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## “ECONOMIC IMPACT OF IRRIGATION ON AGRICULTURE COST BENEFIT ANALYSIS IN COMMAND AREA OF NARAYANPUR RIGHT BANK CANAL”

**Bakri Devareddy and Dr. Sharanappa**

Principal BRB commerce college Raichur , Research scholar Department of Economics.,HOD Dept of Economic Wisdom college of commerce and Management Sindhanur, Raichur Dist. (Karnataka).

### ABSTRACT:

Cost Benefit analysis is often used to assess adaptation approaches. In this study we investigate costs and benefits associated with adaptation approaches employed by farmers with various irrigation systems expressing in monetary term and identify the most effective and economic options based on general information and responses of farmers. Study area.

Post-independence development of irrigation in India was phenomenal, which greatly contributed for 'green revolution' and achieving food production targets. However, poor operating efficiencies of irrigation projects due to unscientific management of land and water resources and inappropriate cropping pattern in the command areas have posed serious concern. This has led to excess irrigation application, conveyance losses and wastage of water through outlets with low crop yields. The financial returns were not commensurate with the investments made in irrigation sector and there were also problems of water logging and salinity. Keeping these aspects in view, a study was carried out on evaluation of land, water and cropping practices in different reaches of command areas of two selected laterals of the Upper Krishna Project (UKP), Karnataka during 2017-18.

Moreover, as the water table is shallow in some pockets of the lower reaches of the command area, canal water releases need to be regulated in conjunction with groundwater and adopting appropriate cropping pattern in different reaches of command areas. This would minimize the problems of water shortage in the tail-end areas, thereby would help in sustainability of irrigated agriculture.

**KEYWORDS:** Cost and benefit, Irrigation project, Evaluation, Lateral command area, Water distribution, Cropping pattern, crop production, irrigation system.

### INTRODUCTION

Agriculture, with its allied sectors, is certainly the most important food source and supplier in Asian Countries, additional therefore within the immense rural areas. It conjointly contributes a major

figure to the Gross Domestic Product (GDP). Agriculture, in terms of food security, rural employment, and environmentally sustainable technologies like conservation, preserved resource management and diversity protection, which are important measures essential for integrated rural development. The study area comes under the command area of branch distributaries 5 of the tail end distributary 18, starting at chainage of 23.33 km in the

UKP Narayanapur Right Bank Canal (NRBC) starting at right bank of Narayanpur dam. The study area is located in Gabbur village at an altitude of 389 m from mean sea level (MSL), Devadurga taluk,

### METHODOLOGY AND DATA

Cost Benefit analysis model Cost Benefit analysis evaluates and compares all of costs and benefits of the environmental, social and economic positive and negative impacts of the adaptation

approaches which are expressed in monetary term based on its general information. Crop production costs include operating cost, fixed cost and consumption of water and benefits are sales revenue and water and labor saving using the irrigation systems. In our study, costs and benefits of the crop farming consist of the following components:

1. **Costs** : Economic costs: Investment cost, fixed cost, operating cost Environmental cost: Water loss
2. **Benefits** : Economic benefits: Revenue, additional yield.

**Table-1**  
**COST OF CULTIVATION PER ACRE IN IRRIGATED AREA**  
**(AVERAGE)**

Crops	HYV Seeds	Fertilizers	Pesticides	Hired Labour	Water Charges	Total
Ground Nut	1050	750	1156	2000	60	5016
Cotton	1600	1000	1346	2000	60	6006
Chilly	1000	650	1782	3000	60	6492
Paddy	1600	750	1421	3000	60	6831
Sugarcane	6000	3500	4156	10000	60	23716
Vegetable	1000	750	1096	2000	60	4906
Jawar	650	600	-	1105	60	2255
Sunflower	650	600	770	1500	60	3580
Bajara	550	916	-	1400	60	2926
Maze	900	1226	-	1500	60	3560

Source: Field Survey.

The table 1 is shows the cost of cultivation in the irrigated area. Total Rs.5016 have incurred a cost to grown the Groundnut, in this cost Rs. 1050 have incurred on HYV seeds, Rs. 750 have incurred on fertilizers, Rs. 1156 have incurred on pesticides, Rs. 2000 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 6006 have incurred a cost to grown the Cotton, in this cost Rs. 1600 have incurred on HYV seeds, Rs. 1000 have incurred on fertilizers, Rs. 1346 have incurred on pesticides, Rs. 2000 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 6492 have incurred a cost to grown the Chilly, in this cost Rs. 1000 have incurred on HYV seeds, Rs. 650 have incurred on fertilizers, Rs. 1782 has incurred on pesticides, Rs. 3000 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 6831 have incurred a cost to grown the Paddy, in this cost Rs. 1600 have incurred on HYV seeds, Rs. 750 have incurred on fertilizers, Rs. 1421 has incurred on pesticides, Rs. 3000 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 23716 have incurred a cost to grown the Sugarcane, in this cost Rs. 6000 have incurred on HYV seeds, Rs. 3500 have incurred on fertilizers, Rs. 4156 has incurred on pesticides, Rs. 10000 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 4906 have incurred a cost to grown the Vegetable, in this cost Rs. 1000 have incurred on HYV seeds, Rs. 750 have incurred on fertilizers, Rs. 1096 has incurred on pesticides, Rs. 2000 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 2210 have incurred a cost to grown the Vegetable, in this cost Rs. 650 have incurred on HYV seeds, Rs. 600 have incurred on fertilizers, Rs. 1105 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 3580 have incurred a cost to grown the Sunflower, in this cost Rs. 650 have incurred on HYV seeds, Rs. 600 have incurred on fertilizers, Rs.770 has incurred on pesticides, Rs. 1500 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 2926 have incurred a cost to grown the Bajra, in this cost Rs. 550 have incurred on HYV seeds, Rs. 916 have incurred on fertilizers, Rs. 1400 have incurred on hired labour and Rs. 60 have incurred on water. Total Rs. 3586 have incurred a cost to

grown the Maize, in this cost Rs. 800 have incurred on HYV seeds, Rs. 1226 have incurred on fertilizers, Rs. 1500 have incurred on hired labour and Rs. 60 have incurred on water.

**Table-2**  
**Cost of Cultivation per Acre in Non-Irrigated Area**  
**(Average)**

Crops	HYV Seeds	Fertilizers	Pesticides	Hired Labour	Total
Tur	850	650	1300	1200	3630
Green Gram	800	500	715	900	2915
Black Gram	650	600	550	1000	2800
Jawar	650	805	-	800	2255
Sunflower	650	885	400	1200	3135
Bajara	550	850	-	800	2200
Maze	800	1070	-	1000	3520

Source: Field Survey.

The table:2 is shows the cost of cultivation in the non-irrigated area. Total Rs.3630 have incurred a cost to grown the Tur, in this cost Rs. 850 have incurred on HYV seeds, Rs.650 have incurred on fertilizers, Rs.1300 have incurred on pesticides and Rs.1200 have incurred on hired labour. Total Rs.2915 have incurred a cost to grown the Greengram, in this cost Rs. 800 have incurred on HYV seeds, Rs.500 have incurred on fertilizers and Rs.715 have incurred on pesticides, Rs.900 have incurred on hired labour. Total Rs.2800 have incurred a cost to grown the Blackgram, in this cost Rs. 650 have incurred on HYV seeds, Rs.600 have incurred on fertilizers and Rs.550 have incurred on pesticides, Rs.1000 have incurred on hired labour. Total Rs.2255 have incurred a cost to grown the Jawar, in this cost Rs. 650 have incurred on HYV seeds, Rs.805 have incurred on fertilizers and Rs.800 have incurred on hired labour. . Total Rs.3135 have incurred a cost to grown the Sunflower, in this cost Rs. 650 have incurred on HYV seeds, Rs.885 have incurred on fertilizers and Rs.400 have incurred on pesticides, Rs.1200 have incurred on hired labour. Total Rs.2200 have incurred a cost to grown the Bajra, in this cost Rs. 550 have incurred on HYV seeds, Rs.850 have incurred on fertilizers and Rs.800 have incurred on hired labour. Total Rs.3520 have incurred a cost to grown the Maize, in this cost Rs. 800 have incurred on HYV seeds, Rs.1070 have incurred on fertilizers and Rs.1000 have incurred on hired labour.

**Table-3**  
**Production, Cost and Profit per Acre in Irrigated Area**

Crops	Yield (Kg) Per acre	Price per Quintal (In Rs)	Total Income Per acre (Kg)	Cost of production (Rs.) Per acre	B.C. Ratio
1	2	3	4	5	6
<b>Khariff</b>					
Groundnut	650	2600	16900	5016	1:3.36
Cotton	350	3000	10500	6006	1:1.74
Maize	2500	600	15000	3586	1:4.18
Paddy	1800	1000	18000	6831	1:2.63
Sugarcane	42(Tones)	2000	84000	23716	1:3.54
Bajra	650	1600	10400	2926	1:3.55
<b>Rabi</b>					
Sunflower	400	3000	12000	3520	1:3.40
Chilly	500	8000	40000	6492	1:6.16
Paddy	1800	1000	18000	6831	1:2.63
Vegetables	1800	800	14400	4906	1:2.93

<b>Summer</b>					
Paddy	1800	1000	18000	6831	1:2.63
Sunflower	400	3000	12000	3520	1:3.43
Vegetables	1800	800	14400	4906	1:2.93

Source: Field Survey (Market price then prevailing in the market)

Agriculture production, cost and profit per acre in the irrigated area is shown in the table 5.20. Season-wise average yield per acre is seen in the column 2. In the khariff season average yield of Groundnut is 650 Kg, yield of Maize per acre is 3000 Kg, yield of Paddy in Kharif, Rabi and summer season is 1800 Kg, Yield of Cotton 350 kg, yield of Sugarcane is 42 tones and yield of Bajra is 650 kg per acre. Yield of Vegetables in the Rabi and summer season is 1800 Kg, yield of Chilly is 500 kg and yield of Sunflower in Rabi and Sunflower is 400 kg per acre. Cost of production per acre is seen in the column 5. Cost of production of Sugarcane per acre (Rs. 23716) is very high followed by the Paddy (Rs. 6831), Chilly (Rs. 6492), Cotton (Rs. 6006), Maize (Rs.3586) and Groundnut (Rs.5016) and etc. The Cost-Benefit Ratio is shown in the column 6. In the Kharif season growing of Maize is the very profit (1:4.18 per cent) compared to the other crops followed by the Groundnut (1:3.36 per cent), Paddy (1:2.63 per cent), Sugarcane (1:3.54 per cent), Bajra (1:3.55 per cent) and Cotton (1:1.74 per cent). In the Rabi season growing of Chilly is the very profit (1:6.16 per cent) compared to the other crops followed by the Sunflower (1:4.54 per cent), Paddy (1:2.63 per cent) and Vegetable (1: 2.93 per cent). In the summer season growing of Sunflower is the very profit (1:4.54 per cent) compared to the other crops followed by the Paddy (1:2.63 per cent) and Vegetable (1:2.93 per cent).

**Table-4**  
**Production, Cost and Profit per Acre in Non-Irrigated Area**

<b>Crops</b>	<b>Yield (Kg) Per acre</b>	<b>Price per Quintal (In Rs)</b>	<b>Total Income (Kg) Per acre</b>	<b>Cost of Production (Rs.) Per acre</b>	<b>B.C. Ratio</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Khariff</b>					
Greengram	300	3500	10500	2915	1:3.60
Maize	2500	800	20000	3520	1:5.68
Tur	400	3600	14400	3630	1:3.96
Sunflower	300	3000	9000	3135	1:2.87
Bajra	650	1600	10400	2200	1:4.72
<b>Rabi</b>					
Sunflower	300	3000	9000	3135	1:2.87
Jawar	550	2400	13200	2255	1:5.85
Tur	400	3600	14400	3630	1:3.96

Source: Field Survey

Agriculture production, cost and profit per acre in the non-irrigated area is shown in the table 4. Season-wise average yield per acre has seen in the column 2. In the khariff season average yield of yield of Maize per acre is 2500 Kg, yield of Sunflower in both Kharif and Rabi Seasons is 300 Kg, yield of Greengram in the kharif season is 300 kg, yield of Tur in the kharif and Rabi seasons is 400 kg, yield of Bajra in the kharif season is 650 kg per acre and yield of Jawar in the Rabi season is 550 kg per acre. Cost of production per acre is seen in the column 5. Cost of production of Greengram per acre (Rs. 2915) is very high followed by the Maize (Rs. 3520), Tur (Rs. 3630), Sunflower (Rs. 3135) and etc. The Cost-Benefit Ratio is shown in the column 6. In the Kharif season grown of Maize is the very profit (1:5.68 per cent) compared to the other crops followed by the Greengram (1:3.60 per cent), Sunflower (1:2.87 per cent), Tur (1:3.96 per cent) and Bajra (1:4.72 per cent). In the Rabi season grown of Jawar is

the very profit (1:5.85 per cent) compared to the other crops followed by the Sunflower (1:2.87 per cent) and Tur (1:3.96 per cent).

**Table-5**  
**Investment on Land and Agriculture Equipments**  
**(Last three years)**

Particulars	10,000-40,000	41,000-60,000	61,000-90,000	91,000-1,50,000	Above 1,51,000	Total
<b>Irrigated</b>						
Purchase of land	-	-	15 (12.5)	08 (06.25)	02 (01.66)	25 (20.83)
Land Development	09 (07.50)	01 (0.83)	-	-	-	10 (08.33)
Agriculture equipments	-	-	06 (5.0)	04 (03.30)	05 (4.16)	15 (12.50)
Household Consumption	112 (93.33)	08 (06.66)	-	-	-	120 (100.0)
Gold and other assets	30 (25.00)	04 (03.33)	-	-	-	34 (28.33)
Chi-square Value	<b>32.086</b>	<b>10.889</b>	<b>2.364</b>	<b>2.273</b>	<b>169.165</b>	
<b>Non-Irrigated</b>						
Purchase of land	-	-	02 (5.0)	-	-	02 (05.00)
Land Development	04 (10.00)	01 (02.50)	-	-	-	05 (12.50)
Agriculture equipments	06 (15.00)	-	-	-	-	06 (15.00)
Household Consumption	16 (40.00)	-	-	-	-	16 (40.00)
Gold and other assets	11 (27.50)	-	-	-	-	11 (27.50)

Source: Field Survey

Table 5. shows the investment by the respondents in the irrigated area. 12.50 per cent of the respondents invest an amount of Rs. 60001-90000, 06.66 per cent of the respondents have invest an amount of Rs. 90001-150000 and 01.66 per cent of the respondents have invest the amount above Rs. 150001 on purchase of land. 5 per cent of the respondents invest the amount of Rs. 60000-90000, 3.3 per cent have invest the amount Rs. 90000-150000 and 4.16 per cent of the respondents have invest the amount above Rs. 150000 on purchase of agricultural equipment. 93.33 per cent of the respondents have invested the amount of Rs. 10000-40000 and 06.66 per cent of the respondents have invested the amount of Rs. 40000-60000 on household consumption. 25 per cent of the respondents have invest the amount of Rs. 10000-40000 on purchase of gold and other assets and 7.5 per cent of the respondents have invest the amount of Rs. 10000-40000 for land development

The table 5 is presented the investment by respondents on various purposes in the non-irrigated area. 5 per cent of the respondents are investing amount of Rs.60001-150000 on purchase of land. 10 per cent of the respondents have invested the amount of Rs.10000-40000, and 2.5 per cent of the respondent has invested the amount of Rs.40000-60000 for land development. 15 per cent of the respondents are made an investment the amount of Rs.10000-40000 on purchase of agricultural equipment, 27.5 per cent of the respondents have invest the amount of Rs.10000-40000 on purchase of gold and other assets and all the respondents in the non-irrigated are a have invested the amount of Rs.10000- 40000 per annum on house hold consumption.

## FINDINGS

1. Analysis of the crop-wise cost per acre incurred by the farmers in the study region, cost of production of the Sugarcane is high compared to the other crops, followed by Paddy, Chilly, and Cotton in the irrigated area and in the non-irrigated area cost of Greengram is more followed by the Maize and Tur.
2. Through the analysis of the Cost-Benefit Ratio in the irrigated area shows that, in the Kharif season the growing of the Maize is more profitable followed by the Groundnut, Paddy, Sugarcane and Bajra, etc., and in the Rabi season the growing of Chilly is profitable followed by the Sunflower, Paddy, etc., and in the Summer season growing of the Paddy is more profitable as compared to other crops. In the non-irrigated area also growing of Maize is more profitable in the Kharif season compared to other crops and growing of Jawar is the more profitable as compared to other crops in the Rabi season. The Cost Benefit Ratio is more in various crops i.e., 1:4.60 in Maize, 1:3.88 in Chilly etc.
3. Season wise employment of labour in the area is indicated that, more employment is generated in the irrigated area (60.83 per cent used above 21 days of labours) as compared to non-irrigated area (74.5 per cent used above 2-20 days of labours). Its shows that per acre employment of labours in the irrigated area is more.
4. According to the study the canal is the main source of irrigation in the study area. In the kharif season, water is somewhat adequate and somewhat regular as compared to Rabi and summer season.
5. Through the analyses of the wages, it is found that wage rates in the irrigated area are high as compared to the non-irrigated area.

## CONCLUSION

The main objective of this work was to gather information from farmers and published reports, determine the expected return from canal irrigation. Farmers who were interviewed were unable to quantify the benefits and costs of canal irrigation. The research study revealed that the farmers need to be advised for adopting efficient water management methods and proper crop planning of growing light irrigated crops in upper reaches, medium irrigated crops in middle reaches and higher irrigated crops in lower reaches in specifically demarcated areas where the water table is shallower and conjunctive use of groundwater is feasible. Through the analysis of the economic impact of the irrigation on agriculture is shows that, due to the irrigation facility the annual income and expenditure of the farmers increased, investment on land purchase, agriculture equipments and purchase of gold and other assets is increased, the farmers shift the cultivation from traditional crops to the commercial crops, wage and employment is also increased as compared to non-irrigated area.

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