LAND USE/LAND COVER mapping of Kalesar National park of Yamuna Nagar,Haryana

Sujata Sharma
M.Sc., M.Phil, NET
Sacred heart convent school,jagadhri

ABSTRACT

Land use/ Land cover information is the basic pre –requisite for land, water, vegetation resource, utilization, conservation and management. The information on Land use/ Land cover is available today in the form of thematic maps, published statistical figures in record. These information are inadequate, inconsistent and do not provide up-to-date information on the changing land use patterns, processes and their spatial distribution in space and time. Satellite remote sensing offers alternate, accurate and faster mode of data collection and updating the land use/land cover information at a standard classification and explanation of different land use/ land cover classes. This paper describes the use of remote sensing technique to construct a map and identification and classification of different land use/land cover in Kalesar National Park of Yamuna nagar district of Haryana. The source of basic data was IRS (Indian remote sensing satellite)LISS-IIIN FCC (liner imaging self canner false color composite).FCC along with digital data was used to prepare vegetation cover and density map. Fieldwork to correlate the image elements with forest types, densities etc. were carried out in the park.

KEY WORDS: Land use, Land cover, Remote sensing, Satellite data

INTRODUCTION

Land is the sole source of sustenance of mankind supporting plants and animals on it by providing habitat. The most important function of land use planning is to plan the land use in such a way that the resources are put to their most profitable use in the long term perspective without adverse impact on the environment.

LAND USE is referred as "man activities and the various uses which are carried on the land.

LAND COVER is referred to "natural vegetation, water bodies, rock/soil, artificial cover and other noticed on land.

Remote sensing is the process of sensing, identification, delineation and measurement of surface features and their processes from a distance without actually coming into physical contact. It is the powerful technique for surveying, mapping and monitoring of earth resources. It provides multi-spectral, multi-spatial and multi- temporal data in digital and analog form amenable to both visual interpretation and computer (digital) analysis. This technology combined with GIS, which help in storage, manipulation and analysis of geographic information and socio-economic data provide a wider application. Remotely sensed satellite data in conjugation with other available data sources have been used to plan optimal land uses throughout the world.

OBJECTIVE OF THE STUDY

To interpret, identify, classify land use/ land cover in Kalesar National Park, District Yamuna Nagar, Haryana using IRS LISS-III data and to generate information on areas covered by different land cover types.

STUDY AREA

Kalesar National Park is situated in Yamuna Nagar Distt. Of Haryana, at a distance of 40km from Yamuna Nagar. It constitutes one of the very important wild-life habitats in the state of Haryana. On the west and North-West side of the park is the Simbalwara sanctuary, Himachal Pradesh. And on the East and South side is the Rajaji National Park of Uttaranchal. Against the backdrop of highly developed agricultural landscape of the state, this park stands out as a treasure trove of bio-diversity in the state. The total area of the park is 137sq.Km, out of which

about 40% is reserved forest. This forest is in the Kalesar valley and supports predominantly Sal forests on the south. While the South-East part of forest are steep hilly slopes of the shiwalik foundation supporting tropical dry deciduous mixedforests.The flatter valley portion and undulating southern slopes supports Chettal(*Axis axis*) population. Whereas the steep slopes have Sambhar and Barking Dear population.

MATERIALS AND METHODS

A) COLLECTION OF DATA

Indian remote sensing satellite IRS18 linear imaging self scanner (LISS-III) with ground resolution of 36.25m false color composite(FCC) of bands 4(R),3(G),2(8) and digital data was used to prepare the vegetation cover and density map. Fieldwork to correlate the image elements with forest types, densities etc. were carried out in the park.

(B) MATERIALS USED

HARDWARE:

1) HCL P-IV Desktop
2) CPU 2Ghz Speed
3) 2GB RAM
4) 200 GB Hard disk
5) 17" Color monitor

SOFTWARE:

1) Arc View GIS version 3.1
2) ERDAS Imagine version 8.5
3) Microsoft Windows 2000

FIELDWORK EQUIPMENTS:

1) Ranger compass
2) Binoculars
3) Photographic Camera
4) Altimeter
5) DeskJet and Laser printer

DATA PROCESSING

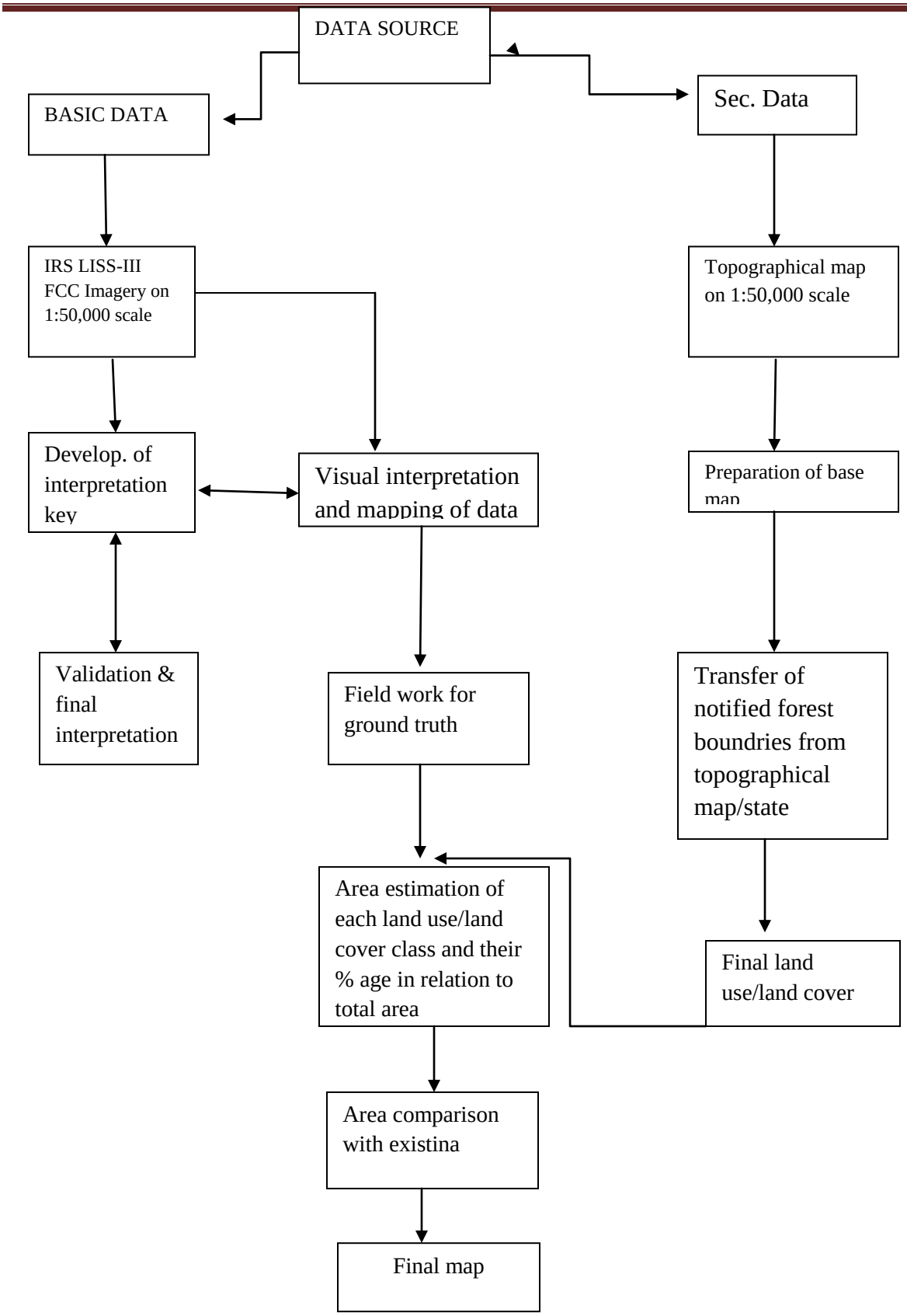
Image restoration was the first step which aims to correct distorted or degraded image data to create more faithful presentation of the original scene. This typically involves the initial processing of raw image data to correct for geometric distortions and to calibrate the data geometrically.

Radiometric corrections were done by dark pixel subtraction technique. This technique assumes that there is a high probability that there are at least few pixels within an image, which should be black(0% reflectance) however because of atmospheric scattering the image system records are non- zero on value at dark shadowed pixels location.

Geometric correction should be done because raw digital images cannot be used as maps. It involves removal of distortions to produce a resample image. Both data sets are then co-registered for further analysis.

Visual interpretation of the image was done so as to create a final map for land use and land cover. The geo coded FCC was visually interpreted with the help of ground truth and collateral data. An interpretation key was developed on the basis of image characteristic.

Flow chart showing the methodology for the estimation of land cover/land use is as follows:


DATA SOURCE
BASIC DATA
Sec. Data
IRS LISS-III FCC Imagery on 1:50,000 scale
Topographical map on 1:50,000 scale
Develop. of interpretation key
Visual interpretation and mapping of data
Preparation of base map
Validation & final interpretation
Field work for ground truth
Transfer of notified forest boundries from topographical map/state
Area estimation of each land use/land cover class and their % age in relation to total area
Final land use/land cover
Area comparison with existina
Final map

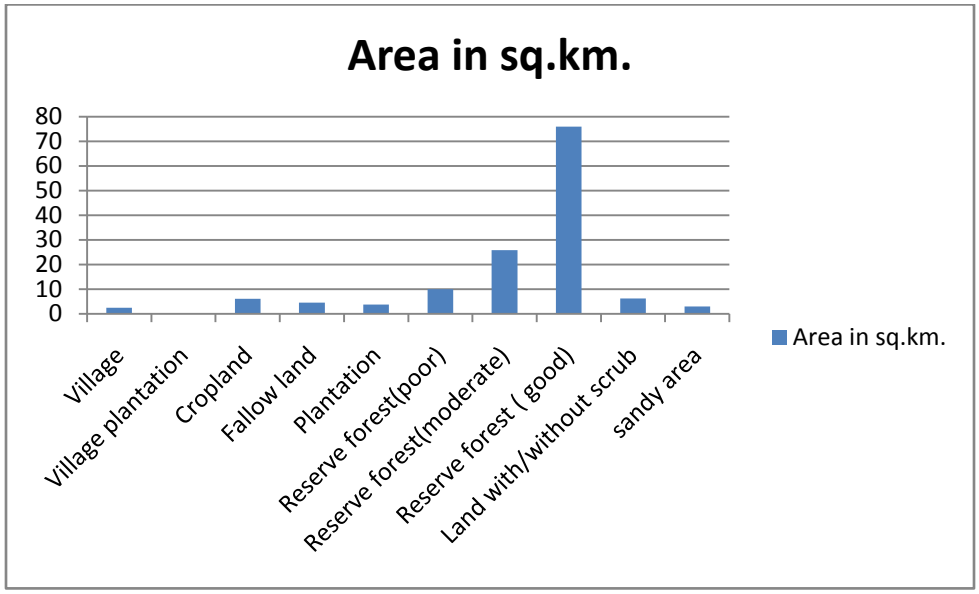
RESULT AND DISCUSSION

Based on the final map generate the LAND USE/LAND COVER categories of Kalesar National Park is generated. The area under various vegetation cover classes is given in table 1 and figure 2.

Table1. Land use land cover categories and their aerial coverage in Kalesar National Park

Landuse/land cover category	Area in sq.km.	% of total area
Village	2.44	1.8
Village plantation	0.09	0.1
Cropland	6.12	4.4
Fallow land	4.53	3.3
Plantation	3.78	2.7
Reserve forest(poor)	9.95	7.2
Reserve forest(moderate)	25.78	18.7
Reserve forest (good)	76.01	55.1
Land with/without scrub	6.21	4.5
sandy area	2.94	2.1

Figure 2. Land use land cover categories and their aerial coverage in Kalesar National Park



The total area of national park was137.85sq.km. Out of which, the village area occupied 2.44 sq. Km. which was1.8% of total area and the village plantations occupied 0.09 sq. Km. which was 0.1% of total area. The cropland occupied 6.12 sq. Km. which was4.4% of total area . The fallow land occupied 4.53 sq.Km. which was 3.3% of total area. The plantations occupied 3.78sq. Km. which was 2.7% of total area. The reserve forest (poor) occupied 9.95 sq.Km. which was7.2% of total area .The reserve forest(moderate) occupied 25.78 sq.Km. which was18.7% of total area. The reserve forest (good) occupied76.01 sq.Km.which was55.5% of total area .The scrub land occupied 6.21 sq.Km. which was4.5% of total area. The sand areas occupied 2.94 sq. Km. which was2.1% of total area.

REFERENCES

[1] Adams G.D**.** and Gentle, A.C.(1978),documenting change in land use and water flow habitat from digitalized aerial photographs, *proc. 5th Canadian symposium on Remote Sensing, Victoria* pp 415-426

[2] Anon (1999) National Policy AND Macro level action strategy on biodiversity. Min. of Env. And Forest Govt. of India. New Delhi, pp43-46

[3] Best R. (1984) Remote sensing approaches for wild life management. In*: Renewable Resources Management*, ASP, pp 55-96

[4] Burroughs,P.A.(1986) *Principles of Geographic information systems for land resources assessment*. Oxford University Press Oxford pp20.

[5] Chimitdorzhiev, t. n.& Efremenko,V.V.2002.Use of different vegetation indices in remote sensing of ecosystems .16,419-430

[6] Donovan, M.L., Rade, D.L. and Olson, C.E. (jr.) (1987) Use of geographical information systems to develop habitat suitability models

[7] Ericson, J.E., Mower, R.D. and Wyckoff, JIW(1983) The use of remote sensing for monitoring sand hill crane populations *PROC*. ACSM-ASP *Fall convention* salt lake city pp 493-510

[8] Green, M.J.B.(1987) Ecological separation in Himalayan ungulates, *J. Zool Land* 1:693-719

[9] Joshi, P.K., Singh, S. Agarwal S. and Roy, P.S. 2001. Land cover assessment in Jammu and Kashmir as discriminant- an approach of wide swath satellite (IRS- WiFS). *Current science*, 81,392-399

[10] Kamat , D.S. 1986. An integrated approach to remote sensing studies in wildlife evaluation.

Proceedings of the seminar cum workshop on wildlife habitat evaluation using remote sensing techniques.22-23 October 1986,Dehra Dun,165-182

[11] Kushwaha, S.P.S. and Madhavan Unni. N.V.(1986). Application of remote sensing techniques in forest cover monitoring and habitat evaluation. A case study in Kaziranga National Park, Assam. *Proceddings of the seminar cum workshop on wildlife habitat evaluation using remote sensing techniques*. 22-23 October 1986,Dehra Dun,pp 238-247

[12] Roy P.S., Saxena, K.G. Pant, D.N. and Kotwal, P.C.(1986) Analysis of vegetation types usineg remote sensing techniques for widely habitat evaluation in Kanha.

[13] Smith ,R.L. 1974 Ecology and Field Biology. Harper and Raw Publishers

[14] Teer, J.G.(1982) Status of Remote sensing in wildlife work, *workshop on techniques in wildlife research and management* , Kanha National Park, M.P.pp6

[15] Westman, W.E. (1985). *Species and landscape diversity in ecological impact assessment and environmental planning.* John Wiley, New York. 444-479