



## Impact evaluation of return on investment due to watershed development project in Ajmer District of Rajasthan

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### Abstract

Agriculture is the backbone of Indian economy and is largely dependent upon natural resources like soil, water and vegetation. These resources are limited in supply and are getting depleted day by day. One of the practical solutions for conservation of these limited natural resources and sustainable development is through proper watershed development strategy. Watershed development projects have been undertaken with a view to improve and stabilize crop productivity in rain fed areas on a sustainable basis in the long run. There are some components of the watershed development programme which require time to show their full impact. Therefore, there is need to evaluate watershed development projects after providing some gestation period on the completion of the projects. The project in Srinagar B watershed was completed in 2010 and it was assumed that it was showing its full impact during the study period (2010-11) on productivity, pattern of agriculture and income of the beneficiaries. Both primary and secondary data were collected for the study. The primary data were collected from the farmers on the field. Different factors determining the return on investment plays a paramount role. It makes the background of the study.

*Key Words: Income, Return on investment, Watershed development*

### Introduction

In India, most watershed projects are implemented with the twin objectives of soil and water conservation and enhancing the livelihoods of the rural poor (Sharma and Scott, 2005). Different types of treatment activities carried out in a watershed include soil and moisture conservation measures in agricultural lands (contour/field bunding and summer ploughing), drainage line treatment measures (loose boulder check dam, minor check dam, major check dam, and retaining walls), water resource development/management (percolation pond, farm pond, and drip and sprinkler irrigation), crop demonstration, horticulture plantation and afforestation (Palanisami and Kumar, 2005). The aim of watershed programme is to ensure the availability of drinking water, fuel wood and fodder to raise income and employment for farmers and landless labourers through improvement of agricultural production and productivity (Rao, 2000). 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 programmes in India with an investment of ` 17,037 crore. The average expenditure per annum during the tenth plan is around ` 2300 crore (Department of land resources, 2006).

**Concept of watershed-** A watershed or catchment is an area from which all water drains to a common point, making it an attractive unit for technical efforts to manage water and conserve soil for improving production. In water scare areas, the objective is to capture water during rainy period for subsequent use in the dry periods. This involves conserving soil moisture and supporting crop growth, encouraging water filtration to recharge aquifers and harvesting surface runoff water in small ponds or tanks. A watershed is a hydrological unit that can serve as a biophysical unit and as a socio-economic and socio-political unit for planning and implementing resource management activities (Springate-Baginski *et al.* 2002). Watershed development has been recognized internationally as an important holistic approach to natural resource management, which seeks to promote the concept of sustainable development.

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Watershed development involves the co-ordinated use and management of land, water, vegetation and other biophysical resources within the entire watershed with the objective of ensuring minimal land degradation, erosion and also to manage and utilize the runoff for useful purposes in order to enhance the ground water recharge. Under the IWD programme, a total of 1842 watershed projects were sanctioned in India including 85 projects in Rajasthan. Srinagar B watershed located at Ajmer tahsil, Ajmer district is one of the completed watershed development projects of Rajasthan under IWDP. Srinagar B watershed project, Ajmer, Rajasthan watershed development projects play very important role in rain fed areas and government spending huge amounts on various projects of watershed development. It is assumed that watershed development projects enhance crop productivity, cropping intensity, income generation, fodder availability and water availability on sustainable basis. There are various views on the impact of watershed based programmes on rural development. Therefore, it is required to assess the impact of watershed development projects on different socio-economic aspects of rural communities. It is also believed that watershed development programmes are one of the reasons for achieving high agricultural growth rate in Rajasthan. The impact of this micro-watershed on different aspects of structural, operational, agricultural production, income generation, employment and extent of technological adoption needs to be examined. This information would lead to sound formulation of policy for upliftment of the rural communities as well as development of the villages. An impact evaluation of such programmes is essential to provide justification for the investment of scarce financial resources and to strengthen the hands of decision makers for future investments. A number of studies have been conducted to assess the impact of watershed development projects in different regions of the country either during or just after the completion of watershed development projects, but these watershed development projects have been undertaken with a view to improve and stabilise crop productivity in rain fed areas on a sustainable basis in the long run. There are some components of the watershed development programme which require time to show their full impact. Therefore,

there is need to evaluate watershed development projects after providing some gestation period on the completion of the projects. The project in Srinagar B watershed was completed in 2010 and it was assumed that it was showing its full impact during the study period (2010-11) on productivity, pattern of agriculture and income of the beneficiaries. Therefore, it was the right time to evaluate the impacts of Srinagar B watershed development project. Taking into account the significance and relevance of the above mentioned facts, the present study entitled "Impact Evaluation of return on investment due to Watershed Development Project in Kota District of Rajasthan".

### Material and Methods

In this study, the term research methodology is concerned with the description of methods and procedures used during research programme. This chapter deals with research design, tools and techniques of the scientific investigation used for data collection in light of objectives of the study. The selection of universe and sampling technique for investigation as well as devices used for data analysis are also explained in this chapter under following sub heads:

- 1 Selection of study Area
- 2 Collection of data and
- 3 Analysis of data

**Selection of study Area-** Rajasthan state comprises six regions of watershed development project viz., Kota, Jaipur, Ajmer, Udaipur, Bhilwara, and Jodhpur. Out of these Ajmer region was selected purposely due to the following regions:

Firstly, Ajmer area soils were black and rain water was usually flown away by rivers. Secondly, Watersheds were helpful in retaining this water and helping in change of scenario. Thirdly, being native of this area, the researcher was quite familiar with the farming conditions of the area and well versed with local dialect.

**Selection of district-** Ajmer district was selected randomly.

**Selection of watersheds-** Srinagar B watershed from Ajmer panchayat samiti was randomly selected for the study.

**Selection of respondents-** A total of 100 respondents was selected for the study. Out of these



50 respondents were from beneficiary group and 50 respondents were from non-beneficiary group. A proportionate random sampling procedure was followed for the selection of respondents. The beneficiaries from each village were selected randomly in such a manner that there would be proportional to total size of the beneficiaries of watershed development project in respective village fell under Srinagar B watershed. Similarly, non-beneficiary respondents were selected that is farmers located outside but adjacent to watershed area.

**Construction tools of data collection-** To gather the required information from the respondents an interview schedule was developed in view of objectives of the study. The schedule contained following parts.

- (i) The first part of schedule consists of general information of respondents.
- (ii) The second part of schedule was used to collect data on the change in cropping pattern and production pattern followed by the farmers in the integrated watershed development area.
- (iii) The third part of schedule was used to assess the effect of watershed on the levels of cost, income and consumption.

**Collection of data-** Both primary and secondary data was collected for the study. The secondary data were collected from the records maintained by the implementation committee (land resource development, Ajmer and krashi pant bhavan, jaipur). The primary data were collected from the farmers on the field. The data on various aspects of farm and household's economy of the beneficiaries and non-beneficiaries sample farm families were collected by survey method through personal interview with the help of a schedule specially designed for the purpose.

**Analysis of data-**The data collected from different sources through various schedules was statistically analyzed for evaluating the objectives of the study.

**Tabular analysis-**The tabular presentation technique was followed to study the socio-economic characteristics of respondents such as land holding, cropping pattern, productivity, sources of irrigation, cost of crop and returns *etc.* for analyzing the data elicited through survey from the sample respondents. The data were compared and

contrasted with the help of averages and standard deviation.

**Change in cost:** Figures of the cost were obtained by working out cost incurred on crop and livestock activities. The total cost was obtained by adding the costs from crop and costs from livestock farm activities.

**Change in income:** Income generated through crop activities and livestock activities were worked out by getting income from these activities. The total income was obtained by adding the incomes from crop and livestock activities.

**Gross return:** Gross return refers to the total income of the farmers earned from crop and livestock sources during the study period. Gross return included both crop income as well as livestock income.

**Crop Income:** The entire gross produce (main and by-product) evaluated at market prices.

**Livestock Income:** The entire gross produce (milk, dung and sell of animals) evaluated at village prices.

**Change in Net Return:** Net return refers to the gross return generated from different agricultural activities less the expenditures incurred to take up these activities. Symbolically it was expressed as:

Net return = Gross return – Total Expenditure

The changes in the net return of the beneficiary farmers were calculated by subtracting the net return of non-beneficiary from that of beneficiary farmers.

## Results and Discussion

One of the main objectives of the watershed project is to improve the household income of the farmers belonging to the rain fed areas besides conserving the land and water resources. Therefore, it was also tried to find out the impact of WDP on two main sources of income of farmers in watershed area i.e. income from crop and livestock enterprises.

### Income from crop enterprises of beneficiary farmers (2011-12)

Table 1 indicate the per hectare gross income from crops of beneficiary farmers. In beneficiary farmers the income from grain was highest in large farmers (Rs.53514.54) followed by medium farmers (Rs.49153.34), marginal farmers (Rs.43225.93) and small farmers (Rs.40647.07). The income from by-products was highest in case of small farmers



(Rs.17583.90) and lowest in case of marginal farmers (Rs.69263.88) followed by marginal farmers (Rs.13949.54). As regards the gross income farmers (Rs.66610.08), small farmers from grain and by-product was highest for large (Rs.58230.97) and marginal farmers (Rs.57175.46).

**Table 1 Income from crop enterprises of beneficiary farmers (2011- 12)**

S. No.	Particulars	Category				Total (N=50)
		Marginal (9)	Small (17)	Medium (16)	Large (8)	
1	2	3	4	5	6	7
(1)	Grain	43225.93 (21480.58)	40647.07 (21481.41)	49153.34 (13225.34)	53514.54 (18012.17)	45892.06 (18700.59)
(2)	By product	13949.54 (6723.30)	17583.90 (9570.10)	17456.74 (6297.30)	15749.33 (4163.61)	16595.49 (7340.71)
(3)	Total grain & by product	57175.46 (26679.33)	58230.97 (30837.90)	66610.08 (18806.22)	69263.88 (20635.36)	62487.00 (24906.76)

**Income from crop enterprises of non-beneficiary farmers (2011-12)**

To find out the gross income from crop enterprises for different categories of non-beneficiary farmers, it is necessary to estimate per hectare gross income, such as income from grain and by products. Table 2 indicate the per hectare gross income from crops of non-beneficiary farmers. In non-beneficiary farmers the income from grain was highest in small farmers (Rs.51237.49) followed by large farmers

(Rs.44795.57), medium farmers (Rs.37757.62) and marginal farmers (Rs.23451.00). The income from by-products was highest in case of marginal farmers (Rs.16217.59) and lowest in case of marginal farmers (Rs.6451.16). As regards the gross income from grain and by-product was highest for small farmers (Rs.61431.59) followed by large farmers (Rs.60944.85), medium farmers (Rs.53975.22) and marginal farmers (Rs.31249.75).

**Table 2 Income from crop enterprises of non-beneficiary farmers (2011- 12)**

S. No.	Particulars	Category				Total (N=50)
		Marginal (8)	Small (18)	Medium (17)	Large (7)	
1	2	3	4	5	6	7
(1)	Grain	23451.00 (10262.06)	51237.49 (48101.01)	37757.62 (13929.39)	44795.57 (34208.90)	41306.63 (33448.48)
(2)	By product	7798.75 (6451.16)	10194.10 (4072.41)	16217.59 (5978.21)	16149.28 (12705.71)	12692.56 (7440.28)
(3)	Total Grain & By product	31249.75 (15942.91)	61431.59 (49951.91)	53975.22 (19323.57)	60944.85 (46904.82)	53999.19 (37483.23)

**Changes in income from crop enterprises of beneficiary and non-beneficiary farmers (2011-12)**

The income from crops was higher in case of beneficiaries compared to the non-beneficiaries. The income difference between the beneficiaries and non-beneficiaries was (Rs.4585.43) in grain, (Rs.3902.93) in by-products and (Rs.8487.81) in grain and by-products. The increase in the crop

income of the beneficiary household was mainly because of three reasons. First, the watershed development project had increased the cropping intensity that has ultimately increased the gross income from per unit of land. Second, the watershed development project, by improving the availability of moisture and water, had helped to increase the productivity of different crops. Third, owing to increased availability of irrigation, the



beneficiaries have shifted the cropping pattern from low value crops to high value crops. The results were in line with the findings of Tilekar *et al.* (2009) who observed that per farm and per hectare income from crop production were increased in post-project period.

**Table 3 Changes in Income from crop enterprises of beneficiary and non-beneficiary farmers (2011-12)**

S. No.	Statement	Beneficiary farmers	Non-beneficiary farmers	Difference over Non-beneficiary
(1)	Grain	45892.06 (18700.59)	41306.63 (33448.48)	4585.43
(2)	By product	16595.49 (7340.71)	12692.56 (7440.28)	3902.93
(3)	Total Grain & By product	62487.00 (24906.76)	53999.19 (37483.23)	8487.81

**Income from livestock enterprises of beneficiary farmers (2011-12)**

Table 4 indicate the per day gross income from livestock of beneficiary farmers. In beneficiary farmers the income from milk was highest in large farmers (Rs.701.56) followed by medium farmers (Rs.607.81), small farmers (Rs.540.44) and marginal farmers (Rs.272.22). The income from dung was highest in case of large farmers

(Rs.132.00) and lowest in case of marginal farmers (Rs.41.33). The income from sold animal was highest in case of small farmers (Rs.46.32) followed by large farmers (Rs.23.96), medium farmers (Rs.22.67) and marginal farmers (Rs.12.38). As regards the gross income of large farmers was highest (Rs.857.52) and lowest of marginal farmers (Rs.325.93).

**Table 4 Income from livestock enterprises of beneficiary farmers (2011- 12)**

S. No.	Particulars	Category				Total (N=50)
		Marginal (9)	Small (17)	Medium (16)	Large (8)	
1	2	3	4	5	6	7
(1)	Milk	272.22 (34.11)	540.44 (280.22)	607.81 (160.40)	701.56 (267.63)	539.50 (250.74)
(2)	Dung	41.33 (5.57)	105.18 (50.29)	122.25 (45.69)	132.00 (40.44)	103.44 (51.59)
(3)	Sold animal value	12.38 (8.19)	46.32 (49.30)	22.67 (14.77)	23.96 (19.76)	29.07 (33.15)
(4)	Total	325.93 (36.78)	691.94 (359.18)	752.74 (203.28)	857.52 (305.91)	672.01 (313.45)

**Income from livestock enterprises of non-beneficiary farmers (2010-11)**

To find out the gross income from livestock enterprises for different categories of non-beneficiary farmers, it is necessary to estimate per day gross income, such as income from milk, dung and sold animal value.

Table 5 indicate the per day gross income from livestock of non-beneficiary farmers. In non-beneficiary farmers the income from milk was highest in large farmers (Rs.671.43) followed by

medium farmers (Rs.538.97), small farmers (Rs.486.11) and marginal farmers (Rs.260.94). The income from dung was highest in case of medium farmers (Rs.116.82) and lowest in case of marginal farmers (Rs.30.75). The income from sold animal was highest in case of large farmers (Rs.23.81) followed by medium (Rs.21.23), small (Rs.18.95) and marginal farmers (Rs.11.27). As regards the gross income of large farmers was highest (Rs.810.10) and lowest of marginal farmers (Rs.302.95).



**Table 5 Income from livestock enterprises of non-beneficiary farmers (2011- 12)**

S. No.	Particulars	Category				Total (N=50)
		Marginal (8)	Small (18)	Medium (17)	Large (7)	
1	2	3	4	5	6	7
(1)	Milk	260.94 (81.68)	486.11 (167.10)	538.97 (277.29)	671.43 (177.62)	494.00 (231.73)
(2)	Dung	30.75 (31.98)	82.33 (23.72)	116.82 (54.38)	114.86 (37.22)	90.36 (49.08)
(3)	Sold animal value	11.27 (2.54)	18.95 (13.39)	21.23 (16.46)	23.81 (16.99)	19.18 (14.20)
(4)	Total	302.95 (110.25)	587.40 (187.11)	677.03 (340.43)	810.10 (219.50)	603.54 (283.62)

### Changes in income from livestock enterprises of beneficiary and non-beneficiary farmers (2011-12)

From the analysis mentioned in the table 6, the income from crops was higher in case of beneficiaries compared to the non-beneficiaries. The income difference between the beneficiaries

and non-beneficiaries was (Rs.45.50) in milk, (Rs.13.08) in dung, (Rs.9.89) in sold animal value and (Rs.68.47) in total income from livestock's. Khatik *et al.* (1997), Babu *et al.* (2004) and Thomas *et al.* (2009) also reported similar findings that watershed development helped farmers of watershed area in improving their livestock status.

**Table 6 Changes in Income from Livestock enterprises of beneficiary and non-beneficiary farmers (2011-12)**

S. No.	Statement	Beneficiary farmers	Non-beneficiary farmers	Difference over Non-beneficiary
(1)	Milk	539.50 (250.74)	494.00 (231.73)	45.50
(2)	Dung	103.44 (51.59)	90.36 (49.08)	13.08
(3)	Sold animal value	29.07 (33.15)	19.18 (14.20)	9.89
(4)	Total	672.01 (313.45)	603.54 (283.62)	68.47

### Conclusion

The results conclude that income from crops was higher in case of beneficiaries compared to the non-beneficiaries. Per farm per day livestock income of the beneficiaries was higher than that of the non-beneficiaries. The maximum increase in net return per day was observed in case of small farmers (Rs.108.96) followed by medium farmers (Rs.37.57), large farmers (Rs.13.49) and marginal farmers (Rs.-28.32).

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