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Economic Impact of Integrated Watershed Development Program in Rajasthan

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Abstract

The present study entitled "Impact of Integrated Watershed Development Program in Rajasthan" was undertaken to study the extent to assess the effect of watershed on the level of employment, income and consumption of the farmers. Jaipur district was selected on the basis of maximum number of watershed in the zone. For this study Jaipur region was selected purposely. It has highest number of watersheds. Two watersheds from Bassi and two watersheds from Jamwaramgarh panchayat samities were selected randomly and thus a total number of 4 watersheds were selected from the Jaipur district. Multi stage random sampling was used for the selection of beneficiary and non- beneficiary farmers for the present study. 40 farmers (beneficiaries) were selected randomly from identified watersheds. The integrated watershed development project helped increase the consumption expenditure which was Minimum for large farmers (Rs. 2187 per annum) and maximum on medium farm (Rs. 6506 per annum). In case of marginal, small, medium and large farmer families the incremental consumption expenditure had Rs. 5817, 4420, 6506 and 21.87 per annum, respectively. The findings of the study shows that the impact of IWDP on pattern on consumption expenditure was not been the same. The relative increase in consumption expenditure for different categories of beneficiary families was at varying rates. The same was true of expenditure on various components like food, clothing, education, fuel, buildings and others. The absolute and per cent increase in annual employment was observed for all the categories of beneficiary farmers. The maximum per cent increase in employment was observed for marginal farmers (36.25%) followed by small (25.82%), medium (2.69%) and large (2.64%) farmers.

Keywords: Watershed; IWDP; Employment; Consumption; Expenditure; Panchayat samities

Introduction

Watershed approach represents the principal vehicle for transfer of rainfed agriculture technology. Realizing the importance of rainfed/dry land agriculture soil and water conservation practices have been accepted as of the important inputs for increasing agricultural production in the country. In order to check soil erosion, soils and water conservation programs were launched both under state as well as central sectors during the five year plans. National Watershed Development Project for Rainfed Areas (NWDPRA, 1986-87) was implemented in unirrigated arable lands moistly falling in the rainfed range of 500 to 1125 mm and above. The favorable impact of irrigation on creation of additional rural employment for agricultural labors and self-employed family workers is quite obvious. While irrigation itself calls for additional farm employment, the scope for on farm employment for other operations associated with irrigation further enhances the rural employment prospects. The increasing trend in cropping intensity in irrigated areas also demands additional rural employment. Large volume of transactions of agricultural inputs and outputs in irrigated area also opens new avenues for employment in the rural areas. The income from livestock also gains support in irrigated areas. Hence, people shifted on to new irrigation technology and this further enhances the use of improved inputs (seed, fertilizers, pesticides etc.) [1-5].

Methodology

For the present study, Jaipur region was selected purposely. It has highest number of watersheds. Two watersheds from Bassi and two watersheds from Jamwaramgarh panchayat samities were selected randomly and thus a total number of 4 watersheds were selected from the Jaipur district. Multi stage random sampling was used for the selection of beneficiary and non- beneficiary farmers for the present study. 40 farmers (beneficiaries) were selected randomly from identified watersheds. Similarly, an equal number of non-beneficiaries were also selected randomly from the same area or nearby area as control group of respondents, thereby constituting a sample of 80 respondents i.e., 40 beneficiaries and 40 non-beneficiaries.

Further the selected farmers were grouped into four categories i.e., marginal farmers having land area less than 1 hectare, small farmers having land area 1-2 hectare, medium farmers having land area 2-4 hectare and large farmers having land area more than 4 hectare [6-8].

Collection of data

Primary data were collected from selected respondents through personal interview method for the year 2013-2014. Secondary data were collected from Directorate of Soil and Water Conservation, Jaipur, Rajasthan.

Analysis of data

Change in income

Income generated through crop activities and livestock activities were worked out by cost incurred on these activities. The total income obtained by adding the income from crop and livestock and income received by working in off farm activities. The changes in gross and net returns as a result of IWDP (Intergraded Watershed Development Program) assistance was estimated as follows:

Change in net return

Net return = Gross return-Total Expenditure

Change in employment level

To estimate the changes in employment levels, employment of family members was calculated in man-days engaged in all the activities. Changes in employment generation were studied by measuring the changes in employment levels of beneficiary over that of non-beneficiary families during the study period. The total employment was worked out by adding the employment hours on crop activities, livestock activities and off farm activities.

Change in consumption expenditure

The changes in the consumption by the beneficiaries were assessed by calculating marginal propensity to consume (MPC).

MPC=$\Delta C/\Delta Y$=Changes in consumption/Changes in income

Where,

MPC = Marginal propensity to consume,

C = Expenditure on consumption items,

Y = Income of the family.

Results and Dissuasion

Changes in income level

Per hectare net return of non-beneficiary and beneficiary farmers

The per hectare average annual gross return generated, expenditure incurred and resultant net return accrued to non-beneficiary and beneficiary families from crops is presented in Table 1. The per hectare net return generated from crops and their by- products was maximum (29498) for medium farmers whereas it was minimum for large farmers i.e., 22967. This was probably due the fact that the expenditure incurred on crop production was minimum (5148) on medium farmers. The per hectare gross return generated ranged from 28491 to 34646 for small and medium farmers, respectively. In case of beneficiary, per hectare net return generated from crops and their by-products was maximum (30518) for medium farmers whereas it was minimum for small farmers i.e., 26052. This was probably due the fact that on medium farms the gross return was maximum i.e., 35668 whereas it was minimum on small farmers i.e., 31561. Per hectare expenditure generated on crop production was minimum on medium farmers i.e., 5150 whereas it was maximum on large farmers i.e., 6911. Per hectare net return generated was 26052 to 30518 for small and medium farmers, respectively (Table 1).

Category	Non-beneficiary farmers			Beneficiary farmers		
	Gross return	Expenditure	Net return	Gross return	Expenditure	Net return
1	2	3	4 = (2-3)	5	6	7= (5-6)
1. Marginal farmers	33827	5920	27907	35594	5432	30162
2. Small farmers	28491	5524	22967	31561	5509	26052
3. Medium farmers	34646	5148	29498	35668	5150	30518
4. Large farmers	32570	6600	25970	34791	6911	27880

Table 1: Annual gross return generated, expenditure incurred and resultant net return accrued to non-beneficiary and beneficiary farmers from crops (2013-14) (Hectare/Annum).

Per hectare change in net return of beneficiary

The per hectare absolute and percent increase in annual net return of beneficiary over non-beneficiary farmers are shown in Table 2. The findings of the study revealed that marginal farmers who obtained assistance under IWDP for crops were able to increase their annual net return per hectare by 2255 over and above 27907 earned by the non-beneficiary farmers. In percentage terms it was about 8.08 per cent higher than that of non-beneficiary farmers. Small beneficiaries were able to increase their annual net return per hectare by 3085 over and above 22967 earned by the non-beneficiaries. In percentage terms it was about 13.43 per cent higher than that of non-beneficiary farmers. Medium beneficiary farmers were able to increase their annual net return per hectare by 1020 over and above 29498 earned by non-beneficiary. In percentage term it was about 3.45 per cent higher than that of non-beneficiary farmers. Large farmers who obtained assistance under IWDP for crops were able to increase their annual net return per hectare by 1910 over and above 25970 earned by non-beneficiary large farmers. In per cent terms it was about 7.35 per cent higher than that of non-beneficiary farmers. Thus, it can be concluded that all the categories of beneficiary farmers recorded absolute and per cent increase in net return over and above the non-beneficiary farmers. The maximum increase in net return per hectare was observed in case of small farmers (3085) followed by marginal farmers (2255), large farmers (1910) and medium farmers (1020).

Changes in consumption level

The total expenditure on consumption was grouped into six heads namely food, clothing, education, fuel, building and others. The impact of IWDP on consumption expenditure was studied by measuring the changes in consumption expenditure of beneficiary families over that of non-beneficiary families during the study period. The pattern of consumption expenditure of non-beneficiary and beneficiary families and the relative changes are presented under the following heads (Table 2).

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Category	Average net return of beneficiary	Average net return of non-beneficiary	Absolute increase in net return of beneficiary over non-beneficiary	Per cent increase in net return
1	2	3	(4 = 2-3)	5
1. Marginal farmers	30162	27907	2255	8.08
2. Small farmers	26052	22967	3085	13.43
3. Medium farmers	30518	29498	1020	3.45
4. Large farmers	27880	25970	1910	7.35

Table 2: Change in annual net return of beneficiary farmers over non-beneficiary farmers from crops on different size group of farms (2013-14) (Hectare/Annum).

Pattern of consumption expenditure of non-beneficiary families

The average annual consumption expenditure incurred by the non-beneficiary families on different heads is presented in Table 3. It was observed that non- beneficiary marginal farmers spent 98.20 per cent (23517) of their total net return (23948) and small farmers spent 98.57 per cent (34781) of their total net return (35285) on consumption items while medium farmers spent 88.95 per cent (67180) of the total net return (75519) and large farmers spent 74.25 per cent (102000) of their total net return (137366) on consumption. Non-beneficiary families under different categories spent a major portion of consumption expenditure on food articles varying from about 54.00 per cent on large farmers to 76.00 per cent on marginal farmers. The share of expenditure on food from total net return decreased as the farm size increased. This was probably due to the fact that the average size of family is almost equal on marginal to large farms and there was a wide variation in net returns on different categories of farms. Out of all six components of consumption expenditure, buildings received the minimum attention of all the non-beneficiary families under investigation. Expenditure on this item constituted only 3.49 per cent to 5.55 per cent of the total consumption expenditure for all the categories of non-beneficiary families. Expenditure on clothing incurred by different categories of non-beneficiary families was almost equal i.e., about 5.50 per cent of the total consumption expenditure. Expenditure on education ranged from as low as 4.50 per cent (1060) for marginal farmers to as high as 12.47 per cent (8379) for medium farmers during the study period. Expenditure on fuel incurred by different categories of non-beneficiaries families varied from 6.48 per cent to 8.82 per cent of the total consumption expenditure. Thus, it can be concluded that as the farm size increased the absolute expenditure on all the items increased but in percentage terms it decreased in case of food items and no set pattern was observed on other items of expenditure on non-beneficiary farms (Table 3).

Category	Expenditure on						Total consumption expenditure	Net return accrued	Difference	Consumption expenditure as percentage of net return (%)
	Food	Clothing	Education	Fuel	Buildings	Others				
1	2	3	4	5	6	7	8	9	10	11
Marginal	17850 (75.90)	1365 (5.80)	1060 (4.50)	1525 (6.48)	822 (3.49)	895 (3.80)	23517 (100.00)	23948	431	98.20
Small	25824 (74.24)	1846 (5.30)	1723 (4.95)	2261 (6.50)	1477 (4.24)	1650 (4.74)	34781 (100.00)	35285	504	98.57
Medium	43000 (64.00)	3333 (4.96)	8379 (12.47)	5057 (7.53)	3730 (5.55)	3681 (5.48)	67180 (100.00)	75519	8339	88.95
Large	55000 (53.92)	5000 (4.90)	6000 (5.88)	9000 (8.82)	5000 (4.90)	22000 (21.56)	102000 (100.00)	137366	35366	74.25
*Figures in parentheses are percentages of total consumption expenditure of the respective category.										

Table 3: Annual consumption expenditure incurred by non-beneficiary families on different items (2013-14) (Family/Annum).

Pattern of consumption expenditure of beneficiary families

The average annual consumption expenditure incurred by the beneficiary families is shown in Table 4. The results show that beneficiary marginal farmers spent maximum amount i.e., 89.55 per cent (29334) of the total net return (32756) on consumption expenditure. It was followed by small farmers who spent 87.31 per cent (39201) of the total net return (44896) on consumption. Medium and large farmers spent 82.36 per cent and 70.56 per cent of their total net return on consumption items. Beneficiary families under different

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categories spent a major portion of consumption expenditure on food articles varying from about 54 per cent on large farmers to 74 per cent on marginal farmers. Of all the six components of consumption expenditure, buildings received the minimum attention of all the beneficiary families under investigation. Expenditure on this item constituted only 4.30 per cent to 4.95 per cent of the total consumption expenditure for all categories of beneficiary families. Expenditure on others such as traveling, entertainment, social customs etc. incurred by different categories of beneficiary families, on the other hand, varied from 3.24 per cent to 21.24 per cent of the total consumption expenditure. Expenditure on clothing incurred by different categories of beneficiary families was around 5 per cent of the total consumption expenditure. The expenditure on education ranged from as low as 5.21 per cent (1530) for marginal farmers to as high as 12.23 per cent (8613) for medium farmers. Expenditure on fuel incurred by different categories of beneficiary families varied from 7.17 per cent to 9.13 per cent of the total consumption expenditure.

Changes in consumption

The per family absolute and per cent increase in annual consumption expenditure of beneficiary families over non-beneficiary families, net incremental income accrued to beneficiary families and per cent increase in their consumption expenditure is depicted in Table 4. It is obvious from the table that IWDP helped increase the annual net return of different categories of beneficiary families by as low as 8808 in case of marginal farmers to as high as 10286 in case of large farmers. Families of small and medium farmers depending on IWDP for earning their livelihood could increase their net return by 9611 and 8808 per annum through IWDP assistance. The incremental consumption expenditure was minimum on large farmers (2187 per annum) and maximum on marginal farmers (5817 per annum). In case of small and medium farmers, families' incremental consumption expenditure was 4420 and 3242 per annum, respectively. It may be seen from the Table 5 that a major part of the increased consumption expenditure was on food items ranging from 50.89 per cent on large farmers to 68.42 per cent on marginal farmers. Incremental expenditure incurred by beneficiary families over non-beneficiaries on fuel and buildings were next to the food items in terms of both percentage terms. The consumption expenditure towards clothing varied from 1.42 per cent on small farmers to 7.13 per cent on large farmers. Education captured less attention as it varied from 5.16 per cent on large farmers to 8.82 per cent on small farmers. Thus, a considerable gain in terms of net return and total consumption expenditure was observed to the beneficiaries under IWDP Program. This increased consumption expenditure shared more on clothing, education and fuel and less on the food which was according to the general theory of consumption. After deducting the increase in consumption expenditure from the increase in income, the difference was highest (8099) in case of large farmer families and lowest (2991) in case of marginal farmers. The change in the total increase in consumption expenditure over the net return was maximum on the families of marginal farmers (66.04%) followed by small farmers (45.98%), medium farmers (32.47%) and large farmers (21.26%).

From the above discussion it may be concluded that the impact of IWDP on the pattern of consumption expenditure had not been the same. The relative increase in consumption expenditure for different categories of beneficiary families was at varying rates. The same was true of expenditure on various components like food, clothing, education, fuel, building and others (Tables 4 and 5).

Category	Expenditure on						Total consumption expenditure	Net return accrued	Difference	Consumption expenditure as percentage of net return (%)
	Food	Clothing	Education	Fuel	Buildings	Others				
1	2	3	4	5	6	7	8	9	10	11
Marginal	21830 (74.41)	1655 (5.64)	1530 (5.21)	2105 (7.17)	1263 (4.30)	951 (3.24)	29334 (100.00)	32756	3422	89.55
Small	28915 (73.76)	1909 (4.86)	2113 (5.39)	2826 (7.20)	1765 (4.50)	1673 (4.26)	39201 (100.00)	44896	5695	87.31
Medium	44963 (63.84)	3519 (4.99)	8613 (12.23)	5569 (7.90)	3944 (5.60)	3814 (5.41)	70422 (100.00)	85501	15079	82.36
Large	56113 (53.85)	5156 (4.94)	6113 (5.86)	9513 (9.13)	5159 (4.95)	22133 (21.24)	104187 (100.00)	147652	43465	70.56

*Figures in parentheses are percentages of total consumption expenditure of the respective category.

Table 4: Annual consumption expenditure incurred by beneficiary families on different items (2013-14) (Family/Annum).

Marginal propensity to consume

The ratio of the increase in consumption to the increase in income is known as "marginal propensity to consume" (MPC). In other words, MPC measures the incremental change in consumption as a result of a given incremental change in income. The incremental income and consumption were worked out by subtracting the net return and consumption of non-beneficiary families from the IWDP beneficiary families. It could be seen in Table 6, that MPC was maximum (0.66) on marginal farmers as they had more expenditure on education, building renovation etc. during the study period.

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Category	Excess expenditure made by beneficiaries over non-beneficiaries on						Total incremental consumption expenditure	Increase in saving over non-beneficiary	Difference	Percentage increase in consumption expenditure of net return (%)
	Food	Clothing	Education	Fuel	Buildings	Others				
1	2	3	4	5	6	7	8	9	10	11
Marginal	3980 (68.42)	290 (4.98)	470 (8.07)	580 (9.97)	441 (7.58)	56 (0.96)	5817 (100.00)	8808	2991	66.04
Small	3091 (69.93)	63 (1.42)	390 (8.82)	565 (12.78)	288 (6.51)	23 (0.52)	4420 (100.00)	9611	5191	45.98
Medium	1963 (60.54)	186 (5.74)	234 (7.22)	512 (15.79)	214 (6.60)	133 (4.10)	3242 (100.00)	9982	6740	32.47
Large	1113 (50.89)	156 (7.13)	113 (5.16)	513 (23.45)	159 (7.27)	133 (6.08)	2187 (100.00)	10286	8099	21.26
*Figures in parentheses are percentages of total consumption expenditure of the respective category.										

Table 5: Change in annual consumption expenditure of beneficiary families over non-beneficiary (2013-14) (Family/Annum).

The high level of income generated by the large farmers showed lowest MPC i.e., 0.21. It implies that the increase in the consumption of this class brought about by the substantial increase in income was less than proportionate as they had already made significant expenditure on various consumption expenditure items. In case of small and medium farmers the MPC were 0.45 and 0.32, respectively, which showed higher incremental consumption expenditure fulfill the desired demand of various items of consumption expenditure (Table 6).

Category	Total incremental consumption expenditure (Rs.) (ΔC)	Total incremental income (Rs.) (ΔY)	MPC = ΔC/ΔY
Marginal	5817	8808	0.66
Small	4420	9611	0.45
Medium	3242	9982	0.32
Large	2187	10286	0.21

Table 6: Marginal propensity to consume (2013-2014).

Changes in Employment Level

This section deals with changes in employment levels of the beneficiary families caused as a result of IWDP Program. For estimating the changes in employment levels, employment was calculated in man days engaged in all the activities. The impact on employment generation was studied by measuring the changes in employment levels of beneficiary families over that of non-beneficiary families during the study period and the results so obtained are presented as under:

Per hectare labor employed on non-beneficiary and beneficiary families

Per hectare average annual man days of labor generated on non-beneficiary farms from crops is depicted in Table 7. Per hectare employment generated from crops was maximum (145.45 man days) for marginal farms whereas it was minimum for large farms i.e., 68 man days. Per hectare employment generated for medium farmers was 121.22 man days per year. The decreasing tendency in labor employment with the increases in farms size was probably due to the fact that mechanization increased as the size of farm increases and thus the human labor decreases to perform various activities on the farm. The per hectare average annual man days of labor generated to beneficiary families from crops was maximum (156.96 man days) for marginal farmers whereas it was minimum for large farmers i.e., 69.80 man days as depicted in Table 7. Per hectare employment generated on small and medium farms was 131.03 and 119.60 man days respectively during the year (Table 7).

	Non-beneficiary families		Beneficiary families	
Category	Average size of land holding (Ha.)	Average labor employed	Average size of land holding (Ha.)	Average labor employed
Marginal	0.55	145.45	0.69	156.96
Small	1.28	117.96	1.45	131.03

Medium	2.45	121.22	2.55	119.60
Large	5.00	68.00	5.00	69.80

Table 7: Labor employment generated by crop activities for non-beneficiary and beneficiary families (2013-14) (Man days/family/ha).

Changes in employment levels: an overview

The number of effective man-days of labor generated by the different categories of beneficiary families over the non-beneficiary families as a result of IWDP assistance is presented in Table 8. The findings of the study revealed that marginal farmers who obtained assistance under IWDP for crops could be able to increase their annual employment by 29 man days over and above 80 man days employed by the non-beneficiary families. In percentage terms it was 36.25 per cent higher than that of non-beneficiary families. Small farmers who obtained assistance under IWDP for crops could be able to increase their annual employment by 39 man days over and above 151 man days employed by the non-beneficiary families. In percentage terms it was 25.82 per cent higher than that of non-beneficiary families. Medium farmers could be able to increase their annual employment by only 08 man days over and above 297 man days employed by non-beneficiary families through crop activities. It was 2.69 per cent higher than that of non-beneficiary families. Similarly on large farmers the increase in employment due to crop activity was only 9 man days over and above 340 days employed by non-beneficiary families. It was 2.64 per cent higher than that of non-beneficiary families.

Thus, it can be concluded that absolute and per cent increase in annual employment was observed on all the categories of beneficiary families over and above the non-beneficiary families. The maximum percentage increase (36.25%) in employment was observed for marginal farmers which were followed by small (25.82%) farmers. the increase in annual labor employment on medium and large farmers was not significant (Table 8).

Category	Beneficiary farms	Non-beneficiary farms	Absolute change	Per cent change
1	2	3	(4 = 2-3)	5
Marginal	109	80	29	36.25
Small	190	151	39	25.82
Medium	305	297	08	2.69
Large	349	340	09	2.64

Table 8: Additional employment generated by the crop activities on beneficiary and non-beneficiary farms (2013-2014) (Man days/year/family).

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