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MONITORING AGRICULTURE LAND COVER DYNAMICS AND IRRIGATION DEVELOPMENT IN BIDAL VILLAGE USING REMOTE SENSING

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Abstract: The reason for Drought is the insufficient rainfall or increase in the water requirement. It may last for a week or for many years with varying intensities. The regional pattern of general landuse and agricultural landuse is described in the temporal and spatial variations in general and agricultural landuse in drought prone area of Bidal village in Man Tehsil of Satara District. The cropping pattern in the study area is a reflection of physiography, soil, slope, irrigation and other socio-economic factors. To carry out an in depth study of Bidal village is practically difficult and time consuming and it is also not possible to record every piece of land. Many geographers in the world and India have emphasized for such landuse survey. Hence, it becomes imperative to save time, money and manpower by studying village.
Keywords: LU/LC, GIS, Cropping Pattern

Introduction

India is an agriculture nation and for the most part relies on rural yields. Be that as it may, in India populace is expanding quickly, however there is no expansion in size of land. So food request likewise gets expanded. Then again, rain is unpredictable and deficient. So far most food creation irrigation techniques are essential.

At present surface irrigation technique has low efficiency and more water wastage so to beat these challenges arrangement is to embrace current new irrigation system. Innovation the assistance in financial utilization of water and to enhance yield as well. The sprinkle and drip irrigation system are propelled techniques sprinkler water system comprise of showering water into air through sprinkle spout and permitted to fall ashore surface in uniform example at rate less then penetration rate of soil

Maharashtra state that isn't free from irregular Monsoon the downfall is insufficient; therefore the irrigation plays an active role in agricultural landuse development. It provides the opportunities to farmers. The surface area isn't increased as like population; however, the population grows very fast. And therefore the increasing people's wants a lot of need of the food. Within the world, thousands of hectares land is lies beneath the Barren land or cultivable waste because of the shortage of irrigation. Irrigation has a significant impact on agriculture landuse development. In the study area, the traditional types of crops were found in the last 10 years. The farmers were grows the Jawar, Bajara, pulses like crops. After 1991, the changing cropping pattern and that resulted on the crop diversification.

Drip irrigation is that the slow drop-by-drop, localized application of water, at a grid simply on top of the soil surface. There are subsurface drip systems, within which buried laterals of drip irrigation are 20-60 cm below the soil surface (Phrone, 1992). This irrigation is much unaffected by wind conditions, neither is it stricken by soil surface conditions. Drip

irrigation is also known as trickle irrigation. Water is delivered near to the root of plants through the drop. This technique is often the most straightforward water saving technique of irrigation. Within the drought-prone area, this technique is widely used for the improvement of agriculture landuse.

Scope of the Study

Agriculture is the base of the Indian economy. However, the drought prone areas always suffer in agricultural practices due to shortage of rainfall. So it is necessary to identify the drought prone area on the basis of rainfall. This research work is 'an analytical study of agricultural landuse in drought prone area of Satara district'. The study tries to identify the agricultural landuse in drought prone tahsils of Satara District with the help of LULC Map of 2015 and 2025 and to also agriculture landuse in the same period. Agricultural is the main stay of economy of DPAS (Drought Prone Area of Satara) and it is directly affected by the occurrence of drought. Some aspects of relief, irrigation, also are studied in the Bidal Village.

Study Area

Bidal village is in Man tahsil, situated at 170 44'13'' north latitude and 740 21' 06'' east longitudes with an altitude of 754 meter from mean sea level. Bidal is located 5 km to the north of Man tahsil headquarter and well connected by road. It is located on the eastern side of Mahadev mountain range. It is surrounded by hills and Andhali Reservoir in west, Dahiwadi suburban place in south side of this village. Bidal village situated 170 km. to the east of Satara city. The village has an area about 2486 hectors, having population 5900 in 2011. The density of population was 310. The village has 1900 hectares cultivated area; out of this 70 percent cultivated area is under irrigation.

Data Source and Methodology

The present investigation has attempted to make an in depth study of Bidal village. Temporal analyses of general and agricultural landuse in 2015 and in 2025 are taken for the study. The socio-economic selected parameters have been studied in the study area. Spatial analysis of agricultural landuse is also carried for same year to find out the problems of the agriculture landuse and certain suggestions are made for its better development. The data for general landuse and agricultural landuse is collected through GIS techniques. The data is collected and is converted into percentage. The data on crop landuse from in 2015 is gathered for computing trends. The primary data is collected though questionnaires from 2015 & 2025 Farmers, *Talathi* and *Gramsevak.* Besides this, personal visits are made to selected Bidal village and observations are noted for getting more information.

Satellite images are used to study the geographical features and landuse / land cover. Two different types of questionnaires were prepared and discussed with farmers and village inventory for Gram Panchayat authorities. First questionnaire is related to farmer's family information, crop land, agricultural practices, agricultural inputs, sources and methods of irrigation, transportation, media and livestock, income-expenditure and problems filled after the interaction with the farmers. Second questionnaire is prepared to obtain the data on physiographic background, population characteristics, education, general landuse, crop land, irrigation, and other infrastructural facilities in the village filled by *Talathi*, *Gramsevak* and *Sarpanch*.

Cartosat-1 DEM image was downloaded from Bhuvan website of Government of India. Land use / Land cover classes were derived from USGS Landsat 4 & 5, Landsat-8 (MSS & TM) satellite image of 30m spatial resolution for the year of 2015 & 2025 by applying supervised classification method in ERDAS 2016 & Arc GIS 10.5 software.

General Landuse (LULC) of Bidal Village (2015 And 2025)

Landuse is known as a first indicator of the land resources which can be extended to which man has altered. When in given time and space the surface or vacant land of specific point is utilized generally known as landuse (Mandal, 1982). Land use/land cover (LULC) changes play a major role in the study of global change. Natural cover of land and human modifications has largely resulted in deforestation and biodiversity loss. These environmental problems are often related to LULC changes. Therefore, available data on LULC changes can provide critical input to decision-making of agricultural management and planning the future. Agriculture is the most important human activity. Agriculture makes a major share of human and animal-food and also other materials to meet human needs, including the necessity for industrial raw materials

In the present study there are two images of 2015 and two images of 2025 taken into account for the study of general and agricultural landuse. The LULC area is classified into six classes namely agriculture land, fallow land, N. vegetation, barren land, built up area, and water bodies.

The major change occurs in the Bidal village, increased agriculture area of this village (7 percent) from 2015 to 2025. The barren land area decreased hence increases of fallow land area in 2025 due to drought condition in that year. Many farmers did not use land for the cultivation in that year

Table No. 1

General Landuse of Bidal Village (2015 and 2025)

Name of the class	**Area in Percent (2015)**	**Area in Percent (2025)**	**Volume of change**
N. Vegetation	1.41	0.75	-0.66
Agriculture Land	35.55	42.55	7
Fallow land	9.57	18.5	8.93
Barren land	52.95	37.47	-15.48
Built up area	0.31	0.62	0.31
Water bodies	0.21	0.11	-0.1
Total area	100	100	

**Source: data compiled by the researcher*

The present images of Bidal village show the situation of general landuse. Barren land, N. vegetation and water bodies have decreased. Agriculture land, fallow land and built up area of the village have been increased. The barren land decreased 15.48 percent from 2015 to 2025.

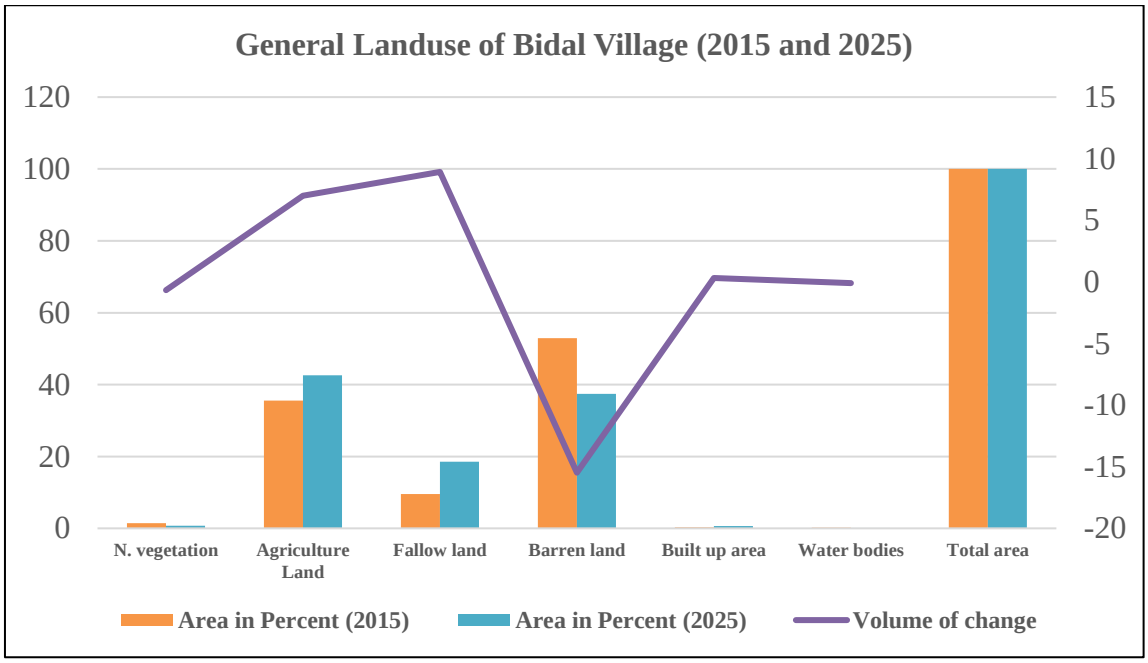

Fig. No. 1

General Landuse of Bidal Village (2015 and 2025)

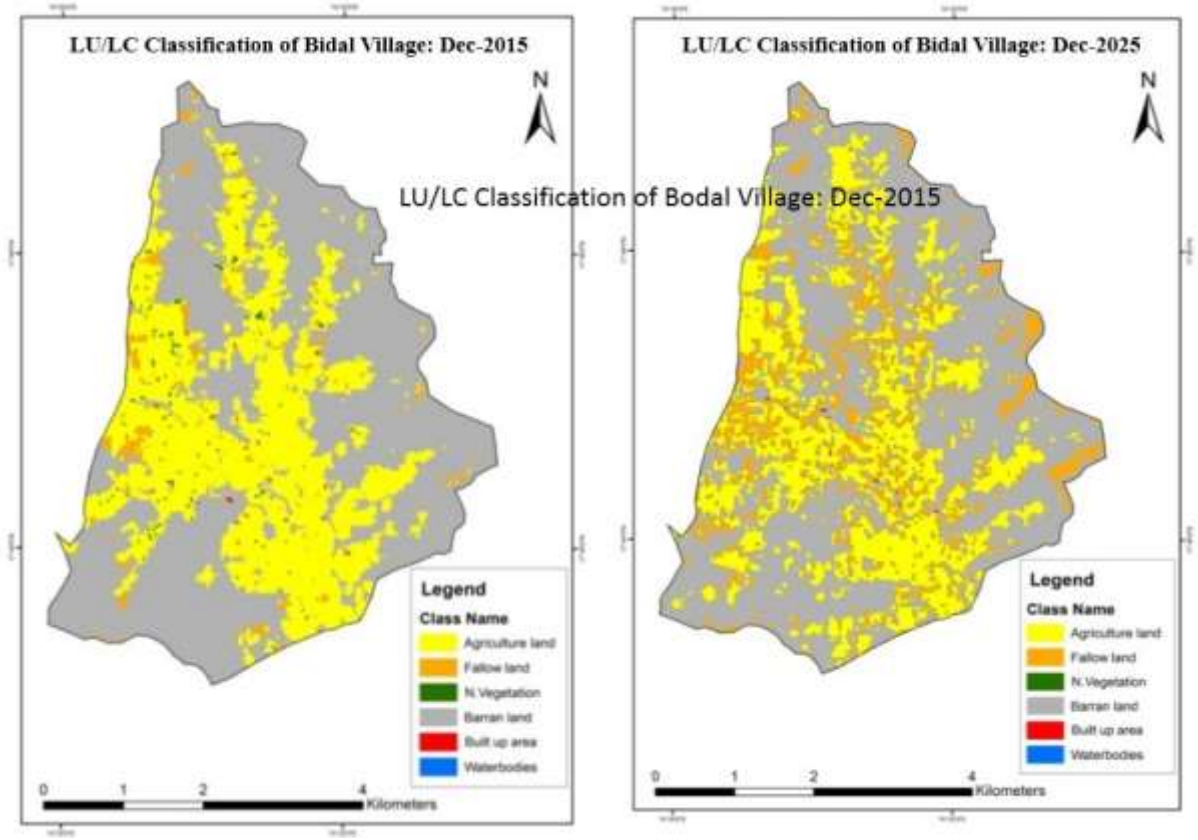

Fig. No. 2

Classification of Irrigation

The study area marked as a drought-prone zone, so it has essential to improve the various types of the irrigation system in the study area. The irrigation gives better opportunities

for the farmers for feature agricultural development. Irrigation is classified into different types, on the basis of sources, distance, means, methods, and time period of irrigation.

Table No. 2

Classification of irrigation in the Bidal

Sr. No.	Classification Type		Bidal (in %)
a.	**Source of Irrigation**		
	i	Well	43.44
	ii	Bore/Tube Well	41.61
	ii	Reservoir	5.54
	iv	Farm ponds	9.41
	Total		**100**
b.	**Distance from sources of Irrigation to agriculture field (meter/Km)**		
	i	Less than 500 Meter	65.02
	ii	500 to 1000 meter	13.36
	iii	1 to 3 km	6.19
	iv	More than 3	15.43
	Total		**100**
c.	**Means of lift Irrigation**		
	i	Diesel Engine	18.79
	ii	Electric motor	81.21
	Total		**100**
d.	**Using method of Irrigation**		
	i	Drip Irrigation	36.38
	ii	Sprinkle Irrigation	1.23
	iii	Pipe Irrigation	31.73
	iv	Flood Irrigation	30.66
	Total		**100**
e.	**Time Period for Irrigation**		
	i	Annual	5.66
	ii	Six Months	30.43
	iii	Four Months	50.55
	iv	Non-irrigation	13.36
	Total		**100**

**Source: data compiled by researcher*

Adhali is one of the Main Reservoirs and source of left irrigation in Bidal village. More than 300 of farmers have lifted water from the Adhali reservoir for the irrigation. But this lift irrigation is not available for the whole year. The left irrigation of Andhali dam is used for the irrigation development of Bidal village. This dam is located in the west side of the village and the distance between village and the reservoir is 3 km. The large scale of irrigation is through

well and bore well in the Bidal village. Well irrigation is the main irrigation in the Bidal village. We were found 267 bore wells in Bidal.

Agricultural Landuse of Bidal Village

Agricultural land divided into two category irrigated land and non-irrigated land (also called rainfed) that includes seasonal fallow (also called current fallow). The area not available for the cultivation included built up area, water bodies, barren land, N. vegetation. The agricultural landuse area increased after the irrigation. The fallow land and part of barren land convert into the agricultural land after the availabilities of irrigation facilities.

The table no. 3 shows the temporal variation of agricultural landuse (irrigated and non-irrigated) of Bidal village in 2015 and in 2025.

Table No. 3

Agricultural landuse of Bidal village

Class	Area in ha. 2015	Percent	Area in ha. 2025	Percent	Volume of change (ha.)
Irrigated	615.6	73.35	699.57	75.44	83.97
Non-irrigated	223.65	26.65	227.7	24.56	4.05
Total agri. land	**839.25**	**100**	**927.27**	**100**	**88.02**

**Source: data compiled by the researcher*

The above table shows that the irrigated land (75.44 Percent) is larger than the Non-irrigated land (24.56 Percent) in the village Bidal. The small scale of Non-agricultural area is in this village. The location of Andhali Dam, mode and sources of irrigation are more adequate in the Bidal village.

Agricultural Landuse of Bidal village

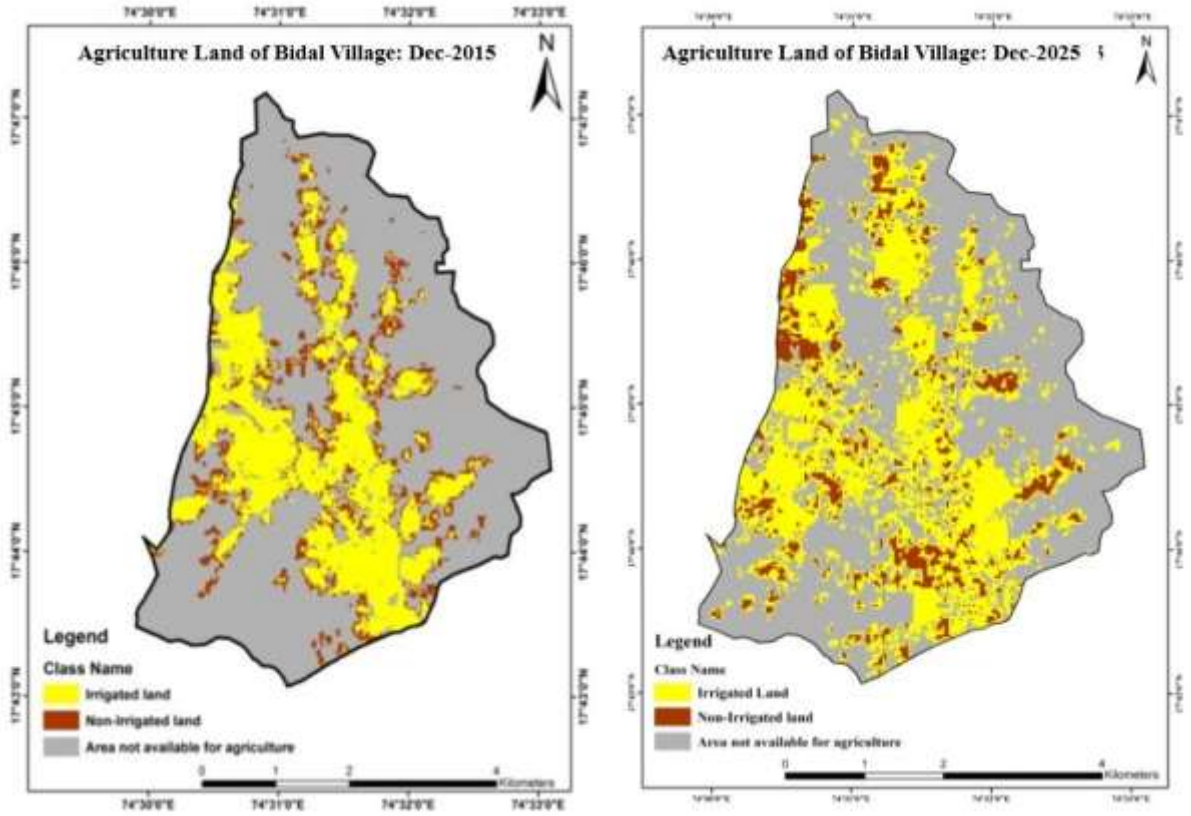

Fig No, 3

In Bidal village, the agriculture landuse increased because of farmer's awareness and use of modern techniques. The 88.02 ha. of agriculture land area increased in the Bidal form 2015 to 2025.

Cropping Pattern

The food grain and cash crops structure in the sample villages of the Man tahsil is shows in the table no. 4 In the Bidal village, the cash crops cultivation increases i.e. onion is the main cash crop in the Bidal village due to irrigation facilities and soil.

Table No. 4

Cropping Pattern of Bidal

Name of Crops	Bidal Area in (ha.)
Jawar	41.42
Bajara	32.12
Wheat	4.23
Gram	5.07
Onion	16.06
Sugar cane	0.85
Pomegranate	0.25
Total	100

**Source: Village Revenue Recorded data compiled by the researcher*

The short terms crops and minimum water consumption crops were growing in large scale e.g. Jawar, Bajara and pomegranate etc. due to the shortage of water.

The table 6.6 shows the cropping pattern of Bidal village. In Bidal village, the highest i.e. 41.42 per cent of area is occupied under Jawar crop while the lowest area is occupied under Pomegranate crop i.e. 3 percent only. Bajara crop is second to Jawar in percentage area (32.12%) under cover. Compare to cash crop, it is found that food grain crops are dominant in the village Bidal. It is because the seasonal irrigation facilities are available in the village.

Conclusion

Land use/land cover (LULC) changes play a major role in the study of global change. Natural cover of land and human modifications has largely resulted in deforestation and biodiversity loss. These environmental problems are often related to LULC changes. Therefore, available data on LULC changes can provide critical input to decision-making of agricultural management and planning the future. Agriculture is the most important human activity. Agriculture makes a major share of human and animal-food and also other materials to meet human needs, including the necessity for industrial raw materials

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