CHANGES IN LAND USE PATTERN AMONG WATERSHED BENEFICIARIES DUE TO IMPLEMENTATION OF IWMP

Dipesh Jha
Adhoc Assistant Professor
Mahatma Gandhi Department of Rural Studies, Veer Narmad South Gujarat University,
Surat-395007, Gujarat, India

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ABSTRACT *Optimum use of land and water is fundamental to agricultural growth and sustainable development in any country. The concept of watershed management has evolved to ensure effective use of both natural and social capitals. Thus, the watershed development programmes include land, water and human resources as essential components. The watershed programme is primarily a land improvement based programme, which is increasingly being focused on water, with its main objective being to enhance agricultural productivity through in-situ moisture conservation practices and support irrigation for socio-economic development of rural beneficiaries. It has been essential in a country like India, where majority of the population depends on agriculture and about 60 percent of total arable land (142 million ha) in the country is rain-fed. A large portion of the rain-fed areas (65.00 per cent of arable land) in India is characterized by low productivity, high risk and uncertainty, low level of technological change and vulnerability to degradation of natural resources (Joshi, et al, 2004). Over the years, the sustainable use of land and water has received wider attention among policy makers, administrators, scientists and researchers. To determine the changes in land use pattern by the watershed beneficiaries due to impact of Integrated Watershed Management Programme (IWMP) implementation, this study was undertaken.*

Keywords: *Land Use Pattern, Watershed, Rain-fed.*

INTRODUCTION:

Rain-fed areas are confronted with intrinsic problem of degradation of land and water. Soil erosion, which is often induced by high wind velocity and intense precipitation, not only degrades the land masses but also leads to the problem of sedimentation and siltation of water-bodies/reservoirs and reduces their storage capacity. Consequently, a sizable volume of water that could be stored in these water-bodies/reservoirs gets lost and leads to floods in low-lying rain-fed areas. To overcome this problem, the watershed projects are largely aimed to conserve soil and water to improve net cropped area and ultimately raise farm productivity by transforming barren land into cropped land and increasing water availability for irrigation.

OBJECTIVE OF THE STUDY:

To study the impact of soil and moisture conservation works and other watershed development work in changes in land use pattern and availability of ground water table. Which can be influence crop productivity, changes in agricultural and animal husbandry practices 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 Integrated Watershed Management Programme (IWMP) Phase I in the Surat District, out of which 6 watersheds of Mandvi, Mangrol and Umarpada block (2 watershed from each block) 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 data about Total ownership/holding of the land in hectare, Irrigated land, Non-irrigated land, Cultivable land and Un-cultivable barren or waste land of the farmer respondents were collected pertaining to find the changes, in situation of agricultural land before and after implementation of Integrated Watershed Management Programme (IWMP) were collected and summarized as per **Table 1**.

The information about land use pattern of core activity beneficiaries given in Table 1 revealed that, there were 42.70 per cent marginal farmers, 33.30 per cent small farmers and 24.00 per cent of big farmers before and after implementation of IWMP. Thus, the change of land holding was not visibly measurable, for any up-gradation of category due to watershed intervention. But, there was remarkable change can be seen within category.

TABLE 1: SHOWING THE IMPACT OF IWMP ON LAND USE PATTERN AMONG CORE ACTIVITY BENEFICIARIES.

Land Description	Land Category	Pre IWMP		Post IWMP		Change	
		Count	Table N %	Count	Table N %	Count	Table N %
Total Ownership/Holding of Land in Hectare	.01 - .99	64	42.7%	64	42.7%	0	0.00
	1.00 - 1.99	50	33.3%	50	33.3%	0	0.00
	2.00+	36	24.0%	36	24.0%	0	0.00
	Total	150	100.0%	150	100.0%	0	0.00
Irrigated Land in hectare	Not Available	87	58.0%	46	30.7%	-41	-47.13
	.01 - .99	50	33.3%	81	54.0%	31	62.00
	1.00 - 1.99	6	4.0%	15	10.0%	9	150.00
	2.00+	7	4.7%	8	5.3%	1	14.29
	Total	150	100.0%	150	100.0%	0	0.00
Non-Irrigated Land in hectare	Not Available*	6	4.0%	15	10.0%	9	150.00
	.01 - .99	73	48.7%	79	52.7%	6	8.22
	1.00 - 1.99	44	29.3%	33	22.0%	-11	-25.00
	2.00+	27	18.0%	23	15.3%	-4	-14.81
	Total	150	100.0%	150	100.0%	0	0.00
Cultivable Land in hectare	Not Available	0	0.0%	0	0.0%	0	0.00
	.01 - .99	64	42.7%	64	42.7%	0	0.00
	1.00 - 1.99	52	34.7%	51	34.0%	-1	-1.92
	2.00+	34	22.7%	35	23.3%	1	2.94
	Total	150	100.0%	150	100.0%	0	0.00
Un cultivable Barren or waste land	Not Available	136	90.7%	142	94.7%	6	4.41
	.01 - .99	3	2.0%	2	1.3%	-1	-33.33
	1.00 - 1.99	3	2.0%	2	1.3%	-1	-33.33
	2.00+	8	5.3%	4	2.7%	-4	-50.00
	Total	150	100.0%	150	100.0%	0	0.00

Source: Field Data 2017-18 *Irrigated land

It was observed that among 150 core activity beneficiaries 87 respondents (58.00 per cent) were without irrigation facilities and only 42.00 per cent were bearing irrigation facilities before IWMP. Those who possessed irrigation facilities, majority of them 33.33 per cent (50 respondents) were bearing irrigation in only 0.01 to 0.99 ha, 4.00 per cent had irrigation in 1.00 to 1.99 ha and only 7 farmers were enjoying to have more than 2.00 ha irrigated land. There was overwhelming increase of 47.13 per cent change in irrigated land, importantly the area under rainfed cropping declined by 30.70 per cent after IWMP. Due to this effect the area under irrigation increased 62.00 per cent in 0.01-0.99 ha category, 150.00 per cent in 1.00-1.99 ha and 14.29 per cent in more than 2.00 ha category. Simultaneously holder of non-irrigated land was decreased 150.00 per cent. This indicates that the increased surface and groundwater availability significantly contributed in increasing irrigated area. Ultimately resulted in marked reduction in crop failure in the watershed area and gave greater confidence to farmers to use improved agricultural inputs viz. fertilizer, improved varieties and other inputs.

It was also observed the change in net cultivable land of respondents. Before IWMP there were 14 beneficiaries found to own cultivable waste land in their holdings. It was declined to 4.41 per cent and now only 8 respondents had reported to bear uncultivable waste land after IWMP. The minor change was also seen between the different categories of land holdings.

These benefits confirm that the watershed program performed as a viable strategy to overcome several externalities arising due to soil and water degradation and therefore, it can be reiterated that watershed could be a safe and effective strategy for augmentation of water resources in the rain-fed areas.

Change in Average of Land Use Pattern after IWMP:

Integrated Watershed Management Practices is generally focused in the arid and semi-arid region where, water is considered as an extremely scarce resource. Water is the critical lacking input and many watershed development activities are focused on conserving soil moisture and augmenting and managing groundwater in a sustainable way. An important outcome expected out of watershed development work is improvement in water availability for agriculture and conserving the soil. Conserving soil means raising farm productivity and transferring good soils to the next generation. Augmenting water storage capacity contributed in (i) reducing rate of run-off and (ii) increasing groundwater recharge. This improves crop prospects and yields substantially in rainfed areas, and is seen as a fundamental benefit of watershed development. The available evidences revealed that both these objectives were accomplished in the watershed areas. These have direct impact in expanding the irrigated area and increasing cropping intensity. There have been changes in the average 'land use' pattern as a result of the implementation of the IWMP can be seen from the results given in **Table 2**. The cropped area was increased due to continuous availability of water in the well. So, that perennially irrigated area and income for the land holders were increased.

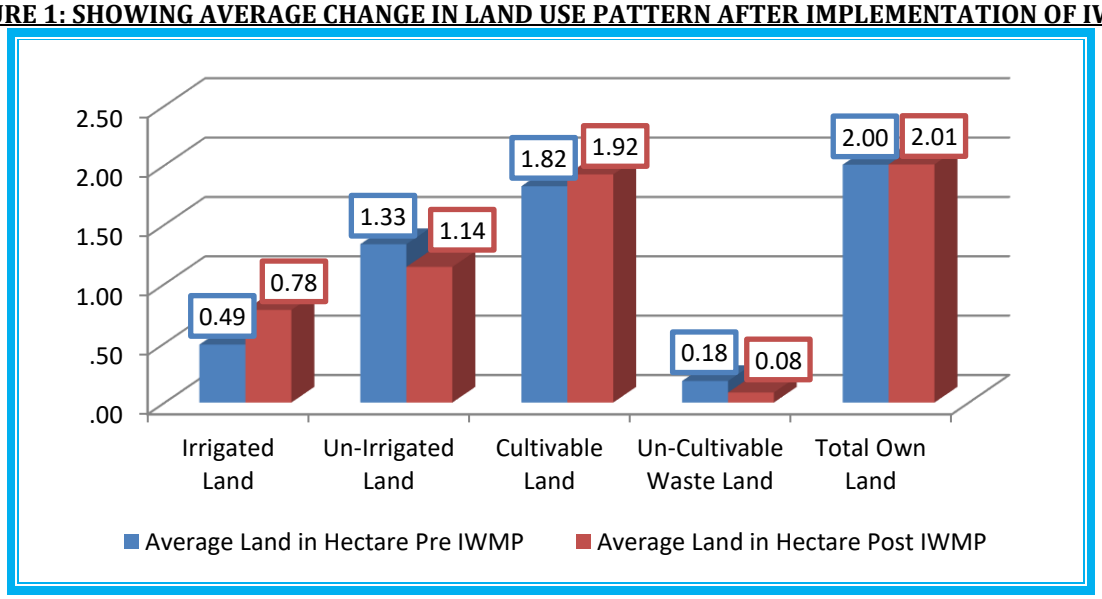
TABLE 2: SHOWING AVERAGE CHANGE IN LAND USE PATTERN AFTER IWMP

Land Description	Average Land in Hectare	
	Pre IWMP	Post IWMP
Irrigated Land	0.49	0.78
Un-Irrigated Land	1.33	1.14
Cultivable Land	1.82	1.92
Un-Cultivable Waste Land	0.18	0.08
Total Own Land	2.00	2.01

Source: Field Data 2017-18

Increased availability of surface and groundwater recorded changed the land use pattern in the watershed area (Table 33). The average irrigated land area was increased by 59.18 per cent (0.49 to 0.78 ha). Importantly, the area under rainfed cropping declined by 14.29 per cent (1.33 to 1.14 ha).

FIGURE 1: SHOWING AVERAGE CHANGE IN LAND USE PATTERN AFTER IMPLEMENTATION OF IWMP



Source: Field Data 2017-18

There was also reported the change in cultivable land due to watershed treatment. Before implementation of treatment it was average 1.82 ha area under cultivation. With the increment of 05.49 per cent, it was reached 1.92 ha after implementation of IWMP. This situation clearly indicates that, due to soil-moisture conservation activities, the uncultivable barren or fellow land of beneficiaries rejuvenated and felled to use

in cropped area. The pictorial comparison in **Figure 1** pointed out the impact and effectiveness of programme on land utilization and reformation.

CONCLUSION:

It was observed that, Cent per cent farmer respondents experienced the notable change in the number of cultivators, net cropped area, crop productivity and yields due to soil and moisture conservation measures. Total cropped area of rainfed crop were increased due to conversion of wasteland/barren land into cultivable land through which, traditional grain crops like rice and Jowar (Sorghum) replaced by cash crops like cotton, ground nuts, castor and beans in some of the fields during monsoon. In nutshell with the increase in water availability due to soil and moisture conservation works, farmers using support irrigation increased and total sown area for their rainy and rabi season crops improved.

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