

CONTEMPORARY ISSUES & CHALLENGES IN SOCIAL SCIENCES

**“ESTIMATION OF LAND USE AND LAND COVER MAPPING
USING REMOTE SENSING AND GIS IN DONAJ VILLAGE”**

Dr. D.N.Ligade Assistant Professor in Geography

Walchand College of Arts and Science, Solapur

Email Id: dhanesh.ligade@gmail.com

Dr. V. C. Dande Assistant Professor in Geography

DBF Dayanand College, Solapur

Email Id: vcdande@gmail.com

Abstract:

Land use and land cover are the two basic approach of describing land and its mapping using RS and GIS techniques is a cost effective method of obtaining a clear understanding of land cover. LANDSAT-8 (Oct-2017) satellite imageries(30 m resolution) used and characterized into eight classes. This paper concentrates on spatial pattern of land use and land cover in Donaj village. Image classification is the process of sorting all the pixels into in an image into a finite number of individual classes. This paper concludes that, in the total geographical area majority of land is used for agriculture which contribute 37.37 percent land and major food crops are taken by people in this region.

Keywords: LULC, Remote Sensing, Barren Land, Mapping, Unsupervised

Introduction:

LULC is a key driver of global change (Vitousek, 1992) and it has significant implications for many international policy issues(Nunes and Auge, 1999). And its change are main issues of universal environment change. Land cover is that which protections the surface of the earth and land use designates how the land cover is adjusted. Now a days remote sensing and GIS has been used for LULC planning in dissimilar parts of India. RS and GIS provide resourceful methods for analysis of land use issues and tools for land use planning and modeling. In this present study, an examination has been carried out in parts of Donaj Village in Solapur district.

Objectives:

1. To create a land use/land cover map of study region.
2. To identify the predominant land use area in study region.

Study Region:

Donaj is one of the important village in Mangalwedha taluka in Solapur district of Maharashtra state, India. It belongs to Desh of Pachim Maharashtra region. Donaj village is bounded by 17O25'48.30" N to 17O28'34.30" N latitudes and 75O31'30" E to 75O34'40" E longitudes. It is located 59 km. from district head quarter of Solapur and 16 Km. from Mangalwedha. It is 499 meters above mean sea level. The total area of the village is 1962.57 hect. As per 2011 census the total population accounts 2953 in Donaj Village.

CONTEMPORARY ISSUES & CHALLENGES IN SOCIAL SCIENCES

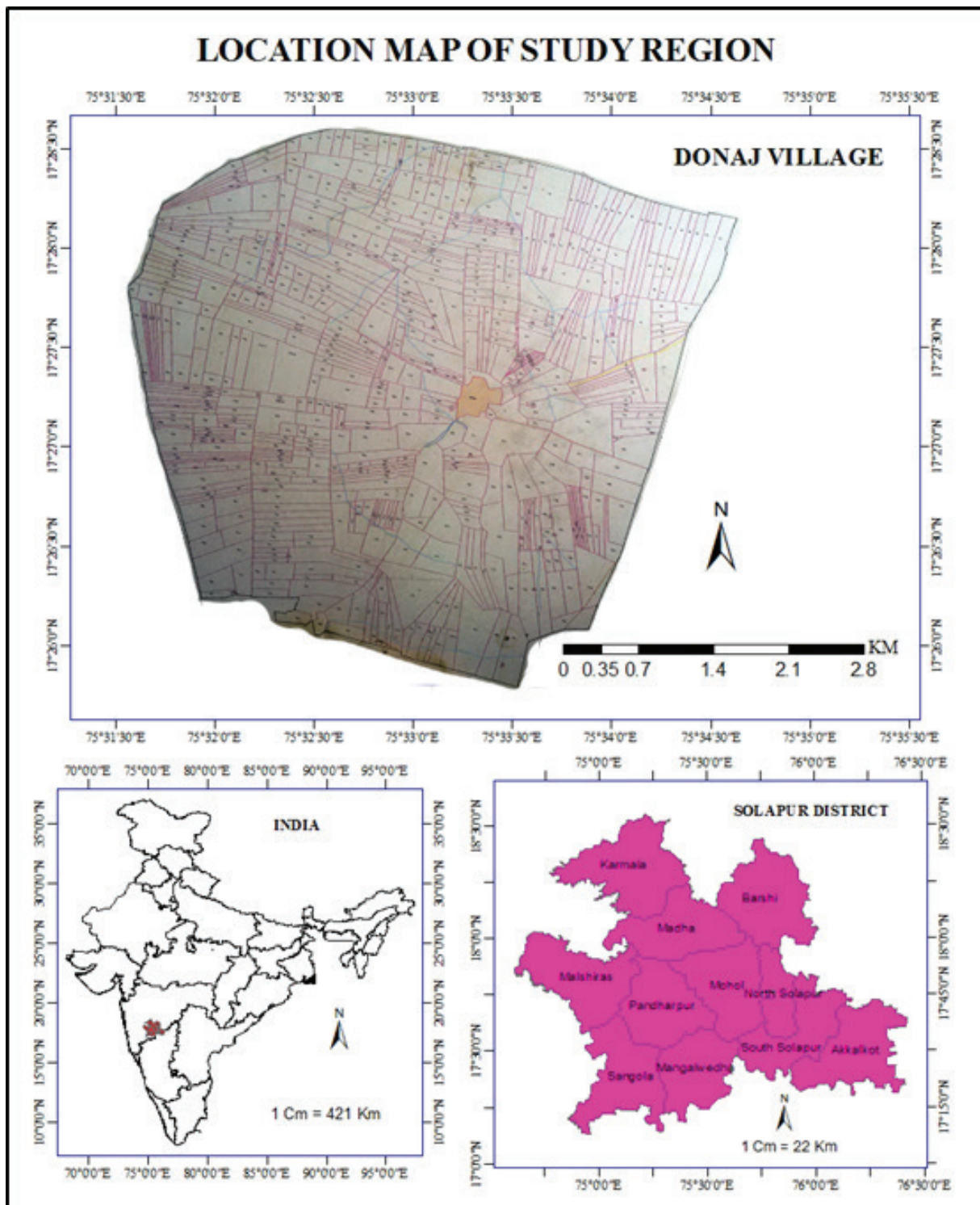


Fig No.1- Location map of study region

Database Methodology:

In order to determine the LULC to the study region, a multi-parametric datasets was used. The detail of the primary and secondary data used for this study are mentioned as follows.

A) Primary Data: SOI topographical Maps (47O/11), Village Map, LANDSAT-8 Satellite Imageries, Field Survey

CONTEMPORARY ISSUES & CHALLENGES IN SOCIAL SCIENCES

B) Secondary Data: The secondary data used are geology and geomorphology map which are need for spatial distribution of LULC

C) Software used: Q GIS, SAGA, Global Mapper

In order to identify the LULC of Donaj Village the primary and secondary data are used. The collected toposheets of study area were scanned, registered and mosaicked using GIS software. Satellite data were collected pre-processed and geo-corrected with respect to registered toposheet, and following methodology was used.

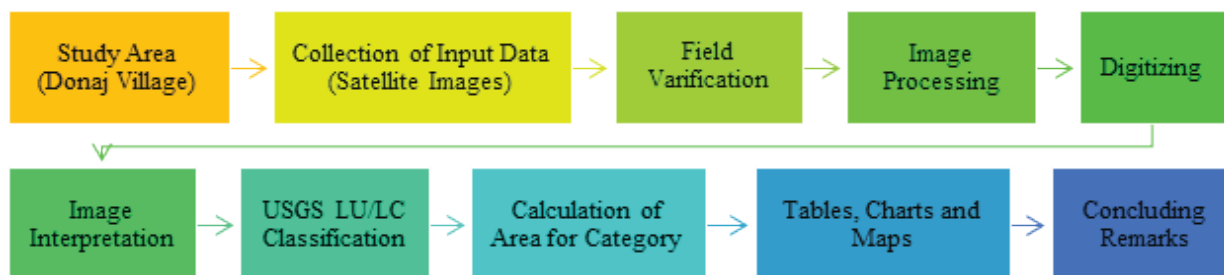


Fig No.2- Flow Chart showing Methodology

The classification of image was performed by using unsupervised classification. In this type of classification spectral classes are grouped first, based on the numerical information of the data and are matched. For the purpose of LULC classification following classification recorded to satellite image and form eight classes. Unsupervised classification is simpler than a supervised classification because the signatures are automatically generated by the ISODATA algorithm, with the help of visual interpretation and standard interpretation characteristics keys such as tone or color, shape, size, texture, shadow, pattern site or aspect, resolution and various associated features etc. identified the features.

Results and Discussion:

The term Land use relates to the manner in which human being employ the land and its resources or to the human activity or economic function associated with specific piece of land use and land cover. The term that relates to the type of features present on the surface of earth or implies the physical or natural state of the Earth surface. (Lillesand and Keifer, 1994; Smits 1999). The LULC are classified as follows and details of LULC cover statistics of study area is given in **Table No.1.**

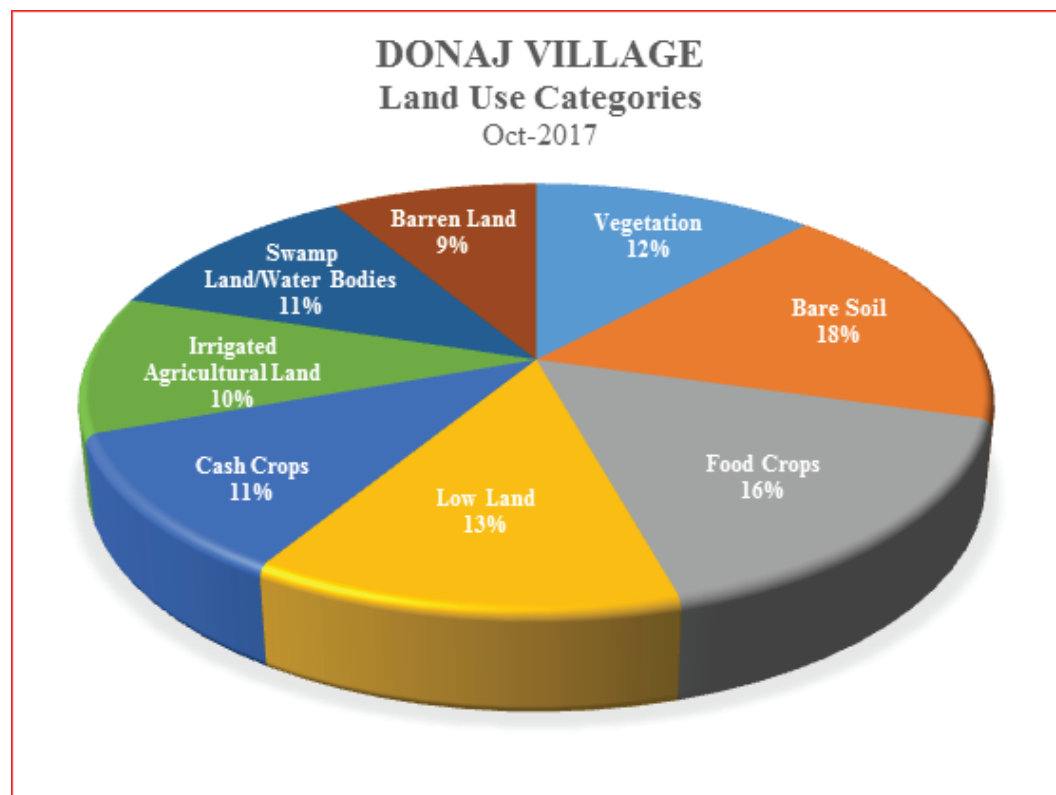
Table No.1- Donaj Village-Land Use/ Land Cover (Oct-2017)

Sr.No.	Land Categories	Approx. Area(in Hect.)	Area (in Sq. Km.)
1	Vegetation	232.98	2.3298
2	Bare Soil	344.31	3.4431
3	Food Crops	319.06	3.1906
4	Low Land	257.09	2.5709
5	Cash Crops	210.03	2.1003
6	Irrigated Agricultural Land	204.29	2.0429
7	Swamp Land/Water Bodies	224.95	2.2495
8	Barren Land	169.86	1.6986
	Total	1962.57	19.6257

Source: LANDSAT-8 (Satellite Imageries)

CONTEMPORARY ISSUES & CHALLENGES IN SOCIAL SCIENCES

1. **Vegetation:**Vegetation is a broader term than flora, which refers specifically to the plant diversity of an area. These are essential factors to maintain the healthy environment. In this study region around 12 percent of area covered under this category. In this region maximum



area occupied in middle part of the study region. Near the road, water bodies and around the agricultural land this type of area were observed.

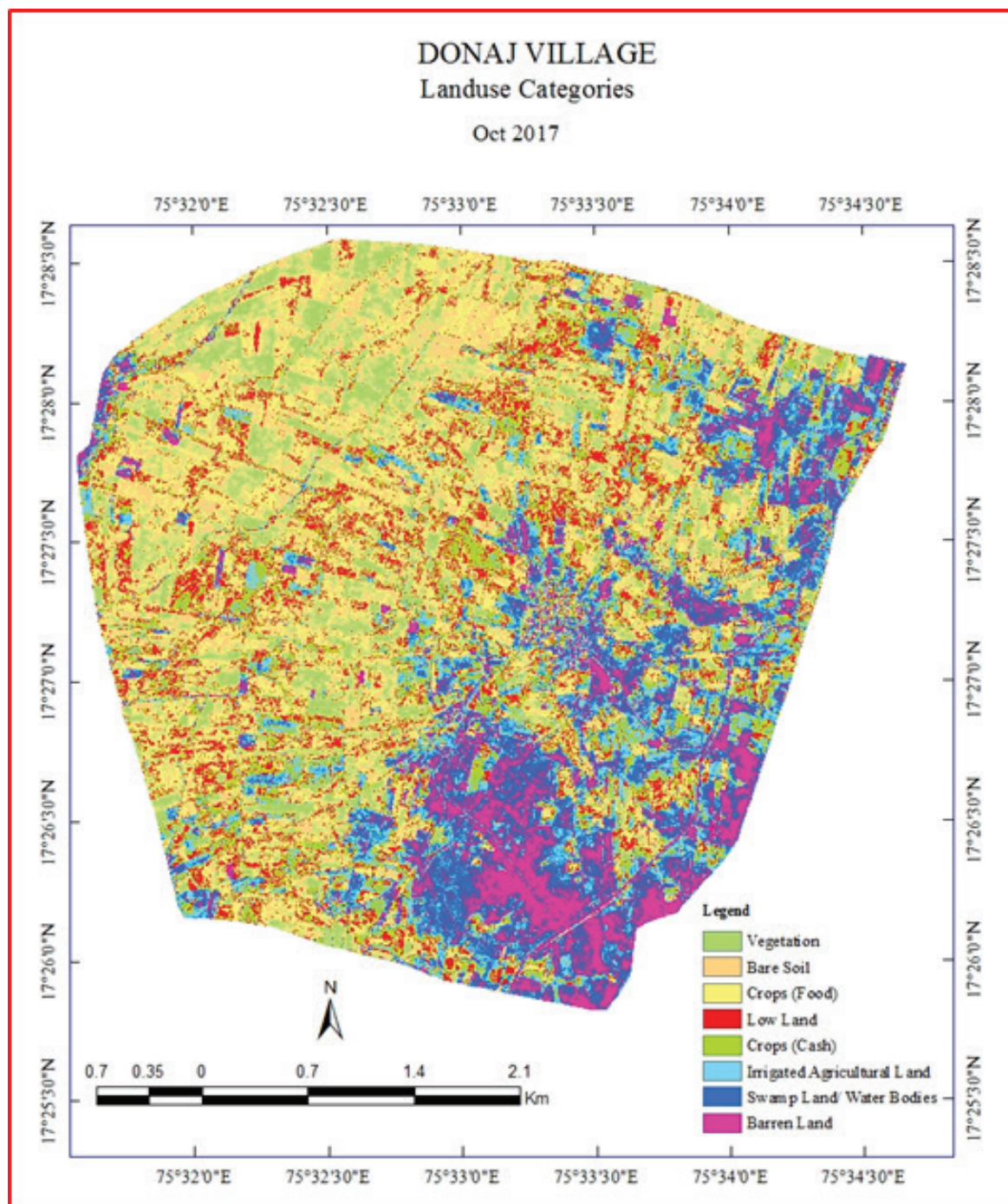
Fig No.3- Distribution of Land Use/ Land Cover Classes

2. **Bare Soil:** Bare soil means soil or sand not covered by grass, sod, other live ground covers, wood chips, gravel, artificial turf, or similar covering. In study region around 18 percent of area covered by bare soil. In agricultural land due to economic problem some people avoid to take crops in this region that's why these area considered the bare soil. Maximum area of bare soil observed in the south-west, west and north region.
3. **Crops:**The observation with the help of the image interpretation reveals that the area under study is predominantly an agricultural region. In this categories two groups are categorized as per the type of crops. In study area maximum areas come under rich cultivation because of whole areas comes in area under black soil. Agricultural area is mainly present in middle and west part of the study area.It occupies 733.38 hect. (37.37%) of the total study area. In this area, food crops are densely observed and in this crops jowar is an important crops. In other crops maize is also important crops observed which is useful for animal.

Other hand cash crops also haphazard in study region which makes to profit in return to selling by grown of crops. Cotton and oil seeds are main cash crops in this region. This types of crops observed in black soil region. Around the 11 percent of area under this category observed in study region.

4. **Low Land:** Low land is an area of land that is low in relation to the surrounding area. In study

CONTEMPORARY ISSUES & CHALLENGES IN SOCIAL SCIENCES



region around the 13 percent area covered by low land. This types of land are not useful for rich cultivation. Some people are practices to grow the crops in this region.

Fig No.4- LULC Map of Donaj Village

5. Irrigated Agricultural Land: Irrigated agricultural area refers to area equipped to provide water (via artificial means of irrigation such as by diverting streams, flooding, or spraying) to the crops. In Donaj village well, bore well and canal are the modes of irrigation. Maximum number of well and bore wells gives the idea of agricultural development in study region. In this study region sugarcane, grape and pomegranate are the major crops. Around 10 percent of area covered by irrigated land in study region.

6. Swamp Land/Water Bodies: Swamp land is an area that always very wet. Due to canal and

CONTEMPORARY ISSUES & CHALLENGES IN SOCIAL SCIENCES

heavy rainfall this types of land observed in study region. Maximum area under this category observed in SE region in study area. This types of area marked by blue tone in satellite imageries. There is no main river in study region so maximum percent of agriculture depend on the rainfall. 11 percent of land covered by swamp land/water bodies.

7. **Barren Land:** Barren lands include deserts, dry salt flats, beaches, sand dunes, exposed rock, strip mines, quariesand gravel pits. In general, Barren Land has thin soil, sand, or rocks. The maximum proportion of barren land covered in SE direction in study region. 9 percent of land covered by barren land.

Conclusions:

The following conclusions can be drawn from the present study:

1. A major proportion of LULC of the study area is comprised by agriculture which contribute 37.37 percent. In this agriculture area food crops are major crops in study region.
2. Built up area comprise of barren land group of classification under LULC which contribute only 1.84 percent of total area.
3. There were no major natural vegetation in study region, therefore some low densely vegetation area observed in this region.
4. Irrigated agricultural land is major economic source of people in this region. In this region sugarcane, grape and pomegranate are the major crops.

References:

1. Agarwal C.S.and P.K.Grag, (2000), "Remote Sensing in Natural Resources Monitoring and management", Wheeler publishing, New-Delhi, India.
2. Andrew Gilg (1985), "Land Use Planning in Switzerland", The Town Planning Review, Vol 56, No 3, pp 315-338
3. E.F Lambin, M.D.A. Rounsevell, and H.J.Geist, (2000), "Are agricultural land-use Models able to predict changes in land use intensity", Agriculture, Ecosystems and Environment, Vol 82, PP.321– 331.
4. FeiYuan , Kali E Sawaya,. Brian C. Loeffelholz, Marvin E. Bauer (2005), "Land cover classification and Changeanalysis of the Twin Cities (Minnesota) Metropolitan Area", By multitemporal Landsat remote Sensing, RemoteSensing of Environment, Vol. 99, August, pp. 317-327.
5. <http://www.nrsc.gov.in>
6. O.S. Olokeogun, O.F.Iyiola and K.Iyiola: "Application of Remote Sensing and GIS in land use/land cover Mapping and change detection in shasha forest reserve", Nigeria, IAPRSSIS, Vol.XL-8, Dec.2014
7. S.V.Hwan, Dr.Eun-Kyung JO: "Survey of Land use and Land cover change detection using Remote Sensing" SSRG-IJGGS Vol.I, Issue.II, 2014
8. Subash S. Sannashiddannanavar: "Land Use Land cover Analysis of Haveri District: Using Remote Sensing", Golden Research Thoughts, Vol.IV, Issue. VIII, Feb.2015, pp.1-5
9. Subash.S.Sannashiddannanavar(2014) "Micro-Level Spatial Planning for Haveri district, Karnataka Using Geo-Spatial technology". UGC major research Project report. New-Delhi
10. Vimla Singh, Ashok Dubey: "Land Use mapping using Remote Sensing and GIS Techniques in Naina-Gorma Basin, Part of Rewa district, M.P., India", IJETA, Vol.2, Issue.11 pp.151-156.