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Impact of Jamda medium irrigation project on irrigated land cover in its command area in Jalgaon district

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Abstract

Irrigated cropping pattern means the proportion of area under different irrigated crop at a point of time, whereas changes in cropping pattern refer to change in proportion of area under different irrigated crops at different periods. Study area is rich in respect of soil for cultivation of various cash crops. Jamda medium irrigation project is one of the important project in Jalgaon district recharging ground water in its command area. Two distinctive irrigation zones are observed in the command area of the project. The northern part of the study area is having good amount of groundwater however, the southern part is comparatively less benefitted in respect of ground water recharge.

Keywords: Cropping pattern, Landuse, Intensive, Groundwater

1. Introduction

Irrigated cropping pattern means the proportion of area under different irrigated crop at a point of time, whereas changes in cropping pattern refer to change in proportion of area under different irrigated crops at different periods. Study area is a south-western part of Jalgaon district. This area is unique in the district regarding rich agricultural soil, cultivation of cash crops such as banana, sugarcane, cotton and healthy agricultural practices. Ample source of groundwater as well as surface water is available. Therefore, banana and sugarcane cultivation thrives well there. Remaining southern villages of study area tehsils have scarcity of groundwater. Farmers of these villages prefer seasonal irrigated crops such as cotton, grain, yellow gram, groundnut, vegetables etc. Thus supply of groundwater determines the Irrigated land use and land cover of the study region.

2. Objectives

The main objective of the present paper is to assess the Impact of groundwater on irrigated land cover of the study area. To achieve this aim of the study, the following objectives are kept in mind.

- 1) To examine the overall impact of Jamda water project on irrigated land cover.
- 2) To display spatial distribution of irrigated cropping pattern.

3. Study Region

Jamda irrigation project is constructed across the Girna River near the village Jamda in Chalisgaon tehsil of Jalgaon district. The command area of the project is a small watershed zone which is demarcated and selected for detailed study.

The command area of Jamda water project is bounded by 20° 30' N and 25° 45' N latitudes and 75° 0' E and 75° 15' E longitudes, covering 539.2472 sq km of land (53924.72 ha). An average elevation of the watershed is 712 m above MSL, slopping towards the east. Both north and south borders of watershed are demarcated by high lands. Drainage pattern of the region is dendritic. All sub tributaries are seasonal, flowing in north-south direction originated from northern high land and fed to river Girna. The entire watershed is plain with well fertile alluvial soil deposited on basaltic structure. Annual average rainfall is 652.79 mm and occurs over a period between June and October. Maximum and minimum temperature of the region is ranging between 40.7 and 25.8 °C.

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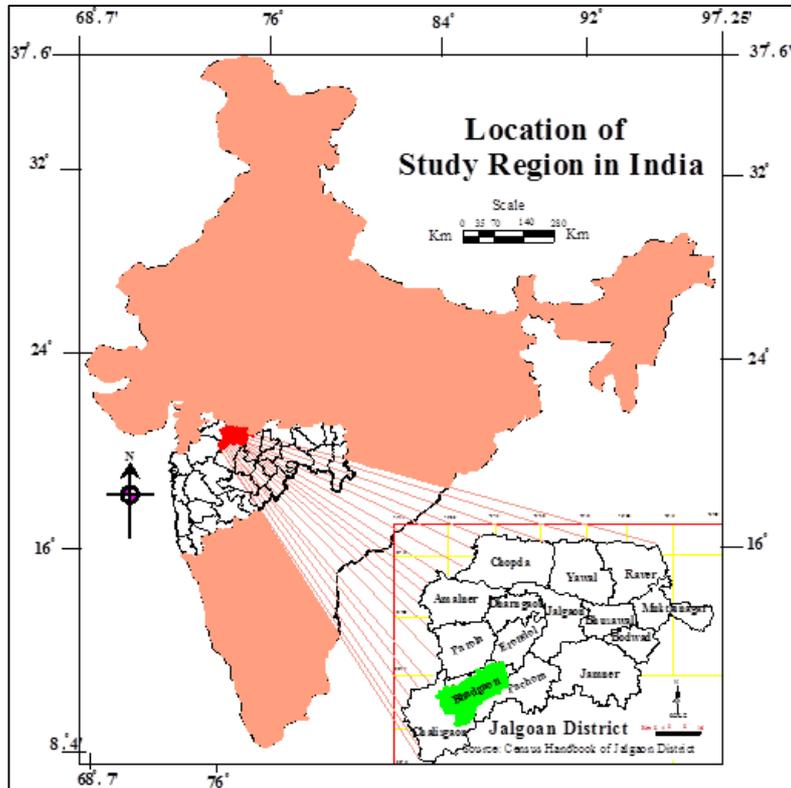


Fig 1

4. Methodology

4.1 Data Base: The present work is based primary and secondary data. Primary data are collected through the personal interviews of the people in rural areas. To collect primary data of 41 villages out of 84 villages of the study region, estimating about 50% of the total villages are selected. From each village approximately 10 farmers are selected for personal interview.

The study of village wise agricultural land cover data have been collected from tehsil offices of Jalgaon district. The data regarding the area under all different irrigated crops in 84 villages of the tehsil was collected from the tehsil office TF20 record.

4.2 Data Analysis Techniques: This research work is entirely completed with the help of computer. Considering the nature of voluminous data, it is not possible to analyze such data manually.

1) Microsoft Excel software is used for the analysis of village wise data of cropping pattern. For data analysis “*IF condition command*”, “*Advance filter command*”, “*Conditional formatting*” commands are used.

4.3 Cartographic Techniques: Auto Desk Map software are used to prepare all maps. Considering the village wise boundary maps, all maps are prepared cited below:

1. Dot maps are prepared showing spatial distribution of all crops
2. By considering the scale, per sq km grids are superimposed on dot maps.
3. Dots are then counted in each grid.
4. Counted numbers of dots are placed in respective grids.
5. With the help of these values of dots, isopleths are drawn.

6. According to the intensity of zones, hatching command is used to show the intensity zones of a particular crop. Thus all maps are prepared showing intensity zones.

5. Discussion

In the study region more than 17 crops are grown during last 3 years. Farmers have cultivated these crops traditionally. It is observed that most of the farmers have preferred cotton, Jowar and pulses crops. About 90.67% of cropped land is found under these crops.

These crops fulfill the requirement of fodder for their cattle and grain for family. Remaining 9.33% of the total cultivated land is used for banana, oilseeds, fruits and vegetables

In the study region cotton, Banana, Wheat, Sugarcane and groundnut are significant irrigated crops. Different types of crops require different amount of water in specific seasons.

5.1 Spatial Distribution of Irrigated Area

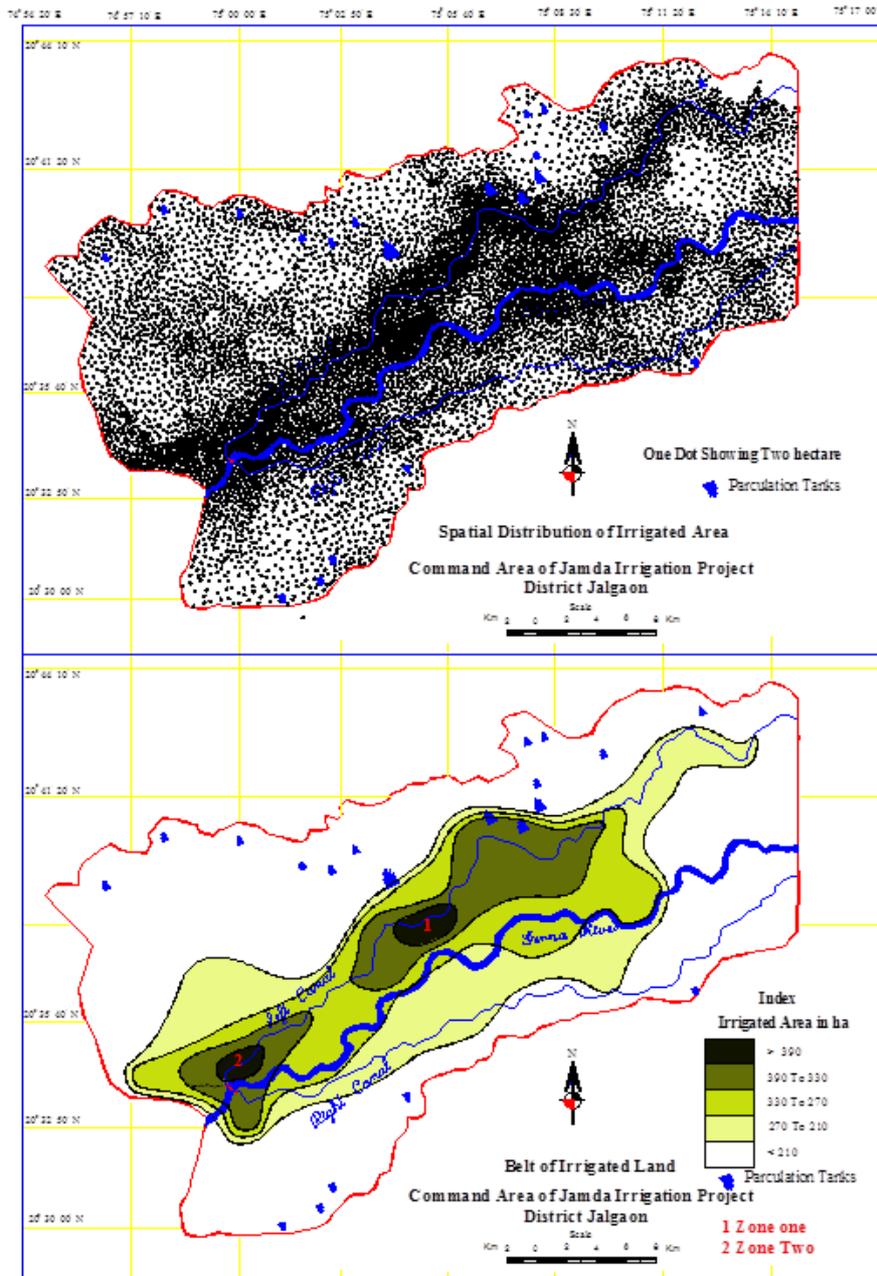
In the study region about 45.77% area to total cultivated land is irrigated during the study period. This clears that irrigated land is significant, ranks second in the district. To display spatial distribution of irrigated area, village wise dot map is prepared (Map No 2) On this dot map 5 sq. km grids are superimposed and dots are counted from each grid. Counted figures are placed in respective grids and isopleths are drawn to display intensity wise zones of irrigated land. Thus, dot map is transformed into belt of irrigated area. (Map No 3)

Map No.3 is showing belt of irrigated land. In this map belt of irrigated land is stretching SW- NE direction in between river Girna and left bank canal. There are two separate zones of intensive irrigated area found in the study region.

5.2 Central Extensive Irrigate Belt: This belt is found in the central part of the study region. There are two intensive zones-(a) a small pocket if extensive irrigated land is found in between canal and river. In this zone more than 390 ha of land are irrigated. It is clear that out of 429.76 hectare of land about 390 hectare is irrigated. Out of total geographical area of this zone about 90.74% land is under irrigation. Around the central extensive zone medium intensive zone of irrigated area has covered SW-NE direction. In this zone 330 to 390 ha of land is irrigated covering 36.8123 sq km. This zone is also stretching between canal and River.

5.3 Second intensive zone: This zone is found near the Jamda dam, occupying 280.61 ha. In this zone more than

390 ha of land are irrigated. Near the Jamda dam intensive irrigated area is observed. Location of dam and area of intensity of irrigated land clears the fact that this area is recharged by back water of Jamda dam. Around this intensive zone another medium intensive zone has covered 13.8121sq.km. (1381.21 ha) area is irrigated. Area irrigated by wells and tube wells imitates groundwater position as well as recharging rate of groundwater. Here backwater of dam helps to recharge the wells located on down slope which are up to 6 km long from the dam. Storage of water in the dam is insufficient hence recharging only 1381.21 ha. When one goes away from this intensive zone of irrigated area, recharging capacity is found decreasing.



Map 2 & 3

5.4 Spatial Distribution of Significant Irrigated Crops: In the study region six crops have occupied significant area. Among these significant crops Cotton, Banana, Sugarcane,

Wheat and Groundnut crops have covered 46.36% of the total irrigated land.

In the study region cotton, Banana, Wheat, Sugarcane and groundnut are significant irrigated crops. Different types of crops require different amount of water in specific seasons.

5.5 Cotton: Cotton is cultivated in both late summer and monsoon season. Out of total cultivated land about 34.40% area of cotton is grown with the help of supplementary irrigation and remaining 65.60% area of cotton is cultivated during monsoon period. It is obvious to note that 34.40% area enjoys sufficient groundwater to irrigate cotton fields. Because most of the farmers cultivate cotton in the middle of May. May is the hottest month, requires ample supply of water to irrigate the fields. (Table No. 1)

5.6 Banana: Banana is a water loving cash crop requires continuous supply of water throughout the year. In the study region *Basarai* variety of banana is grown. Though different variety of banana requires different amount of water, it is quite certain that all varieties of banana require ample supply of water. In the study region 1329.37 hectares (6.34% of the total irrigated land) of land is found under banana cultivation. It is clear that 6.34% area has ample continuous source of groundwater. (Table No. 1)

5.7 Sugarcane: Sugarcane is third ranking irrigated crop occupying 1048.49 hectares of land. This crop requires a

period of 11 to 12 months. Out of total irrigated land about 5% area is under this crop. This crop also requires continuous supply of water. There are two seasons of sugarcane cultivation, i.e. *Suru* and *Adsal*. Farmers cultivate *Suru* sugarcane during rainy season and *Adsal* sugarcane during the months of October and November. It is clear that where groundwater supply is scanty, farmers prefer sugarcane instead of Banana. (Table No.1)

5.8 Wheat: Wheat is seasonal irrigated crop generally cultivated during winter months. Those farmers have short supply of groundwater, they prefer wheat crop after harvesting yellow gram which is a rainy crop. In the study region about 828.88 hectare of land (3.96%) is found under this crop. (Table No. 1)

5.9 Groundnut: Groundnut is ranking crop significantly cultivated during winter period (December- January). This crop also requires a period of 4 month. April and May are the harvesting months. To harvest groundnut a short supply of irrigation is must. Those farmers have supply of groundwater in their wells in the month of April, they prefer groundwater. In the study region about 2.858% land is found under groundnut crop. It is clear that groundnut crop require sufficient supply of groundwater during summer season.

Table No. 1: Proportion of Irrigated Crops in the Command Area of Jamda Irrigation Project

Irrigated Crops	Irrigated Area (ha) Ave. of 2009-10 to 2011-12	% To Total Irrigated area	Status
Cotton	5287.71	25.23	Significant
Banana	1329.37	6.34	
Sugarcane	1048.49	5.03	
Wheat	828.88	3.95	
Other Grain crops	623.84	2.97	
Groundnut	599.06	2.85	
Yellow Gram	370.45	1.76	Insignificant
Other Fruits	152.84	0.72	
Chilly	142.81	0.68	
Guava	127.16	0.60	
Lemon	112.45	0.53	
Vegetable	99.65	0.47	
Onion	88.85	0.42	
Corn	39.8	0.19	
Chikku	25.38	0.12	
Coconut	0.30	0.00	
Total Irrigated	20958.41	100	

Source: Tehsil Office- Record No 20

5.10 Spatial Distribution of Insignificant Irrigated Crops

This group of insignificant crops guava, chilly, corn, vegetables, lemon, onion, coconut, chickoo etc are included. Out of total irrigated land about 7.77% area is found under these crops. Only one village (Gudhe) is having more than 25 hectare of land under these crops. Medium concentration is found in 11 villages namely Kolgaon, Primpihat, Bachchhar, Khedgaon kh, Shivani etc. It is interesting to note that Gudhe is only one village having ample source of groundwater on which sugarcane, banana and wheat are ranking crops.

6. Conclusion

It is concluded that two identical zones in respect of groundwater recharge are found in the northern and southern parts of the Girna River in command area of Jamda Project.

In the northern part, two intensive zones of irrigated land are found between the left canal of project and Girna River. In the first zone, more than 390 ha. of land is irrigated while the second intensive zone is observed near the Jamda dam, occupying 280.61 ha. In this region perennial irrigated crops are observed in many pockets.

It is concluded that the southern part of the study region has shortage of groundwater. Hence farmers are cultivating seasonal irrigated crops as a substitute of sugarcane and banana crops. More number of wells, low capacity of wells to irrigate the fields, low HP motor pumps and seasonal irrigated crops indicating that southern part of the region has scarcity of groundwater while northern part of the region is enriching with banana and sugarcane cash crops only because of ample supply of groundwater and favorable edaphic condition.

It is concluded that in the northern part where groundwater is ample farmers prefer perennial irrigated crops while in the southern part of Girna River of the command area where ground water is insufficient, they prefer short duration crops grown successfully on short supply of water.

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