IMPACT OF MOISTURE CONSERVATION ACTIVITIES ON DRINKING WATER FACILITIES IN WATERSHED MANAGEMENT PROGRAMME

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ABSTRACT

The Integrated Watershed Development Programmes involving the entire community and natural resources influence (a) conservation and optimum use of land, water, human and livestock resources (b) improvising socio-economic conditions of the people such as income, employment, assets, health, education and energy use (c) change attitude of the community towards project activities and their overall participation in project (d) impact on environment (e) changes in land use, cropping pattern, productivity and production of crops, adoption of modern technologies, increase in milk production, etc. (f) development of various institutions for implementation of watershed development activities, and (g) ensuring sustainability of improvements. It is thus clear that watershed development is a key to sustainable production of food, fodder, fuel wood and meaningfully addresses the social, economical and cultural status of the rural community. Recognising the importance of watershed development programme in the rain fed area, a large number of studies assessed the impact of watershed development over a period of time. These studies vary in purpose, regions and domain of impacts. The impact studies vary from impact of specific water harvesting intervention to overall impacts of watershed development programme. The impact assessment studies focus mainly on the impact of different interventions such as water resources development, soil and moisture conservation measures, drainage line treatments, and afforestation and assess the impacts on different aspects like increase in surface and groundwater resources, cropping pattern changes, yield, environmental conditions, socio-economic conditions, including the social capital and institution building as a result of watershed interventions. This study was undertaken to check impact of soil and moisture conservation activities on drinking water facilities.

Key words: Watershed, Ground water table, drainage line treatment, moisture conservation

INTRODUCTION:

Integrated Watershed Development and Management (IWMP) are evolving as a useful mechanism to address the two most common water resource problems in India. Firstly, it aims to address the problem of water availability resulting from an increased demand on a resource rendered fragile due to irregular and erratic rainfall. However, in addition to addressing water resources issues, the watershed development model also offers an effective medium to tackle larger natural resources management problems arising out of a competition for the limited resources that often results in conflicts at various levels.

Repeated water scarcities leading to large-scale droughts have severely affected the livelihoods of the rural poor in India. Three types of reactions to such situations can be broadly observed: (Kakade, *et al.*).

1. Short term, relief measures to mitigate water shortages by developing water sources that are often not sustainable.
2. Highly expensive measures involving relief measures like supplying water through tankers (as relief measure) and development of regional piped water supply schemes that require high costs of operation and management.

3. Local solutions through participatory approaches that have increasingly resorted to the integrated watershed management model to identify assess and address the larger problem of rural systems management.

Thus, one of the major tasks of the IWMP is to develop village tanks and wells for drinking and domestic water facilities etc., so as to benefit even the landless households. These tasks are important, because the project guidelines state that at least 80 per cent of the watershed area is to be covered with treatment or developmental activities selected by the watershed communities. Whether this task was properly implemented in the study area, the impact of moisture conservation activities on drinking water availability was measured.

OBJECTIVE OF THE STUDY:

To study the impact of moisture conservation activities on drinking water facilities through watershed development work and subsequent impacts on rural livelihood.

RESEARCH METHODOLOGY:

In order to study the objectives of the study, ex-post-facto research design was selected, for that a well-structured interview schedule was prepared. There are 34 watersheds implemented in 3 batches of IWMP Phase I in the Surat District of Gujarat, out of which 6 watersheds selected and studied for this research. The interview schedule consisted of specific questions pertaining to soil and moisture conservation activities and its impact on various parameters was operated among total 150 core activity beneficiaries (25 from each watershed) i.e. farm land owners of the selected micro-watersheds. The respondents were selected by simple random method from the list derived from Watershed Development Team members and Village Watershed committees (VWC) and Watershed User Association (WUA).

RESULTS AND DISCUSSION:

The watershed beneficiaries were asked about the sufficient availability of pure and safe drinking water before the implementation of the watershed project. Out of 150 farm respondents only 7.30 per cent of the respondents replied that it was sufficient, whilst overwhelming majority (92.70 per cent) suffered the shortage for the same. Further they were asked about the usage of alternate sources to meet the requirement for pure and safe drinking water at that time. The responses were registered, analyzed and presented in **Table 1**.

TABLE 1: SHOWING THE ALTERNATE SOURCE OF DRINKING WATER BEFORE IWMP

Source of Drinking Water	Count	Percentage
Farm Well	139	92.67
By Tanker (Arranged by Gram Panchayat)	13	8.67
By Tanker (Individually arranged)	2	1.33
From Other Village	2	1.33
From Other Source	0	0.00

Source: Field Data 2017-18

The data given in the Table 1 revealed that, high majority (92.67 per cent) of the farmer respondents were dependent on the farm wells to meet the requirement of drinking and domestic water before IWMP. Whilst arrangement of tankers by Gram Panchayat and individually was found to be second and third alternate source in crisis period respectively. Thus, before IWMP domestic water crisis were settled by the farm wells mainly.

The farmer respondents were asked for whether the availability of drinking water facilities increased after implementation of IWMP in their villages or not. All the respondents gave positive response for that. The study was also directed to find out different sources of drinking water, their potential to provide water in months, distance of the sources from residence and investment of time to fetch water from that source by the respondent before and after the implementation of IWMP. The responses of the farmer respondents were compared in the **Table 2**.

The data given in Table 2 indicates that, hand-pumps, bore-wells, farm-wells and somewhere village-wells or group-wells were the major source of drinking water before IWMP in the studied watershed villages. All these sources were compared separately as per their usage by farmer respondents.

Before IWMP out of the total (150) farmer respondents 115 (76.67 per cent) utilized hand-pumps for fulfilling their drinking water need. Nearly seventy per cent of them could meet their requirement up to 8 months from this source. Rest of the time they had remained dependent on alternate sources. Only 31.30 per cent of the respondents could utilize this source for more than 8 months. From the total hand-pump users, nearly three-fifth (58.30 per cent) of the respondents could find it within 51-100 metres distance from their home. Whilst 27.80 per cent had to fetch water from more than 100 metres distance to home, only 13.00 per cent could find water in less than 50 metres distance and one family had to rush for more than 200 metres

TABLE 2: CHANGE IN USE OF DRINKING WATER SOURCES DUE TO IWMP

Source of Drinking Water	Pre-IWMP									Post-IWMP								
	Duration in Month	Count	Table N %	Distance from Home in Metres	Count	Table N %	Fetching time in Minutes	Count	Table N %	Duration in Month	Count	Table N %	Distance from Home in Metres	Count	Table N %	Fetching time in Minutes	Count	Table N %
Hand pump	<= 4	0	0.0%	<= 50.0	15	13.0%	<= 30.0	40	34.8%	<= 4	1	.7%	<= 50.0	22	15.8%	<= 30.0	124	89.2%
	5 - 8	79	68.7%	51.0 - 100.0	67	58.3%	31.0 - 60.0	74	64.3%	5 - 8	1	.7%	51.0 - 100.0	78	56.1%	31.0 - 60.0	15	10.8%
	9 - 12	36	31.3%	101.0 - 200.0	32	27.8%	61.0+	1	.9%	9 - 12	137	98.6%	101.0 - 200.0	39	28.1%	61.0+	0	0.0%
				201.0+	1	.9%							201.0+	0	0.0%			
Bore Well	<= 4	1	1.8%	<= 50.0	20	35.7%	<= 30.0	36	64.3%	<= 4	0	0.0%	<= 50.0	23	28.8%	<= 30.0	77	96.3%
	5 - 8	21	37.5%	51.0 - 100.0	21	37.5%	31.0 - 60.0	17	30.4%	5 - 8	0	0.0%	51.0 - 100.0	27	33.8%	31.0 - 60.0	2	2.5%
	9 - 12	34	60.7%	101.0 - 200.0	10	17.9%	61.0+	3	5.4%	9 - 12	80	100.0%	101.0 - 200.0	25	31.3%	61.0+	1	1.3%
				201.0+	5	8.9%							201.0+	5	6.3%			
Well	<= 4	0	0.0%	<= 50.0	3	11.5%	<= 30.0	2	7.7%	<= 4	0	0.0%	<= 50.0	3	13.0%	<= 30.0	11	47.8%
	5 - 8	2	7.7%	51.0 - 100.0	15	57.7%	31.0 - 60.0	23	88.5%	5 - 8	0	0.0%	51.0 - 100.0	13	56.6%	31.0 - 60.0	12	52.2%
	9 - 12	24	92.3%	101.0 - 200.0	4	15.4%	61.0+	1	3.8%	9 - 12	23	100.0%	101.0 - 200.0	3	13.0%	61.0+	0	0.0%
				201.0+	4	15.4%							201.0+	4	17.4%			
Group Well	<= 4	0	0.0%	<= 50.0	0	0.0%	<= 30.0	1	50.0%	<= 4	1	100.0%	<= 50.0	0	0.0%	<= 30.0	1	100.0%
	5 - 8	0	0.0%	51.0 - 100.0	1	50.0%	31.0 - 60.0	0	0.0%	5 - 8	0	0.0%	51.0 - 100.0	1	100.0%	31.0 - 60.0	0	0.0%
	9 - 12	2	100.0%	101.0 - 200.0	1	50.0%	61.0+	1	50.0%	9 - 12	0	0.0%	101.0 - 200.0	0	0.0%	61.0+	0	0.0%
				201.0+	0	0.0%							201.0+	0	0.0%			
Village Well	<= 4	0	0.0%	<= 50.0	1	50.0%	<= 30.0	0	0.0%	<= 4	0	0.0%	<= 50.0	1	50.0%	<= 30.0	2	100.0%
	5 - 8	0	0.0%	51.0 - 100.0	0	0.0%	31.0 - 60.0	2	100.0%	5 - 8	0	0.0%	51.0 - 100.0	0	0.0%	31.0 - 60.0	0	0.0%
	9 - 12	2	100.0%	101.0 - 200.0	0	0.0%	61.0+	0	0.0%	9 - 12	2	100.0%	101.0 - 200.0	0	0.0%	61.0+	0	0.0%
				201.0+	1	50.0%							201.0+	1	50.0%			
Tap by Panchayat at Public place	<= 4	0	0.0%	<= 50.0	0	0.0%	<= 30.0	0	0.0%	<= 4	0	0.0%	<= 50.0	12	26.7%	<= 30.0	44	97.8%
	5 - 8	0	0.0%	51.0 - 100.0	0	0.0%	31.0 - 60.0	0	0.0%	5 - 8	0	0.0%	51.0 - 100.0	20	44.4%	31.0 - 60.0	1	2.2%
	9 - 12	0	0.0%	101.0 - 200.0	0	0.0%	61.0+	0	0.0%	9 - 12	45	100.0%	101.0 - 200.0	13	28.9%	61.0+	0	0.0%
				201.0+	0	0.0%							201.0+	0	0.0%			
Tap by Panchayat at Individuals	<= 4	0	0.0%	<= 50.0	0	0.0%	<= 30.0	0	0.0%	<= 4	0	0.0%	<= 50.0	25	96.2%	<= 30.0	26	100.0%
	5 - 8	0	0.0%	51.0 - 100.0	0	0.0%	31.0 - 60.0	0	0.0%	5 - 8	0	0.0%	51.0 - 100.0	1	3.8%	31.0 - 60.0	0	0.0%
	9 - 12	0	0.0%	101.0 - 200.0	0	0.0%	61.0+	0	0.0%	9 - 12	26	100.0%	101.0 - 200.0	0	0.0%	61.0+	0	0.0%
				201.0+	0	0.0%							201.0+	0	0.0%			

Source: Field Data 2017-18

to satisfy its thirst. Majority of these families (64.30 per cent) had to spent from half an hour to an hour every day for fetching the drinking water, followed by 34.80 per cent of the respondents were required less than half an hour.

After the implementation of IWMP hand-pump users were reached up to 92.67 per cent (139 respondents). Now overwhelming majority of them (98.60 per cent) could find the water almost round the year i.e. 9-12 months. More than seventy per cent of the respondents could find water within 100 metres periphery of their house. Only 28.10 per cent respondents required to go more than 100 metres for fetching water after the implementation of project. Fetching time was also declined in such a way that, nearly ninety per cent of the respondent (124 numbers) had to invest less than half hour for this task.

These results indicate that due to watershed intervention groundwater conservation in the watershed area had been increased, through which recharging and activation of old aquifers might be improved. More availability of water in old hand-pumps might be resultant to that. These results also increased the scope for installing new hand pumps in the study area if needed in future.

Bore wells were the second most alternate source of drinking water in the project area. Before IWMP out of 150 watershed beneficiaries, 56 beneficiaries were utilized it for their drinking water source. More than sixty per cent of them could get supply of water between 9-12 months from that source. Rest of the respondents hardly found water for less than 8 months from that source. Majority of bore wells were dig out as per the conveniences of the respondents, as 35.70 per cent of the respondents could reach the bore wells within 50 metres of range followed by 37.50 per cent respondents were required to travel 50-100 metres of distance, only 10 and 5 respondents had to go more than 100 metres and 200 metres respectively to fetch a water. Nearly two-third of the respondents (64.30 per cent) had to spend less than 30 minutes for fetching water from bore-wells, followed by 30.40 per cent were took about an hour, whilst 5.40 percent were required more than an hour to satisfy their needs. After the implementation of IWMP there was tremendous change occurred in the above scenario, as 80 watershed beneficiaries were utilizing bore wells for drinking water source, and Cent per cent of them could get water round the year from these sources. In case of distance now more than sixty per cent of the respondents were required to go not far than 100 metres for water, whilst only 37.5 per cent respondents had to fetch the water from more than 100 metres distance. It was also interesting to observe that high majority of the respondents (96.30 per cent) could save their time by completing this daily task within half an hour. The result indicates the increased availability of water in bore-wells, this might be due to increase in water-table and simultaneously numbers of bore-wells in project area after the completion of project.

The above reflections of increased ground water table were also observed in other sources like wells, village-wells and group-wells in project area. There were 26 farmer beneficiaries were utilized wells and two respondents for each village well and group well before IWMP. Majority of them could get water round the year from these sources. After the completion of the project distance to reach these resources remain constant but, the time taking for fetching the water was declined.

After the completion of the project there are two new sources of drinking water introduced viz. tap by Village Panchayat at public place and tap by Village Panchayat at individual house for the betterment of the watershed beneficiaries' life. Total 45 watershed beneficiaries were utilized public place taps and 26 respondents had facilitated individual tap at their door step. Majority of them could utilize these facilities round the year, with least distance of less than 100 metres and accordingly spending nominal time to meet drinking and domestic water

requirements. This might be due to the Entry Point Activities in IWMP and convergence with GWSSB (Gujarat Water Supply and Sewage Board) mission for drinking water facilities.

CONCLUSION:

It can be concluded from the above evidences that, implementation of IWMP had induced the ground water table of the drinking water sources in the project area. By which the scarcity of drinking water was checked and resulted in to reduction of the distance and time investment by the respondents for this task.

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