International Journal of Multidisciplinary Research and Development

IJMRD 2015; 2(1): 65-69
www.allsubjectjournal.com
Received: 06-11-2014
Accepted: 08-12-2014
e-ISSN: 2349-4182
p-ISSN: 2349-5979
Impact Factor: 3.762

P.L. Keshava Kiran Kumar
Research Scholar, Dept. of Geology, Y.V. University, Kadapa, Y.S.R District.

K. Raghu Babu
Asst. Professor, Dept. of Geology, Y.V. University, Kadapa, Y.S.R District.

Correspondence:
P.L. Keshava Kiran Kumar
Research Scholar,
Dept. of Geology, Y.V. University, Kadapa, Y.S.R District.

Evaluation of Landuse Landcover for potential town planning using remote sensing and GIS techniques around Kadapa Mandal, Y.S.R district, Andhra Pradesh, India.

P.L. Keshava Kiran Kumar and K. Raghu Babu

Abstract
Land Cover, defined as the assemblage of biotic and a biotic components like water, snow, grassland, forest, and bare Soil. On the earth's surface is one of the most crucial properties of the earth system. Land cover is that which covers the surface of the earth and land use describes how the land cover is modified. Land Use includes agricultural land, built up land, recreation area, wildlife management area etc. Both land use land cover are dynamic. The Land cover reflects the biophysical state of the earth's surface and immediate subsurface, thus embracing the soil material, vegetation, and water. The study area (between Parallels of 78°51'14.659"E longitude 14°32'23.913"N latitude and 78°54'2.7"E longitude 14°24'10.573"N latitude) falls in the Kadapa mandal, Y.S.R District,India. Land use and Land cover is an important parameter for developmental planning. In the present study an attempt has been made to generate the land use and land cover map from Satellite (IRS) P6, linear image self-scanning (LISS III) geocoded data with UTM projection, of total 4 bands on a 1:50,000 scales. Geographic Information System is used to for integrating remote sensing data, topographical maps and field data to accurately map landuse and land cover of the study area. Six major land use classes were identified and mapped for the study area. These are: Cultivated land, Uncultivated land, Forest land, Waste land, Builtup land, Water bodies. The study observed that cultivated land and Builtup land is dominant in Kadapa mandal. The study recommends the use of satellite imageries for future environmental monitoring studies.

Keywords: Kadapa mandal, Y.S.R District, linear image self-scanning, Geographic Information System and topographical maps.

1. Introduction
Land use and land cover (LULC) change is a major issue of global environment change. Scientific research community called for substantive study of land use changes during the 1972 Stockholm Conference on the Human Environment, and again 20 years later, in 1992 United Nations Conference on Environment and Development (UNCED). At the same time, International Geosphere and Biosphere Programme (IGBP) and International Human Dimension Programmed (IHDP) co organized a working group to set up research agenda and promote research activity for LULC changes. Land use/ land cover mapping is essential component where in other parameters are integrated on the requirement basis to drive various developmental index for land and water resource. Land use refers to man's activities and the varied uses which are carried on over land and land cover refers to natural vegetation, water bodies, rock/soil, artificial cover and others noticed on the land (NRSA, 1989).
Land use refers to man's activities on land which are directly related to the land. Land use and land cover are dynamic. Changes may involve the nature or intensity of change but may also include spatial (forest abatement at village level, or for a large scale agro industrial plant), and time aspects. Land use/ Land cover changes also involve the modification, either direct or indirect, of natural habitats and their impact on the ecology of the area. Remote sensing techniques have been used to monitor land use changes; this has an important role in urban development. Also remote sensing is very useful for the production of land use and land cover statistics which can be useful to determine the distribution of land uses in the watershed. Using remote sensing techniques to develop land use classification mapping is a useful way to improve the selection of areas to design agricultural, urban and industrial areas of a region (Selcuk, 2003).

Thus, the evolution in technology of remote sensing has caused it to become one of the most commonly used techniques. As the demand for increased amounts and quality of information rises, and technology continues to improve, remote sensing will become increasingly critical in the future. Therefore, the focus of this chapter is on the issues and challenges associated with monitoring land-cover and land-use change. Remote sensing information allied with available technologies such as GPS and GIS, can form the information base upon which effective decisions can be made (Franklin *et al*., 2000; Franklin, 2001).

Application of remotely sensed data made possible to study the changes in land cover in less time, at low cost and with better accuracy (Kachhwaha, 1985) in association with Geographical Information System (GIS) that provide suitable platform for data analysis, update and retrieval (Star *et al.* 1997; McCracker *et al.* 1998; Chilar 2000). Spaceborne remotely sensed data may be particularly useful in developing countries where recent and reliable spatial information is lacking (Dong *et al.* 1997). Remote sensing technology and geographic information system (GIS) provide efficient methods for analysis of land use issues and tools for land use planning and modeling. By understanding the driving forces of land use development in the past, managing the current situation with modern GIS tools, and modeling the future, one is able to develop plans for multiple uses of natural resources and nature conservation. The change in any form of land use is largely related either with the external forces and the pressure built-up within the system (Bisht and Kothyari, 2001). The main objective of the study area is 1) To identify the Location of the study area for better interpretation, 2) To identify the Land use / Land cover in the given imagery based on tone and texture, 3) To prepare the Land use / Land cover analasys using GIS software 9.7, 4) Mapping of various Land use / Landcover patterns using ArcGIS9.7 and satellite imagery at 1:50,000 scale.

2. Study Area

The study area is Kadapa mandal, Y.S.R District, Andhra Pradesh, India (Fig1), lies between 78°51'14.659"E longitude 14°32'23.913"N latitude and 78°54'2.7"E longitude 14°24'10.573"N latitude with intended boundary falling in Survey of India toposheet no.57J14 and 57J15 covering approximately 92,31 Sq.km. Major geological formations are Nandyala shales and minor geological formations are Bironkonda quartzites, Cumbum shales, Cumbum phyllites and Koilkuntla limestones.

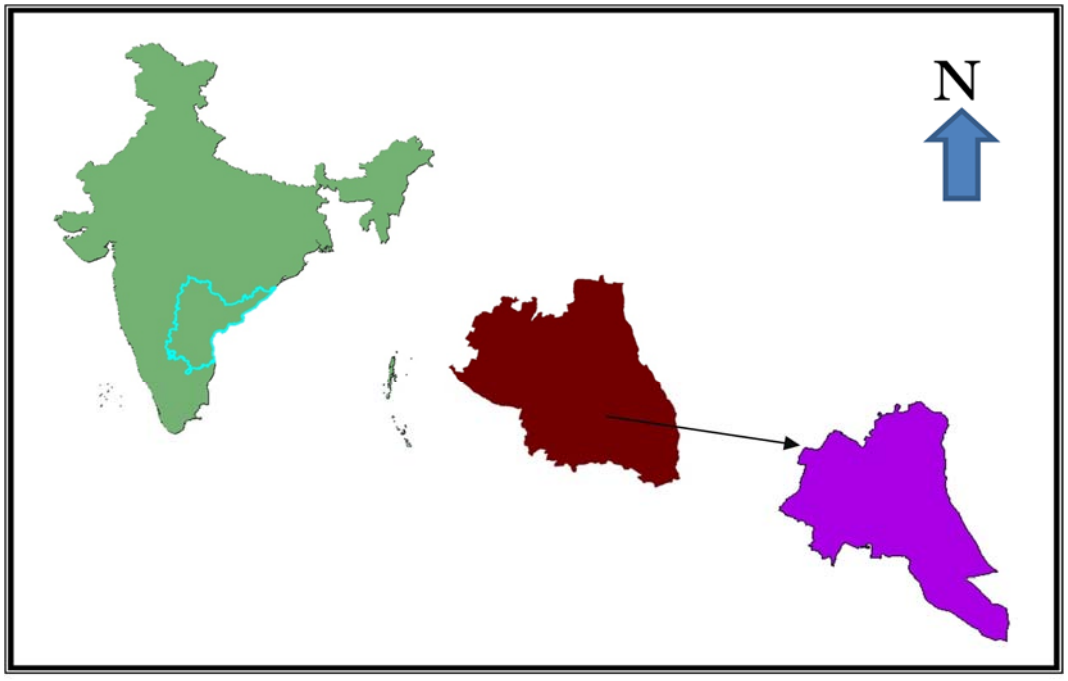

Fig 1: Map Showing Study Area

3. Methodology

Preparation of various thematic data such land use and Land cover using LISS-III Pan data and create a land use land cover map from satellite imagery using GIS classification (G. Sudarsana Raju *et al.*, 2010; K.Raghu Babu *et al.*, 2012). The Land use land cover maps were prepared based on various land patterns like Built-up land, cultivated land, uncultivated land, and Forest land and water body. Geology map also prepared by using GIS software 9.7. The Indian Remote sensing Satellite (IRS) P6, linear image self-scanning (LISS) III of geocoded with UTM projection, datum WGS-84, Zone North 44 generated from the total bands 4 on a 1:50,000 scales, was used for the present study. The data used in the study is described in the Table 1. The Survey of India toposheet maps 57 J 14 and 15 on a scale of 1:50,000 equal to the corresponding imagery were used for the preparation of thematic maps. Finally to prepare a Land use / Land cover map for future environmental monitoring studies as shown in the methodological flow chart in Fig. 2.

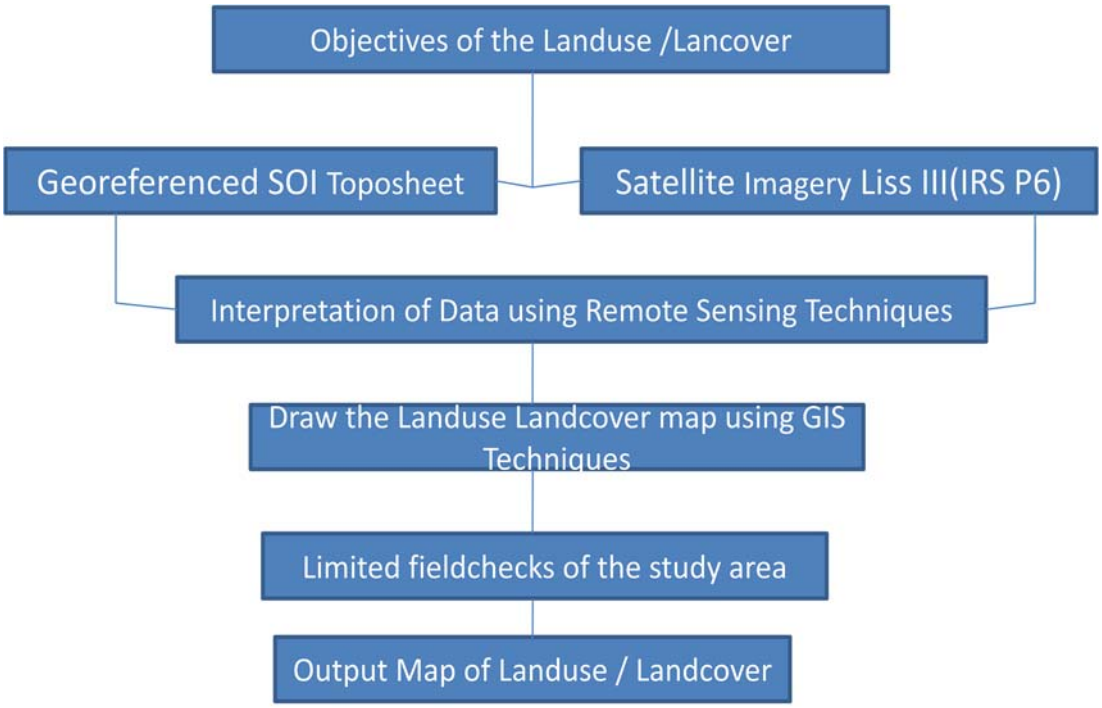

Fig 2: Flow Chart Showing Methodology

Table 1: Statement showing the image properties

S. No.	Image Type	Sensor	Spectral Composition (No. of Bands)	Spectral Resolution	Source
1.	IRS P6 2006	LISS-III	G-0.52-0.59 R-0.62-0.68 NIR-0.76-0.86 SWir-1.55-1.70	23.5(all bands)	Free data (Bhuvan data)
2.	IRS P6 2009	LISS-III	G-0.52-0.59 R-0.62-0.68 NIR-0.76-0.86 SWir-1.55-1.70	23.5(all bands)	Free data (Bhuvan data)

4. Result and Discussion

Field surveys were conducted within the study area (Table 2) to determine the major types of land use and land cover. Such data is used in two aspects of the mapping of land use land cover. Firstly it will aid in land use and land cover classification, by associating the ground features of a specific type of land use and land cover with the relevant imaging and spectral characteristics. Secondly, ground data will be used for accuracy assessment of the developed land use and land cover maps.

Table 2: Locality Index of the Study area

	Name of the Village	Longitude	Latitude
1	PUTLAMPALLE	78°51'31.855"E	14°26'18.802"N
2	CHINNACHOWK	78°51'29.429"E	14°27'55.961"N
3	UKKAYAPALLE	78°50'47.65"E	14°29'29.677"N
4	KADAPA	78°49'14.384"E	14°29'47.784"N
5	AKKAYAPALLE	78°48'44.612"E	14°28'21.75"N
6	CHEMMUMIYAPETA	78°48'14.96"E	14°27'33.036"N
7	RAMARAJUPALLE	78°47'41.512"E	14°28'29.953"N
8	GUDURU	78°48'18.714"E	14°29'19.314"N
9	PALAMPALLE	78°48'37.469"E	14°30'33.461"N
10	PATAKADAPA	78°50'8.152"E	14°31'3.941"N

5. Landuse Landcover

The landuse map for the study area was prepared with the help of image interpretation keys such as tone, texture, drainage, structure fabric and relief using both toposheets as well as geocoded data. Further demarcated areas were confirmed though ground truth data (Selvam *et al* 2011). The

various landuse found in the study area and their map overlay technique is consent of GIS. The study area has been classified into different types they are forest land, cultivated land, uncultivated land, and built-up land and water bodies. In the Kadapa 40% of the area is covered by cultivated land. Kadapa mandal occupy 92.31 Sq km. the land use land cover map prepared is shown in the Fig. 3.

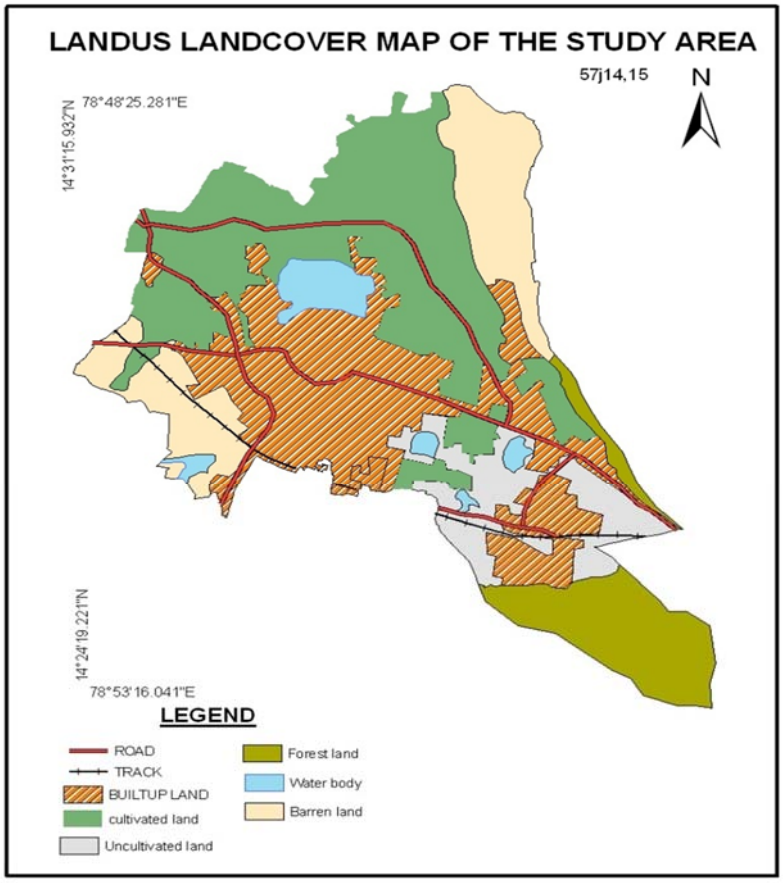

Fig:3 Landuse landcover

6. Built up Land

The Kadapa Mandal has more number of settlements. Basically these settlements formed by road side areas, riverside areas along cultivated areas and water body areas. The road side settlements are formed straight, hence they may be called as linear, other settlements in Kadapa town very closely space and compact they are called massive settlements. Built up land entire Kadapa mandal occupy an area of 26.76Sq Km and spread over the areas like Chinna chaku, Putlampalle, Chemmumeyapeta, Nagaraj peta, Kadapa, Akkayapalle, Ramaraju palle, Guduru.

7. Cultivated Land

Cultivated land is observed in area around Palampalle, Guduru, Pathakadapa, Ukkayapalle, Chinnachowk, Putlampalle, Ramaraju palle. Kadapa mandal Cultivated area occupies 30.50 Sq km. In present scenario population is gradually increasing and cultivation/agriculture land decreasing in the same pace. The main cause is that people are covering cultivated areas into builtup lands.

8. Uncultivated Land

In kadapa mandal uncultivated land is very less, because of fast development of the Kadapa town. This land occupies 8.29 Sq.Km. Uncultivated Lands are observed in area around Chinnachowk.

9. Forest Land

Satellite imagery of study area forest land is identified by red to dark red tone and varying size. SW portion of the forest land was decreased because of the expanding town area. Forest land occupies 9.45 Sq.K.m. and observed in area around Puttlampalle, Chinnachowk.

10. Water Bodies

Water bodies appears in light blue to dark blue in tone in satellite imagery. The shallow water bodies are light blue and dark water bodies are in dark blue color. Total water body occupies 3.73 Sq.K.m. Major water bodies are observed in Kadapa, Puttlampalle, Chinnachowk, Chemmumiyapeta.

11. Barren Land

This type of land is use full for settlements and cultivation. But they are situated far away from the city and water bodies etc. This land occupies 13.4219 Sq.K.m. Barren land is observed in Chinnachowk, Ukkayapalle, Old Kadapa, Chemmumiyapeta, Ramarajupalle.

12. Conclusion

In Kadapa mandal majority of land is occupied by settlements because of availability of resources. It occupies an area of 26.76 Sq.km. Cultivated land observed around Kadapa city measures about 30.50 Sq.km, because of the

development of urban area, cultivated land and forestland is going on decreasing in Kadapa mandal. Forest land measures about 9.45 Sq.km. The uncultivated land shown can be brought into cultivation which measures about 8.29 Sq.km. Barren land also could bring to use for cultivation and for settlements. Barren land occupies an area of 3.73 Sq.km, this can be used for agriculture or for the establishment of industries etc. Water bodies occupy 3.73 Sq.km. in the form of tanks, reservoirs and canals in the Kadapa mandal.

13. References

1. Bisht BS, Kothyari BP. LandCover Change Analysis of Garur Ganga Watershed Using GIS/Remote Sensing Technique. I. Indian Soc Remote Sensing 2001; 29(3):165174.
2. Chilar J. Land cover mapping of large areas from satellites: status and research priorities. International Journal of Remote Sensing 2000; 21(67):1093–1114.
3. Dong Y, Forster B, Ticehurst C. Rader backscatter analysis for urban environments, International journal of remote sensing 1997; 18(6):1351-1364.
4. Franklin J, Woodcock CE, Warbington R. Digital vegetation maps of forest lands in California: integrating satellite imagery, GIS modeling, and field data in support of resource management. Photogrammetric Engineering and Remote Sensing 2000; 66:1209–1217.
5. Franklin SE. Remote Sensing for Sustainable Forest Management, Lewis Publishers, Boca Raton FL, 2001, 407.
6. Jensen JR. Cowen DJ. Remote sensing of urban/suburban infrastructure and socio-economic attributes. Photogrammetric Engineering and Remote Sensing 1999; 65:611–622.
7. Kachhwala TS. Temporal monitoring of forest land for change detection and forest cover mapping through satellite remote sensing. In: Proceedings of the 6th Asian Conf. On Remote Sensing, Hyderabad, 1985, 77–83.
8. Loveland TR, Sohl TL, Stehman SV, Gallant AL, Sayler KL, Napton DE. A Strategy for estimating the rates of recent United States land-cover changes. Photogrammetric Engineering and Remote Sensing 2002; 68:1091–1099.
9. Raghu Babu K, Keshava Kiran Kumar PL, Ramakrishna P. Evaluation of Geoenvironmental facet of a satellite imagery using GIS, a study in YSR District, India, International Journal of Remote Sensing & Geosciences (IJRSG) 2012; 2(3):39-49.
10. Rogan J, Miller J, Stow D, Franklin J, Levien L, Fischer C. Land cover change mapping in California using classification trees with Landsat TM and ancillary data. Photogrammetric Engineering and Remote Sensing 2003; 69(7):793–804.
11. Star JL, Estes JE, McGwire KC. Integration of geographic information systems and remote sensing. New York, NY: Cambridge University Press, 1997.
12. Sudarsana Raju G, Raghu Babu K. Application of Remote Sensing in Geoenvironmental Studies in and Around Balapanuru-Ellanuru Area of Kadapa District, Andhra Pradesh, Indian Journal of Environmental Protection 2010; 30(2):140-157.