

LAND USE MAP OF INDORE BHOPAL REGION FROM LANDSAT MSS DATA

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ABSTRACT

This paper deals with the Remote sensing Techniques suitability in the rapid land use mapping within a short time and sufficiently accurate manner. It evaluates how Landsat MSS data could be used to identify and delineate land use pattern within the Indore-Bhopal region of Madhya Pradesh. The main objective was to prepare small scale land use map from satellite imagery showing broad distribution of land use pattern of a large area. On landsat MSS scene No.157-44 of 14 Nov., 1972 of Indore-Bhopal region of Madhya Pradesh was examined to determine the ease of identifying major land use and land cover classes.

INTRODUCTION

For proper management of natural resources, upto date, reliable information in respect of existing land cover and land use must be made available to the planners and decision makers. Not only this, since over all land use implies a change in land cover and in natural resources and ecosystem we must also have constantly up-dated information about changing land use.

The information required for land use planning comprise reliable, upto date and comprehensive data on physical, ecological and socioeconomic resources. Remote Sensing has the potential to make the most significant contribution in the area of land use data collection.

STUDY AREA

One landsat MSS Scene No.157-44 selected for study, which has varieties of Land Use pattern i.e., water bodies, forest, barren land, scrub, high-low relief, habitation. The area of study falls under coordinates

Latitude - $22^{\circ}15'$ to $23^{\circ}50'$

Longitude- $75^{\circ} 8'$ to $77^{\circ} 5'$

M.S.S. scene covers Indore-Bhopal divisions of Madhya Pradesh.

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METHODOLOGY

In this study two types of data were used

(A) Landsat MSS data

(B) Ground Data

LANDSAT MSS DATA

Landsat Scene No. 157-44 of 14 Nov. 1972 selected for the land use mapping. MSS Black and White imagery on 1:2,50,000 scale in both 5 and 7 band, and false color composit on 1.1 million were used for visual interpretation. Topographical maps on 1:2,50,000 scale were used for better separation of land use categories.

GROUND TRUTH COLLECTION

To analyse and interpret effectively, the remotely sensed data, need the physical evaluation of the parameters. The ground truth collection executed to evaluate the physical parameter of the scene. The field visit undertaken for identifying the land use of predetermined area and to confirm categories for doubtful areas were corrected and broad land use boundaries delineated on imagery. Following ground truth has been collected
(1) Agricultural Area (2) Forest Area (3) Irrigated Land Area
(4) Soil (5) Barren Land (6) Urban Areas.

VISUAL INTERPRETATION

Preliminary visual interpretation for delineation of land use/land cover classes was made with the help of black and white landsat imagery on 1:2,50,000 scale and false color composit on 1:1 million scale.

The element of image interpretation of land use were tone, texture, size, pattern. The tone and texture characteristics of scrub appeared as a smooth light grey which make it difficult to delineate from agricultural land in certain part. In some area it was very difficult to draw boundaries to differentiate between scrub and cultivated area. Identification and delineation of forest and agricultural land were easy from band 5 imagery due to the combination of tone, pattern, and size element. Water bodies easily identifiable on band 7 due to their spectral contrast in relation to other land use categories i.e. lakes, tank, river etc. water bodies appears black.

Built up area identified by light to dark bluish grey tone and by linear pattern. Alluvium and barren land is easy to identify as a white signature, alluvium is easily detectable as narrow white strip in the river bed.

LAND USE CLASSIFICATION

Image identification were done considering limited field varification using landsat imagery. The criteria is given below:

- (1) Only major land use classes taken and detailed land use classification could not be done because of repetitive imagery of the area were not available.
- (2) Detail classification of forest type was not attempted and classified as mixed forest. However, scrub area were separated within heterogenous areas.
- (3) Agricultural land, water bodies, barren land, forest, sand were recognised and identified individually and delineated as a unit.

A generalised system has been adopted for land use classification to obtain reliability. The following land use classes of level I were obtained:

- (1) Agricultural land
- (2) Forest land
- (3) Built up area
- (4) Water bodies
- (5) Scrub
- (6) Barren land
- (7) Alluvium

LAND USE PATTERN

The land use map of Indore Bhopal Division prepared from Landsat imagery shows spatial distribution of various land use categories. These land use categories are due to factors like topography, climate, socioeconomic change, environmental influences. Landsat scene cover an area about 34,225 sq.km. and 41.58 per cent area of it is under agriculture including fellow land, crop land, the forest and scrub covers about 29.78% and 17.88% of the total area respectively. Narmada river and Chambal river are major river and number of tributaries of Narmada and Chambal and reservoirs have been mapped which covers about 7.12% of the total area. Only Indore and Ujjain city could be identified and shown as built up area. Barren land covers about 3.46% of the total area.

S.No.	Land use category	Area in sq.km.	Percent
1.	Agricultural land	14237.50	41.58
2.	Forest	10198.75	29.78
3.	Scrubs	6125.50	17.88
4.	Water bodies	2440.00	7.12
5.	Barren land	1186.25	3.46
6.	Built up area	52.00	0.15
		34240.00	100.00

CONCLUSION

The land use map that have been prepared may serve as a base to monitor subsequent changes in land use/land cover. They can provide information to aid in formulating regional land use policies. The result of this study indicate that landsat MSS data could be used for broad based land use planning and bringing out changes. Field checking and ground data collection is necessary for each land use categories. The visual interpretation of landsat imagery ground data collection and preparation of land use map completed within four months time. Further level II land use classification can also be achieved. With the availability of landsat imagery very large areas can be studied in detail, comparatively in short time.

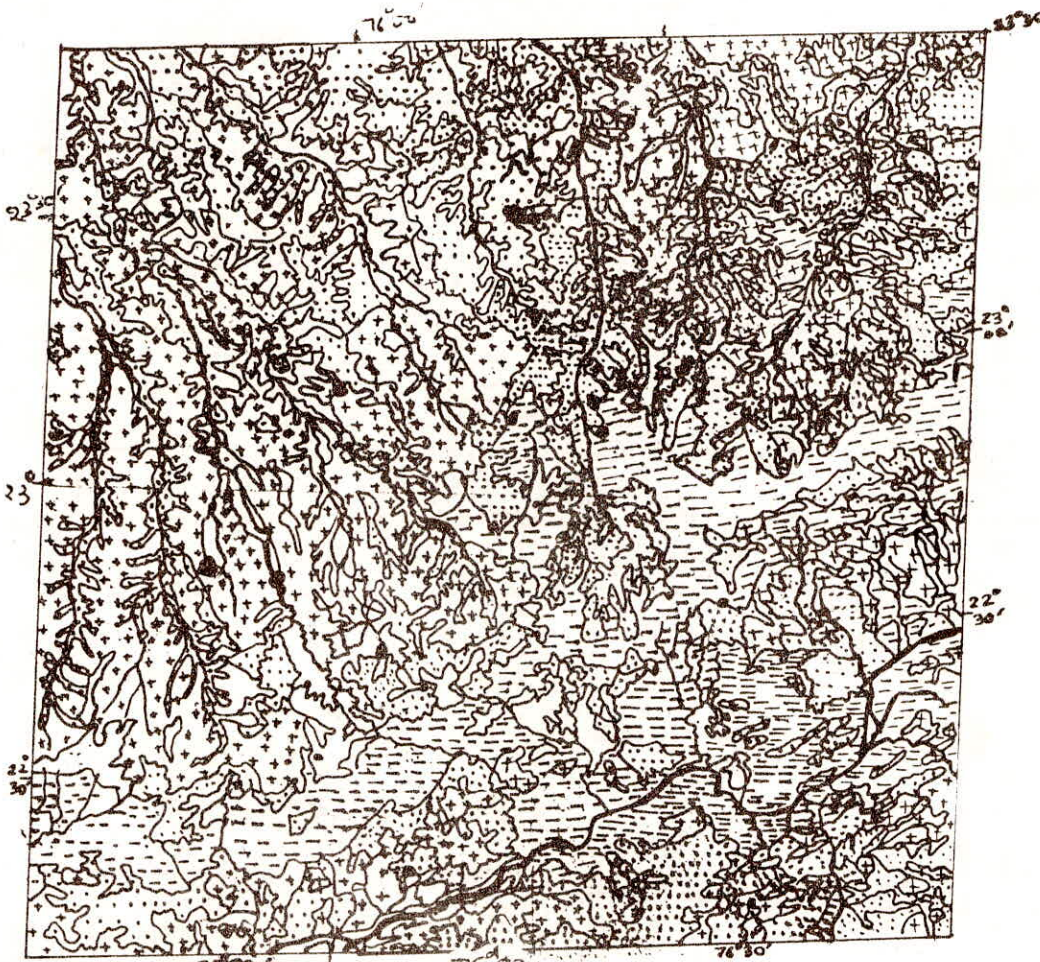
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REFERENCES

1. Choubey V K etc. 1981 Land Use Map of Madhya Pradesh by the help of Landsat Imageries ISRO Project report, Indore.
2. Gautam N C and Narayan L R A, 1983 - Landsat MSS Data for Land Use and Land Cover inventory. A case study of Andhra Pradesh Vol.II No.3 Photo Nirvachak, Dehradun.
3. Chadha, Colonel S M etc. 1986 - Land Use/Land Cover Survey and Monitoring. Vol. 2, International Seminar on Photogrammetry and Remote Sensing for the developing countries, March 1986.
4. Prof.Patel, A N and Choubey V K etc. 1981 - Establishing Corelation between characteristic of soil and their photographic grey level records.

INTERPRETATION OF LANDSAT IMEGERY FOR INDORE-BHOPAL REGION(M.P)
 LAND USE MAP



1:4000/72 C 022-95/E076-10 N 22-92/E076 1965

LEGEND

SCALE 1:1000,000



- BUILT UP AREAS
- AGRICULTURAL LAND
- SCRUB
- FOREST MIXED
- STREAM
- BARREN LAND
- WATER BODIES



INTERPRETATION OF LANDSAT-1 IMEGERY FOR INDORE-BHOPAL REGION(MP)

DRAINAGE FEATURE



REFERENCE

WATER BODIES
 R1 YESHWANT SAGAR
 R2 DEPALPUR TANK
 R3 SHAJAPUR TANK
 R4 TEJPUR GORI TANT
 R5 RONSI TANK
 R6 THUNA KALAN TANK

STREAM
 R1 PARBATI RIVER
 R2 NEWAJ RIVER
 R3 KALISINDH RIVER
 R4 LAKUNDAR NALA
 R5 CHOTIKALISINDH RIVER
 R6 SHIPRA RIVER
 R7 CHAMBAL RIVER
 R8 CHAMLA NALA

LEGEND

STREAM.....
 WATER BODIES.....

SCALE -1:1000,000

Km. 10 5 10 20 30 40 50 Km.