showing the various classes and their area calculations. The final Lu/Lc

information map is shown in Fig.2 and Fig.3 showing distribution of classes and distribution land use and land cover shown in Table 1.

In the present study area Land with scrub area occupies larger part of about 30% of the study area followed by single crop, double crop and other settlements occupying 48%, 15% and 1% of the study area respectively. The next major classes are villages (0.2%), scrub forest (11%), land without scrub (1%), major industries (0.008%), tanks with water (0.35%), and dry tanks (2%). The other classes are plantation (0.12%), Scrub forest (11%), forest plantation (0.12%), fallow land (0.27%), mining areas (0.01%), occupied the study area.

Table 1. Distribution of Land Use Land Cover CLASS

V. CONCLUSIONS

This study helps to create the digital data of Land use/Land cover information of the study area, according to their importance. If we analyze Land use/Land cover map in the form of tabular attribute data and details of each class. We can get the distance between any two settlements; we can get all details of the each class of study area for Decision support to environmental micro level planning. Hence for make this type of study use for all users.

Any user can easily find out all the Land use/Land cover details.

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