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Study of Decadal Change in Land use Pattern in URBC Command, Gujarat.

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***Abstract*—In order to monitor the significant variation on the surface of the earth, the land use land cover mapping over the period of certain interval, the analysis of changes can be done accurately in command area. Due to human and natural causes, the changes in vegetation quality, water body and agricultural land, salt affected area, etc impact on policies. The land use / land cover map of Ukai Right Bank Canal command area detect the changes between year 1998-99 and 2014. These changes can be monitored with the help of aerial photography and remotely sensed data and has also been proved cost effective. Land use/ land cover changes very consistently and it is required to be monitored for an issues related to better environment. Digital data obtained from satellite imageries give accuracy in computation of land use/land cover monitoring. This paper monitor the changes in various category of command area and it has been notice the considerable increase in Crop area by 4302 Ha due to over all agricultural development in last 2 decades. Similarly, the water body in command area is increased by 2624 Ha due fishing activity have been developed. It also demonstrates capabilities of GIS and Remote Sensing in this field of terrain mapping and detects the geological and physical changes.**

***KEYWORDS:* Land use / land cover, Satellite imaginary, Change detection.**

I. INTRODUCTION

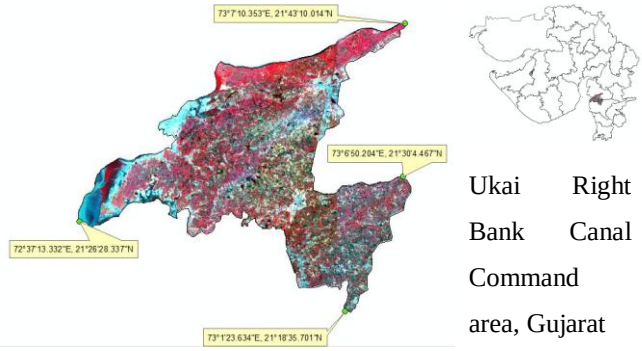
Although the terms land cover and land use is often used interchangeably, their actual meanings are quite distinct. Land cover refers to the surface cover on the ground, whether vegetation, urban infrastructure, water, bare soil or other. Land use refers to the purpose the land serves, for example, recreation, wildlife habitat, or agriculture. Land use applications involve both baseline mapping and subsequent monitoring, since timely information is required to know what current quantity of land is and what type of use is required to identify the land use changes from year to year. This knowledge will help to develop strategies to balance conservation, conflicting uses, and developmental pressures. Requirements of land use studies are because of the removal or disturbance of productive land, urban encroachment, and depletion of forests.

The Remote sensing satellite records responses, the characteristics of land surface including natural and artificial cover. It is possible to use the tones, texture and pattern, shape, size and shadow and site organization to get information about land use.

The Land use/ land cover map of January 1999 and January 2014 have been digitized based on topographical maps and aerial photographs from satellite using GIS. Detection of long term changes in land cover may reveal a response to a shift in local or regional climatic condition.

II. STUDY AREA

The study area forms part of Ukai-Kakrapar Project of the southern region in the state of Gujarat, known as Ukai Right Bank Canal Command and located between 21º 43' & 21º 21' North latitude and 72º 39' & 73º 7' East longitude as shown in figure 1.



Ukai Right Bank Canal Command area, Gujarat

Fig.1 Study area Index map of Latitude and longitude.

The study area selected is command area of Ukai Right Bank Canal take off from KRBMC at 46.6 km, which was constructed after coming up Ukai dam to provide irrigation facilities to area of 61,309 ha lying between Narmada River and Kim River.The design capacity of this unlined canal is 1590 cusecs and length of canal is 48 km.

III. METHODOLOGY AND DATA COLLECTION

The methodology of Land use/Land cover mapping has been explained in form of flowchart containing all steps as shown in figure 2. The data inputs in a GIS are usually spatial and consist of thematic maps derived from a combination of existing maps and manual interpretation of remotely sensed imagery. Remote Sensing data are an important source of information for land use mapping.

Ukai Right Bank Canal command area is spread over Six Satellite Remote Sensing Data namely, 46C10, 46C11, 46C14, 46C15, 46G02, 46G03. These six toposheets cover complete command area of URBC and selected for land use/ land cover mapping study. The imageries of IRS-1C with PAN+LISS-III merged data have been extracted during pre-interpretation field visits for getting information about land cover classes, crop type, crop condition, extent of salinity and water-logging. Other data like base maps containing settlement, water body, road network, etc. are collected. Categories as shown in the Table 1 have been transformed on the satellite imageries using collected data with visual interpretation. Each category then labelled as individual feature class using Egomania Professional software.

Finally, each feature class is integrated as different attribute and output of Land use/Land cover map is prepared.

CODE	DISCRIPTION	CODE	DISCRIPTION
1	Canal Network	5	Rabi Crops
1.1	Main Canal	6	Salt Affected
1.2	Branch Canal	7	Water Logged
2	Road Network	8	Settlement
3	Rail Network	9	Saline Region
4	Admin. boundary	10	Water bodies

Fig 1: Land use classification of command area.

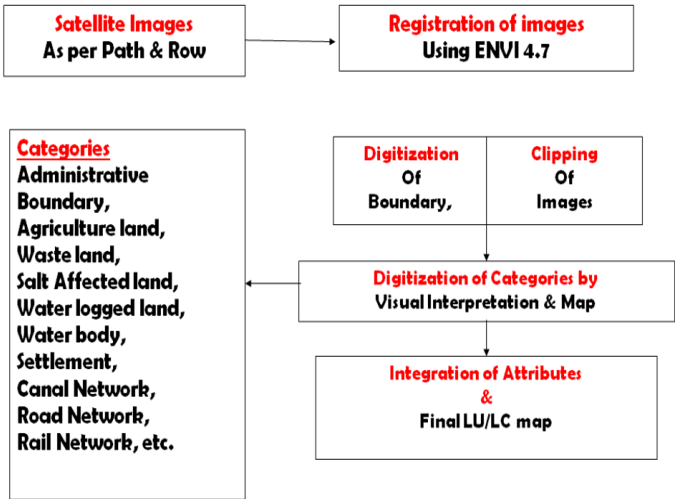


Fig 2: Methodology flow chart of land use/land cover mapping

The Land use/Land cover maps prepared using the methodology described above and been shown in figure 3. The canal network containing Ukai Right Bank Main Canal,

Hansot, Jitali and Kosamba Branch Canals have been digitized using Geo media Professional Software as shown in the figure: 3.

Simultaneously various land use and land cover classes delineated which includes land occupied by settlement, agricultural land, built-up area, forest area, water body and waste land as shown in the figure 3.

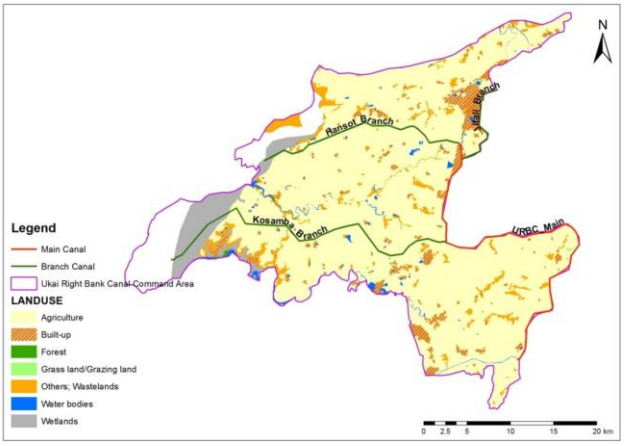


Fig 3: Output of prepared land use map

LAND USE COMPARISION BETWEEN YEAR 1998-99 AND 2013-14					
Sr. No	CATAGORIES	YEAR 1998-99		YEAR 2013-14	
		AREA (%)	AREA (Ha)	AREA (%)	AREA (Ha)
1	Saline Region	6.04%	5114.42	6.34%	5304
2	Waste Land	18.77%	15888	19.00%	15424
3	Water Body	1.51%	1274	4.66%	3898
4	Settlement	33.86%	28660	25.09%	20976
5	Water logging	1.91%	1615.33	1.93%	1615.33
6	Area of Rabi Crop	37.92%	32097.7	43.53%	36400
TOTAL AREA OF URBC		100 %	84649.4	100%	83617.33

Table 2: Land use comparison between 1998-99 & 2013-14

Detailed comparison of land use characteristics as described above. The land use statistics in 1998-99 and 2013-14 have various observations are tabulated as per table 2.

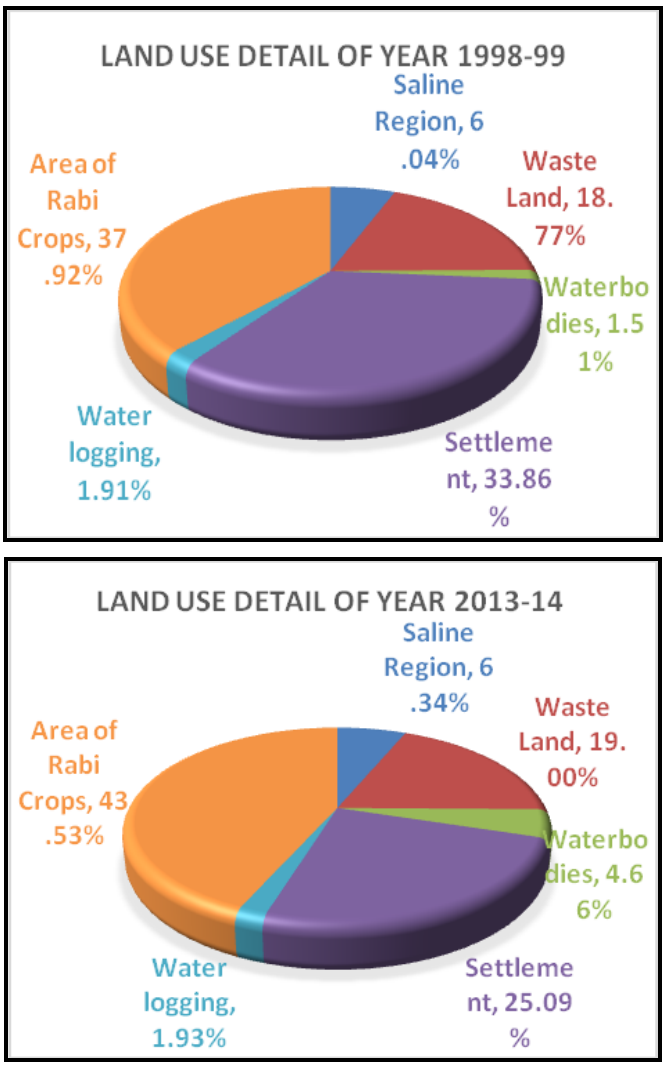


Fig 4 Land use distribution over the period of time.

IV. Discussions and Conclusions

Land use/Land cover mapping helps in monitoring land use classes like cropping pattern, urbanization, water logging, salt affected area, waste land, water body etc. based on all these attributes the land cover data can be drawn used in decision making and identify long-term impacts of irrigation in command.

In irrigation command the water logging and salinity is the major problem. Water logging is affect to the fertility and productivity of the land because of the high water table. The main factors which causing the water logging are inadequate surface drainage, excess use of canal water by the farmers, seepage from the canal system.

Since in the year of 1998-98 these issues is continued and no solution been found after 15 years ever in 2014.On the contrary due to the overall development in agriculture in the central region of state, the Rabi crop land has considerable increment of So in this way water logging and salinity is the major problem in canal command.

This paper monitor the changes in various category of command area and it has been notice the considerable increase in Crop area by 4302 Ha due to over all agricultural development in last 2 decades. Similarly, the water body in command area is increased by 2624 Ha due fishing activity have been developed. Remote sensing through synoptic and repetitive coverage can monitor irrigated land degradation by water logging and salinity.

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