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**Land, Labor, and Agricultural Innovations in a Semi-arid Region of
Maharashtra, India: The Case of Bhojdari Village**

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I. Introduction

India has a vast arid and semi-arid rain-fed area, mainly on the western side of the country.¹ Such areas are characterized by erratic, deficient, and delayed rainfall and hence, have not been able to benefit from agricultural innovations such as the Green Revolution. Moreover, mainly due to historical deforestation and associated land degradation, a high proportion of farmland has been abandoned, with local people migrating to urban cities for livelihood.

Watershed development (WSD) projects started in India in the 1970s for restoring degraded landscapes in arid/semi-arid rain-fed regions by increasing their capacity to capture and store rainwater, reduce soil erosion, and improve soil nutrients and the carbon content for greater agricultural yield and income generation (Gray and Srinidhi, 2013).

However, WSD projects had, for many years, suffered from a top-down, technical, and bureaucratic approach. Overall, the projects improved crop yields, especially in irrigated areas, but the net returns were low. Hence, after the 1990s, nongovernment organizations (NGOs) have become more active as project implementation agents of WSD projects. A good and successful example is the Indo-German Watershed Development Programme (IGWDP), which began in 1993 and was first implemented in Maharashtra by an NGO, Watershed Organization Trust (WOTR).

Bhojdari was one of the first villages where the IGWDP was implemented (starting in 1996). WSD activities were undertaken in the village—these included area treatments such as continuous contour trenches (CCTs), water absorption trenches (WATs), stone bunds, farm bunds, plantation and afforestation, and drainage line treatments such as gully plugs, loose boulder structures, earthen gully plugs, percolation tanks, and cement check dams. Local people were encouraged to offer voluntary labor (*shramdaan*) in these processes.

Apart from the physical infrastructure, there were also efforts to improve human and local-level institutional capacities in the form of the capacity-building activities of self-help groups (SHGs) and community-based organizations through a participatory operational pedagogy, which is a step-by-step interactive strategy for awareness generation, training, and skill development. Institutional building was promoted within the village by establishing a village watershed committee (VWC) and *Sanyukt Mahila Samiti*, which was the village-level federation of the SHGs. By the end of the 1990s, all these activities resulted in increased water tables and the availability of drinking water throughout the year. Greater availability of water led to more wells, irrigated agriculture,

¹ It is estimated that almost 53.4 percent of the land area in India comprises arid and semi-arid regions.

and increased crossbreed cows for dairy farming.

Further, Bhojdari village was part of a climate change and adaptation project (hereinafter CCA project) undertaken by WOTR during the period 2009–14 with the objective of enhancing the capability of rural communities to adapt to climate-change effects. The key components of the project included integrated water resources management, adaptive sustainable agriculture, crop-specific agro-meteorology advisories, and water budgeting (WOTR, 2014a, 2014b). Note that one of the important incidents that triggered the initiation of the CCA project was the severe drought experienced in Maharashtra during 2000–03.

Until now, 1,992 villages have benefitted from the WSD projects by WOTR, across the seven states of Maharashtra, Rajasthan, Madhya Pradesh, Telangana, Andhra Pradesh, Odisha, and Jharkhand.²

After more than 25 years of WOTR's intervention in the village in various ways, it would be interesting to explore how the participatory approach of WOTR contributed to the development of the village, and especially to narrowing the gaps between the two major communities there, that is, the traditionally dominant caste (Maratha) and the scheduled tribes (STs). The primary objective of this paper was, while focusing on these aspects, to analyze the structure of the land, labor, and agricultural innovations in Bhojdari, by analyzing the data collected in 2018 from all the households in the village.

The composition of the paper is as follows. In Section 2, an outline of the village is presented, including its geographical location and climate, population and employment structure, and land tenure. Then, in Section 3, agriculture in the village is delineated with a focus on groundwater utilization mainly in the *rabi* (winter) season, as a key input for agricultural innovation. In Section 4, income distribution of the village households is presented, followed by the spread of major consumer durables and the borrowing behavior of the village households. Lastly, summary and conclusions are presented.

II. Outline of the Village

2-1. Location, topography, and climate

Bhojdari is a village (*gram panchayat*) in Sangamner Taluka (Block) in Ahmednagar District of Maharashtra (Fig. 1). Sangamner Taluka has 172 villages in total.

² The number of project villages is greater (3,594).

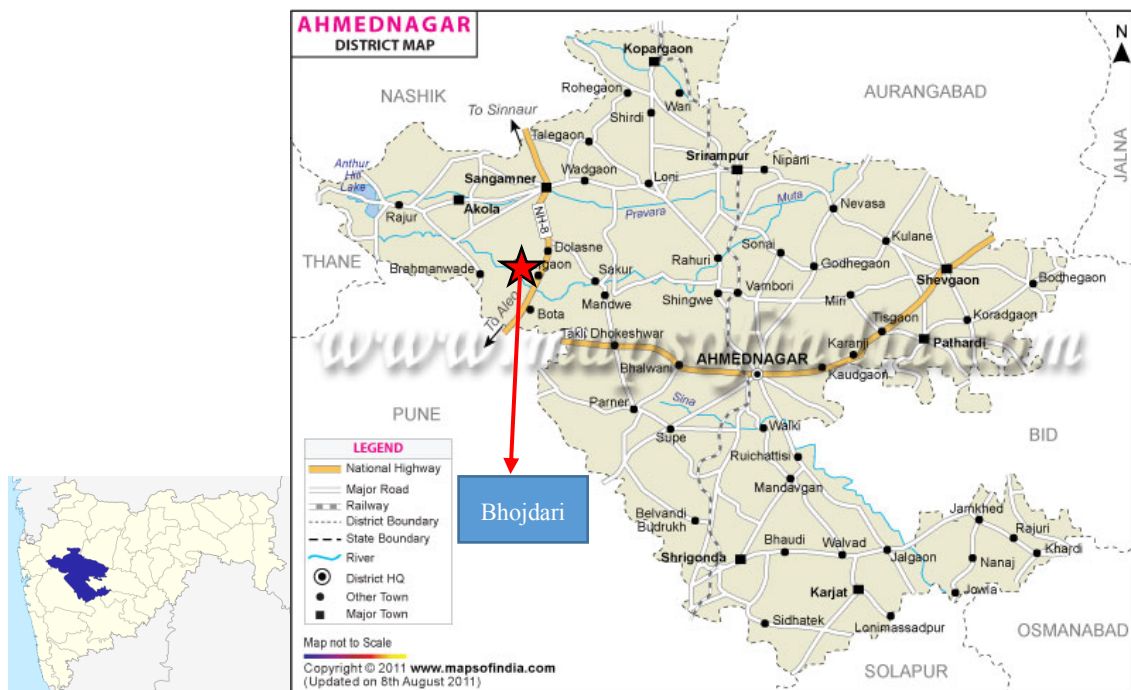


Figure 1 Location of Bhojdari Village

Bhojdari is located in the Mula river basin, with a watershed area of 1,159 hectares, of which 50 percent is public land and covered by forests. Sangamner is the nearest large town, approximately 60 km away, although a small town Bota is at a 17 km distance. The village is in a rain-shadow area of the Western Ghats mountains and has an average annual rainfall of a little more than 400 mm (Fig. 2).

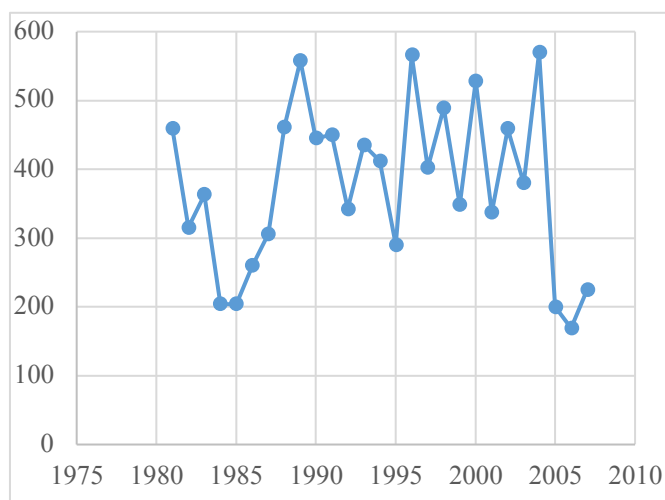


Figure 2 Annual Rainfall in Sangamner

Fig. 3 shows the rainfall data measured by automated weather stations installed in the village in 2010 under the CCA project of WOTR, namely, the annual rainfall in the village from 2011 to 2017, along with its monthly distribution. It is found that with the exception of some years, 90–100 percent of the rainfall is concentrated in the six months from May to October during the southwest monsoon season.

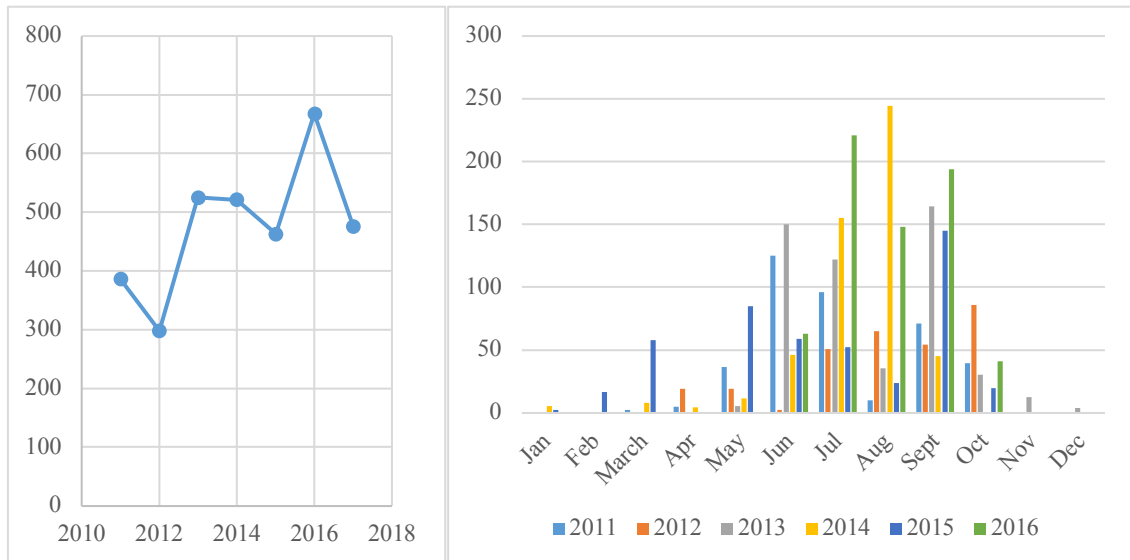


Figure 3 Annual Rainfall and its Monthly Distribution in Bhojdari from 2011 to 2017

2-2. Population, land tenure, and migration

Our survey data in 2018 indicate that the total number of households in the village is 203, with a total population of 946 (4.66 persons/household). In a report on the Bhojdari village published by WOTR in February 2014 (WOTR, 2014a), the number of households was recorded as 215;³ hence, it has reduced slightly during the four years.

Bhojdari village is composed of six hamlets and six caste categories: Open (Maratha), OBC (other backward castes), SC (scheduled castes), ST (scheduled tribes),

³ However, according to the 2011 Population Census, Bhojdari village had a population of 1,632 in 324 households (5.04 persons/household), which seems to be overestimated. The census data are based on panchayat listing of households, which is sometimes overestimated as household/family respondents indicate themselves as separate or nuclear families even if staying together, with the intention of availing the benefits of government schemes for households. Also, there are households that have migrated and stay in nearby towns and cities such as Pune and Mumbai, but continue to appear in village records as separate households.

NT (nomadic tribes), and Muslim (Table 1). In terms of the number of households, the largest community is ST (N=97), followed by Open (Maratha) (N=79), OBC (N=11), NT (N=8), SC (N=7), and Muslim (N=1).

The largest (main) hamlet is called Bhojdari, which is dominated by Maratha households, whereas the next three large hamlets (Balandri, Pimpaldara, and Darsunwadi) are dominated by ST (Thakar) households. Gongobawadi hamlet has a mix of Maratha and NT (Bharadi). The smallest hamlet (Valunjadara) only has Maratha residents. All the SC households live in the main hamlet.

Table 1 Hamlet-/Caste-wise Household Distribution in Bhojdari

Hamlet	No. of households						Total
	Open (Maratha)	OBC	SC	ST	NT	Muslim	
Bhojdari	58	8	7	5			78
Balandri				49			49
Pimpaldara	1	3		23		1	28
Darsunwadi	1			20			21
Gongobawadi	11				8		19
Valunjadara	8						8
Total	79	11	7	97	8	1	203
Note: OBC-- Sutar (3), Navi (2), Kumbi (2), Kumbhar (1), Kanchar (1), Gurav (1).							
SC-- Nav buddha (6), Matang (1).							
ST-- Thakar (94), Bhil (1), Koli (1).							
NT-- Bharadi (8).							

As shown in Table 2, of the total 203 households in the village, 33 households (16.3 percent) are nonfarm households with no operational land.⁴ The land tenancy market in the village is “thin,” but of the 170 farm households, 6 households (3.5 percent) leased in all their operated land. That is, they are landless, but engage in farming by leasing in land. Moreover, there are some female-headed households (FHH) among the nonfarm and small-scale farm households. It is interesting to note that of the total 11 FHHs, 7 households (63.6 percent) are Maratha.⁵

⁴ Note, however, that five nonfarm households own farmland (0.5, 2.0, 2.5, 3.0, and 7.0 acres), but their entire land is fallow mainly due to the infertility of land. As mentioned later, “land is hard” in the village. By contrast, it seems that two Maratha households (with 2.5 and 3.0 acres) left their entire land fallow, at least partly because of the unavailability of labor for cultivation, as their livelihood depends mainly on large remittances from household members living outside the village.

⁵ The others are as follows: two each of SC and ST. The proportion of FHHs among SC households is notably high. It is one of the major reasons why the average household income of SC households is extremely low, as discussed later.

We have classified the farm households into six classes based on the size of the operational land. Note that the largest operational size in the village is 10 acres (for 3 households).

Land size (operational)	No. of HHs	FHH	HHs with farmland (owned)	HHs leased out all land	HHs left all land fallow	HHs leased in all land	Caste-wise distribution						
							Open (Maratha)	OBC	SC	ST	NT	Muslim	Total
Nonfarm	33	6	6	1	5		11	5	2	13	1	1	33
-1.00	50	2	47			3	6	1		41	2		50
-2.00	53	2	51			2	17	4	3	27	2		53
-3.00	26	1	26				14			11	1		26
-4.00	23		22			1	17	1	2	3			23
-5.00	14		14				13			1			14
Above 5	4		4				1			1	2		4
Total	203	11	170	1	5	6	79	11	7	97	8	1	203

Table 3 shows the major demographic indicators. On an average, 14.3 percent of the population lives outside the village, mainly in large cities such as Mumbai and Pune.⁶ The average number of labor force per household is 2.56, but 11.0 percent of them live outside as migrant workers.

Land size (operational)	No. of HHs	No. of HH members			No. of members living outside			No. of laborforces			No. of migrants		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Nonfarm	33	61	66	127	7	7	14	40	23	63	6		6
		1.85	2.00	3.85	11.5%	10.6%	11.0%	1.21	0.70	1.91	15.0%		9.5%
-1.00	50	119	119	238	15	13	28	82	48	130	11	1	12
		2.38	2.38	4.76	12.6%	10.9%	11.8%	1.64	0.96	2.60	13.4%	2.1%	9.2%
-2.00	53	131	114	245	7	3	10	96	53	149	6	1	7
		2.47	2.15	4.62	5.3%	2.6%	4.1%	1.81	1.00	2.81	6.3%	1.9%	4.7%
-3.00	26	79	64	143	26	17	43	50	26	76	15	2	17
		3.04	2.46	5.50	32.9%	26.6%	30.1%	1.92	1.00	2.92	30.0%	7.7%	22.4%
-4.00	23	56	46	102	9	7	16	37	18	55	5		5
		2.43	2.00	4.43	16.1%	15.2%	15.7%	1.61	0.78	2.39	13.5%		9.1%
-5.00	14	40	33	73	14	9	23	28	10	38	10		10
		2.86	2.36	5.21	35.0%	27.3%	31.5%	2.00	0.71	2.71	35.7%		26.3%
Above 5	4	9	9	18	1		1	6	3	9			
		2.25	2.25	4.50	11.1%		5.6%	1.50	0.75	2.25			
Total	203	495	451	946	79	56	135	339	181	520	53	4	57
		2.44	2.22	4.66	16.0%	12.4%	14.3%	1.67	0.89	2.56	15.6%	2.2%	11.0%

Note: In the second column is the average per household.

⁶ Of the total 135 persons living outside the village, 48 persons (35.6 percent) live in Mumbai and 36 persons (26.6 percent) in Pune.

Although counter-intuitive, the percentage of household members who live outside is the highest (31.5 percent) among the large-scale farm households with an operational size of 4.01–5.00 acres, followed by 30.1 percent among the medium-scale farm households with 2.01–3.00 acres. This percentage is much lower among the nonfarm households and small-scale farm households. The major reason may lie in the dominance of ST households among the small-scale farmer classes.⁷

Table 4 shows the same figures by caste categories. The percentage of household members living outside is the highest among Open (Maratha) (29.3 percent), followed by NT (14.3 percent) and OBC (13.2 percent). No members live outside among SC and Muslim households, with a very small percentage among ST households (only 4.4 percent). This could be due to the better literacy among the Open (Maratha) and OBC castes, as seen from the relatively large number of household members with higher education (greater than 12 years, indicating graduation level) from these communities, 13 and 26 percent, respectively (Table 5). This could have helped the individuals from these categories in getting job opportunities in nearby towns and cities. In comparison, only 3 percent of the total members in the ST category had graduate-level education (beyond 12 years of education).

Table 4 Household Members and Laborforces in Bhojdari by Caste Categories

Caste category	No. of HHs	No. of HH members			No. of members living outside			No. of laborforces			No. of migrants		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Open (Maratha)	79	184	161	345	58	43	101	119	56	175	37	2	39
		2.33	2.04	4.37	31.5%	26.7%	29.3%	1.51	0.71	2.22	31.1%	3.6%	22.3%
OBC	11	30	23	53	5	2	7	23	6	29	5		5
		2.73	2.09	4.82	16.7%	8.7%	13.2%	2.09	0.55	2.64	21.7%		17.2%
SC	7	12	10	22				7	3	10	1		1
		1.71	1.43	3.14				1.00	0.43	1.43	14.3%		10.0%
ST	97	248	230	478	12	9	21	175	109	284	9	2	11
		2.56	2.37	4.93	4.8%	3.9%	4.4%	1.80	1.12	2.93	5.1%	1.8%	3.9%
NT	8	19	23	42	4	2	6	13	6	19	1		1
		2.38	2.88	5.25	21.1%	8.7%	14.3%	1.63	0.75	2.38	7.7%		5.3%
Muslim	1	2	4	6				2	1	3			
		2.00	4.00	6.00				2.00	1.00	3.00			
Total	203	495	451	946	79	56	135	339	181	520	53	4	57
		2.44	2.22	4.66	16.0%	12.4%	14.3%	1.67	0.89	2.56	15.6%	2.2%	11.0%

Note: In the second column is the average per household.

⁷ This is because at some point in the past, the government allocated a small fixed size of land per household.

Education	Caste categories						Total
	Maratha	OBC	SC	ST	NT	Muslim	
Illiterate	80 23.2%	13 24.5%	3 13.6%	152 31.8%	7 16.7%	2 33.3%	257 27.2%
1 to 5 years	59 17.1%	7 13.2%	8 36.4%	105 22.0%	12 28.6%	2 33.3%	193 20.4%
6 to 10 years	114 33.0%	14 26.4%	6 27.3%	175 36.6%	13 31.0%	2 33.3%	324 34.2%
11 to 12 years	47 13.6%	5 9.4%	3 13.6%	29 6.1%	7 16.7%	0 0%	91 9.6%
> 12 years	45 13.0%	14 26.4%	2 9.1%	17 3.6%	3 7.1%	0 0%	81 8.6%
Total	345 100%	53 100%	22 100%	478 100%	42 100%	6 100%	946 100%

We need to mention here that the large-scale (but not the largest) farm households with 4.01–5.00 acres should be paid special attention. As demonstrated in Table 2, of the total 14 households, 13 households (92.9 percent) belong to the caste category of Open (Maratha). They enjoy the highest income in the village, both from agricultural and nonagricultural (mainly remittance) activities. More than 30 percent of their household members live outside and are generally engaged in high-salaried jobs. At the same time, most of the members living in the village are advanced farmers, as discussed later.

III. Agriculture in the Village

3-1. Land distribution and agriculture

Land in Bhojdari village is “hard.” According to a village resident, “In our village the soil depth is very little—the best parts of the village it is about 50 cm, but in most of the villages it is just 25 cm, after that one hits black, impervious rock. Even after drilling, no water is struck” (WOTR, 2013).

Our survey data in 2018 show that the total farmland owned by 170 households (the remaining 33 households are landless) is 439.5 acres (=178 hectares). After adjusting the land leased-in/leased-out, the total operational land is 445.0 acres, of which, however, 39.5 acres is left fallow (for more than one year); hence, the total net cropped area is 405.5 acres. Some of the land is cropped twice a year, both in *kharif* and in *rabi* seasons. Thus, the total gross cropped area is 493.9 acres, with an average cropping intensity of 122 percent (Table 6).

Land size (operational)	No. of HHs	Owned land	Leased-out land	Leased-in land	Operated land	Fallow land	Net cropped area	Gross cropped area	Cropping intensity
Nonfarm	33	20.5 0.62	5.5 0.17		15.0 0.45	15.0 0.45	0	0	
-1.00	50	42.9 0.86		2.5 0.05	45.4 0.91	1.5 0.03	43.9 0.88	51.4 1.03	1.17
-2.00	53	96.5 1.82		5.0 0.09	101.5 1.92	6.0 0.11	95.5 1.80	114.6 2.16	1.20
-3.00	26	81.8 3.15			81.8 3.15	9.0 0.35	72.8 2.80	88.1 3.39	1.21
-4.00	23	93.5 4.07		3.5 0.15	97.0 4.22	8.0 0.35	89.0 3.87	110.0 4.78	1.24
-5.00	14	67.3 4.81			67.3 4.81		67.3 4.81	82.3 5.88	1.22
Above 5	4	37.0 9.25			37.0 9.25		37.0 9.25	47.5 11.88	1.28
Total	203	439.5 2.17	5.5 0.03	11.0 0.05	445.0 2.19	39.5 0.19	405.5 2.00	493.9 2.43	1.22

Note: In the second column is the average per household.

Table 7 shows the same figures by caste categories. In terms of land ownership, 53.9 percent of the land is concentrated in the hands of Maratha households, followed by ST (33.4 percent). It is found, however, that the per-household area of land ownership is the biggest among NT.

Caste category	No. of HHs	Owned land	Leased-out land	Leased-in land	Operated land	Fallow land	Net cropped area	Gross cropped area	Cropping intensity
Open (Maratha)	79	236.9 3.00	5.5 0.07		231.4 2.93	16.5 0.21	214.9 2.72	271.9 3.44	1.27
OBC	11	15.8 1.44		1.0 0.09	16.8 1.53	5.0 0.45	11.8 1.07	15.5 1.41	1.31
SC	7	14.5 2.07			14.5 2.07	1.5 0.21	13.0 1.86	13.5 1.93	1.04
ST	97	146.8 1.51		10.0 0.10	156.8 1.62	16.5 0.17	140.3 1.45	163.5 1.69	1.17
NT	8	25.5 3.19			25.5 3.19		25.5 3.19	29.5 3.69	1.16
Muslim	1								
Total	203	439.5 2.17	5.5 0.03	11.0 0.05	445.0 2.19	39.5 0.19	405.5 2.00	493.9 2.43	1.22

Note: In the second column is the average per household.

The major crops grown in the village include pearl millet (*bajra*), groundnut, and soybean in the *kharif* season, and onion and Bengal gram in the *rabi* season (Table 8). The major cash crops are soybean, onion, fenugreek, pomegranate, and other minor crops such as green peas, moong, and *kiniva*.

Crop	<i>Kharif</i>	<i>Rabi</i>	Summer	Perennial	Total	%
Pearl millet	192.1	0	0	0	192.1	38.9%
Groundnut	97.9	0	0	0	97.9	19.8%
Soybean	83.9	0	0	0	83.9	17.0%
Onion	4.5	43.2	0	0	47.7	9.7%
Bengal Gram	1.0	35.3	0	0	36.3	7.3%
Wheat	0	5.0	0	0	5.0	1.0%
Maize	6.5	0	0	0	6.5	1.3%
Paddy	4.5	0	0	0	4.5	0.9%
Pomogranate	0	0	0	1.0	1.0	0.2%
Fenugreek	1.5	1.5	0	0	3.0	0.6%
Others	10.5	5.0	0.5	0	16.0	3.2%
Total	402.4	90.0	0.5	1.0	493.9	100.0%

3-2. Groundwater issues

Most of the *kharif* crops are grown under rain-fed conditions in the village. According to our data in 2018, however, a total of 18.75 acres (4.7 percent) of *kharif* crops were irrigated by dug wells or borewells. By contrast, most of the *rabi* crops are irrigated, with an exception of Bengal gram (10.375 acres are under rain-fed, which is 29.4 percent of Bengal gram cultivated in the *rabi* season; in other words, 70.6 percent is irrigated). Pomegranate, which is a perennial crop, is irrigated year-round. Since Bengal gram is grown mainly for home consumption, onion is the most important irrigated cash crop in the village.

Table 8 shows the distribution of dug wells/borewells, which are indispensable for lifting groundwater for irrigation, mainly in the *rabi* season (Table 9). The distribution of farm pond, which is for storing groundwater for irrigation,⁸ is also demonstrated.

⁸ Farm ponds are originally considered as an effective way of rainwater harvesting in which water can be stored from the runoff and can be used during dry spell and promoted by government of Maharashtra since 2010. But in this region, farmers started using the farm pond structures to pump and store groundwater instead of harvesting rainwater. From the social and environmental viewpoint, this way of utilization of farm ponds is very harmful, because a large percentage of the stored groundwater is evaporated and hence wasted. On farm ponds in Maharashtra, see Kale (2017) for example.

Table 9 Distribution of Dug wells/Borewells and Area under Onion and Bengal Gram

Land size (operational)	No. of HHs	No. of dug well	No. of borewell	No. of farm ponds	Area under onion (acres)	Area under bengal gram (acres)	Caste	No. of HHs	No. of dug well	No. of borewell	No. of farm ponds	Area under onion (acres)	Area under bengal gram (acres)
Nonfarm	33						Open (Maratha)	79	26 0.33	6 0.08	4 0.05	32.5 0.41	17.1 0.22
-1.00	50	4 0.08	5 0.10		4.5 0.09	4.0 0.08	OBC	11	3 0.27	1 0.09	1 0.09	1.0 0.09	1.8 0.16
-2.00	53	11 0.21	10 0.19	3 0.06	12.7 0.24	5.0 0.09	SC	7	1 0.14				0.5 0.07
-3.00	26	4 0.15	4 0.15	1 0.04	6.0 0.23	7.4 0.28	ST	97	10 0.10	16 0.16		14.3 0.15	11.0 0.11
-4.00	23	11 0.48	3 0.13	1 0.04	13.5 0.59	4.5 0.20	NT	8					1.0 0.13
-5.00	14	8 0.57	1 0.07		8.5 0.61	5.5 0.39	Muslim	1					
Above 5	4	2 0.50			2.5 0.63	5.0 1.25	Total	203	40 0.20	23 0.11	5 0.02	47.8 0.24	31.4 0.15
Total	203	40 0.20	23 0.11	5 0.02	47.7 0.23	31.4 0.15							

Note: In the second column is the average per household.

In the study village, Maratha households own 26 dug wells, 6 borewells, and 4 farm ponds, which accounted for 65 percent, 26 percent, and 80 percent of the total number, respectively. On the other hand, the share of ownership by ST households was 25, 70, and 0 percent, respectively. It is notable that of the 13 Maratha farmers with the operational size of 4.01–5.00 acres, 8 farmers (62 percent) own either a dug well or a borewell (one farmer has 2 dug wells).

The share of the cropped area of onion, the most important irrigated cash crop, by Maratha households is 68 percent, followed by ST households (30 percent).

Table 10 shows the constructed year of dug wells/borewells and farm ponds, and the distribution of owner's caste category. It is found that in 1993—before the WSD project—a total of 20 dug wells already existed in the village. The owners of dug wells at that time were mainly Maratha households. The WSD project by WOTR started in 1996 and completed by the end of the 1990s. The construction of dug wells started again after the project is over, but it is notable that ST households participated more aggressively then.

The table also shows that the construction of borewells started after the mid-2000s in the village. At first, investment in borewell was dominant among Open (Maratha)/OBC households, but after 2013, the major investors converted to ST households, which is quite impressive.

The construction cost varied considerably, depending on location, type of wells/farm ponds, and construction year, although in general, construction of dug wells and farm ponds is found to be costlier than borewells. The high average construction cost of borewells from Rs. 20,000 to 40,000, which is borne by ST households, is especially notable, considering their low average annual household income: Rs. 42,054, as discussed later.

In addition, of course, well owners need to purchase pump sets (and bear the cost of maintenance every year too) to lift groundwater. To pump groundwater, they also need to bear the cost of electricity/diesel oils.⁹ The cost of pump sets ranged from Rs. 4,000 to 35,000 (most frequently Rs. 10,000–15,000), and the average total maintenance (machineries) and operation (electricity/diesel oils) cost in a season (year) was found to be Rs. 7,000–13,000.

Year	Dug well	Borewell	Farm pond	Owner			Average construction cost ('000 Rs.)		
				Dug well	Borewell	Farm pond	Dug well	Borewell	Farm pond
1947	1			Ma			20		
1952	1			Ma			40		
1955	2			Ma2			30		
1960	1			Ma			NA		
1970	7			Ma7			19		
1980	4			Ma3/OBC			23		
1985	2			Ma/OBC			35		
1991	1			SC			40		
1993	1			ST			200		
1998	1			Ma			20		
2000	2			Ma/ST			53		
2001	1			Ma			70		
2002									
2003	1			ST			100		
2004	1	1		ST	OBC		50	25	
2005									
2006	1			Ma			25		
2007	1	2		OBC	Ma2		50	38	
2008	3	1		Ma/ST2	Ma		60	16	
2009									
2010									
2011	1	1	1	ST	Ma	OBC	80	18	200
2012	3		1	Ma2/ST		Ma	170		35
2013	1	2		ST	ST2		60	20	
2014	1	4	1	Ma	Ma/ST3	Ma	400	29	50
2015		3			Ma/ST2			20	
2016	1	5	1	Ma	ST5	Ma	60	40	100
2017		1	1		ST	Ma		31	50
2018	1	1		Ma	ST		200	40	
Unknown	1	2		ST	ST2		NA	NA	
Total	40	23	5						

⁹ Two dug wells (owned by an ST and OBC household each) are attached by diesel pump sets.

The village resident mentioned before, after conveying how land in Bhojdari is “hard,” continued: “in any case, only families with some working and earning good money in Mumbai can afford to drill a borewell. Most farmers here cannot afford this expense” (WOTR, 2013). However, the situation changed drastically shortly after. In spite of the low rate of migration to urban cities among the ST households (Table 4) and the low income earned (Table 12 as shown later), how could they afford to do it? A new movement did happen in the village after 2013!

IV. Income, Consumer Durables, and Access to Credit

4-1. Income-earning structure

Let us now turn to the income-earning structure of the village households (Tables 11 and 12). The overall average household income is Rs. 88,809 (=1,269 US\$), if income from crop production is ignored.¹⁰ Remittance income accounted for 64 percent of the income. Note that the average gross income per household from crop production is, as the table shows, Rs. 7,656 and Rs. 15,819 for food crops and cash crops, respectively.¹¹

Land size (operational)	No. of HHs	Agri. Labour	%	Labour	%	Service	%	Non-farm self employment	%	Migrant work	%	Sub-total	%	Gross production from food crops	Gross production from cash crops
Nonfarm	33	19,333	18.4%	15,727	15.0%	32,727	31.2%	1,970	1.9%	35,145	33.5%	104,902	100%	0	0
-1.00	50	21,350	28.7%	2,976	4.0%	8,640	11.6%	0	0%	41,460	55.7%	74,426	100%	3,844	4,328
-2.00	53	18,441	37.8%	1,439	2.9%	10,481	21.5%	0	0%	18,425	37.8%	48,786	100%	6,438	14,109
-3.00	26	10,617	9.6%	5,538	5.0%	0	0%	0	0%	94,731	85.4%	110,886	100%	11,455	24,806
-4.00	23	7,674	13.1%	4,348	7.4%	0	0%	1,304	2.2%	45,391	77.3%	58,717	100%	12,854	39,460
-5.00	14	11,143	3.9%	0	0%	0	0%	1,429	0.5%	271,714	95.6%	284,286	100%	19,686	38,107
Above 5	4	11,500	100%	0	0%	0	0%	0	0%	0	0%	11,500	100%	37,875	40,250
Total	203	16,440	18.5%	4,867	5.5%	10,185	11.5%	567	0.6%	56,750	63.9%	88,809	100%	7,655	15,819

¹⁰ Income from livestock rearing is also neglected. For reference, the total number of (adult) animals in the village in 2018 is 70 bullocks (0.34 per household (HH)), 70 cows (local) (0.34 per HH), 40 cows (crossbred) (0.20 per HH), 4 buffaloes (0.02 per HH), 393 goats (1.94 per HH), and 112 chickens (0.55 per HH).

¹¹ If we assume that 70 percent of gross income is net income for food crops, while the same figure is 60 percent for cash crops, the average total agricultural net income can be reached at Rs. 14,850. Hence, the total household income is estimated to be Rs. 103,659 (=1,481 US\$). In this case, the share of remittance income to total household income reduces to 55 percent.

Caste category	No. of HHs	Agri. Labour	%	Labour	%	Service	%	Non-farm self employment	%	Migrant work	%	Sub-total	%	Gross production from food crops	Gross production from cash crops
Open (Maratha)	79	6,560	4.8%	6,380	4.7%	7,747	5.7%	443	0.3%	115,352	84.5%	136,482	100%	10,466	30,454
OBC	11	5,159	2.3%	19,205	8.5%	132,318	58.3%	5,000	2.2%	65,455	28.8%	227,137	100%	5,655	6,945
SC	7	17,714	60.0%	0	0%	0	0%	0	0%	11,786	40.0%	29,500	100%	5,804	3,343
ST	97	25,355	60.3%	915	2.2%	0	0%	258	0.6%	15,526	36.9%	42,054	100%	5,467	6,833
NT	8	20,375	47.1%	10,500	24.3%	0	0%	0	0%	12,375	28.6%	43,250	100%	11,766	5,338
Muslim	1	16,000	13.8%	100,000	86.2%	0	0%	0	0%	0	0%	116,000	100%	0	0
Total	203	16,441	18.5%	4,867	5.5%	10,185	11.5%	567	0.6%	56,750	63.9%	88,809	100%	7,656	15,819

OBC households attained the highest average household income (Rs. 227,137), followed by Maratha (Rs. 136,482). The very low average household income observed among the other caste categories (ST: Rs. 42,054, SC: Rs. 29,500, and NT: Rs. 43,250) is notable. Income from crop production by these caste categories is also low.

The farm households with the operational size of 4.01–5.00 acres recorded the highest average household income of Rs. 284,286. Almost all (95.6 percent) of their income came from remittance. They also earned the highest income from crop production.

4-2. Dissemination of consumer durables

We asked about the holding of several major consumer durables: TV, ceiling fan, desk fan, cell phone, refrigerator, bicycle, motor bike, car, etc. Figure 3 demonstrates the dissemination of four major durables (TV, ceiling fan, cell phone, and motor bike), for all households and for ST households alone.¹²

¹² For simplicity, the present number of households (203 for all and 97 for ST) was used as parameter for the years before 2018.

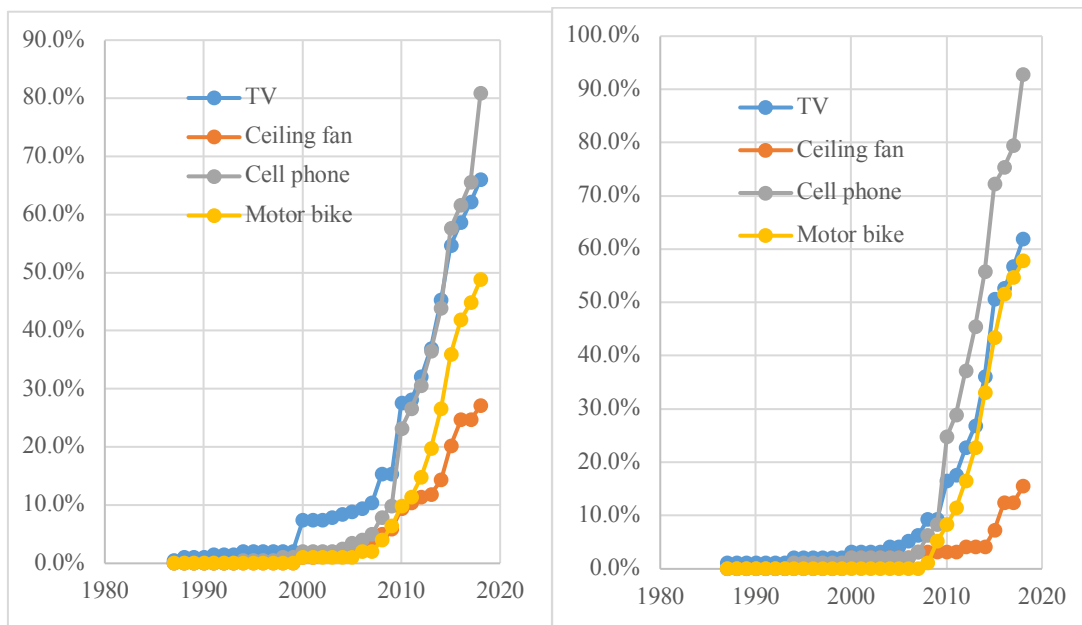


Figure 3 Spread of Major Consumer Durables

Note: Left—All households, right—ST households only.

The dissemination started since the 2000s and accelerated after the 2010s. ST households, though slightly lagging behind at the beginning, soon caught up to the average. Considering the low-income level of ST households, it is a bit surprising. Note that the low rates of dissemination of TV and ceiling fan seem to connect to the non-availability of electricity, because their hamlets are in relatively high land and remote areas.

4-3. Access to credit

Table 13 shows the households with debts from the primary agricultural cooperative society (PACS) in the village. The PACS usually lends money every May for a period of one year with 4 percent per annum interest rate. The table clearly indicates that the credit from the PACS is almost monopolized by Maratha households.

Table 13 Households with Debt from PACS by Caste Categories

Caste category	No. of HHs	No. of HHs with debts from PACS	% of households	Average amount of debts (Rs.)
Open (Maratha)	79	33	41.8%	67,758
OBC	11	0	0%	-
SC	7	0	0%	-
ST	97	2	2.1%	75,000
NT	8	0	0%	-
Muslim	1	0	0%	-
Total	203	35	17.2%	68,172

Note: PACS--primary agricultural cooperative society.

5. Summary and Conclusions

This paper is a preliminary report on the Bhojdari village in Ahmednagar District of Maharashtra State, India, where the Indo-German Watershed Development Programme (IGWDP) was implemented by an NGO, Watershed Organization Trust (WOTR), since the mid-1990s. The village also benefitted from the project “Climate Change Adaptation in Rainfed Regions of Maharashtra, Madhya Pradesh and Andhra Pradesh” (CCA project), which started in 2009 and was implemented by WOTR in collaboration with NABARD.

The village is composed of 203 households in 2018, of which the largest caste category is ST (47.8 percent), followed by Open (Maratha) (38.9 percent), OBC, NT (nomadic tribes), SC, and Muslim. The total farmland owned by the villagers is 439.5 acres (=178 hectares). A little more than 16 percent (16.2 percent) of the households are landless. After adjusting for land tenancy, the total operational land is 445.0 acres, of which 39.5 acres is left fallow; hence, the total net cropped area is 405.5 acres. The average cropping intensity is 122 percent.

In terms of land ownership, 53.9 percent of the land is concentrated in the hands of Maratha households, followed by ST households (33.4 percent). The highest average owned land per household is, however, found among NT.

Agriculture in the village is dominated by food crops for self-consumption, such as pearl millet (38.9 percent of the gross cropped area) and groundnut (19.8 percent). Soybean cultivation (17.0 percent) follows, but it is a cash crop. Other crops include onion (9.7 percent) and Bengal gram (7.0 percent). The most important irrigated cash crop in the village is onion.

In 2018, there were a total of 40 dug wells, 23 borewells, and 5 farm ponds. Maratha households have a share of 65, 26, and 80 percent among the dug wells, borewells, and

farm ponds, respectively (the corresponding figures for ST households are 25, 70, and 0 percent, respectively). Since the 2010s, ST households have begun digging wells, especially borewells. Although they are generally poor (with very low average household income), they started to take a strong initiative for agricultural innovation; however, how they could afford to do so and the background of this situation remains unknown, which is an important research agenda in the future. The small gap between the caste categories in terms of the spread of major consumer durables such as TV, motor bike, cell phone, and ceiling fan should also be clarified by future research.

In terms of the outmigration from the village to large urban cities such as Mumbai and Pune, Maratha is by far the leading caste community (29.3 percent in terms of population and 22.3 percent in terms of labor force). The corresponding figures for ST households are only 4.4 and 3.9 percent, respectively. If income from crop production is ignored, 84.5 percent of the average total household income comes from remittances in the case of Marathas, whereas the corresponding figure is 36.9 percent for ST. Note that even the gross income from crop production, for both food crops and cash crops, is much larger among Marathas than ST.

Farm households with an operational size of 4.01–5.00 acres are the most powerful and rich households in the village. The total number of such households is 14, of which 13 (92.9 percent) are Maratha. They enjoy the highest average household income (before adding income from crop production), and almost all of it comes from remittances. Some household members stay outside to earn a high salary, whereas other members are engaged in agriculture in the village and also earn a relatively high income. Maratha households also enjoy a near monopoly over cheap credit (4 percent per annum interest rate) from the primary agricultural cooperative society (PACS).

A major and fundamental question remains unanswered: Given the high income enjoyed both from agricultural and nonagricultural sources (mainly remittances) and the monopoly of resources (including high-quality land, water, and institutional credit) by the traditionally dominant Maratha caste, how can we understand the recent new movement by other caste communities such as ST to purchase rather expensive consumer durables and also to invest in wells, especially borewells? In-depth interviews in the village, especially with ST households, are, therefore, necessary.

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