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Outcomes of IWMP: A Study of Some Aspects in Loha Tahsil of Nanded District (M.S.)

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Abstract

Integrated Watershed Management Programmer (IWMP) for erratic, semiarid, unpredictable, rain fed area was launched in the year 2008-2009. The objectives of the programmer were to promote the overall economic development and improvement of the socioeconomic conditions of rural poor people in the programmer areas through optimum utilization of resources and generation of employment and augmentation of other income generating activities. Keeping this in view the study was conducted to assess impact of IWMP in trams of change in land use pattern, improved water potential, and change cropping pattern, increase yield level, changes in migrations pattern, changes in employment pattern.

Keywords: IWMP, Watershed, Livestock, Groundwater Status

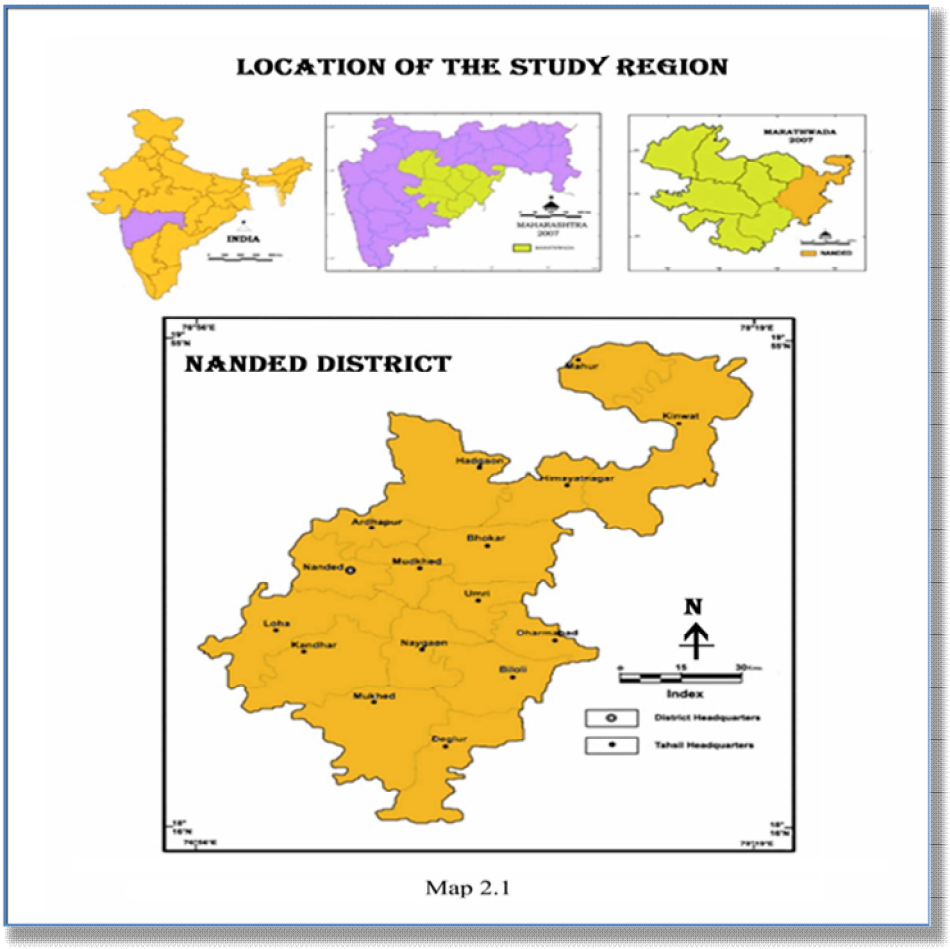
Introduction

In India, most watershed projects are implemented with the twin objective of soil and water conservation and enhancing the livelihoods of the rural poor. Different types of treatment activities carried out in a watershed include soil and moisture conservation measures in agricultural lands (contour/field bonding and summer plugging) drainage line treatment measures (loose boulder check dam, minor check dam, and major check dam, and retaining walls), water resource development / management (percolation pond, farm pond and drip and sprinkler irrigation), crop demonstration, horticulture plantation and a forestation. The aim has been to ensure the availability of drinking water, fuel wood and fodder and raise income and employment for farmers and landless laborers through improvement in agricultural production and productivity. Today watershed development has become the main intervention for natural resource management. A total of 45.58 million hectares of land has been treated through various watershed development programmers in India with an investment of Rs. 17,037 crore with programmers so large land varied, it is important to understand how well they function overall and which aspects should be promoted and which be dropped. Keeping these issues in view the present paper has examined the overall performance of Integrated Watershed Management Programmers (IWMP) in the Loha tahsil of Nanded district.

Location

The study was undertaken in the Integrated Watershed Management programmer Number 24 is located in Loha tahsil of Nanded District of Maharashtra state. The study area lies between 18° 58′ 00′′ to 18° 54′ 00′′ north latitude and 77° 02′ 00′′ to 77° 08′ 00′′ east longitudes the study area is under Godavari basin.

The study area consist of 7 villages and 13 micro watersheds, out of two villages namely Sunegaon and Pardi located on state Highway of Maharashtra State. Other 5 villages namely Dhanora (M), Kabegaon, Hipparga, Chitali and Haldave are connected with Loha tahsil roads.



Map 2.1

The total geographical area of the study area Integrated Watershed Management Programmer Number 24 in Loha tahsil is 6745.68 hectare out of these area under cultivation is 3969.40 hectare the cropping pattern of the study area is predominantly rain fed agricultural. Out of cultivatable area, area under agriculture is 3807.04 hectare irrigated area is very negligible 162.00 hectare i.e. 2.40 % of cultivable area. This study area comes under mainly kharif crops like Cotton, Jowar, Soyabian and Arhar (Tur).

Objectives

1. To study the changes in
   - i. Employment Generations
   - ii. Groundwater Status
   - iii. Livestock
   - iv. Changes Horticulture

Data collection and Analysis

During the study, primary as well as secondary data were collected from the various sources. During 2009-2010 and 2014-2015 the primary data were collected following focus group discussion as well as through stratified detailed household survey. I am visited watershed villages and conducted meetings with farmers followed by field visits to collect primary information on general agriculture, crops and their productivity, surface and groundwater and socio-economic data. This was collected through investigation of farmers with pre-tested questionnaire. The secondary data were collected from various sources like reports prepared by the implementing agencies and various Government office. The data were analyzed using statistical techniques.

Impacts

The watershed development programmer involving the entire community and natural resources influence (i) productivity and production of crop, changes in land use and cropping pattern, adoption of modern technologies, increase in milk production, etc., (ii) attitude of the community toward project activities and their participation at different stages of the project, (iii) socio-economic conditions of the people such as income, employment, assets, health, education and energy use, (iv) use of land water, human and livestock resources. 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. The impact studies vary from impact of specific water harvesting intervention such as percolation ponds to overall impacts of watershed development programmer. The impact assessment studies focus mainly on the impact of different interventions such as water resources development, soli and moisture consecration measures, drainage line treatment, and a forestation and assess the impacts on different aspects like increase in surface and groundwater resources, cropping pattern changes, yield, socio-economic conditions, including the social capital and institution building as a result of watershed intervention.

Socio-economic Impacts

The watershed development programmers influence bio-physical and environmental aspects and thereby bring changes in the socio-economic conditions of the people. The socio-economic indicators like changes in household income, employment, migration and wage rates at the village's level were considered for the impact assessment.

Creation of employment opportunities and migration of population

The watershed program increased the employment opportunities for all categories of farmers due to various activities related to agriculture, horticulture, floriculture, a forestation, animal husbandry and small enterprises. The soil and water conservation measures like water storage structures, structures, mini percolation pits, gully control, gabion structures and others were constructed in the fields, which provided additional job opportunities to the small and marginal farmers.

Employment

National Resource Management (NRM) activates proposed under the project (IWMP-24) in Loha tahsil will generate total 1711743 working day's employment in the project villages and self employment through livelihood activities for landless and production system. The details of employment generated for SC, ST, Other, women are furnished in table 1 A and B.

Table 1 (A) - Employment Generations (Wage Employment) of Study Area (IWMP-24 in Loha tahsil) 2014-15

Name of the villages	Wage employment									
	Numbers of working days					No. of beneficiaries				
	SC	ST	Other	Women	Total	SC	ST	Other	Women	Total
Dhanora (M)	19800	0	283691	121320	424811	110	0	1576	674	2360
Sunegaon	60300	36000	270000	146160	512460	335	200	1500	812	2847
Pardi	38700	6120	215640	118440	378900	215	34	1198	658	2105
Kabegaon	5940	900	63000	27000	96840	33	5	350	150	538
Hiparga	1800	0	110160	49500	161460	100	0	612	275	987
Chitli	27540	0	101700	87300	216540	153	0	565	485	1203
Haldave	9000	6300	88020	72000	175320	50	35	489	400	974
Total	163080	49320	1132211	621720	1966331	996	274	6290	3454	11014

Source: Socio-economic survey conducted by under DPR preparation, Agriculture office Loha Dist. Nanded.

Table 1 (B) - Employment Generation (Self Employment) of Study Area (IWMP-24 in Loha tahsil) 2014-15

Sr. No.	Name of the village	Self employment				
		No. of beneficiaries				
		SC	ST	Other	Women	Total
1	Dhanora (M)	45	35	135	70	285
2	Sunegaon	40	32	135	65	272
3	Pardi	35	0	102	50	187
4	Kabegaon	25	22	98	35	180
5	Hiparga	0	0	65	35	100
6	Chitli	33	33	65	33	131
7	Haldave	0	0	60	29	89
	Total	178	122	660	317	1244

Source: Socio-economic survey conducted by under DPR preparation, Agriculture office Loha Dist. Nanded.

Environmental impacts

The watershed development activities generate significant positive externalities which have a bearing on improving the agricultural production, productivity, socio-economic status of the people who directly or indirectly depend on the watershed for their livelihood. The environmental indicators include water level in the wells to changes, changes in irrigated area, duration of water availability, water table of wells, surface water storage capacity, and differences in the number of wells, number of wells recharged / defunct, difference in irrigation intensity.

Change in life of wells and streams and rise in groundwater level

One of the main objectives of watershed development programmers, especially in drought – prone and rain fed regions is to mitigate the distress with regard to water for drinking and domestic purpose (including water for cattle).

Increase in irrigated area

It is generally observed in many studies that watershed activities increase the irrigation potential in a give watershed (and even in the downstream areas) through increased availability of groundwater and surface water. However the correlation between the extent of increase in groundwater and the area brought under irrigation through the increased resource is something, which requires further analysis. This is important because the increased irrigation is most often through an increased number of bore well and in certain cases through increasing the depth of existing dug wells. It is also important to look at the recuperation rate of wells and bore wells (before / after, normal rainfall / drought) to understand the issue of groundwater recharge.

Groundwater recharge and its availability

One of the major impacts of the Integrated Watershed Management Programmer on improving groundwater recharge and its availability. The groundwater level in wells in treated areas of watershed was higher compared to that in untreated areas. The water level has increased as a result of treatment in most projects. The present groundwater status is SUB CRITICAL which means groundwater to word expiation. After completion of project water table will rise up to 8 meter (which is 11 meter per project) which turn the SAFE status of groundwater in the study area. The mean dept of water level in the wells before the watershed programmer was 8 meter compared to 10 meter after the watershed intervention. There is a

substantial increase in the mean groundwater level during all the season, vis. rainy, and post rainy and summer after the watershed interventions.

Table 2 (A) - Average Groundwater Status of the Study Areas (IWMP-24 in Loha tahsil) pre and Post Project (2009-10 and 2014-15)

Sr. No.	Names of villages	Pre-project 2009-2010 Stage of Groundwater in the study area (Safe/Semi critical/Critical/Over exploited)	Reason for over exploitation	Post-project 2014-2015 Stage of Ground water in the project area (Safe / Semi critical / Critical / Over exploited
1	Dhanora (M)	Critical	1. Low rainfall 2. Soil type is more erosion 3. Water holding capacity of soil is less. 4. Advance irrigation system is not adapted.	Semi Critical
2	Sunegaon	Critical		
3	Pardi	Critical		
4	Kabegaon	Critical		
5	Hiparge	Critical		
6	Chitali	Critical		
7	Haldave	Critical		

Source: Socio-economic survey conducted by under DPR preparation, Agriculture office Loha Dist. Nanded.

The wells in the study area will be functioning and increase the irrigation potential. The details of pre and post project groundwater availability status are furnished in table 2 A and B.

Table 2 (B) - Average Groundwater Table of the Study Areas (IWMP-24 in Loha tahsil) pre and Post Project (2009-10 and 2014-15)

Sr. No.	Name of villages	Sources	Pre-project level 2009-10 (In meters)	Post-project level 2014-15 (In meters)
1	Dhanora (M)	Open wells	10 Mtr.	8 Mtr.
		Bore wells	30 Mtr.	27 Mtr.
		Others (specify)	-	-
2	Sunegaon	Open wells	9 Mtr.	7 Mtr.
		Bore wells	32 Mtr.	30 Mtr.
		Others (specify)	-	-
3	Pardi	Open wells	11 Mtr.	9 Mtr.
		Bore wells	38 Mtr.	35 Mtr.
		Others (specify)	-	-
4	Kabegaon	Open wells	11 Mtr.	9 Mtr.
		Bore wells	24 Mtr.	21 Mtr.
		Others (specify)	-	-
5	Hiparge	Open wells	12 Mtr.	10 Mtr.
		Bore wells	24 Mtr.	22 Mtr.
		Others (specify)	-	-
6	Chitali	Open wells	11 Mtr.	9 Mtr.
		Bore wells	40 Mtr.	37 Mtr.
		Others (specify)	-	-
7	Haldave	Open wells	12 Mtr.	10 Mtr.
		Bore wells	38 Mtr.	36 Mtr.
		Others (specify)	-	-

Source: Socio-economic survey conducted by under DPR preparation, Agriculture office Loha Dist. Nanded.

Livestock production and ruminants

Livestock and ruminants are very important component of farming systems. Before the watershed program, most of livestock and ruminants in the watershed villages were of local breed; and their productivity was low. To improve the breed, artificial insemination was undertaken with the help of trained persons.

Watershed programmers trend to regard grazing as a harmful practice and bans are imposed on free grazing when watershed intervention is underway. Social fencing and restriction on access bring about a forced migration or reduction of livestock, particularly the small ruminants. one noticeable trend, especially in villages where the ban on grazing has been enforced strictly **(in Pardi for example)**, is the number of smaller ruminants like goats is decreasing. Dairying seems to have picked up in many watersheds. this also shows that is a shift towards bigger milk animals, the numbers of which seem to be rising, trends have been reported from irrigated areas. In some watershed, grazing restrictions have led to change in herd compositions and a shift from open grazing to stall-feeding. For example in **Dhanora (M)**, there has been a shift from goats to stall-fed buffalos and an improved breed of cows. The details of pre and post livestock population in study area are furnished in following table 3.

Table 3 -Livestock of the Study Area (IWMP-24 in Loha tahsil) Total 7 Villages pre and Post Project (2009-10 and 2014-15)
(For fluids- liters, for solids- kg. and income Rs. In lakhs)

Type of Animal	Pre-project 2009-10			Mid-term 2013			Post-project 2014-15		
	No.	Yield / Year	Income	No.	Yield / Year	Income	No.	Yield / Year	Income
Milk-animals									
Cow	1122	269280	80.784	2244	538560	161.57	2693	592416	710899.2
Cross-breed	76	182400	54.72	152	364800	109.44	182	401280	481536
Buffalo	489	264060	79.218	978	528120	158.44	1174	580932	697118.4
Total	1687	715740	214.722	3374	1431480	429.44	4049	1574628	18889553.6
Animals for other purpose									
Goat	1191	25011	37.5165	2382	50022	75.033	2858	55024	66029.04
Sheep	0	0	0	0	0	0	0	0	0
Poultry (Broiler)	240	240	0.240	480	480	0.480	576	521	721.28
Poultry (Layer)	461	50710	2.5355	933	101420	5.071	1106	111562	133874.4
Other(pl. specify)	0	0	0	0	0	0	0	0	0
Total	1892	75961	40.292	3795	151922	80.584	4540	167107	200624.72

Source: Socio-economic survey conducted by under DPR preparation

The livelihood activities related to farming system. Numbers of livestock have increased. Goat percentage has increased by 30 %. Indigenous cows are replaced by cress bred cows; indigenous buffalos are replaced by improved increased bred buffalos. Working animal percentage will decreases due to farm mechanization. Poultry population increased by (50%) as it is major source of livelihood, overall milk production will also rise.

Change in cropping pattern

Most of the watershed showed a change in cropping pattern towards growing cash crop such as wheat, gram, vegetables, etc. overall there seems to have been a slight shift towards growing horticultural crops and plantations. Food grain pulses and certain other traditional crops appear to have lost out, in spite of an increase in overall area under cultivation. This is more so in those watershed where the intervention have made a visible difference in water availability. However, there is no uniform pattern to this shift. Different types of crops have been chosen at different places, depending on local conditions and the market. The area under groundnut and has also increased in many watershed projects especially in area of low soil depth, but with irrigation possibilities.

Summer season crop

In summer groundnut, vegetable area increased from **18.00 to 35 hectors** post project information regarding pre project and post project area, productivity and production of summer season crops is shown in table 4.

Table 4 - Summer Season Crop - Areas and Yield in the Study Area (IWMP-24 in Loha tahsil) pre and Post Project (2009-10 and 2014-15)

Sr. No.	Names of villages	Name of crops	Pre-project 2009-10			Post-project 2014-15		
			Irri. Area (ha)	Average Yield kg. Per hectare	Total production (M.T.)	Irri. Area (ha)	Average Yield kg. Per hectare	Total production (M.T.)
1	Dhanora (M)	Groundnut and Vegetable	2.00	915.00	3.66	4.00	1050.00	4.20
2	Sunegaon	Groundnut and Vegetable	3.00	915.00	4.58	5.00	1050.00	5.25
3	Pardi	Groundnut and Vegetable	2.00	915.00	3.66	4.00	1050.00	4.20
4	Kabegaon	Groundnut and Vegetable	2.00	915.00	4.58	5.00	1050.00	5.25
5	Hiparge	Groundnut and Vegetable	2.00	915.00	4.58	5.00	1050.00	5.25
6	Chitali	Groundnut and Vegetable	3.00	915.00	5.49	6.00	1050.00	6.30
7	Haldave	Groundnut and Vegetable	1.00	915.00	5.49	6.00	1050.00	6.30
	Total study area		18.00		32.03	35.00		36.75

Source: Socio-economic survey conducted by under DPR preparation, Agriculture office Loha Dist. Nanded

Changes in area under horticulture

Existing area under horticulture is **35.00 hectors** which increases up **to 70.00 hectors** post project. Information regarding per project and post project change in area of horticulture is shown in table 5.

Table 5 Changes in Area under Horticulture of the Study Area (IWMP-24 in Loha tahsil) pre and Post Project (2009-10 and 2014-15)

Sr. No.	Name of villages	Name of horticulture crop	Existing area under horticulture (ha)	Achievement (ha)	
				Area under horticulture to be covered	Change in area under horticulture
1	**Dhanora (M)**	Mango	3.00	5.00	2.00
		Citrus	2.00	5.00	3.00
2	**Sunegaon**	Mango	4.00	5.00	1.00
		Citrus	3.00	5.00	2.00
3	**Pardi**	Mango	3.00	5.00	2.00
		Citrus	3.00	5.00	2.00
4	**Kabegaon**	Mango	2.00	5.00	3.00
		Citrus	2.00	5.00	3.00
5	**Hiparge**	Mango	3.00	5.00	2.00
		Citrus	2.00	5.00	3.00
6	**Chitali**	Mango	2.00	5.00	3.00
		Citrus	2.00	5.00	3.00
7	**Haldave**	Mango	2.00	5.00	3.00
		Citrus	2.00	5.00	3.00
	Total study area	Mango	19.00	35	16
		Citrus	16.00	35	19
Total			**35.00**	**70.00**	**35.00**

Source: Socio-economic survey conducted by under DPR preparation, Agriculture office Loha Dist. Nanded

Future direction

1) As impact assessment of watershed development has been felt crucial, a general framework has to be developed and trained personnel should be involved in watershed development impact assessment. Developing a framework, selection of right approach and method of impact assessment identification and use of indicators will enable a proper impact assessment. Establishing proper institutional mechanism in a multidisciplinary approach will be available step in impact assessment. Panel database should be created for the watershed in different agro-ecological regions for proper evaluation.
2) Watershed development programmer's not only protect and conserve the environment, but also contribute to livelihood security. All the stakeholders should be involved at various stages of project activities, planning and implementation with the ultimate objective of sustainability. In addition, strengthening of community organization within the watershed, implementation of the planned watershed management activities, encouraging linkages with other formation of apex bodies will help motivate the people and make it a people's movement.
3) Given the increasing demand for watershed program by the community, it is difficult to provide adequate funding for all locations. Hence, development and adoption of a decision support system (DSS) to promote the watershed investment is highly watershed.

Conclusions

Today watershed development has become the main intervention for natural resource management and rural development. Integrated Watershed management programmers not only protect and conserve the environment, but also contributed to livelihood security. The importance of watershed development as a conservation programmed is being recognized, not only for rain fed areas, but also for high rainfall areas, coastal regions, and catchment areas of dams. With large investment of financial resources in the watershed programmer, it is important that the programmer becomes successful. Watershed development activities have significant impact on groundwater recharge, access to groundwater and hence the expansion

in irrigated area. Therefore, our policy focus must be on the development of these water-harvesting structures, particularly percolation ponds, wherever feasible. In addition to these public investments, private investment through construction of farm ponds may be encouraged as these structures help in a big way to harvest the available rainwater and hence groundwater recharge. Watershed development activities have been found to alter crop pattern, increase crop yields and crop diversification and thereby provide enhanced employment and farm income. Therefore, alternative-farming system combining agricultural crops, trees and livestock components component with comparable profit should be evolved and demonstrated to the farmers. Once the groundwater is available, high water-intensive crops may be introduced. Hence, appropriate water saving technologies like drip is introduced without affecting farmer's choice of crops. The two depths of wells and spacing between wells will reduce the well failure, which could be possible through formation of watershed Association.

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