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Impact of Irrigation upon Farm Productivity with Particular Reference to Kopili Flow Irrigation Scheme (FIS), Rani, Kamrup District, Assam

Rabinjyoti Khataniar[1], Shahnaaz Benazir[2] and Padma Sharma[3]
[1]Assistant Professor, Department of Economics, B.H.College, Howly, Assam
[2]Assistant Professor, [3]Associate Professor,Department of Economics, Cotton College, Gauwahati
E-mail: rabinkhataniar@gmail.com, shahnaaz.benarzirgmail.com, padma.sharmag@gmail.com
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Abstract **- In Assam, most of the irrigation schemes regardless of major or minor give services during monsoon season only when normally there are plenty of water in the paddy fields due to heavy rainfall. During pre or post monsoon seasons or rabi and pre-kharif seasons these schemes remain non-functioning and lay idle in the name of repairing, development, renovation, extension and what not? In the project command of Kopili FIS, only half of the total cultivable land could be provided with irrigation water. The study reveals that irrigation development is an utmost necessity for agricultural development in the region. Irrigation ratio along with other factors determines agricultural productivity to a greater extent. However, the level of irrigation development in the region is not much impressive. Under this environment agricultural development programmes and policies are of very limited practical implication and arguing for sustainable irrigation is of no sense. This situation is inevitable, unless a strategy is formulated for a radical increase in cropping intensity, supported by commensurate irrigation facilities along with required (and feasible) increase in productivity levels of foodgrains especially rice and wheat.**
Keywords: **Mechanisation, Productivity, Irrigation Ration, Terms of Trade.**

I. INTRODUCTION

The Kopili Flow Irrigation Scheme (F.I.S) is situated at Rani under Rani Development Block in Kamrup District,Assam. There has been provision of head works and canal system to cover the commanded area of 1331 hectares. The ultimate irrigation potential (i.e. maximum annual irrigation potential) of the scheme is 2330 hectares. The net command are is estimated to be 1331 hectares, out of which only 631 hectares of cultivable land have been benefited so far due to damages of the earthen canals and syphone structure etc. But after Modernisation of Kopili F.I.S. it expected to regain the irrigation facilities to the remaining 700 hectares of land. Moreover this scheme belongs to a tribal sub plan (T&P) scheme and benefit to 14 (fourteen) villages namely,Kachariallibari, Khanalibari,Bahuapara, Rangapara, Nagoan-111, Pathaldia, Moirapur, Batabari, Deorali, Majkuchi, Kamargaon, Lochopa, Sorania, Mallata. About 80 per cent of the total beneficiaries are of schedule tribe people is being given. The local economy is expected to boost up after implementation of the scheme by the way of triple cropping pattern to be adopted by the cultivators of the locality. Under these circumstances the present study is an attempt to assess the impact of KOPILI (F.I.S.) irrigation scheme upon farm productivity in the project command.

II. OBJECTIVES

Basic objectives of the study is to

1. Highlight the key characteristics of operational holdings in the project command.
2. Estimate the impact of the irrigation scheme on farm productivity.

III. RESEARCH DESIGN AND METHODOLOGY

Nature of the study

The study is basically empirical in nature and based on primary survey data. The primary data were collected in connection with a UGC sponsored Minor Research Project in Economics undertaken by the authors.

Tools of data collection

The study used two types of schedule for data collection. One is for the management authority to elicit information on its capacity, sources of water, distribution frequency, maintenance cost and other management aspects. Another set of schedule will be designed to gather information from the water users.

Sampling design

A multistage sampling technique was followed while selecting the farmers. As per official record there are 14 numbers of benefited revenue villages under Kopili F.I.S. So at the first step 7 villages were selected purposively. In the next step the available farmers of a particular village were grouped into three different categories viz. Small, medium, and large based on Participatory Rural Appraisal (PRA[1]) techniques.

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[1]Under this exercise the participants (Farmers, Gaon Burha, Village Leaders and some educated elder peoples) were asked to categorize the households into two different households groups namely relatively poor and non-poor considering some variables which the villagers consider as important to identify the economic status of the households. These are household income, size of land, livestock and other assets holding, consumer durables, etc.

IV. RESULTS AND DISCUSSION

The Table I presents certain key characteristics of operational holdings, such as numbers of operational holdings, total land owned, total land operated, average size of operational holdings, etc. The average land holding size is found to be 11.26 bigha in the surveyed area which is the highest in Bahupara village (24.33 bigha) and lowest in Kaharapara village (8.23 bigha). It is also observed that all the operated lands are not owned by the farmers. Out of the total operated land of 2286 bigha, 1308.50 bigha, i.e. only 57.24 per cent of the total operated lands are owned by the farmers. The owners of the rest of the lands are the people who have migrated to urban cities basically to Guwahati metro from the village. Though these peoples were shifted to cities they have land at their acquisition and these lands have been operated by the villagers on share basis. So share cultivation is one of the important characteristic that observed in the surveyed area.

TABLE I CERTAIN KEY CHARACTERISTICS OF OPERATIONAL HOLDINGS

Sl. No.	Villages	No. of operational holdings	Land Holdings (Bigha)		Avg. area operated
			Owned	Operated	
1	Dharampur	57	367.00	644.50	11.31
2	Kaharapara	56	308.50	461.00	8.23
3	Nampara	28	118.00	340.00	12.14
4	Nargaon	12	134.00	201.00	16.75
5	Natun Rani	41	331.00	420.50	10.26
6	Bahupara	9	50.00	219.00	24.33
7	Total	203	1308.50	2286.00	11.26

Source: Field Survey, 2009.

Various empirical studies proved that sustained irrigation services induce productivity as well as cropping intensity. The present study also attempts to highlight the role of irrigation as production and supply shifter. Before the observation, let consider the sources of water for agricultural operation in the surveyed area.

TABLE II SOURCES-WISE DISTRIBUTION OF OPERATED LAND.

Villages	Operated land (Bigha)	Sources of water		
		Irrigation	Rain water	Others
Dharampur	644.50	320.00	324.50	0
Kaharapara	461.00	266.50	194.50	0
Nampara	340.00	147.50	192.50	0
Nargaon	201.00	125.50	75.50	0
Natun Rani	420.50	197.00	223.50	0
Bahupara	219.00	160.00	59.00	0
Total	2286.00	1216.50	1069.50	0

Source: Field Survey, 2009.

It is clear from the data presented in Table II that irrigation services cannot cover all the operated land in the surveyed area. A part of the land is still dependent upon rainfall for operation. It is estimated that out of total operated land of 2286.00 bighas, irrigation service is extended to 1216.50 bighas of land only. That is the irrigation service covers only 53.21 per cent of the total operated land in the surveyed area.

In order to highlight the contribution of irrigation service, the farm productivity and irrigation ratios[2] (IR) are observed. The data presented in Table III signifies the fact that higher the irrigation ratio greater is the productivity. So it is observed that in Bahupara village where irrigation ration ratio is comparatively higher (0.68) the productivity is also greater being 5.35 quintal /bigha. Similarly in Nargaon where irrrigation ratio is lower in comparison to others, the productivity is also lower being 4.62 quintal/bigha.

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[2] Irrigation ratio is calculated dividing total irrigated land by total cropped area.

TABLE III IRRIGATION RATIO AND FARM PRODUCTIVITY

Village		Productivity (Bigha/quintal)	Irrigation Ratio
Dharampur	N	57	57
	Mean	5.18	0.55
Kaharapara	N	56	56
	Mean	5.04	0.64
Nampara	N	28	28
	Mean	4.79	0.42
Nargaon	N	12	12
	Mean	4.62	0.36
Natun Rani	N	41	41
	Mean	4.95	0.47
Bahupara	N	9	9
	Mean	5.35	0.68
Total	N	203	203
	Mean	5.02	0.53

Source: field Survey, 2009.

However, it is to mention here that the irrigation services in the surveyed area not only fail to give a wider coverage to the agricultural fields but also fail to induce cropping intensity. The farmers viewed that during Rabi and Pre-kharif seasons the irrigation department keeps on maintaining the scheme (Development, Maintenance, extension) and fail to supply water to the paddy fields. So double or multiple cropping is not at all possible inspite of their willingness and they have to restrict their farm operation with mono-cropping. The Kopili irrigation scheme also fails to distribute water equally and sufficiently due to technical and others deficiency. It was observed that in some regions (under Kopili irrigation coverage) crops suffered from acute water shortage. It certainly brings harm to productivity. Thus it can be concluded that the Kopili F.I.S., though enhances the productivity but not as it is expected and it completely fails to induce cropping intensity due lack of proper management and technical loopholes.

It is to be noted here that though the variables IR is found to be significant in determining farm productivity it may not be the sole determinant of productivity. Because when irrigation is initiated so many factor starts appearing and we observe an integrated impact upon productivity. Under irrigated agriculture there seems a better farm mechanization, use of fertilizers, use of HYV Seeds, etc. Moreover, the village level averages ignore the discrepancies in individual farm level. Therefore we run bivariate analysis for farm level data upon some selected variables to see their influence upon each other. Following table (table-2.4) presents the findings of bivariate analysis between productivity and selected variables.

TABLE IV BIVARIATE ANALYSIS.

Relation Between Variables	Estimated Equation	R	R^2	F-value	Interpretation
PDN and IR	Y = 0.711X +4.636	0.389	0.189	28.30*	Not-Correlated
PDN and TOT[3]	Y = 0.713x+5.329	0.627	0.384	120.39*	Correlated
PDN and MECH	Y = 100.14x+383.41	0.648	0.410	129.84*	Correlation

Source: Field Survey, 2009.

Implies F-value is significant at 0.01 level PDN= productivity in quintal/bigha; IR= Irrigation Ratio; TOT= Terms of Trade; MECH= Cost of mechanisation/bigha.

[3] Agricultural terms of trade. It is a ratio of prices received by farmers to price paid by farmers. It was calculated as: TOT= IPD for agricultural sector/ IPD for non-agricultural sector

The bivariate analysis between productivity and irrigation ratio shows no statistically significant correlation. The non-correlationship indicates that a favourable irrigation ratio alone may not be sufficient in sustaining higher agricultural growth. Agricultural growth demands the improvement in some other areas like consumption fertilizer, cost of farm mechanisation, etc.

The relationship between agricultural terms of trade and productivity is significant. TOT represent real output price in a year or the relative price of agricultural output. The result indicates that the variable TOT is negatively associated with agricultural productivity and the relationship is significant at 0.01level. It implies that if the relative price of agricultural output goes on increasing peoples found to be less interested to agriculture as a result productivity starts falling. So, the relationship between agricultural supply and TOT is found to be negative.

Mechanisation, which indicates overall technological progress in agriculture sector, is found to be significant in determining agricultural productivity. The relationship is as high as 0.10 level.

Thus the study reveals that irrigation development is an utmost necessity for agricultural development in the region. Irrigation ratio along with other factors determines agricultural productivity to a greater extent. However, the level of irrigation development in the region is not much impressive. It is estimated that out of total operated land of 2286.00 bighas, irrigation service is extended to 1216.50 bighas of land only. That is the irrigation service covers only 53.21 per cent of the total operated land in the surveyed area.

V. CONCLUSION AND POLICY IMPLICATION

Unfortunately, the scheme fails to supply water to all the paddy fields. Only a half of the total cropped area is covered by the scheme. Irregular water supply, insufficient water supply and technical deficiency in construction of channels are some of the important remarks made by the users. So, special emphasis should be given by the respective agencies in removing these shortcomings and sustained water supply with proper monitoring should be ensured.

Although some farmers are intended for double cultivation, they could not do so due to non-availability of water supply. So emphasis should be given on immediate completion of the project and service should be continued during pre-kharif and rabi seasons so as to motivate farmers for double as well as triple cultivations. Unfortunately, in Assam, most of the irrigation schemes regardless of minor or major start giving services during rainy seasons only. During off-raining seasons or rabi and pre-kharif seasons these schemes were for name shake only and lay idle in the name of development, renovation, extension and what not? Under this environment agricultural development programmes and policies are of very limited practical implication and arguing for sustainable irrigation is of no sense. This situation is inevitable, unless a strategy is formulated for a radical increase in cropping intensity, supported by commensurate irrigation facilities along with required (and feasible) increase in productivity levels of foodgrains especially rice and wheat.

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