ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

*(A High Impact Factor, Monthly, Peer Reviewed Journal)*

*Website: www.ijircce.com*

**Vol. 5, Issue 10, October 2017**

# Mapping and Assessment of LU-LC Features of the Jodhpur city using Geoinformatic Techniques

S.K.Yadav[1], S. L. Borana [1], S.K.Parihar[2]

Scientist, Remote Sensing Group, DL, Jodhpur, Rajasthan, India[1]

Professor, Dept. of Mining, MBM Engineering College, J.N.V.U, Jodhpur, Rajasthan, India[2]

**ABSTRACT:** Monitoring of Land cover and Land Use (LU/LC) features and manmade objects using satellite imageries is being one of the important applications. One of the major advantages of remote sensing technique is timelines in the availability of information over large area and simultaneous observation making it possible to detect temporal changes. Geographical Information System (GIS) serves as a powerful tool for spatial and non-spatial analysis of remotely sensed data. This paper presents the spatial extent, magnitude and temporal behavior of land cover changes around Jodhpur city caused by Rapid City expansion due to increasing population and urbanization in the past one decade. High Resolution Satellite data of IRS-P6 LISS-3 and Landsat data was used for carried out the change detection and preparation of GIS based outputs maps of the Jodhpur City and surrounding areas. These images were classified for finding different changes categories like no change, positive change and negative change. Results revealed significant changes in land cover and urban settlements of the city during the study period. Results were also verified using ground check data.

**KEYWORDS**: LU/LC, Remote Sensing, GIS, Landsat.

## I. INTRODUCTION

A geographic Information System (GIS) can be as simple as points plotted on a paper map with some attribute attached to the points.GIS today involves sophisticated software and can be integrated with Remote Sensing (RS) technologies to provide monitoring of vegetation. The key element of GIS is that attributes are related spatial and some system is utilized to process and analyze these relationships. Urban growth and its associated population increase is a major factor which has altered natural vegetation cover. This has resulted in a significant effect on local weather and climate. The use of remote sensing data in recent times has been of immense help in monitoring the changing pattern of vegetation. Change detection, as defined is the temporal effects as variation in spectral response involves situations where the spectral characteristics of the vegetation or other cover type in a given location change over time. Or described change detection as a process that observes the differences of an object or phenomenon at different times. The vegetation is one of the invaluable natural resources which changes spatio- temporally in its extent and distribution. Hence, reliable information on the extent and distribution of vegetation types is pre-requisite for natural resource management and planning. As the vegetation types in tropical part of India represents diverse formations, on screen visual image interpretation approach was found to be suitable to delineate various vegetation types. In the present study, IRS P6 LISS III data which is having spatial resolution 23.5 m was used to generate baseline information of vegetation types of Jodhpur. The objective of the present study was to develop detailed vegetation type map using visual image interpretation technique supplemented by information collected from phytosociological surveys.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 5, Issue 10, October 2017

## II. STUDY AREA

Jodhpur city is located at a latitude of 26° 18' North and longitude of 73°1' East and is located in the middle of the thar desert tract of western rajasthan about 250 km from the pakistan border. Its general topography is characterized by the hills located in the North and North-west. The hill ranges start within the walled city and extends up to Mandore and Jaisalmer road. There are extensive stone quarries to the Northwest of the city. Jodhpur city is located at an average altitude of 241 m above Mean Sea Level (MSL) at railway station with fort and old city being much higher at 367.83 m and between 277.21m to 245.50 m respectively. The city has a natural drainage slope from North-North East to South-South East towards Jojari River.

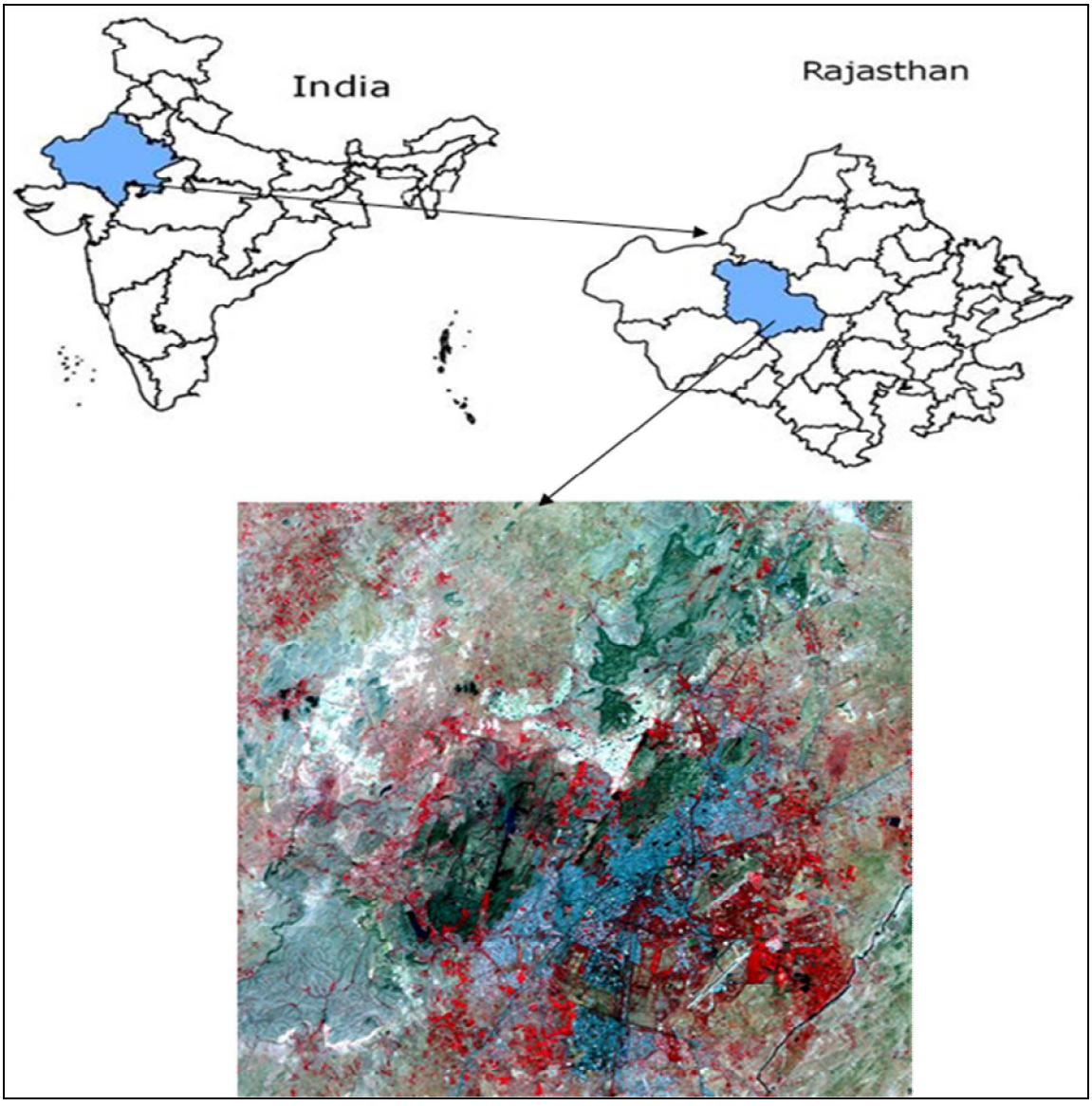


Fig.1. Location Map of The Study Area.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 5, Issue 10, October 2017

The type of soil found in the region is predominantly sandy except the rocky strata in the part of fort and walled city, which is totally impervious. The climate of the city is characterized by extremes of temperature, uncertain rainfall and dryness. The average annual rainfall is about 386 mm. The average number of rainy days in a year is about 20. About 90% of rainfall is received during the southeast monsoon season from June to September and sometimes a single storm may give more rain than average. The mean monthly temperature varies from 260 C to 410 C in summers and 90 C to 310 C in winter. The relative humidity varies from 45% to 82% in the mornings and from 15% to 50% in the evenings.

## III. DATA USED

Geocoded False Colour Composite (FCC) scene of IRS L3 and LANDSAT data and true color composite (TCC) of landsat data were used on scale 1:50,000 for year 2010 in the present study ( Table-1). The data that has been used for studying the municipality level spatiotemporal land use/land cover analysis. Along with satellite data SoI maps, district gazette & resource map and limited ground truth data were also used for this study.

Table-1 The Satellite Data used in the Study Area.

| RS Data | Resolution | Path/Row | Date of Acquisition |
|---|---|---|---|
| Landsat TM | 30 m | 149/42 | Oct 2010 |
| IRS L-3 | 23.5m | 92/53 | Oct 2010 |

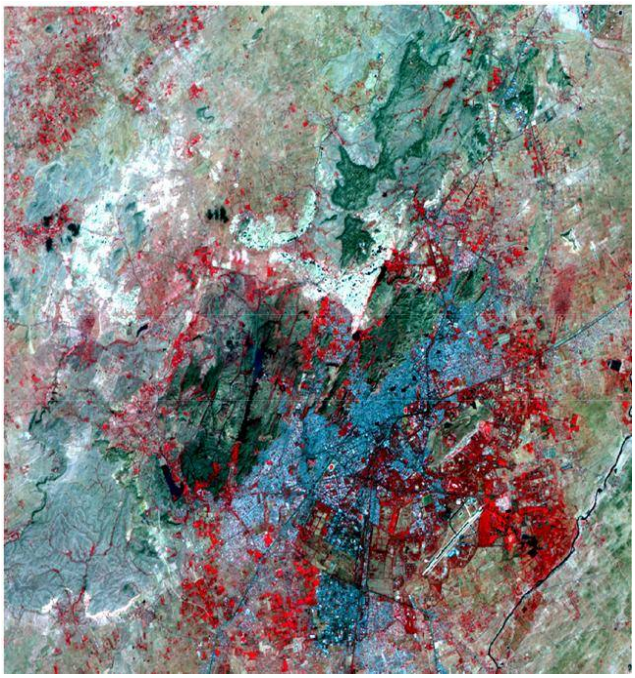

Fig.2. IRS P6 LISS-3 FCC Imagery of Jodhpur city.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 5, Issue 10, October 2017

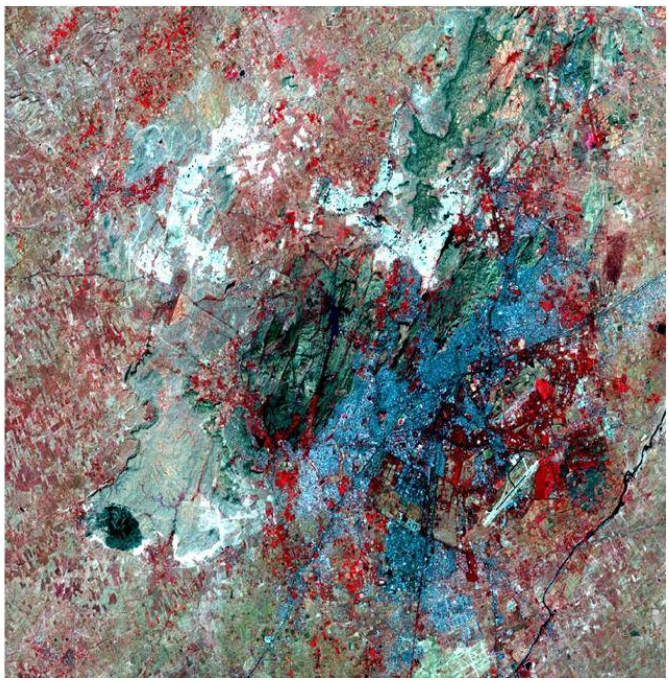

Fig.3. LANDSAT-7 FCC Imagery of Jodhpur city.

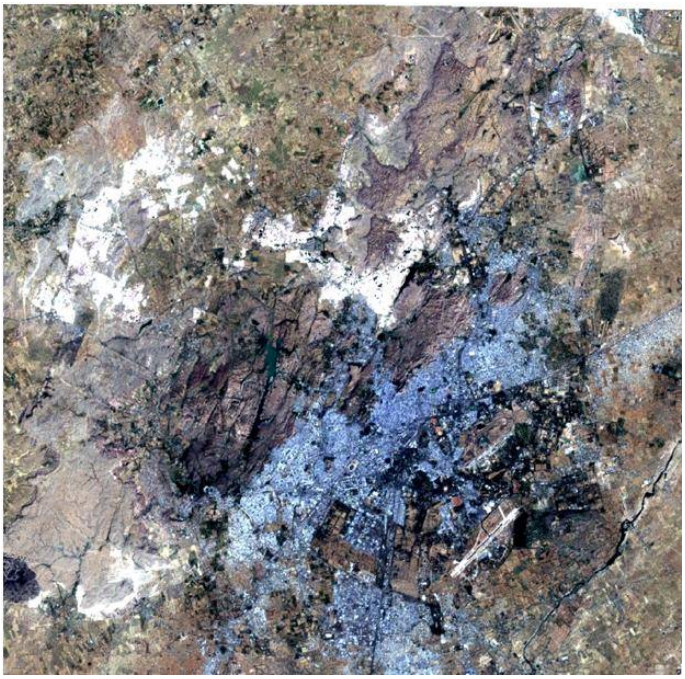

Fig.4. LANDSAT-7 TCC Imagery of Jodhpur city.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 5, Issue 10, October 2017

## IV. METHODOLOGY

The Area of Interest was demarcated on the satellite imagery of the study area. Various image processing techniques, classification and interpretation was performed using ERDAS Imagine. Land use/land cover classes were identified by means of visual interpretation and ground truth data using handheld GPS. Major classes in the study area are agricultural fallow land, agricultural plantation, barren rocky, settlement, forest, grass, scrub land and water body. Using ERDAS Imagine & ArcGIS software a land use classification analysis were carried out on IRS L3 and LANDSAT images of year 2010. The generated land use classification was also compared with field data for better accuracy of the LU/LC features of the area.

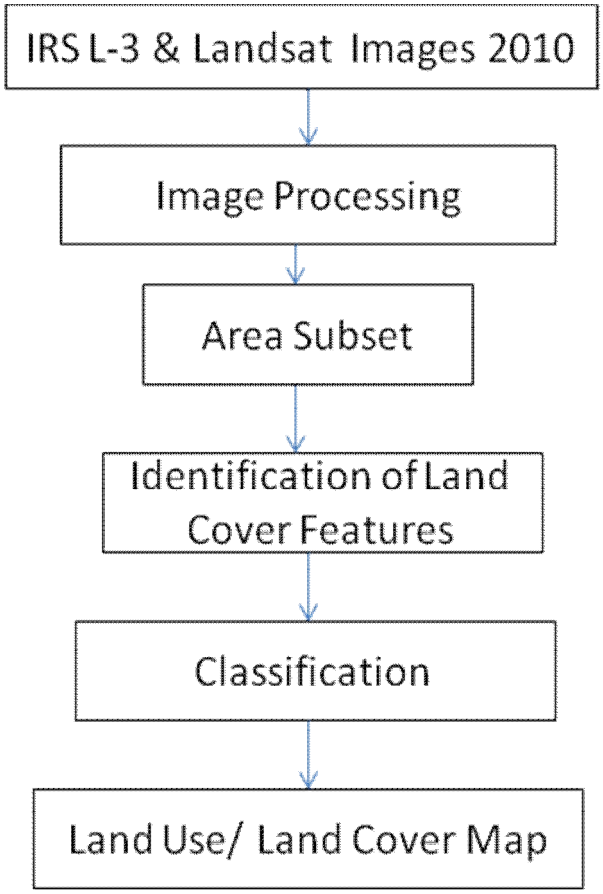


Fig.5. Methodology Flow Chart

## V. RESULTS & DISCUSSION

In the study area, vegetation is mainly comprises of natural trees, forest plantation and agricultural crop fields. Natural vegetation cover occupies maximum 2%, medium 9%, moderate 28%, 40% less and 21% dry deciduous of the total study area . The study demonstrated that remote sensing is a state of the art technological tool to map and distinguish the vegetation formations in Jodhpur & surrounding area. The geospatial data generated on vegetation type maps are important for monitoring and change detection analysis. The vegetation type map clearly showed that maximum coverage of the geographical area is under sparse vegetation. Area of the barren & rocky classes increases as the seasonal grasses dry.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 5, Issue 10, October 2017

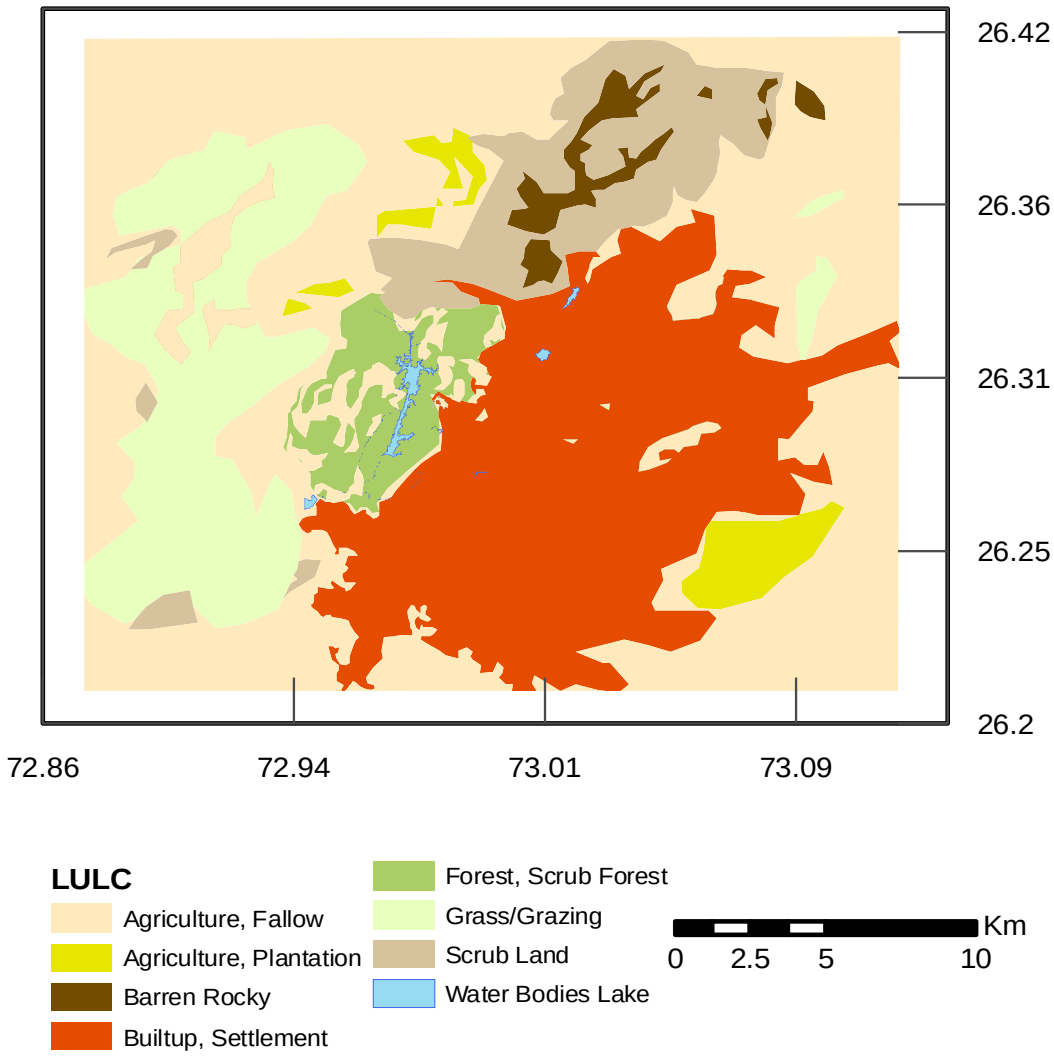


Fig.6. LULC Map Output map based on the two Imageries.

## ACKNOWLEDGEMENTS

The authors are thankful to the Director DLJ, Jodhpur for help, encouragement and critical suggestion during the study.

## REFERENCES

1. Parihar, S.K, Borana, S.L., Yadav, S.K. and Palria V.S. - Remote Sensing and Geographic Information System: A Tool for Measuring Land Degradation due to Mining Activities, International Conference on Electronics, Information & Communication Systems Engineering (ICEICE-2010). MBM, Jodhpur.
2. Borana S.L., Yadav S.K., Parihar S.K. and Paturkar R.T. - Integration of Remote Sensing & GUS for Urban Land Use / Cover Change Analysis of the Jodhpur city, 33rd INCA International Congress on Integrated Decentralized Planning: Geospatial Thinking, ICT and Good Governance, 19 - 21 September, 2013, Jodhpur, Rajasthan, India.
3. Dymond, J.R., J.D. Shepherd, J. Qi. 2001. A simple physical model of vegetation reflectance for statndardising optical satellite imagery. Remote Sensing of the Environment, 77(2): 230-239.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 5, Issue 10, October 2017

4. Bhagawat Rimal (2011). Urban Growth and Land Use /Land Cover Change of Pokhara Sub-Metropolitan City, Nepal. Journal of Theoretical and Applied Information Technology, Vol.26, No. 2, ISSN 1992-8645
5. Ahmed, B. and Ahmed R. (2012). Modeling Urban Land Cover Growth Dynamics Using Multi-Temporal Satellite Images: A Case Study of Dhaka, Bangladesh, ISPRS International Journal of Geoinformation, 1, 3-31.
6. Goodchild, M. F. (2000). Spatial analysis: methods and problems in land use management. in Spatial Information for Land Use Management, eds. M. J. Hill and R. J. Aspinall, (Gordon and Breach Science Publishers, Singapore), 39-50.
7. Lillesand T.M.and Keifer W(1994) "Remote Sensing Image Interpretation", New York: John Viley.
8. Bhuwan - http://bhuvan.nrsc.gov.in/data/download/index.php
9. USGS - http://glovis.usgs.gov