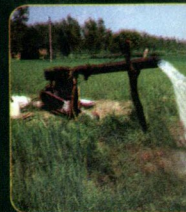
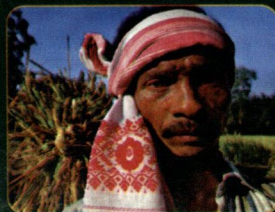
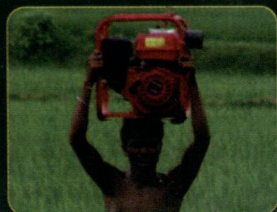


# Irrigation Potential in Agriculture of Assam



**Mrinal Kanti Dutta**



Irrigation in high rainfall areas has a two-fold role of promoting growth in agricultural productivity in one hand and stabilizing agricultural production on the other. Assam, in the north eastern region of India, has tremendous scope of agricultural development due to its richness in surface and ground water. However, irrigation infrastructure in the state has remained relatively weak, which has been identified by researchers as one of the main factors restricting farmers from fuller utilization of the potentials of the new agricultural technology. While most of the irrigation projects in the state are developed with government investment and are managed by government agencies, installation of privately owned ground water based small scale shallow tube well schemes started in the later part of 1990's with subsidized finance from agencies like the World Bank and National Bank for Agriculture and Rural Development. For enhancing agricultural production and productivity, there is a need to strengthen irrigation infrastructure in the state. Ironically, even the existing low irrigation capacity has remained underutilized for years together. This book investigates the question whether demand for irrigation is indeed low among farmers in Assam or shortcomings in the delivery from government owned irrigation facilities account for such poor utilization of existing irrigation capacity. The effectiveness of different categories of irrigation schemes in inducing farmers to adopt modern inputs such as fertilizer, HYV, etc. has also been examined using inputs from field study. The book should be of interest to agricultural policy planners, students of agricultural economics and those interested in agricultural economy of the state in general.

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# Irrigation Potential in Agriculture of Assam

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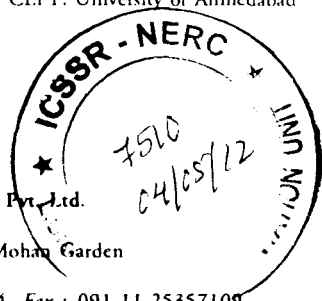
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# Contents

<i>Preface</i>	<i>v</i>
<i>List of Tables</i>	<i>xi</i>
<i>List of Maps</i>	<i>xvi</i>
<b>1. INTRODUCTION</b>	<b>1-10</b>
1.1 Background of the Study	1
1.2 Objectives	5
1.3 Hypotheses	6
1.4 Data Base and Methodology	6
1.5 Layout of the Dissertation	8
<b>2. CONCEPTUAL ISSUES AND REVIEW OF LITERATURE</b>	<b>11-53</b>
2.1 Definition and Importance	11
2.2 Related Concepts	13
2.3 Methods of Irrigation	22
2.4 Size Classification of Irrigation Works	25
2.5 Review of Literature	27
2.6 Conclusion	48
<b>3. IRRIGATION IN THE AGRICULTURAL ECONOMY OF ASSAM</b>	<b>54-89</b>
3.1 The Agricultural Economy of Assam	54

3.2	Water Resources and Ultimate Irrigation Potential	63
3.3	Development of Irrigation Infrastructure in Assam	67
3.4	Irrigated Area in Relation to Net Sown Area	75
3.5	Public Sector Investment in Irrigation	77
3.6	Government Irrigation and Water Charge	78
3.7	Irrigation Potential Actually Created	79
3.8	Utilisation of Irrigation Potential Created	83
3.9	Issues for Further Analysis	86
<b>4.</b>	<b>FIELD STUDY LOCATION, SAMPLING DESIGN AND THE SAMPLE</b>	<b>90-111</b>
4.1	The Purpose of Field Study	90
4.2	Selection of Area for Field Study	91
4.3	Selection of Schemes under Government Sector and Collection of Data	91
4.4	The Sampling Design for Private Minor Schemes	94
4.5	Sample Profile and their Agrarian Structure	95
	<i>Appendix 4.A : The Government Irrigation Schemes Included in the Field Study</i>	102
<b>5.</b>	<b>UTILISATION AND EFFECTIVENESS OF IRRIGATION UNDER DIFFERENT CONDITIONS</b>	<b>112-142</b>
5.1	The Utilisation Rate	112
5.2	Use of Irrigation Water	115
5.3	Availability of Irrigation Water as per Farmers' Requirements	116
5.4	Reasons Cited for Non-availability of Irrigation Water in Time and in Adequate Quantity	119

5.5	Cropwise Irrigation	122
5.6	Cropping Pattern and Cropping Intensity	124
5.7	Use of High Yielding Varieties	128
5.8	Use of Soil Nutrients	131
5.9	Yield of Rice	132
5.10	Extent of Contact of Sample Farmers with Extension Agencies	134
5.11	Principal Findings of the Chapter	138
5.12	Conclusion	141
	<b>Appendix 5.A : The Method of Processing Farmers' Responses Towards Extension Services</b>	<b>142</b>
<b>6.</b>	<b>FACTORS BEHIND LOW UTILISATION OF IRRIGATION POTENTIAL</b>	<b>143-173</b>
6.1	Major and Medium Schemes	144
6.2	Government Minor Schemes	152
6.3	Constraints on Fuller Utilisation of Irrigation Potential in Private Minor Schemes	166
6.4	Factors behind Low Utilisation of Irrigation Potential in the State	168
6.5	Conclusion	172
<b>7.</b>	<b>IRRIGATION FORMS AND EFFECTIVENESS IN USE OF BETTER FARMING PRACTICES</b>	<b>174-194</b>
7.1	Indicators of Effective Use of Irrigation	175
7.2	Analysis of Multiple Cropping	176
7.3	Analysis of Crop Diversification	180
7.4	Analysis of Use of High Yielding Varieties	185
7.5	Analysis of Use of Chemical Fertiliser	187
7.6	Analysis of Yield of Rice	189

7.6	Analysis of Yield of Rice	189
7.7	Conclusion	192
<b>8.</b>	<b>SUMMARY OF FINDINGS, CONCLUSION AND POLICY SUGGESTIONS</b>	<b>195-206</b>
8.1	Principal Findings	195
8.2.	Conclusion	201
8.3	Policy Suggestions	202
	<b>BIBLIOGRAPHY</b>	<b>207-212</b>
	<b>Index</b>	<b>213-216</b>

# Introduction

## 1.1 Background of the Study

Assam is basically an agrarian economy in the sense that about 69 per cent of the workforce is employed in agriculture sector alone. In 2006-07, this sector contributed about 26 per cent to the Net State Domestic Product of the State (Government of Assam, 2007). The development of the state's economy is dependent, to a large extent, on the development of this sector. But in spite of its overwhelming dominance in the state's economy, the progress of agriculture in the state is far from satisfactory. Agricultural productivity in the state is one of the lowest in the country. For example, the yield rate of rice, the major food crop in the state, stood at 15.41 quintal per hectare in 2005-06 against 37.00 quintal per hectare in Punjab, 30.00 quintal per hectare in Haryana, 29.39 quintal per hectare in Andhra Pradesh, 26.50 quintal per hectare in Tamil Nadu and 20.74 quintal per hectare at all-India level (CMIE, 2007). In view of the relatively higher growth rate of population of the state, for attaining self-sufficiency in food production it will be necessary to achieve a much higher growth rate of agricultural production in the coming years.

The most crucial input for agricultural production is land, the supply of which is inelastic in nature. In view of the high

and rising density of population in the state, the pressure on land for agricultural as well as non-agricultural purposes has been going up continuously. As a result, the scope for increasing net area under cultivation has become extremely limited. Higher agricultural growth, has therefore, to come about mainly through more intensive use of the land area under cultivation. This makes the role of irrigation in agriculture very crucial.

Irrigation has been considered as a prime factor for growth of agricultural production for the country as a whole. Due emphasis had, therefore, been given to this important sector even during the British period (Mitra, 1984). The role of irrigation in the field of agriculture is two-fold. On one hand, it promotes growth in agricultural productivity and on the other hand, it contributes towards stabilization of agricultural production. Irrigation imparts stability to agricultural production by reducing farmer's dependence on rainfall, which could be quite uncertain at times. Its contribution to enhancement of agricultural production can come through in a number of ways. As Dhawan (1996) points out, irrigation increases crop output through a rise in (a) proportion of net sown area of a holding and (b) gross cropped area and cropping intensity. It also enhances agricultural productivity directly through yield effects. Apart from these, irrigation helps replacing low-valued crops by high-valued ones which ultimately results in enhancement of the value of agricultural production. The concept of multiple cropping has received much more importance particularly after Green Revolution started in Indian agriculture during the late 1960s. The increasing use of high yielding variety (HYV) for enhancing agricultural output has also necessitated the expansion of irrigation network. HYV possesses high potential. To use it, soil should contain nutrients, which is provided by chemical fertilizer. HYV with chemical nutrients can give the best possible result under irrigated condition only.

Irrigation has a particularly important role in stabilizing

agriculture in a state like Assam. Although the state receives good rainfall almost every year, it is not evenly distributed over time and space. The erratic nature of rainfall makes *kharif* crops vulnerable to the twin problems of flood and drought thereby adversely affecting agricultural productivity. Thus, it has become necessary to expand the area under and output of *rabi* crops which requires adequate and assured irrigation water. The importance of irrigation in the state, thus, arises from the need to stabilize and step up the quantum of agricultural output, to generate income and employment in the rural sector and to meet the mounting food demands of the fast growing population (Sharma, 1992).

However, the scenario of irrigation in the state is paradoxical. The state can boast of a huge amount of surface as well as ground water resources. But these are yet to be fully exploited. In case of created potential also, there exists a huge gap between capacity created and capacity utilised. As per data available, out of a total of 27,06,000 hectares net sown area, only 6.20 per cent is irrigated in 2003-04 (CMIE, 2007) as against 39.11 per cent of net sown area being irrigated for the whole of the country. Interestingly, the figure has been on the decline from 1999-2000 onwards. On the utilisation front also, out of a total created potential of 5,35,212 hectares under government sector in 2005-06 only 60,762.37 hectares were utilised thereby putting the utilisation percentage at as low as 11.35 per cent. Thus while the capacity created under the existing projects do not add up to even a quarter of the cultivated area, the low utilisation of the created capacity is a matter of serious concern. It is, in this context, identifying the factors responsible for low overall utilisation of created irrigation potential in the state becomes important. The studies carried out on the subject so far, although not sufficient to comprehensively cover all the aspects of the problem, have pointed out a number of interesting factors hindering full utilisation of irrigation potential created.

According to Das (1984), this low utilisation is basically

due to the fact that "the aspect of 'Command Area Development', which includes construction of field channels, consolidation of holdings, land levelling and shaping and other infrastructural development had not been planned earlier."

Bezbaruah (1994) attributes the problem of under-utilisation partly to inadequate planning and lack of coordination among various agencies responsible for implementation of irrigation programmes of the state. He, however, is of the view that without a comprehensive study on the subject, it is difficult to point out all the factors responsible for low utilisation rate of irrigation potential created.

The limitations of the above studies in this context are that these studies are basically on agriculture in the state in general and, therefore, have not adequately analysed the problems of the irrigation sector. There are, however, a few studies, which have specifically taken up the issues of irrigation and problem of underutilisation of irrigation potential.

In a study undertaken in Jorhat district of the state, Gohain and Gogoi (1986) found that underutilisation of irrigation arose as a result of interplay of various constraints at farm level. These include prevalence of monocropping system among large farmers, resource constraints among small and marginal farmers, slow development of irrigation distribution network, lack of training and extension programmes to the farmers, non-availability of infrastructural facilities like quality seed and fertilizer in time, institutional credit, etc.

According to Gogoi (1989), frequent breakdowns of the wells, irregular supply of electricity in case of deep tube-wells, lack of proper time schedule for raising different crops in case of surface flow schemes are some of the factors hindering full utilisation of irrigation potential created. He

also found that inadequate agricultural extension facilities and lack of coordination among various departments in the development of irrigation in the sample district were also responsible for underutilisation of created irrigation potential.

In a study on Jamuna Irrigation Project of the state, Saikia and Borah (1993) found that non-utilisation of created capacity is due to the poor canal system leading to non-availability of irrigation at the time of requirement, poor project management, loss of water in the process of conveyance and distribution, lack of consolidation of holdings and land development, inadequate agricultural support programme, etc.

The findings of all these studies are very interesting. But these cannot be generalised as the factors for low utilisation of potential created for the state as a whole since these studies are specific to either a project or a location only. As such, to identify the factors responsible for low utilisation of irrigation potential in different irrigation projects in the state, a specific study was considered necessary. It is in this context that the present study was undertaken to examine the performance of the irrigation projects in the state in terms of capacity created and utilised and to identify the factors responsible for low utilisation of the capacity created.

## **1.2 Objectives**

The specific objectives of the study were as follows :

- (i) To examine the factors responsible for under-utilisation of created potential of irrigation projects.
- (ii) To examine the relative efficiency and effectiveness of different types of irrigation projects in Assam. The efficiencies have been studied with respect to the rate of utilisation of different forms of irrigation in Assam

while effectiveness is studied mainly with respect to its capacity to induce the farmers using irrigation to adopt modern inputs such as fertilizer, HYV, etc.

- (iii) To suggest policy measures for better utilisation of created irrigation potential and outline the direction for future expansion of irrigation infrastructure in the state .

### **1.3 Hypotheses**

Based on preliminary scrutiny of literature and statistics, the following hypotheses were taken up for verification during the course of the study :

1. Inefficient management of government owned and operated irrigation schemes is responsible for dismal utilisation rate of created irrigation potential in the state.
2. Faulty design has resulted in low utilisation of capacity of the projects.
3. Low utilisation is due to absence of land reform and preparation measures such as consolidation of holdings, levelling of land, etc.

### **1.4 Data Base and Methodology**

The study is based on both secondary and primary data. Secondary data were collected from the publications of various organisations, viz. Directorate of Economics and Statistics, Government of Assam; Irrigation Department, Government of Assam; CMIE report as well as research publications of individual and institutions like Agro-Economic Research Centre for North Eastern Region. The overall picture emerging from the analysis of such secondary data provided the general outlook for a more detailed and intensive investigation of the problems in the field study.

In view of the technical, institutional and sizewise heterogeneity of irrigation projects in the state, the fieldwork had various layers. For major and medium size irrigation projects, 2 out of the 19 existing projects were selected for detailed case study. This selection was made on the basis of preliminary scrutiny of all the projects in the category. The inputs for case study came from the initial project report, reports on the functioning of the project, interview of the officials and a survey of the farmers in the command area. While the reports provided valuable information and insight, the interview of the project officials was necessary for verification and better understanding of the working of the project. The survey of the farmers in the command area helped in cross-checking and also in gathering additional information regarding the problems of utilisation and effectiveness of the project. For selecting the sample of farm households, a two-stage random sampling was used. In the first stage, one village each from different reaches of the major and medium schemes was selected. In the second stage, about 12 per cent of farm households in each selected village were taken at random for collection of data on different aspects of farm operations and use of irrigation water.

Minor irrigation schemes are not homogeneous in nature. On the basis of ownership pattern, these can be classified as government owned or privately owned. From the technical point of view, the government schemes are relatively bigger. These are either surface lift irrigation schemes from river flow or deep tube-well based irrigation schemes. In both these types water is distributed to farmers' fields through canals as in the major and medium schemes. Five schemes from the two districts of Dibrugarh in Upper Assam and Barpeta in Lower Assam were selected for analysis. The methodology adopted for data collection was more or less same as in the case of major and medium schemes. The privately owned schemes are based on shallow tube-wells with maximum command area of two hectares each. For comparability, the sample of farm households under privately owned schemes

has been drawn from the same three districts, viz. Dibrugarh, Nagaon and Barpeta, to which the government owned schemes studied belong. The sample of farms was selected using a multi-stage sampling process. In the first stage, two representative Agricultural Extension Officers (AEO) circles were selected from the three districts. Then one representative village from each of the selected circles was taken. Finally, from each of the selected villages about 12 per cent of farm households were selected at random.

Besides using simple statistical tools like averages, ratios and percentages for summarization and comparison, detailed case studies of different schemes have been carried out for identification of factors responsible for the observed utilisation rates under different types of schemes. For further validation of some of the findings regression analysis has also been used.

## **1.5 Layout of the Book**

The Book is comprised of 8 chapters including the present one.

Based on the survey of available literature, chapter two deals with the conceptual issues of irrigation. It also presents a theoretical discussion on the issues relating to the development of irrigation in a state. It covers a variety of issues ranging from the definition of irrigation to utilisation of irrigation potential created. The chapter is also the product of a survey of available literature on irrigation. The findings of some of the empirical works found relevant in the context of the present study have also been summarised in this chapter.

The core of the study begins with chapter three on Irrigation in the Agricultural Economy of Assam. Here a brief description of the structure of agriculture in Assam is followed by an analysis of the trends in the development of irrigation in the state. A comparative study of the development of irrigation at the state level and national level

is also presented in this chapter. The chapter ends with identifying the emerging issues for fieldwork. The analysis of secondary data on irrigation in Assam and the findings of the pioneering works on irrigation lead us to certain issues which need further investigation by way of collection of primary data on these issues. The issues that will be dealt with rigorously in the field studies are identified in this chapter.

The four chapters from chapter four to chapter seven are based on the field surveys carried out as a part of the study. Chapter four outlines the background and methodology of the field survey. It also presents the general profiles of the irrigation projects where field studies were carried out. The last part of this chapter deals with the sample profile and its agrarian structure. Chapter five analyses effectiveness and utilisation of different irrigation schemes across regions with the help of some simple statistical tools like averages, ratios and percentages. Detailed case studies of different schemes were carried out for identification of factors responsible for the observed utilisation rates under different types of schemes which is reported in chapter six. In chapter seven, the detailed econometric analysis of the effectiveness of irrigation of different forms in inducing farmers to use better farming practices has been reported.

In the concluding chapter of the dissertation, findings have been summarised, conclusions have been inferred and on the basis of the findings and conclusions, some policy suggestions have been outlined.

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