ROLE OF SURFACE WATER IN THE DEVELOPMENT OF AGRICULTURE – AN IMPACT ANALYSIS OF TANK IRRIGATION IN SHIMOGA DISTRICT

[1]Dr. Channabasavanagouda Patil.,[2]Akram Basha S. and Manjula B.G[3]

[1]Director, Millennium Institute of Management, N.H.63, Dadegal, Koppal, Karnataka, INDIA.

[2]Research Fellow, Department of Commerce, Gulbarga University, Gulbarga, Karnataka, INDIA.

[3]Research Scholar, Department of Economics, Karnatak University, Dharwada, Karnataka, INDIA,

ABSTRACT

Tank irrigation has been prevalent in the different States of India. Being a very old irrigation system, tanks were traditionally considered to be assets by the princely states and created by state funds. However, their maintenance has always been neglected by the rulers. Many of village irrigation tanks have lost their capacity due to silting, weed growth and structural erosion. Feeder channels are not functioning due to encroachment and distribution network has been disrupted. Tanks are basic resource for irrigation, drinking water, domestic use for people and animals, recharging ground water, fuel wood and timber, fish production, fodder, environment and silt and sand for construction. Current scenario of tank irrigation is discouraging. Thus, the present study is intended to study the importance of surface (tank) water irrigation in the development of irrigation and awareness of the farmers about tank management.

Key Words: *Development, Employment, Cost, Income, Surface Water, Tank Irrigation*

INTRODUCTION

Irrigation holds the key to agricultural development. It is one of the most important factors for assured crop production. It permits better utilization of all other productive factors and thus, leads not only to increased yields per unit of land and time, but also to stability in economic conditions of the farmers. It may be defined as "the application of water by human agency, to assist the growth of crops and grass". Adequate and timely supply of irrigation water to crops is a pre-requisite in the agricultural production process, particularly in the area where therainfall is scanty and irregular. It is an instrument with which rural transformation and agricultural development is possible.

Tank irrigation is an old and well-established earthen embanked from practice machinery and all small reservoirs across small streams, found extensively in the semi-arid regions of India.

They generally have small storage capacity. These tanks have differing uses for example drinking water, water for livestock's, etc.; however, they are mainly constructed for irrigation purpose. At present there are about 2 lakhs of tanks are sores over all the country which have been providing various benefits to farmers and accommodating to rare species. Especially Shimoga district is a leading in Tank irrigation in the Karnataka state (6217 tanks, with net irrigated area of 62,362 hectares). In a country like India where agriculture is a perpetual gamble with the monsoon, irrigation acts as a protective and stabilizing factor as well as productiveinput. Irrigation enhances the income of the landowners by providing with an assured source of income from an income-guarantying asset, land and irrigation it helps them to build up capital gains and also creates the employment opportunity for agriculture labours.

Hence, the present study is intended to analyse the impact of surface (tanks) water on agriculture.

OBJECTIVES OF THE STUDY

The main objectives of the study as follows;

1. To analyse the impact of tank irrigation on income of the farmers and employment opportunity.
2. To study the cost of cultivation in the study area.
3. To know the people's participation in the management of tanks in the study area.

HYPOTHESES OF THE STUDY

In the light of the objectives and based on literature the present study inferred the following hypotheses;

1. Tank irrigation has contributed to significance increase in income level of the farmers and employment level.
2. Participation of the people in the management of tank is significantly poor.

METHODOLOGY

The present study is based on primary information which is collected through personal interview. It is a comparative analysis of income, employment and cost structure between tank irrigated and non-irrigated farmers. The well-structured interview schedule has been utilized to collect the primary information from the selected households. The Shimoga district has been selected for the study which has highest Tank irrigated area in the Karnataka state. The data were collected for one complete agricultural year of 2010-11.

a) Selection of the Taluks

Shimoga district is predominantly a Malnad district and it was noted for heavy rainfall. The district having more tanks and as well as area under tank irrigation. Among the seven taluks of the district only three taluks such as Hosanagara, Shikaripura and Shimoga has been chosen for the study.

b) Sample Design

The simple random sampling method has been utilized for selection of the tanks and respondents. For conducting the micro level analysis the total 300 respondents (150 from tank irrigation and 150 from non-irrigation) have been selected.

c) Framework of Analysis

The main objective of the present study is to identify the development of agriculture through tank irrigation in the Shimoga district by analyzing income of the farmers, employment level and cost structure. The various statistical methods such as average, percentage have been applied to draw the inference. Further, to test the hypothesis the tools like, 't'-test, Pearson's chi-square test and Standard Deviation has been utilized.

To calculate the 't' value the fallowing formula was employed.

$$t = \frac{\overline{M}_1 - \overline{M}_2}{\sqrt{\dfrac{(N_1 - 1)S_1^2 + (N_2 - 1)S_2^2}{N_1 + N_2 - 2}\left[\dfrac{1}{N_1} + \dfrac{1}{N_2}\right]}}$$

Where, M_1 = Mean score of I[st] variable.

M_2 = Mean score of II[nd] variable.

S_1 = Standard deviation of I[st] variable

S_2 = Standard deviation of II[nd] variable.

N_1+N_2-2 = df (degree of freedom).

From the theoretical 't' table the probability of obtaining such a large derived 't' value is obtained if this provability greater than the specified significance level then the difference between two mean values taken as significant.

X^2 test is a basic test for determining whether what is observed differs from what is expected by chance at a particular level of significance

$$X^2 = \sum \frac{(0 - \varepsilon)^2}{\varepsilon}$$

Where 0 = the frequency of observations in any particular category: and

ε = The frequency of observations expected under the probability model in any particular category (goodness of fit test).

DATA ANALYSIS AND INTERPRETATION

Table 1
Social Profile of the Farmers

Variables	Measuring Groups	Tank Irrigated	
Gender	Male	140	93.33
	Female	10	6.67
	Total	150	100
Age Group	25-40	40	26.67
	41-55	78	52.00
	56 & above	32	21.33
	Total	150	100.0
Education	Primary	56	37.3
	Secondary	52	34.7
	Above Secondary	18	12.0
	Illiterate	24	16.0
Status of House Owned	Hut	00	00
	Thatched with Wall	40	26.67
	Improved Hut	53	35.33
	House with Concrete Roof	57	38
	Total	150	100

Source: Field Survey

Table 1 provides the information about social profile of the farmers in the study area. It shows that 93.33% of the respondents were male and whereas 6.67% were female. The lion shares of the respondents were men.

In terms of age, 26.67% were in the age group of 25 to 40 years. 52.00% of therespondents were in the age group of 41-55and remaining 21.33% of the respondents were 56 years and above.

We also classified the respondents in terms of their educational experience. It could affect the way in which they manage and live their daily lives and manage the household and business. From this survey, it realized that many of the respondents had at least basic education.

Table 2
Annual House Hold Income

Income Group (Rs.000)	Irrigated					Non-Irrigated				
	F	Percent	Mean	S.D.	‘t’Value	F	Percent	Mean	S.D.	‘t’Value
Below 25	00	00	**2.19**	**1.87**	**2.49581***	23	15.33	**1.86**	**1.22**	**1.545***
25-50,000	56	37.33				116	77.33			

51-75,000	47	31.33				11	7.33			
76-1,00000	32	21.34				00	00			
Above 1,00000	15	10.0				00	00			
Total	150	100				150	100			

Source: Field Survey

Note:* denotes 't' value. Significant @ 0.025 levels in tank irrigated area. Insignificant @ 0.25levels in non- irrigated area.

F: Frequency

The test result of the of the irrigated area shows that the mean value is 2.19, S.D. value is 1.87 and „t‟ value is 2.49581. The table value at 0.025 percent significant level was 2.447. It shows that the derived 't' value is greater than the table 't' value, hence the null hypothesis in irrigated area rejected. On the other hand the respective mean value, S.D value and 't' value of the unirrigated is 1.86, 1.22 and 1.545. Since the derivative 't' value is lesser than the table 't' value the null hypothesis of unirrigated area accepted. In other words the tank irrigation has been influencing sum extent on the income group of the irrigated households has not in unirrigated area one (table 2).

Table 3

Production, Cost and Profit per Acre in Irrigated Area

Crops	Yield (Kg) Per acre	Price per Quintal (In Rs)	Total Income (in Rs) Per acre	Cost of Production (Rs.) Per acre	B.C. Ratio
1	**2**	**3**	**4**	**5**	**6**
Khariff					
Paddy	3200	1000	32000	9255	1:2.65
Sugarcane	40000	950 (per Ton)	38000	15595	1:1.93
Areca nut	3000	-	-	24100	-
Zinger	1000	2500	25000	6650	1:3.58
Jawar	1200	800	9600	4550	1:1.87
Rabi					
Paddy	3000	1000	32000	10000	1:2.65

Source: Field Survey

Agriculture production, cost and profit per acre in the irrigated area is shown in the table 3. Season-wise average yield per acre is seen in the column 2. In the khariff season average yield of Paddy is 3200 kg per acre, yield of Zinger per acre is 1000 Kg, the average yield of Sugar cane is 40 tons per acre and in rabi season yield of Paddy is 3000 kg per acre. In the column 5 depicts the Cost of production per acre. The Cost of production of Areca nut per acre (Rs. 24100) is very high fallowed by the Sugar cane (Rs. 15595), Paddy (Rs. 9255), Zinger (Rs. 6650) and etc. The column 6 presents the Cost-Benefit Ratio. In all cases the ratio is beyond one, and it shows that, the farmers in this study area received more of the income than the cost in respect of all crops in all season.

Table 4
Employment of Agriculture Labour per Acre

(In all Seasons)

Labour (No of Days)	**Irrigated**					**Non-Irrigated**				
	F	**Percent**	**Mean**	**S.D.**	**'t'Value**	**F**	**Percent**	**Mean**	**S.D.**	**'t'value**
2-14	31	20.67	**1.53**	**0.74**	**2.472***	98	65.33	**1.22**	**0.45**	**1.856***
15-25	60	40				34	22.67			
26-34	44	29.33				18	12.0			
35 & Above	15	10				00	00			
Total	150	100				150	100			

Source: Field Survey

Note: * denotes 't' value. Significant @ 0.25 levels in tank irrigated area. Insignificant in non-irrigated area @ 0.25 levels.
F: Frequency

The test result of irrigated households' employment (in all seasons), mean value is 1.53, S.D. value is 0.74 and the derived 't' value is 2.487. The derived value is greater than the table 't' value 2.447 and hence (at 0.025 percent level) the null hypothesis is rejected on the other hand for unirrigated households the test results of mean value is 1.22, S.D. value is 0.45 and the derived 't' value is 1.856, and hence the null hypothesis is accepted in this case. The test result shows that the tank irrigation influencing same extent in increasing employment in agriculture per acre in all seasons in irrigated area but not in unirrigated area of the study (table 4).

The table 5 shows the peoples participation and their knowledge in the tank management. In the study area 88.7% of the respondents have not been participating in the management of tank at all and 11.3% of the respondents have been participating in the tank management. Lack participation in the management of tanks, may cause sewage and silting of the tank.

Table 5

Management of Tanks in the Study Area

Particular		Frequency	Percent
Participation in Tank Management	Yes	17	11.3
	No	133	88.7
	Total	150	100
Attended Community Participation Programme of Tank Management	Yes	19	12.7
	No	131	87.3
	Total	150	100
Attended a Training for Water Management	Yes	25	16.67
	No	125	83.33
	Total	150	100
Existence of Water Management Committee	Yes	33	22.0
	No	117	78.0
	Total	150	100

Source: Field Survey

The farmers attended in community participation programme of the tank management have also shown in the table 5. About 87.3% of the respondents were not attended in community participation programme of tank management, and 12.7% of the respondents have attended in these programmes. The table is also showing the farmers attended in training programmes regarding tank management and existence of Water Management Committee in the village

CONCLUSION

Irrigation is vital to the Indian economy as it helps to relieve agriculture from its dependence on the monsoon rains. Farmers with access to irrigation can stabilize and increase farm production; risks of crop failure can be reduced and opportunities increased for making full use of improved seed and fertilizer. Irrigation systems in India are categorized for administrative purposes into major, medium, and minor irrigation works. Major irrigation works are generally built on perennial rivers, and constitute large dams and canals that irrigate areas of many thousand hectares. Medium irrigation works constitute reservoirs of run- off water, or the so called large tanks. All ground water and surface water and tanks, ponds are classified as minor irrigation sources. The Ultimate Irrigation Potential from minor irrigation has been assessed as million hectares of irrigation. They were created essentially as multiple-use structures for irrigation, livestock, and human uses. In addition, small water holding structures called ponds have been in existence in many parts of India .Although these ponds are primarily meant for inland freshwater aquaculture. These tanks have many special features. The tank is recognized as having at least four different functions in irrigated agriculture-water conservation, soil conservation, flood control, and protection of ecology of the surrounding area. These tanks and ponds have been animportant minor irrigation source of irrigation over centuries.

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