IMPACT ON FARM INCOME BY JALASAMRUDHI PROJECT, THIRUVANANTHAPURAM

Abstract

The study analysed the impact of Jalasamrudhiwatershed development programme on farm income. The data regarding the crops and income were collected from Kattakada legislative constituency of Jalasamrudhi Project, Thiruvananthapuram. A systematic sampling technique was adopted for the data collection and information was collected from 80 beneficiaries and 80 non-beneficiaries of the project, thus making the total sample size to 160.In addition to the watershed development programme implemented by Jalasamrudhi project, the beneficiaries of the project received one cattle per person and five poultry birds per person, enhancing their livelihoods and agricultural capabilities in the Kattakada constituency of the Jalasamrudhi Project in Thiruvananthapuram. Thus, the beneficiaries benefitted from increase in adoption of water conservation measures and net farm income.

Keywords: Farm income, Jalasamrudhi project, water conservation measures, watershed development.

Introduction

A watershed refers to an area drained by a stream or interconnected streams, where all surface runoff converges and is discharged through various outlets, making it crucial for water resource management (Tesfaye *et al.*, 2018). Beyond its hydrological function, watersheds evolve into socio-political and ecological entities shaping social dynamics and economic security. The primary aim of watershed development is to optimize water resource utilization while minimizing environmental degradation and enhancing ecological resilience. Initiatives like the National Watershed Development Project for Rainfed Areas (NWDPRA) launched in 1991 aim to improve the production environment, restore ecological balance, and mitigate rural-to-urban migration by diversifying agricultural activities and cultivating cash crops (Sharma, 2001). The programmes like the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) which was launched in 2015 and Integrated Watershed Management Programme (IWMP) launched during 2009-10 in Kerala further contribute to rural livelihood

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enhancement through subsidized livestock and agricultural inputs (Silpa andMercykutty, 2023). The Jalasamrudhi project, initiated in the Kattakada Legislative Assembly Constituency of Thiruvananthapuram, addresses climate change-induced drought by innovatively replenishing groundwater using deserted rock quarries, while also providing livelihood support through subsidy for cattle and poultry. Additionally, under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), the restoration of the *Kollodthodu* stream in Thiruvananthapuram with check dams further contributes to watershed management and rural livelihood development (Nizamudeen, 2021).

Material and methods

This study heavily relied on primary data and focused on its investigation on the Jalasamrudhi Watershed Project in Kattakada, which was purposively selected for its recognition as one of the two successful watershed development initiatives in Kerala. The study focused on comparing the average net farm income of beneficiaries in the treated Kulathummalthodu micro watershed, comprising Kollod (2K27b1) and Kuzhaykadu (2K27b2) micro watersheds, and that of non-beneficiaries in the untreated Manappuram micro watershed (2K27b3). To study this, 80 respondents were chosen from each group, with those in the fully implemented watershed designated as beneficiaries and those in the unimplemented watershed as non-beneficiaries.

Percentages and Averages

The water conservation measures benefitted by the beneficiaries of treated watershedwere analysed using percentages and averages.

Two-sample unpaired t-test

A two-sample unpairedt-test was performed tocompare the average net farm income of beneficiaries and non-beneficiaries of the project using Grapes software**.**

Null hypothesis (H_o): There is no significant difference in the average net farm income of beneficiaries and non-beneficiaries.

Alternate hypothesis (H_1): There is significant difference in the average net farm incomeof beneficiaries and non- beneficiaries.

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$$t=\frac{\bar{x}_1-\bar{x}_2}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}}$$

$\bar{x}_1$= mean value of(i) average net income from crops (banana and tapioca)
(ii) average net livestock income
(iii) average net farm income of thebeneficiaries

$\bar{x}_2$= mean value of (i) average net income from crops (banana and tapioca)
(ii) average net livestock income
(iii) average net farm income of the non-beneficiaries

s_1 = standard deviation of (i) average net income from crops (banana and tapioca)
(ii) average net livestock income
(iii) average net farm income ofthe beneficiaries

s_2 = standard deviation of (i) average net income from crops (banana and tapioca)
(ii) average net livestock income
(iii) average net farm income of the non-beneficiaries

n_1= number ofbeneficiaries

n_2 = number of non-beneficiaries

If the p-value < 0.05, we reject the null hypothesis. *i.e.*,we accept that there is a significant difference in the average net farm incomeof beneficiaries and non-beneficiaries, at 5 per cent level of significance.

If the p-value > 0.05, we accept the null hypothesis. *i.e.*,there is no significant difference in the average net farm incomeof beneficiaries and non-beneficiaries.

Results and discussion

Water conservation measures implemented by the Jalasamrudhi Project

The beneficiaries in the Kulathummalthodu micro watershed benefited from various water conservation measures implemented through the Jalasamrudhi Project. These measures included the construction of farm ponds, well recharging, well curbs along withthe supplying of fruit seedlings (rambuttan, jackfruit and mango), practicing intercropping in coconut plantations, and construction of biogas plants and biomass composts. Additionally, with the assistance from workers under MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme), beneficiaries saw improvements in side wall protection and the

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construction of check dams in Kollodthodu, leading to increased crop production and groundwater levels, particularly benefiting farmers near Kollodthodu. The project also rejuvenated public wells and farm ponds, further contributing to groundwater replenishment. Furthermore, the project facilitated additional income for beneficiaries through livestock provision, promoting sustainable water management practices by recharging nearby wells through rain water harvesting and through water from abandoned granite quarries. Palanisami and Kumar (2009) conducted a study in Tamil Nadu, highlighting the positive impacts of watershed development programs on soil and water conservation, soil fertility enhancement, changes in cropping patterns, and increased crop production, with significant benefits observed in groundwater sustainability and water availability for domestic and livestock purposes.

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Table 1. Water conservation measures adopted by the beneficiaries of the Jalasamrudhi project

Sl.No	Activities	Number of beneficiaries
1	Intercropping in coconut plantation	8 (10)
2	Fruit tree planting- Jack fruit, Rambutan, Mango	4 (5)
3	Biogas plant	3 (3.75)
4	Crop residue biomass composting	3 (3.75)
5	Renovation of public wells	35 (43.75)
6	Renovation of public ponds	10 (12.50)
7	Sidewall protection and construction of check dam in Kollodthodu	32 (40)
8	Livelihood activities such as cattle and poultry	27 (33.75)

Note: Figures in parentheses indicate per cent to total

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IMPACT OF WATERSHED DEVELOPMENT PROGRAMME ON FARM INCOME

The respondents in the area were growing banana, tapioca, rubber and coconut as major crops. Intercropping of banana with tapioca is the major cropping pattern seen in the selected watersheds. The farm income of the sample farmers from the watershed area was estimated by adding the average net returns from crops (banana and tapioca) and the average livestock income of sample farmers in the study area.Nendran variety of banana was the popular variety grown by farmers in the study area. The respondent farmers applied a basal dose of organic manures like green manure, cow dung and ash. The yield obtained from the

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cultivation of banana by the beneficiaries was more (25,501.56 kg ha^{-1}) compared to non-beneficiaries (20,547.62 kg ha^{-1}). The average price of banana was ₹ 40/kg. The gross returns obtained from the cultivation of banana was more for the beneficiaries (₹ 10,20,062.40 ha^{-1}) when compared to that of non-beneficiaries (₹ 8,21,904.80 ha^{-1}). The study conducted by Kumar (2021) on economic analysis of production and marketing of banana in Bilaspur district of Chhattisgarh revealed that the overall cost of banana cultivation was ₹ 1,82,274.47 ha^{-1}. Since banana is a tropical fruit and the climate of Kerala suits its production, most of the farmers including small size holders cultivate banana. The respondents had planted tapioca along with banana as an intercrop. M-4 variety of tapioca was mostly grown in the fields of the respondents since the stem cuttings are cheap and locally available. The sample farmers applied a basal dose of organic manures such as cattle manure, cow dung and ash followed by chemical fertilizers such as urea, diammonium phosphate and muriate of potash. The yield obtained from the cultivation of tapioca by the beneficiaries was more (12,853.04 kg ha^{-1}) when compared to non-beneficiaries (10,052.55 kg ha^{-1}).The average price of tapioca was ₹ 30/kg. The gross returns obtained from thecultivation of tapioca was more for the beneficiaries(₹ 3,85,591.20 ha^{-1}) when compared to that of non-beneficiaries (₹ 3,01,576.50 ha^{-1}).The study conducted by Athira (2018) on economic analysis of production and marketing of tapioca in Kollam and Malappuram districts of Kerala found the average yield of tapioca to be 20.26 tonnes ha^{-1} and the average cost of cultivation at cost $A_2$was₹ 1,22,313 ha^{-1}.

Under the Jalasamrudhi Project, livestock is provided to the beneficiaries as a part of the watershed development programme which further increases the farm income. The beneficiaries were provided with cattle and poultry. The subsidy was provided for the livestock under the watershed development programme. Each individual bought one cow with a 50 per cent subsidy provided under the watershed development programme. Fifteen individual of treated watershed were benefitted from the provision of cattle. Five hens were given to each beneficiary free of cost along with cage. Twenty seven beneficiaries were benefitted from poultry bird and cages distributed under the project. Two sample t- test was used to analyse the impact of watershed development programme on net farm income. The average net income from crops (banana and tapioca), average net income from livestock (cows and poultry) and average net farm income were separately analysed. The average expenditure of cattle was estimated to be ₹ 74,358 per annum. These expenditure includes cattle feed, green grass and paddy straw. On an average, a cow produced 12 to 15 litres of

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milk per day. The average price per litre of milk was ₹ 52/-. The milking period of cattle ranges from 210 to 250 days. The average expenditure of raising poultry was ₹ 1,917.87 per five hens per annum. This expenditure includes the feed, medicine and supplement which were bought annually. The farmers opted different poultry management systems such as intensive, semi intensive and free range systems. In free range system, birds were allowed to move around the farm and farmyard. These birds don't need extra feed, as they feed on the farm remainings. The average price of an egg was ₹ 7. The average number of eggs produced from five hens was 204.28 per annum. The results of the farm income are given in table 2.

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Table 2. Impact of watershed development programme on net farm income

Sl. No	Item	Average net income from crops (₹ / annum)	Average net income from livestock (₹ /annum)	Average net farm income (₹ /annum)
1	Beneficiaries	2,10,136.62	38,481.57	2,48,618.19
2	Non-beneficiaries	1,57,853.92	8,364.38	1,66,218.30
Test statistic		z = 2.005*	t =-0.901 ^{NS}	z = 2.936**
p value		0.046	0.375	0.003

Note: NS– non-significant
** Significant at 1 per cent level
* Significant at 5 per cent level

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In the case of average net income from crops and average net farm income, z- test was used because of the large sample size (n=80). In the case of average net income from livestock, t- test was used because of small sample size (n=27).

The p-value for the t-test was 0.046, 0.375 and 0.003 for average net income from crops, average net income from livestock and average net farm income respectively. As the p-value was less than 0.05, the null hypothesis was rejected and concluded that there was a significant difference between the average net income from crops of beneficiaries and non-beneficiaries.

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As the p–value was less than 0.01, the null hypothesis was rejected and concluded that there was a significant difference between the average net farm income of beneficiaries and non- beneficiaries.

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The table revealed that the annual net farm income of beneficiaries was greater than that of non – beneficiaries. This was due to the more availability of water to the beneficiaries under the watershed development programme which in turn increased the net farm income of the beneficiaries compared to that of non- beneficiaries. Similarly, other water conservation measures under the watershed development programme had led to increased crop production which in turn increased the total income of the beneficiaries compared to non-beneficiaries.

Kadam *et al.*(2013) conducted a study on the impact of watershed project in Nagpur district and found that thetotal incomeof farmers increasedfrom ₹ 90,322.47 to ₹ 1,21,929.80 and the share of agricultural income inthe total income had also increasedfrom₹ 79,553.68 (88.09 %) to₹ 1,08,390.58(80.89 %) after the implementation of the watershed development programme.

Sengar*et al.* (2016) in their study on the impact of the NWDPRA on crop productivity among tribals in Chhattisgarh, found that beneficiaries' average annual income was significantly higher than that of non-beneficiaries. In addition to agriculture, animal husbandry, forest products and services were the primary contributors to the rise in average annual income. The reason could be that the beneficiaries are more aware of the value of animal husbandry and the forest products that generate additional income as a result of the NWDPRA programme.

Conclusions

The watershed development programme has brought about a positive transformation, as reflected in the increased adoption of water conservation measures by beneficiaries when compared to non-beneficiaries.The success of the watershed development programme manifested in higher adoption rate of water conservation practices by beneficiaries when compared to non-beneficiaries including recharge, well curbs, rain pits, and renovation of *thodu* (stream). Rubber, coconut and banana were the major crops and there was not much difference in cropping pattern between the beneficiary and non-beneficiary farmers. The impact of watershed development programme on net farm income was analysed using two sample t-test of beneficiaries and non-beneficiaries.There was a significant difference between the average net income from crops of beneficiaries and non- beneficiaries. Thus, there was a significant difference between the average net farm income of beneficiaries and non- beneficiaries.

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