CHAPTER - IV

IMPACT OF DHAVAL PERCOLATION TANK : ASSESSMENT OF MICRO WATER HARVESTING SYSTEM

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4.1 INTRODUTION

After studying the rainwater harvesting practices in the study region in the previous chapter an attempt has made to assess the impact of rainwater harvesting techniques in the present chapter. For this purpose percolation tank has considered as a case study.

Percolation tanks are the most prevalent form of traditional water harvesting system where the water stored in percolation tanks has used for domestic & irrigation purpose also. They were essentially a mechanism to overcome the seasonal nature of rainfall and create availability of water for agriculture.

4.2 THE STUDY REGION

Dhaval percolation tank falls in the juradication of Dhaval village having area of 540 hectares it is situated nearly 20 km. southwest of Phaltan city. It falls in Girvi revenue circle of Phaltan tahsil(Fig.4.1& Photo Plate 4.1). Dhaval Village is located at the southern foothills region. This area falls in the rain shadow zone of Western Ghats receiving an average rainfall of 500-mm. Dhaval village has been experiencing severe droughts once in five years. The landscape is marked by coarse soil largely unsuitable for cultivation. The Dhaval percolation tank is located near northern side of Tathawada hills at Dhaval Village. The command area of Percolation Tank is about 372.72 hectares and its catchments area is 153 hectares. Its storage capacity is 1.09 TCM.

4.3 DATA BASE AND METHODOLOGY

The entire information and data required has been collected by organizing frequent field trips, by using a questionnaire, schedule, interview and observation techniques. To compare the situation the study carried out by researcher during the year 1981 has been considered. The performance of wells and technical report of Dhaval PT is made available from the Asst. Geologist, G.S.D.A.Satara (Task force, Govt. of Maharashtra, 1977),

LOCATION OF DHAVAL PERCOLATION TANK

Photo plate no. 1

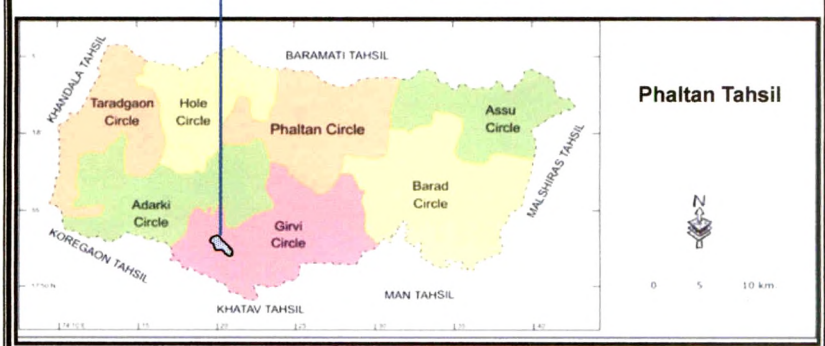

Fig 4.1

whereas the salient features of PT have been obtained from the Minor Irrigation Dept. Govt. of Maharashtra. A cadastral map of the village made available from the Inspector Land Records, Satara, has been used to determine area benefited, henceforth called the command area. To assess the socio-economic impact 20 percent farmers from command area have seen selected by adopting random sampling technique. Besides this, statistics regarding landuse, cropping pattern size of holdings, agro-inputs etc. for respective years have been procured from the village officials such as Talati and Gram Sevak. For the preparation of isolines map of the command area, plot-to-plot visits were undertaken.

4.4 IMPACT OF PERCOLATION TANK:

4.4.1 AGUMENTATION IN GROUND WATER

Before the construction of percolation tank, there were twelve dug wells (1981). The depth of these dug wells varied from 7 meters to 16 meters below the ground level and diameter varied from 5 to 7 meters.(Fig.4.2.). The water level in these wells in winter season was 2 to 2.5 meters; however, most of these wells go dry in summer. As a result, these wells were providing water for 16 hectares of land during the Kharif season only.

During the post construction period, twenty-four new wells and thirty bore wells are constructed; having an average depth of 30 meters. Each tube wells is providing water to about 2.5 hectares of cropped area. In case of dug wells, the water level has increased by 1.5 to 4.5 meters and duration of the water in these wells has extended by two months i.e., up to the month of March. The yield of the dug wells has increased significantly. At present about 372.17 hectares of land has benefited from irrigation water by wells and tube wells. All these facts revel that there is significant augmentation in ground water in the command area during the post construction period. However, interference of water in the wells

DHAVAL PERCOLATION TANK COMMAND AREA – ISOLINES, SHOWING WATER TABLE BEFORE (1981) CONSTRUCTION OF TANK; (WATER LEVEL IN MTR. FROM THE GROUND SURFACE)

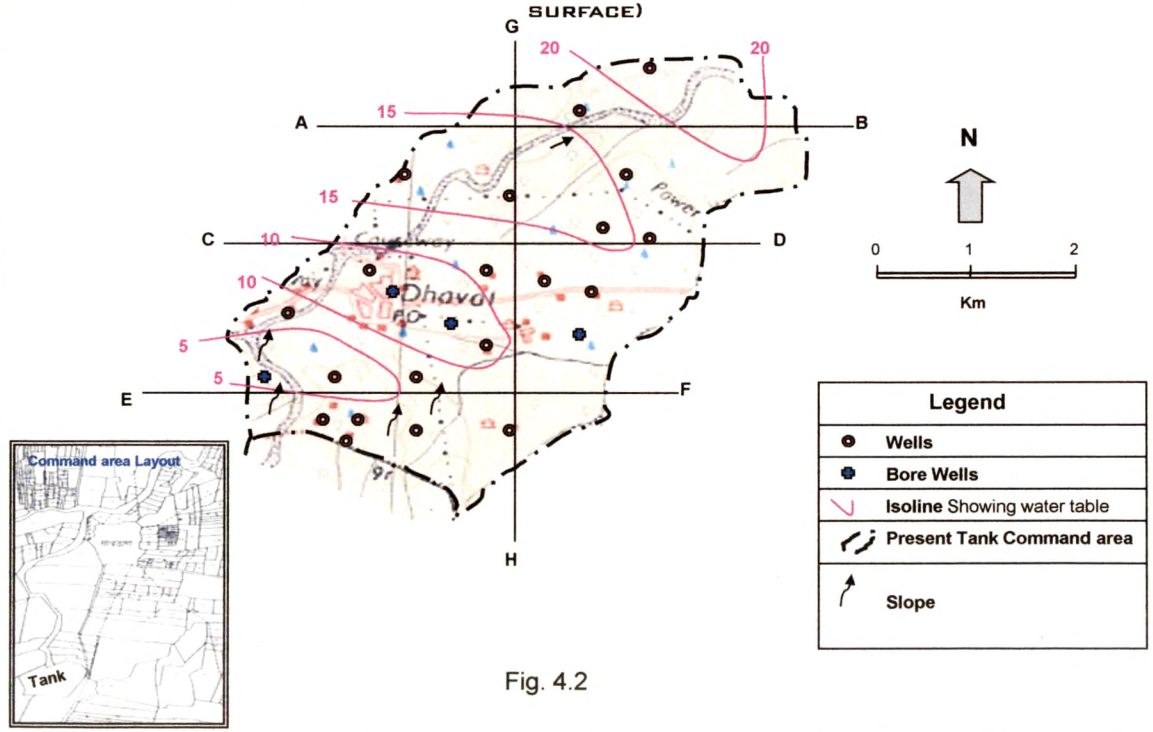

Fig. 4.2

DHAVAL PERCOLATION TANK COMMAND AREA – ISOLINES, SHOWING WATER TABLE AFTER(2005) CONSTRUCTION OF TANK; (WATER LEVEL IN MTR. FROM THE GROUND SURFACE)

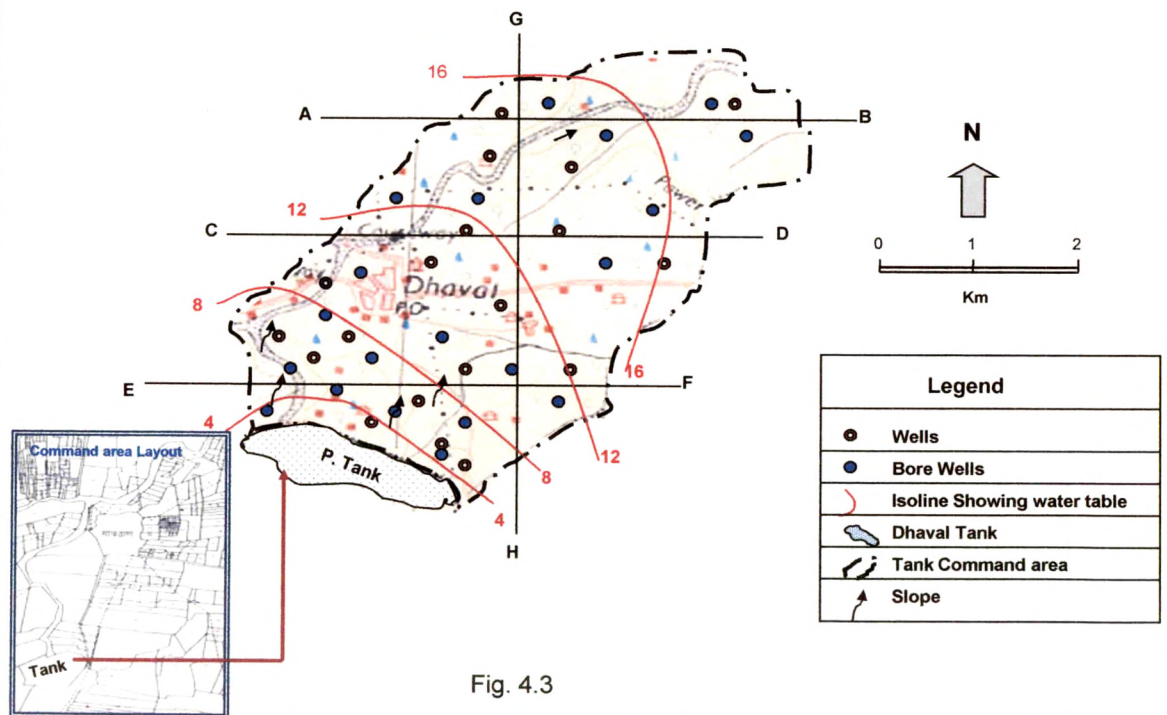

Fig. 4.3

located at distance of 100 meters. (by questionnaire result) is noted indicating the over development of command area. Hence, digging of new wells in the command area may not be economical.

4.4.2 CHANGES IN CROPPING PATTERN

During the year 2005 out of the total cropped area, 88.19 percent is occupied by food crops of which 24.92 percent is shared by sugarcane. Among the non-food crops, other pulses (Ghevda) accounte for 08.35 percent, followed by groundnuts (08.05%). Among the cereals, Jowar (35.19%), and wheat (7.89%) are important. During 1980-81, about 85.96 percent of the gross cropped area was occupied by food crops of which 77.94 percent was shared by food grains and 4.27 percent by sugarcane. Among non-food crops, a groundnut (10.58%) was dominant (Table.4.1). In the command area sugarcane is the major leading crop of increase whose area has increased by 20.65 percent, during the last two decades. Per hectares yield of sugarcane has also increased form 40 to 60 tunes.

Increased irrigation facilities, assured water supply by tube wells, nearness to sugar factory and sugarcane crop, being a symbol of status are some of the reasons for the increase in area under this crop. Sunflower is oil seed crop and Pomegranate & Grapes are another important fruits crops which have been recently introduced by the farmers.

During the period under review, there has been a remarkable change in the respective positions of crops. Among the major crops, the highest decline was in Bajra (9.65%) followed by pulses (7.6%).Various crops which recorded increase are sugarcane (20.65%) and Sunflower (1.13%). (It is interesting to put on the record, that a crop like Tuti leaves required for silk industry, a perennial water-demanding crop is cultivated on 97.1 hectare of land.

Table 4.1

DHAVAL PERCOLATION TANK COMMAND AREA : CHANGES IN CROPPING PATTERN

Sr.No	Crops Change	1980-81 ⟶		2004-05 ⟶		Volume of change in %
		Area in hectares	Percentage to total	Area in hectares	Percentage to total	
1	Jawar	133.43	35.80	131.16	35.19	- 0.61
2	Bajra	66.04	17.72	30.09	8.07	- 9.65
3	Wheat	31.54	8.46	29.4	7.89	- 0.57
4	Rice	-	-	-	-	-
5	Total cereals	231.01	61.98	190.65	51.15	- 10.83
6	Gram	-	-	2.54	0.68	+ 0.68
7	Other pulses	59.44	15.95	31.13	8.35	- 7.6
8	Total pulses	59.44	15.95	33.67	9.03	- 6.92
9	Total food grain	290.45	77.94	224.32	60.18	- 17.76
10	Sugarcane	15.91	4.27	92.87	24.92	+ 20.65
11	Vegetables fruits	13.97	3.75	11.53	03.09	- 0.66
12	**Total food crops**	**320.33**	**85.96**	**328.72**	**88.19**	**+ 2.23**
13	Ground nut	39.46	10.58	30.02	8.05	- 2.53
14	Sunflower	-	-	4.23	1.13	+ 1.13
15	Total oil seeds	39.46	10.58	34.25	9.19	- 1.09
16	Tobacco	-	-	-	-	-
17	Other non-food crops	12.92	3.46	9.75	2.62	- 0.84
18	**Total non-food crops**	**52.39**	**14.04**	**44.00**	**11.81**	**- 2.23**
Gross cropped area		372.72	100	372.72	100	+ 2.23 -

Source: Socio-Econ. Review & District Statistical Abstract of Satara District : 1981 & 2005. and Village Records.

4.4.3 SOCIO-ECONOMIC CHANGES

Among the 300 beneficiaries, 30 farmers were selected by stratified random sampling methods. The results of the analysis are:

a) Size of holdings:

In an agro-based society, land holdings have immense importance. It is one of the major parameters to evaluate the socio-economic status of the farmers. At present about 57.65 percent farmers are marginal landholders followed by small (26.22%) and moderate holders. As compared to the base year there is a slight change observed in the proportion of large size holdings (Table 4.2 & Fig.4. 4).

b) Area irrigated:

The cropping pattern; intensity of cropping and crop productivity depend upon the availability of assured irrigation facilities. The farmers with assured irrigation facilities adopt modern agricultural technology earlier than other farmers (Pawar, 1989). About 67.90 percent of the farmers have irrigate land below 0.5 hectares while 20.52 percent have between 0.6 to 1.0 hectares and about 11.58% have above 1 hectare of irrigated land (Table 4.3 & Fig.4.5). As compared to the base year, increase is observed in the moderate size of holdings. This is mainly due to an increased in the irrigated area from 265.8 hectares to 372.72 hectares because of increase of ground water reservoirs in the PT command area.

c) Area under cash crops:

The farmers adopt cash crops only when assured water supply is available. As such, sugarcane is the major cash crop, followed by groundnut sunflower and ghevda. Farmers having 0.5 hectares and above, irrigated land have switched over to cash cropping. Only 30 percent farmers do not cultivate cash crops (Table 4.4).

Table 4.2
Distribution of sampled farmers according to Percentage of size of holdings
(Figures in bracket indicate number of farmers)

Size of Holdings → / year ↓	Marginal < 1Hect.	Small to 2 Hect.	Moderate > 2.01 Hect.	Total
1980 – 81	61.14 (15)	28.96.(10)	9.9 (05)	100 (30)
2004 - 05	57.65 (09)	26.22 (10)	16.13 (11)	100 (30)

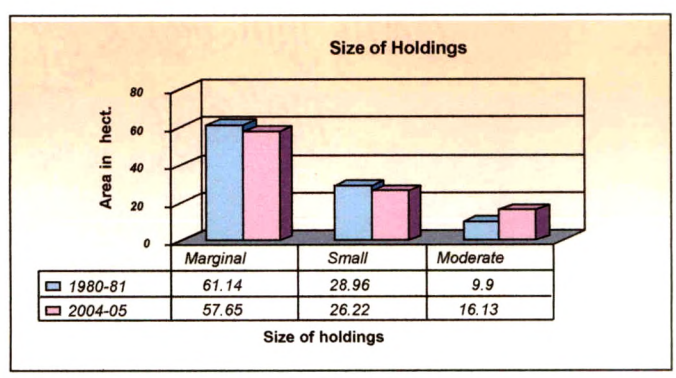

Fig. 4.4

Table 4.3 **Area irrigated (in Hect.)**

Size of Holdings → / year ↓	> 0.5	0.6 to 1.0	1.1 to 2.00	Total
1980 - 81	71.21 (16)	19.78 (8)	9.01 (6)	100 (30)
2004 - 05	67.90 (18)	20.52 (9)	11.58 (7)	100 (30)

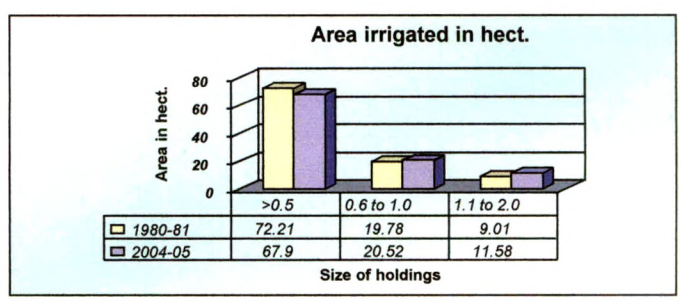

Fig. 4.5

d) Agricultural Implements and machinery:

Mechanized agriculture is encouraged in commercial farming. Modern agriculture includes use of machineries and bio-chemical inputs. In the command area of PT, use of such agro inputs was absent. At present about one-third farmers are using modern implements (Table 4.5). This proportion is increasing with increasing facilities of irrigation. As rightly observed by Gadgil (1948) "due to irrigation, farmers could make additional investment in cattle, farm implements and more valuable crops like sugarcane" seems to be applicable to the area under investigation.

e) Education:

Education is the prime factor for over all development of human beings. Higher education leads to a positive approach towards adoption of agricultural innovations (Pawar, 2003). During the base year about 33% farmers were illiterate, about 25% had completed their primary education and another 7% had entered secondary schools.

However during last 2 decades considerable change in educational level has been observed. None of them is illiterate, and over 25% have achieved degrees of higher secondary and higher education.

f) Cosmopolitanism:

Involvement of farmers in social activities is complementary for the development of agricultural and allied activities. Although all the farmers participate in social functions, fairs and festivals, very few (10%) play an active role in political and community activities.

g) Annual Income:

During the period under investigation there is considerable rise in annual income of farmers. In the base year, over 83.23 percent farmers were in the low income group, about 10 percent in the moderate income group, whereas 7 percent were in high income group. At present, about

Table 4.4
Area under cash crops (in Hect.)

Size of Holdings → year ↓	Nil	< 0.5	0.6 to 1.0	> 1	Total
1980-81	53.37 (15)	31.14 (11)	8.92 (2)	6.57 (2)	100 (30)
2004-05	30.00 (09)	45.13 (14)	13.15 (4)	11.72 (3)	100 (30)

Table 4.5
Agricultural Implements

Types → Year ↓	Traditional	Traditional & Modern	Total
1980 - 81	100.00 (30)	--	100 (30)
2004 - 05	72.55 (25)	27.45 (05)	100 (30)

Table 4.6
Annual Incomes (in Rs.)

Income → Year ↓	< 25,000 Low Income Group	25 to 50,000 Moderate Income	> 50,000 High Income Group	Total
1980 – 81	83.23 (21)	10.32 (7)	6.45 (2)	100 (30)
2004 - 05	54.00 (9)	25.45 (15)	20.55 (6)	100 (30)

Source:: Compiled & Processed by Researcher

54 percent farmers belong to low income group, about 25.45 percent to the moderate and about 20.55 percent belong to the high-income group (Table 4.6). This can be attributed to the changing cropping pattern, particularly cultivation of cash crops such as sugarcane and sunflower, due to increase in assured irrigation. In this regard, Baviskar's (1998) statement, "commercialization of agriculture through growing sugarcane has contributed to the economic viability of small farmers and the co-operativization of sugar industry has strengthened the economic and political position of the cane grower" seems to be supported.

CONCLUSION

Due to micro water harvesting programme, recharge of ground water has increased, resulting in the rise in the water table leading to increase in yield and duration of well water and assured irrigation facilities.

The cropping pattern has changed drastically. Farmers have switched over from cereal to cash crops. The increase in per hectare yield has also been achieved.

The consequential impact of all these factors have been on increasing the socio-economic status of farmer, rise in educational level and attitudinal change in the farmers as well.

It is found that such schemes of micro water harvesting development would be a panacea for rural development, provided there is real co-operation and active participation of the local people. In this respect Ankalkhop and Vadgaon Villages of Sangli district, Nayagaon Pani Panchayat of Pune district could be cited as models for micro watershed development.

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