বি আই ডি এস ওয়ার্কিং পেপার
BIDS WORKING PAPER

Working Paper New Series No. 14

PERFORMANCE OF SMALL SCALE WATER MANAGEMENT PROJECTS IN BANGLADESH: RAPID RURAL APPRAISAL OF SIX SELECTED PROJECTS

KARIMULLAH BHUIYAN*

June 1995

Price Tk. 75.00

বাংলাদেশ উন্নয়ন গবেষণা প্রতিষ্ঠান
ঢাকা, বাংলাদেশ
BANGLADESH INSTITUTE OF DEVELOPMENT STUDIES
DHAKA, BANGLADESH

Working Paper New Series No. 14

PERFORMANCE OF SMALL SCALE WATER MANAGEMENT PROJECTS IN BANGLADESH: RAPID RURAL APPRAISAL OF SIX SELECTED PROJECTS

KARIMULLAH BHUIYAN*

June 1995

Price Tk. 75.00

*The author is a Research Associate at the Bangladesh Institute of Development Studies, E-17 Agargaon, Sher-e-Bangla Nagar, GPO Box 3854, Dhaka-1207.

Acknowledgement

The Appraisal Study of SSISP concentrates its efforts mainly on socio-economic evaluation of ten selected projects in Bangladesh. The ten projects have been selected out of 31 SSISP sub-projects in such a manner that they are representative in terms of size, type and regional dispersion. However, it was subsequently felt that the left out projects may have some characteristics of their own which would not be captured in the evaluation of the ten selected projects. Moreover, all the projects selected for evaluation are already completed. It was felt that the on-going and the discontinued projects are also likely to provide valuable information on problems of implementing small scale water development projects in the country. Recognizing this, an attempt has been made to evaluate, using Rapid Rural Appraisal technique (RRA), the socio-economic impact of another six projects including those already completed, on-going and discontinued. This Report is the outcome of this effort.

This working paper is a part of the report of the BIDS socio-economic evaluation study of Small Scale Irrigation Sector Projects (SSISP) in Bangladesh. Dr. Quazi Shahabuddin deserves special thanks as the Project Director of the BIDS-SSISP study. Thanks are also due to my colleagues of the BIDS-SSISP Research Team, as well as those who provided excellent assistance in computer programming, word processing, and in carrying out the field survey and subsequently in the tabulation of data (names are listed in Annex-1 of the Report).

The members of the Appraisal Team extensively visited and spent about a week in each project area. While conducting the study, they received whole-hearted cooperation everywhere. I, on behalf of the Research Team would like to take this opportunity to express my thanks to all those concerned. In particular, we are grateful for the cooperation received from the Chairmen and Members of Union Parishads in the survey areas, and the officers of different organizations at thana level in Boalkhali, Tetulia, Thakurgaon Sadar, Mohonganj, Banoripara, Uzirpur and Galachipa. Special thanks are due to Mr. M.A. Mannaf Majumder, Director and Mr. Md. Shahidullah, Executive Engineer at the Directorate of Planning Schemes - II (ADB), BWDB, and Mr. Harunur Rashid Bhuiyan (XEN), Mr. Altaf Hossain (XEN) and Mr. Hamidul Haque (XEN), as well as other staff of different field offices of BWDB, who provided their support and extended their cooperation in the conduct of this study. The Appraisal Team also wishes to thank the farmers, labourers, fishermen, and other rural people, who with their family members gave time and shared their experience with the members of the Appraisal Team.

Finally, I would like to thank the Delegation of the Commission of the European Communities for conceiving and subsequently providing financial support for this study.

Karimullah Bhuiyan
June 1995

Table of Contents

List of Tables

List of Figures

List of Annexure

SECTION I

Introduction

The economy of Bangladesh is predominantly agrarian. The share of agriculture in GDP is declining since independence and at present it's share is 37.5%. Foodgrain production is being considered as the focal point of agricultural development since early sixties. Rice and wheat account nearly 80 per cent of gross cropped area but it is yet to achieve self sufficiency in food due to population increase, level and mode of production, natural constraints and calamities. The growth of cereal economy can not be achieved without accelerated diffusion of technology which depends on flood control, drainage and irrigation facilities. The efficient management of water resources and the accessibility of credit and input package have been earmarked by the policy makers and the option is for less capital intensive but high and quick return by small scale irrigation-drainage and flood control projects.

1.1 The Small Scale Irrigation Sector Project (SSISP)

SSISP was initiated and designed within the Medium Term Foodgrain Production Plan (MTFPP) under the Second Five Year Plan of Bangladesh to increase the area available for foodgrain production. This was sought through implementation of small projects comprising the construction and rehabilitation of irrigation, drainage and flood protection facilities, and the installation of appropriate equipment such as low-lift pumps, deep and shallow-tubewells.

The project was initially planned to encompass 31 sub-projects in four cycles/phases selected from all areas of Bangladesh with a net area of 103,730 ha, 69.7% of which were to be brought under flood control, 48.6% under irrigation, and drainage facilities were to be established in 35% of the land.

Construction of the first cycle of sub-projects (4 in number) commenced in 1982-83. The Bangladesh Water Development Board (BWDB) is responsible for the identification, appraisal, design and construction of the main civil works. The sub-projects were selected in accordance with the basic criteria specified by the Asian Development Bank (ADB) which are as follow. Each of the selected sub-project must be :

i) in line with the goal of increasing foodgrain production as prescribed by the MTFPP;
ii) selected to include areas succeptible to seasonal flooding and/or impeded drainage;
iii) constructed on the basis of simple engineering works essentially labour-intensive in character and designed to achieve immediate results after a construction period not exceeding three years;
iv) selected in order to achieve an equitable distribution of sub-projects throughout Bangladesh;
v) designed to benefit a maximum area of about 8,000 ha; and
vi) proposed to receive external financing exclusively under the project.

Project Implementation Mannual was prepared by the Directorate of Planning Schemes II (ADB), BWDB which clearly outlines and incorporates the process involved in identification and planning of sub-projects which also includes BWDB responsibilities and programme of activities for SSISP in the lines of design, contract documentation, construction and general implementation.

So, each of the selected sub-projects went through detailed appraisal by the BWDB Project Office and fulfilled, inter alia, the following criteria :

i) subject to a maximum investment of US $ 1000 per ha;
ii) capable of achieving a minimum economic internal rate of return (EIRR) of 15 per cent; and
iii) capable of generating significant benefits to farmers with landholdings of less than 1 ha in the sub-project area.

The Bangladesh Agricultural Development Corporation (BADC) was initially perceived to be responsible for the procurement and distribution of irrigation equipment required under the project. BADC was also made responsible for supervising Command Area Development (CAD). However, the procurement of LLPs and STWs for SSISP was taken out of the PP for BADC which implied virtually no role of BADC in CAD. Apparently, the CAD aspects of SSISP are considered under the national programme, and SSISP is expected to provide BADC with detailed planning map of each sub-project so that BADC can use it to organize and monitor pump fielding under the national programme. In only two sub-projects, BADC remains interested in the CAD for DTW for which it is procuring the DTW equipment under EEC grant. The Project had also envisaged that the Bangladesh Rural Development Board (BRDB) and the Department of Agricultural Extension (DAE) would actively participate in the on-farm infrastructure and extension work as cooperating agency.

SSISP is financed by ADB loans, EEC grant and local counterpart funding by the Government of Bangladesh (GOB), the latter accounting for only 24% of the total expenditure of US $62 million.

1.2 Objectives and Scope of the Evaluation Study

SSISP involves a number of sub-projects that are regionally dispersed. More importantly, there are variations across these sub-projects in terms of infrastructure related to water management. However, there are two common elements : (a) these are relatively small projects (316 ha to 8097 ha of net area), and (b) they aim at increasing the area available for foodgrain production. Recognizing these commonalities, the objectives of the general study on SSISP are two-fold:

(a) assess the socio-economic (including agricultural) impacts of these projects, and

(b) from the experience of these projects, identify lessons for future designing and implementation of small scale irrigation projects in Bangladesh.

Under the first objective, attempts have been made to identify the socio-economic impacts of 10 selected sub-projects; identify factors that have constrained the extent of project impacts that were expected within the particular context of the projects' objectives; and to capture attitude, expectation, experience and opinions of the population affected by the projects.

Within the scope of the second objective, specificities of individual projects are expected to be captured in order to reach general conclusions on problems related to small scale irrigation project and on ways to resolve them.

The perceived benefit of SSISP is an increase in foodgrain production which is likely to be realized by bringing in more land under cultivation, crop diversification in favour of more remunerative crops, and higher yields due to adoption of modern HYV varieties. The study, therefore, examines the changes resulting from the project in agronomic practices,soil status, cropping patterns, farm labour demand along with cumulative impact of these changes on over all income and employment in the project area. The projects involving flood control and drainage are also expected to reduce the vulnerability of human lives, livestock and plant species and damages to crops and infrastructures. Some positive impacts may also go for health and habitation in such projects. Besides these aspects, the impacts of the project on non-crop agriculture and non-agricultural activities are also important for evaluation study. Among various social aspects, the impacts on family structure, education, health, nutrition, sanitation and status of women etc. deserve evaluation.

It is expected that the performances of participating agencies, particularly of BWDB will have bearing on the extent of project impacts. While detailed engineering aspects of the BWDB activities are beyond the scope of the present evaluation, certain technical matters such as appropriateness of structures and their sites, adequacy of works done, operation and maintenance (O&M) etc. are examined in relation to their implications for flow of projects benefits.

Another important area of evaluation is how irrigation schemes are being operationalised in the project area once the basic infrastructures are provided. This calls for examination of the nature and extent of local level participation in maintenance, supply of modern inputs, and dissemination of information on seed and technology. In this regard, the activities of BADC, BRDB and DAE are studied along with identification of private responses.

1.3 Study Methodology and Sources of Data

As noted earlier, SSISP has a number of sub-projects that are regionally dispersed and vary in terms of the component involved (i.e. flood control, drainage, irrigation and protection from high tide). Moreover, there are wide variations in size (i.e. net cropped area), irrigation modes practiced, and involvement of public agencies in CAD (i.e. BADC and national programme). Also, the sub-projects have been implemented at different times (broadly grouped into four cycles) with a number of them discontinued later on due to some reasons or other. While it may have been desirable to evaluate each of the sub-projects under SSISP to capture all specificities, it is not considered cost effective both in terms of finance and time. So, 10 sub-projects were purposively selected (selection procedure has been described elsewhere in the evaluation reports of each of the selected sub-projects) for detailed study. While the selected sample sub-projects have been intensively surveyed through 3 sets of structured questionnaires for evaluation providing much of the insights into the SSISP, the left out projects may have their peculiarities of their own. Moreover, the discontinued sub-projects are likely to provide valuable information on problems of implementing small scale water management and development projects in Bangladesh. So,in case of these left out projects assessment needs to be done by resorting to some aspects of Rapid Rural Appraisal (RRA) technique.

Among the 21 left out projects, 7 were discontinued (project nos. 11, 14, 17, 20, 29, 30 & 31), 5 are ongoing (projects nos. 09, 15, 23, 24 & 25) and the remaining 9 were completed in different times of which project nos. 05, 13 and 16 were completed by June, 1992. Time and our limited resources do not

allow us to make socio-economic Rapid Appraisals for all the 21 left out projects. So it has been decided to apply RRA technique to a sample of sub-projects of each category, as stated above, having representation for geographical dispersion and type of project component. The sample sub-projects selected for socio-economic rapid-appraisal are shown as follows :

Selected Sub-Projects for RRA

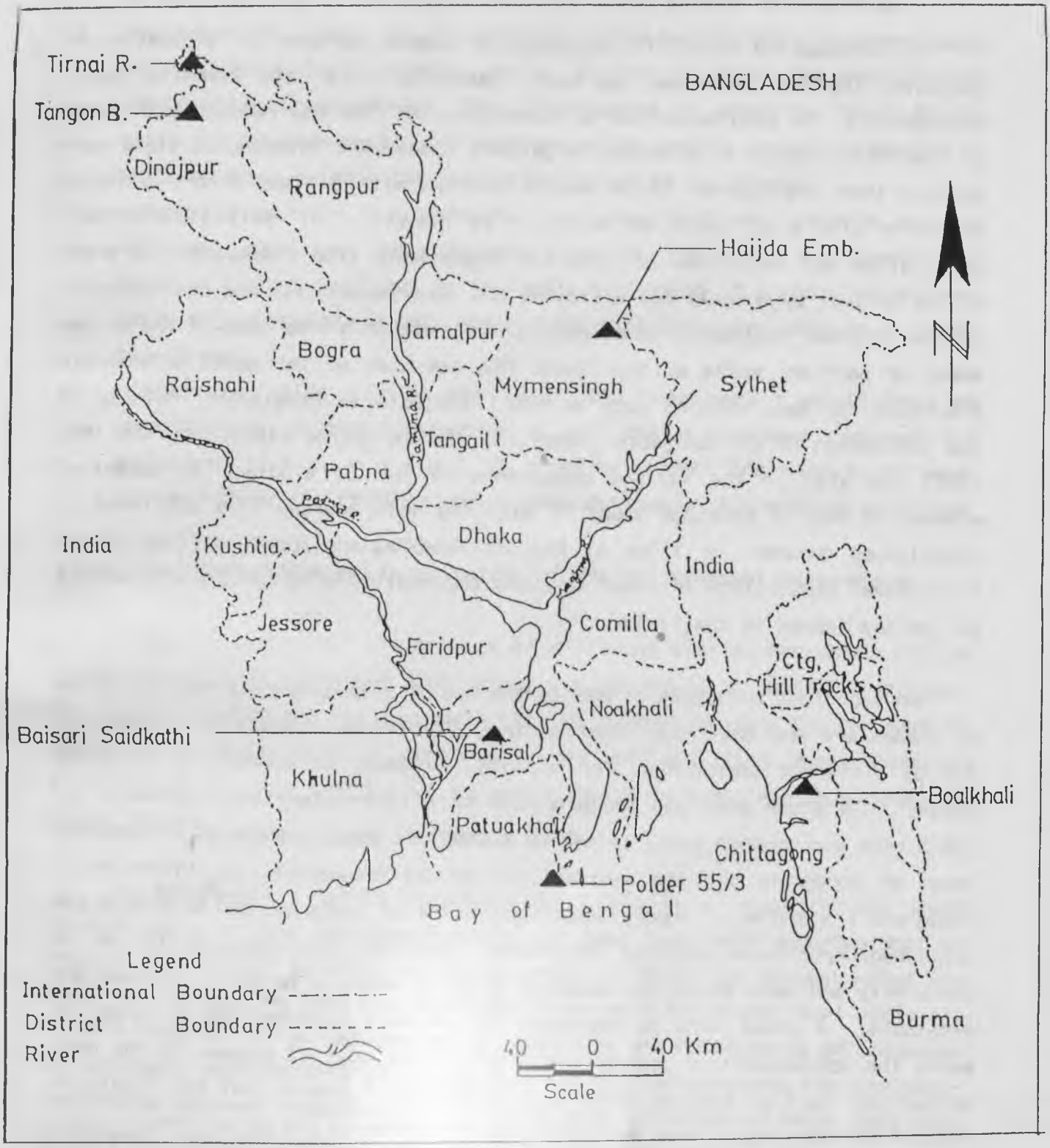
Cycle	Project number	Selected Sub-Project for RRA	Status of project	Objective of project	Area (ha.)		Location (District)
					Gross	Net	
II	05	Haijda Embankment Project	RC	FC/I	9717	8097	Netrokona
II	06	Tirnai River Sub-project	C	I	486	316	Panchagarh
II	09	Tangon Sub-Project	O	I	6073	4453	Thakurgaon
III	14	Boalkhali Irrigation Project	RD	I or FC/I	12550	7287	Chittagong
IV	20	Baisari-Saidkati Sub-project	D	FC/I	5223	Not known	Barisal & Pirojpur
IV	25	Patuakhali Polder 55/3	O	FC	9845	7403	Patuakhali

Note : C = Completed, RC = Recently completed, O = On-going,
D = Discontinued, RD = Recently discontinued,
I = Irrigation, FC = Flood control.

The selected 2 sub-projects from each category of completed, on-going and discontinued sub-projects, have diversities in terms of size of project, objective, location, time of completion or discontinuation and also by time of initiation of project in different cycles which may quite well testify the representativeness of our sample for RRA technique application.

FIGURE 1

PROJECT LOCATION MAP OF SAMPLE PROJECTS



1.3.1 Rapid Rural Appraisal Technique

In contrast to scientific approach of sample surveys for evaluation of projects, the RRA technique has been evolving since late seventies quite successfully in Bangladesh due to constraint of time and resources in terms of high cost. RRA is a technique of project assessment intended to yield more quickly than traditional large sample surveys with minimum errors avoiding possible bias's of data collection. It consists of selective direct observation and interviews of informed respondents from representative areas of the project by a small but efficient and experienced team who can logically derive informed judgements relatively quickly within a time span of one or two weeks or earlier, while at the field. RRA has been so far quite extensively practised for many studies such as FCD/I projects in Bangladesh, notably in the evaluation of EIP projects (1988), in the series of studies by MPO (MPO 1991) and also in the various components of FAP 12 studies. An essential element of RRA is thorough study of existing data sources from published or unpublished document or files at Project Head/Regional/Local offices before field level exploration in order to avoid duplication of effort, and to arrive at the key issues in the field.

An important principle of RRA is the use of triangulation, the estimation of parameters and their verification from alternative sources of information and by different approaches. For example, evidence on changes in foodgrain output in a study area can be generated by direct interview of growers for yield rate and cropped area, by asking housewives about changes of consumption level of foodgrain and its availability in the households, by interview of foodgrain traders about supply/demand and price of foodgrain and also from the published/unpublished data of government agencies. All these should be in conformity and none should be accepted uniquely where alternative sources are available. A great care is necessary for an well condcted RRA in order to avoid the achievement of speedy execution at the cost of biases in the data collection. Earlier studies earmark the sources of biases that are likely to distort the very objectives and utilities of RRA which are as follows:

a) locational bias - for example, interviewing/observing only accessible areas or failing to penetrate low-lying areas because of flooding;

b) socio-economic bias - in the extreme, interviewing only the conspicuous and vociferous local notable, while failing to cover the socially and economically disadvantaged. The interviewing of women in rural Muslim societies presents particular problems which require specific remedies if project impact on half the population is not to be ignored;

c) seasonal bias - in Bangladesh the same area routinely presents a quite different appearance at different times of the year, and conclusions based on a short visit may be seriously misleading if precautions are not taken to triangulate direct observation with interview data on a longer time-frame;

d) professional bias - while the ideal RRA team member would have an understanding of the interaction of all the disciplines required for evaluation of a given project, in practice precautions need to be taken to cross-check the findings and recommendations of different disciplines.

1.3.2 Team Composition and Organisation of RRA for Selected Sub-projects

A team consisting of six members of different disciplines which include Field Co-ordinator and Field Supervisor, was headed by a Junior Consultant. The team was entrusted the responsibility of conducting the RRA for each of the selected sub-projects. All the members are well qualified, experienced and efficient in deriving qualitative and quantitative judgements with accuracy of higher degree.

The team members before launching for field level exploration, went through the available documents/reports and data from BWDB Head/Regional or Project Offices for examination and analysis in order to conceptualize the targetted issues. The team also exchanged views with the field level officials of BWDB involved in the implementation, operation and maintenance of concerned sub-projects particularly S.O., SDE and XEN for augmenting the concept-tualization process. Meeting with the thana level officials of BRDB, DAE, BADC & TNO etc., the officials of available NGOs and other knowledgeable personnels

such as UP Chairmen/Members, teachers, advocates, KSS, traders etc. and group discussions with the farmers of all type - large, medium or small at village level within the project area helped much for generalising the impact evaluation.

A check list for socio-economic rapid appraisal for the selected sub-projects was prepared for discussion at various levels in the field. Attempt was made to evaluate the impact of the sub-project in contrast to pre-project situation while discussing with the groups of people of all categories. The trend of socio-economic aspects within the project area were also compared with the neighbouring areas but beyond the project and relatively free from the impact of any other such projects for which the team members extensively visited all nook and corners within the project area and also a few other villages beyond the project area but neighbouring to the project periphery.

1.4 Structure of the Report

After the introductory section, this report is being structured into 7 (seven) other sections. Each section of II-VII deals with the RRA of individual sub-project where project description, aims and objectives of the project, engineering design, implementation and maintenance, socio-economic impact of the project, overall appraisal and limitation in implementation and recommendations etc. are dealt under the sub-sections. In section VIII concluding remarks based on findings and observations are provided for future plan and implementation of any water management project.

SECTION II

Boalkhali Irrigation Project

Boalkhali Irrigation Project as the name indicates is basically a project for improved irrigation but the original project proposal conceived the project not only for irrigation but also for drainage improvement and flood control. The appraisal report prepared by the Directorate of Planning Schemes-II (ADB), BWDB and the Consulting Engineers (Coode & Partners, UK), also contained these three components and it was duly approved by the screening committee of BWDB and ADB. This is a 3rd cycle sub-project designed to be completed by 1989 and starting from 1986. But due to non-availability of approved design no work was initiated in time except embankment. The approved design drawing of regulators began to roll out from March '88 and work order for 3 regulators were issued in May '88. But due to delay in getting land possession the contractors could not start the work before last week of December '88. It has been remarked in the quarterly report no. 36, prepared by Directorate of Planning Schemes - II (ADB), BWDB and Consulting Engineers (Coode & Partners, U.K.), as follow:

> "Boalkhali as a coastal project is already at a high standard of production. In view of the slow progress, the large size of the project and the impossibility of completing it by 1991, it was concluded at the end of the ADB review on Oct. - Nov. 1989 that the sub-project should be dropped from the SSISP programme but ongoing regulators were to be completed and no new work should be taken up. The remaining work of the 3 on-going regulators has been completed by June 1992".

So, after completion of work for 3 regulators out of proposed 12 regulators, the project has been discontinued till date.

2.1 Project Description

Location : Boalkhali Irrigation Project is located in Boalkhali and Patia in the district of Chittagong about 12 km east of Chittagong District Head Quarter (Figure-2). The entire Boalkhali thana (including all the villages/unions) and part of Patia thana have been treated as the catchment area of this project which according to Appraisal Report, May 1986 of BWDB and Coode & Partners, UK, covers a gross area of 12550 ha and net area of 7287 ha. Actually the catchment area of this project appears to be even much larger than cited in the appraisal report (May, 1986). The project is bounded by Karnaphuli river left bank in the north and west, the foot range of hills in the east, and Boalkhali Khal upto road bridge and Chittagong - Cox's Bazar road as far as Patia in the South.

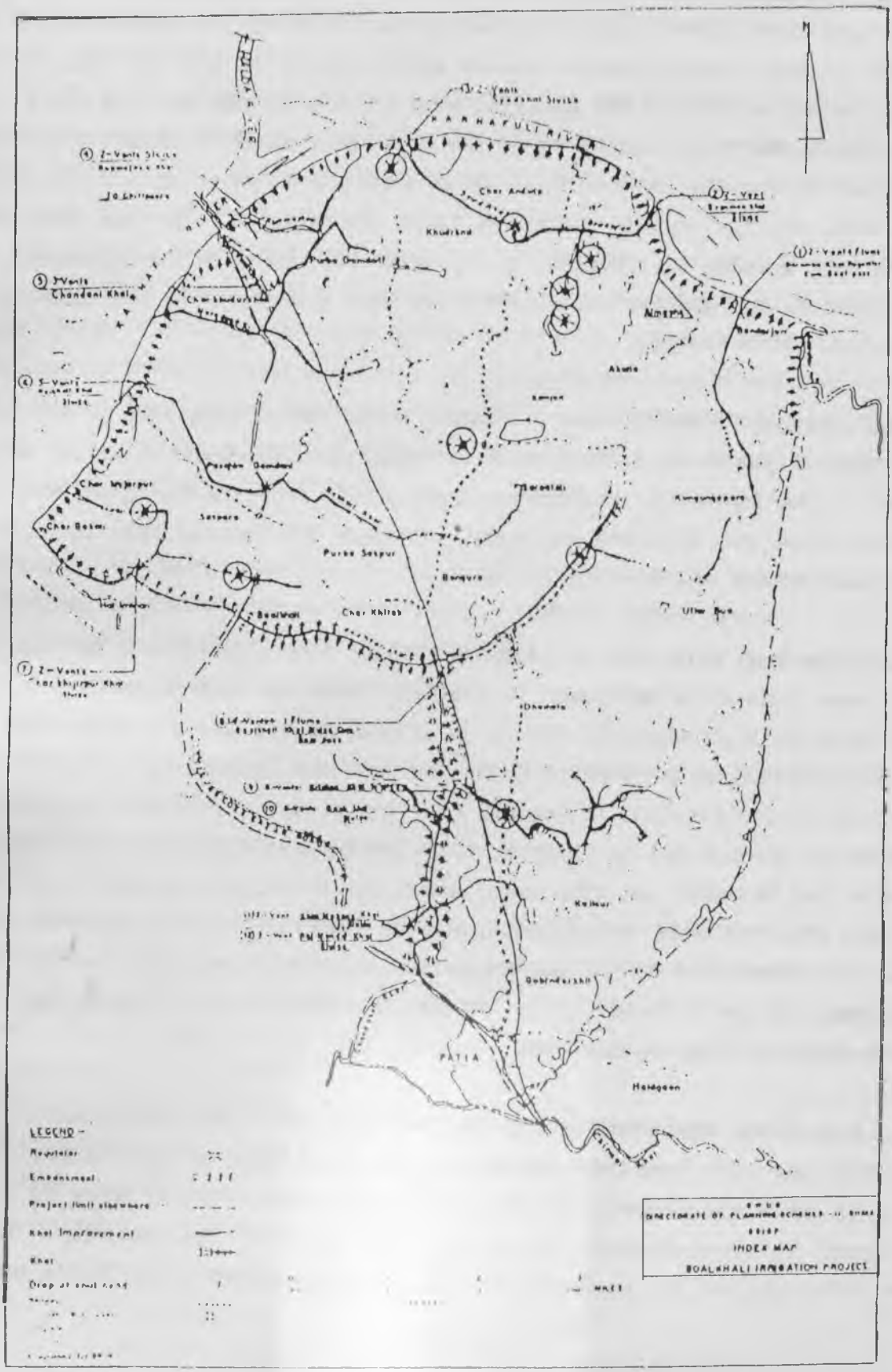
Background : The feasibility report (1968) under the Karnaphuli river project for the left bank of Karnaphuli river examined the possibility of providing improved irrigation, improved drainage for internal rainfall run-off and protection against external river floods. The report suggested a centrally pumped irrigation scheme which was never carried out but an extensive spontaneous installation of LLPs has taken place which covers nearly 83% of net cultivable area in the left bank as revealed in the appraisal report, May 1986.

The main problems of the project area that have been identified are as follow:

i) Shortage of water supply for irrigation from February to April for boro crop and around November for Aman crop.
ii) Standing water from rainfall run-off which is slow to drain away during June to September.
iii) Backing up of high Karnaphuli river levels in July & August.

FIGURE 2

BOALKHALI IRRIGATION PROJECT MAP



Irrigation Supply : The Karnaphuli river is being treated as the only source of surface water for irrigation in the project area. It has been observed that network of small khals (canal) receive sufficient water only at times of high tides. Operation of LLPs are possible only 2 hours during day time and 2 hours again during the night depending on the importancy which creates limitation in yield due to the limited period of water supply when water enters the khal at high tide. An LLP should operate 6 hours normally per day and more hours during peak demand. So, in order to increase the supply of surface water, the khals need to be deepened and conserve the high tide water so that pumping can take place sufficiently.

Rainfall Runoff : Rainfall runoff causes inundation of crop land in the north-east area of the project. This area collects all the runoff from the western slopes of the foothills. It also receives spills from the Bandajuri khal when in high flood and from the Karnaphuli through the Baramba khal both in the north-east corner of the project.

Flood Protection : In July and August - ocassional river levels are too high which does not allow drainage of the low land and high river levels also coincide with high rainfall during this time on the project area. The high tide water levels cause difficulty for the aus crop harvesting in July and the aman crop transplantation in August. Planting of aman is delayed to September and even to October due to flooding which brings lower yield due to drought in November and December. An embankment along the Karnaphuli and Boalkhali banks can keep the area free from flooding due to high river levels. The regulators along the embankment will allow irrigation water to enter and drainage water to escape. For full flood protection the following measures were recommended in the Appraisal Report, May 1986.

(a) a flood embankment along the Bandajuri khal and the Karnaphuli left bank from the high land near the former to a regulator on the Boalkhali khal near its mouth, a distance of 11 miles over much of which there is a low embankment existing already. In view of the level of the embankment of the Halda River Project on the opposite bank of the Karnaphuli, the levels adopted

for Boalkhali are 18 ft SOB at the Baramba khal and 14 ft SOB at the Boalkhali. This is indicated as giving protection from overtopping only 1 in 8 years at the upstream end of the bank.

(b) a flood embankment on the north bank of the Boalkhali khal up to the road bridge and on both banks of the Boalkhali khal and Chandkhali khal from the Boalkhali bridge to the road bridge on the Chandkhali khal near Patia, all at a crest level of 14 ft.

(c) 12 Nos. regualtors including a total 34 Nos. (5 feet x 6 feet) vents fitted with flap gates on the river side and land side and a total of 2 or 3 flumes fitted with a radial gate about 15 ft high and 12 or 15 ft wide to allow country boats to pass when internal and external levels are similar.

(d) additional regulators may be required under the railway line just to the north of Patia. A single regulator may be able to cover a number of railway crossings.

Objectives : The main objective of the project comprises the following :

i) Protection against the external river floods by embankment.
ii) Improved drainage of internal runoff and hilly runoff by re-excavation of khals and providing sufficient ventage of regulators.
iii) Improved irrigation by deepening of khals for retention of high tide water and fielding of more LLPs to the farmers and by installation of shallow tubewells.
iv) Unhindered navigation facilities.

Salient Features : Original block PP was approved on 11-4-85 while revised block PP was cleared by PEC on 25-4-89. Individual PP of this sub-project was approved by the Ministry on 8.10.88. According to the original PP which was duly appraised by BWDB on May 1986, the salient features of this sub-project are as follows :

(a) The sub-project is on the left bank of Karnaphuli river and spread over the Boalkhali and Patia thanas of Chittagong district.
(b) Irrigation, drainage and flood conrol are the basic components of this sub-project.

(c) Gross project area was considered to be 31,000 acres (12,550 ha) and it was estimated that net benefitted area would be 18,000 acres (7,287 ha) which would get sufficient irrigation facilities.On the other hand it was noticed that irrigation was being provided to 15,000 acres in various degrees which constitute 83% of proposed area to be benefitted.

(d) The main objective was to improve the condition of Boro, Aus and Aman cultivation by providing the facilitis like fielding 98 additional number of LLPs and 50 STWs, 58 km khal deepening and 45 km flood protection embankment with 12 regulators having 34 vents.

(e) The capital cost was budgeted Tk. 2035 lacs (in 1986 price) having foreign exchange component Tk. 570 lacs. Later-on total cost of the project was increased to Tk. 3788 lacs. The annual O&M cost was assumed Tk. 47 lacs.

(f) The intended benefit of the project was perceived increse in output of foodgrain by 14800 met. tons and the economic internal rate of return was estimated at 20%.

(g) It was expected that the project would be completely implemented by the end of 1989 starting from 1986 but the project has been discontinued after June 1992 and the progress of work or implementation status of project is very insignificant. Quarterly reports prepared by the Directorate of Planning Schemes II (ADB), BWDB reveal the following position of project implementation.

Item of work	As per PP		Implementation upto June, 1992	
	Quantity	Cost (lac taka)	Quantity	Expenditure (lac taka)
1. Land acquisition	191.5 ha	951.22	6.44 ha	34.27
2. Regulator	12 (total 34 vents)	795.00	3 (each of 2 vents)	Not known
3. Boat pass	2	150.00	nil	nil
4. Box culvert	10	60.00	nil	nil
5. Foot bridge	20	10.00	nil	nil
6. Embankment	45 km	740.00	2.50 km	28.60
7. Canal re-excavation	58 km	190.00	nil	nil
8. Jeep	1	9.00	nil	nil
9. Motor cycle	3	1.20	nil	nil
10. Speed boat	1	2.50	nil	nil
11. Others	Not specified	879.08	nil	nil

2.2 Assessment of Project Features

2.2.1 Project Area and Location

It has been indicated in the Appraisal Report (May, 1986) of BWDB, approved by ADB, that the gross project area consists of 31,000 acres and benefitted area is 18000 acres, spread over the Boalkhali & Patia thanas in the district of Chittagong. There are 10 unions under Boalkhali and 22 unions under Patia thana. Boalkhali thana accounts an area of 33,920 acres and the corresponding figure for Patia is 90,240 acres. The land use distribution in 1991-92 at Boalkhali and Patia thana are shown in Table - 1.

Table 1

Land Use in Boalkhali and Patia Thana, 1991/92

Land use (1991-92)	Boalkhali Thana		Patia Thana	
	Acres	%	Acres	%
Single crop	1598	4.71	9917	12.10
Double crop	11950	35.23	21950	24.32
Tripple crop	4052	11.95	1868	0.96
Perennial crops	1808	5.35	2041	2.26
Forest	8258	24.35	18000	19.95
Current fallow	531	1.57	582	0.64
Not cultivable (homestead, roads, river, ponds etc.)	5803	17.11	35882	39.76
Total area	33920	100.00	90240	100.00
Net cropped area	17600	51.88	33735	37.38

Source: Thana Statistical Offices, Boalkhali and Patia, 1993

The Appraisal Report of BWDB fails to mention the unions/villages which are covered under the project. So, confusion arises in demarcating the exact location and boundary of catchment area of the project. While discussing with the officials of BWDB at Chittagong & Kaptai and the thana level officials of Boalkhali and Patia, it appears that the project was conceived for the entire Boalkhali thana and for about 30-40 per cent area of Patia on both banks of Boalkhali and Chandkhali khals. So the gross area of the project appears to be much larger than 31000 acres. There is a gross violation of norm set up in the Project Implementation Manual (PIM) of BWDB, approved by ADB, in terms of gross area of the project as it has been clearly stated in the PIM that project area should not be larger than 8000 ha. The largeness of the project

has eventually emerged to be one of the contributory factors for discontinuation of the project as revealed in the ADB review (1989).

2.2.2 Physical Structures of the Project and Implementation

The success of any project for water management depends much on proper designing and implementation of physical structures and their operation and maintenance. As it has been earlier stated that it is one of the discontinued projects of BWDB under SSISP, so physical implementation is insignificant but the factors involved in the discontinuation process need to be looked into critically by item specific work done or supposed to be done.

Land Acquisition : As per PP 191.5 ha land at a cost of Tk. 951.22 lac was supposed to be acquired for implementation of the project but only 6.44 ha land at a cost of Tk. 34.27 lac was acquired till the time of discontinuation of the project. Here two points need to be explained. First, the cost of land per ha was budgeted Tk. 4.9672 lac which was very much on the high side (in 1986 price). Our observation and interview with the villagers reveal that at present land price varies in terms of intensity of cropping from Tk. 1.50 lac (for single crop) to Tk. 2.70 lac (for tripple crop) per ha and none of the farmers received more than one thousand taka as compensation per decimal of land. Secondly, the acquired land cost Tk. 5.3214 lac per ha which is nearly 7 percent higher than the budgeted estimate. It appears that the project was proposed without making sufficient survey for cost data which inflated the project cost.

Construction and Maintenance of Regulators : The main component of the project as per PP was conceived for constructing 12 regulators having 34 vents in different khals within the project area. All designs except for the Regulator cum Boatpass at Bharamba Khal were finalised for implementation. Design work for the structure at Bharamba Khal could not be finalised for change of site due to erosion pattern on the bank of Karnaphuli river. Work orders for 7 regulators were issued by the concerned XEN's office but due to delay in getting land possession, the contractors could start work for only 3

regulators by the end of December, 1988. Finally 3 regulators each of 2 vents were constructed by the end of June, 1992 at Roopmajhee Khal, Syed Khal and Brahman Khal, all on the left bank of Karnaphuli river. While we visited the sites of regulators as members of RRA team, each of the regulators were in good condition. But operation and maintenance of these completed regulators are totally absent and while asked the project officials of BWDB they replied that as the project was discontinued and there is no additional fund for O&M of the project, so it is not their business. They recommended that the responsibility for O&M of regulators may be entrusted to the concerned Union Parishad. They also urged for taking appropriate measures in order to complete all the project structures.

Canal Re-excavation : In order to conserve sufficient water with the help of regulators and also for draining out the rainfall run-off, it is necessary for canal re-excavation. As such it was proposed for 58 km re-excavation of existing khals but not a single inch of any khal is re-excavated and as such the utility of the completed regulators are apprehended to be jeopardized to a great extent.

Embankment : It was proposed that 45 km of embankment will be made where necessary in order to protect rainfall run-off and spills from the Bandajuri Khan in the north-east area of the project. It was also proposed to construct embankment along both banks of Boalkhali Khal, Bandajuri Khal and Karnaphuli left bank. But embankment was made only along the left bank of Karnaphuli. Total length of constructed embankments will be around 2 to 2.5 km and they are separated from one to another and the embankments are made only around the regulators. We interviewed the villagers whether before embankment Karnaphuli river damaged crops by inundating crop land during July & August when river levels are high. The villagers around the embankment reported that during last 20-25 years there was no crop damage due to flood or inundation by Karnaphuli except for the cyclone and tidal waves of April, 1991. But river erosion effects to some extent in almost every year. So, it appears that embankments, where made, are not essential. The embankments along Bandajuri khal and both banks of Boalkhali khal are very much essential but no attempt was made by

BWDB possibly due to existence of low embankment but it contains several cuts which need to be repaired and level of height should be increased.

Auxiliary Structures and Services :

It was proposed for construction of structures such as 2 Boatpasses, 10 Box Culverts, 20 Foot-Bridges and procuring auxiliary services like one Jeep, 3 Motor Cycles and one Speed Boat etc. but none of these are procured or constructed.

2.2.3 Institutional Arrangement and Involvement of Local People

The success or failure of a project depends much on conceptualizing the importance of institutional cooperation and arrangement among various Govt./Non Govt. agencies together with the participation of local people particularly involving the intended beneficiaries while implementing the project and overall management afterwards. BWDB Project Office did neither consult with the thana or district level officials of BRDB, BADC & DAE nor involved the local people who were intended to be the beneficiaries after implementation of the project. BWDB officials are of the view that involvement of so many agencies and local people, can only multiply the problems and develop confusion.

2.2.4 Irrigation

In an agricultural economy irrigation facilities play a vital role for diffusion of technology and production increase. The Appraisal Report (1986) states that the Boalkhali project area is already highly advanced agriculturally and the extent of development is basically based on low-lift pumps and the irrigated area is accounted to be 83% of the net cultivable area. In 1983-84, irrigated area as percentage of net cropped area of Boalkhali & Patia thanas were 61% and 66% respectively (BBS: The Bangladesh Census of Agriculture and Livestock: 1983-84) which are much high in comparison to national average (21% in 1983-84) and Chittagong district (about 30%). In Bangladesh area of irrigation has increased over time, and during

1983-84 to 1988-89 the percentage increase of irrigated area is 43%. While visiting the project area across the villages of Patia and Boalkhali thana we enquired about the mode of irrigation practice and extent of irrigation and it appears that apart from irrigation by modern methods such as DTW, STW or LLPs, farmers are habituated to irrigate their land by traditional means e.g. 'doons', swing baskets, gravity canals etc. from the large number of khals available near their crop land. Irrigation by hand tubewell is also noticed when surface water is not available. Extent of irrigation is quite high than elsewhere in the country as observed by the RRA Survey Team members. According to BRDB official records, there are 235 irrigation schemes in operation at present in the project area. The following table shows the irrigation practice at some villages within the project area and beyond.

Table 2

Irrigation Practice at Some Villages of Boalkhali and Patia Thana

Name of village and location	Area (in acres)	Net cropped area (in acres) 1991-92	Irrigated area as percentage of net cropped area		Modern irrigation facility (1991-92) existing
			1986/87	1991/92	
Sreepur (within the project, Boalkahli)	725	450	78	89	LLP-3 STW-1
Popadia (within project, Boalkhali)	1200	900	56	67	LLP-8 STW-1
Bidhugram (within project, Boalkhali)	742	550	46	77	DTW-1 LLP-3 STW-1
Dakkhin Vurshi (within project, Patia)	476	254	59	87	LLP-3
Hanmohona (within project, Patia)	445	320	41	51	LLP-3
Chowdhurygram (Beyond project, Patia)	2250	1500	38	47	LLP-3 STW-1
Entire Boalkhali Thana	33920	17600	63	69	LLP-165 DTW-10 STW-151
Entire Patia Thana	90240	33735	67	72	LLP-390 DTW-17 STW-175

Source: (a) RRA Survey of BIDS on SSISP, January, 1993.
(b) Thana Statistical Office, Boalkhali & Patia, 1993.

Area of irrigation by any means has increased quite significantly during 1986-87 to 1991-92 in Boalkhali and Patia Thanas and also in the villages within or beyond the project area. The development of irrigation is due to the initiatives and investments of local people and not related with the project as it has been discontinued and the built up regulators are yet to be operated. The present cost/charge of irrigation water per acre per season (particularly in dry season for boro cultivation) has been Tk. 500 - Tk. 600/= in different villages for modern/mechanised mode of irrigation. Share of irrigation by manual process and traditional means constitute around 40%-50% of total irrigated area and practiced by poor farmers in their small piece of land due to their inability to pay or purchase water. In some cases locational suitability of small plots dictate for traditional irrigation. But traditional mode of irrigation fails to provide sufficient water due to supply constraint of surface water.

Irrigated area as percentage of net cropped area is very high in the project area compared to elsewhere in the country but intensity of irrigation is not that much satisfactory due to lack of sufficient surface water in the canals which is available only during high tides. Re-excavation of Khals as proposed in the PP, operation of regulators and fielding additional LLPs (98) and STWs (50) would be sufficient for supply of both surface and underground water which would bring the desired objective of increased production.

2.3 Agricultural Transition

Discussions with the personnels of BWDB, BRDB, DAE, BADC at various levels and also with the UP Members/Chairmen, local elites and people of different walks of life in different villages reveal that the agricultural activities in the project area have been witnessing a considerable transition in terms of net cropped area, cropping pattern, cropping intensity, yield rate, diffusion of technology, inputs use such as seed, irrigation, chemical fertilizer etc. This transition has evolved over time due to its necessity by the people of the locality and not by any tangible intervention by the Government in terms of implementing any production oriented project.

2.3.1 Net Cropped Area

Available documents (published/unpublished) from the Thana/Union offices and also discussions with the UP Chairmen/Members, Block Supervisors of DAE and farmers, suggest that net cropped area within the project area has increased over the years in eighties. During 1983/84 net cropped area at Boalkhali and Patia thanas (according to BBS) were 14338 acres and 28446 acres respectively and the corresponding figures in 1991-92 (according to Thana Statistical Offices) are 17600 acres and 33735 acres respectively, which result that percentage of net cropped area increase for Boalkhali and Patia during 1983-84 to 1991-92 are 22.7% and 18.6% respectively which is really amazing where National scope for extension of net cropped area is very limited. This increase is caused due to bringing fallow, forest and khas land under cultivation. Our interview/discussion with the villagers reveal increase of net cropped area, in all the six villages as shown in table - 3 below.

Table 3

Change of Cropped Area in six villages of Boalkhali-Patia
1986/87-1991/92

Village	Cropped area (in acres) 1986-87				Cropped area (in acres) 1991-92			
	Single	Double	Tripple	Net	Single	Double	Tripple	Net
Sreepur	100	240	70	410	100	250	100	450
Popadia	150	650	50	850	175	650	75	900
Bidhugram	75	340	90	505	100	350	100	550
Dakkhin Vurshi	70	150	29	249	60	165	29	254
Hanmohona	80	190	40	310	80	200	40	320
Chowdhurygram	390	900	200	1490	400	900	200	1500
All villages	865	2470	479	3814	915	2515	544	3974

Source: RRA Survey of BIDS on SSISP, January, 1993.

2.3.2 Cropping Intensity

Cropping intensity of the project area was estimated at 192.5 (Appraisal Report, May 1986). The cropping intensities for Boalkhali and Patia thanas of Chittagong in 1983-84 were estimated by BBS to be 172 and 184 respectively. And using the data supplied by the Thana Statistical Offices, the cropping intensities in 1991-92 for Boalkhali and Patia Thanas are estimated to be 213 and 176 respectively which indicate that cropping intensity for Boalkhali increased and for Patia decreased. The decrease of intensity is due to increase of net cropped area as there is an increase of 18.6% gross cropped area at Patia during 1983-84 to 1991-92. Also, from Table - 3, the cropping intensities for the villages in 1986-87 and 1991-92 are calculated as follows:

1986-87 : 193, 188, 203, 184, 189, 187.
1991-92 : 200, 189, 200, 188, 188, 187.

It appears that for only village Bidhugram, the cropping intensity has slightly reduced but its cropped area for both net and gross increased by 8.9% and 7.3% respectively. Also, the cropping intensity for six villages all together, increased from 190 to 191 during 86/87 to 91/92 apart from increase of net cropped area. So, we can conclude that there is an upward shift interms of cropping intensity in the project area but it does not qualify project impact rather it is due to the necessity of time and by the people of Boalkhali and Patia.

2.3.3 Cropping Pattern

Both Boalkhali and Patia thanas of Chittagong district are food surplus area in the country since quite a long time and both the areas have emerged as an intensive rice growing area. The basic objective of the project was conceived to increase the production of rice upto the optimum level by all possible means. According to BBS (The Bangladesh Census of Agriculture and Livestock: 1983-84), the acreage of cereal production accounts 92.7% and 92.8% respectively of gross cropped area at Boalkhali and Patia thanas in 1983-84.

Again, aus, aman and boro account (10.28%, 48.70% and 33.46%) and (15.51%, 45.82% and 31.33%) respectively of gross cropped area at Boalkhali and Patia and other cereals (e.g. wheat, maize, cheena, kaun etc.) accounted less than 1% at both the area.

Appraisal Report (May, 1986) prepared by consultants (Coode & Partners, UK) accounts only for paddy production (Appendix 4) where HYV Boro predominates with 37% of gross cropped area, followed by T. Aman (HYV) - 36%, T. Aman (local) - 16%, T. Aus (HYV) - 6% and T. Aus (Local) - 5%, This picture reported in the Appraisal Report (May, 1986) is quite misleading and erroneous as it implies that only rice is grown in the project area but any sensible person can observe and find by interviewing the people that other crops (about 30-40 other crops) also grow in the area.

According to statistics maintained by the Thana Statistical Officer, Thana Agriculture Officer and supplemented by the field interviews of farmer within the villages, the general picture of cropping pattern at present (1991-92) may be stated as follows :

In both Boalkhali and Patia 4 varieties of aus paddy (e.g. B. Aus, T. Aus, HYV Aus, Pajam Aus), 4 varieties of aman paddy (B. Aman, T. Aman, HYV Aman and Pajam Aman), 3 varieties of boro (Local Boro, HYV Boro, Pajam Boro), wheat (local and HYV), other cereals (Jab, Cheena, Maize, Kaon etc.), Pulses (Mug, Masur, Mator, Mashkalai, Garikalai, Khesari, Chola etc.), sugarcane and other cash crops, vegetables of all types (e.g. potato, sweet potato, patal, barbati, brinjal, cucumber, lady's finger, Karala, Kachu, data-shak, lal-shak, pui-shak, kakrol, cabbage, cauliflower, radish, carrot, tomato, chal-kumra, water gourd, beans, etc.), spices (e.g. chillies, turmeric, ginger, onion, garlic, coriander seed etc.) and oilseeds (mustard, til, tishi etc.) are cultivated by the farmers.

Table 4

Cropping Pattern (Percentage of Gross Cropped Area) at Boalkhali & Patia (1983/84-1991/92)

Crops	Boalkhali		Patia	
	Percentage of gross cropped area		Percentage of gross cropped area	
	1983/84	1991/92	1983/84	1991/92
Broadcast Aus	0.31	0.89	2.64	1.02
T. Aus	3.24	3.00	7.42	5.34
HYV Aus	4.89	5.21	3.94	5.60
Pajam Aus	.85	1.73	1.49	1.31
Total Aus	10.28	10.84	15.49	13.27
Broadcast Aman	1.25	1.25	1.86	1.66
T. Aman	12.93	20.12	19.11	17.88
HYV T. Aman	17.27	23.84	12.56	20.22
Pajam Aman	17.25	3.94	12.27	4.81
Total Aman	48.70	49.15	45.82	44.57
Local Boro	2.56	1.10	2.59	2.89
HYV Boro	30.34	28.66	28.56	25.76
Pajam Boro	0.56	0.79	2.87	2.71
Total Boro	33.46	30.55	31.33	31.36
Local wheat	0.002	0.46	0.01	0.44
HYV wheat	0.001	0.79	0.01	0.61
Maize	0.025	0.08	0.01	0.06
Other cereals	0.036	0.17	0.04	0.11
Total (wheat & others)	0.064	1.50	0.07	1.22
Mug	0.64	0.73	0.19	0.48
Masur	0.03	0.22	0.04	0.17
Mashkalai	0.06	0.14	0.12	0.14
Khesari	0.02	0.13	0.02	0.09
Other pulses	0.51	0.79	0.74	0.78
Total pulses	1.26	2.01	1.07	1.66
Sugarcane	0.06	.09	0.03	0.07
Tobacco	0.02	0.05	0.01	0.03
Other cash crops	0.16	0.20	0.07	0.01
Total cash crops	0.25	0.34	0.11	0.21

Table 4 contd.

Crops	Boalkhali		Patia	
	Percentage of gross cropped area		Percentage of cropped area	
	1983/84	1991/92	1983/84	1991/92
Potato	0.14	0.17	0.76	1.18
Sweet Potato	0.14	0.14	0.02	0.26
Brinjal	0.77	0.79	0.39	0.48
Arum	0.33	0.38	0.32	0.33
Patal	0.01	0.08	0.02	0.23
Radish	0.04	0.08	0.09	0.26
Beans	0.52	0.47	0.15	0.22
Cauli-flower/Cabbage	0.03	0.09	0.06	0.23
Tomato	0.11	0.11	0.11	0.15
Kakrol	0.42	0.47	0.04	0.24
Lady's Finger	0.10	0.11	0.08	0.09
Data/Pui/Lal shak	0.16	0.23	0.11	0.23
Water-Melon	0.08	0.13	0.60	0.79
Other vegetables	1.04	0.24	0.92	0.21
Total vegetables	2.89	3.50	3.67	4.90
Chillies	1.78	1.42	2.05	2.10
Onion	0.02	0.08	0.02	0.06
Garlic	0.04	0.05	0.03	0.03
Turmeric	0.02	0.05	0.06	0.06
Coriander Seed	0.03	0.05	0.04	0.04
Other spices	0.06	0.17	0.08	0.26
Total spices	1.95	1.82	2.39	2.56
Mustard seed	0.12	0.17	0.05	0.13
Other oilseeds	0.05	0.13	0.02	0.09
Total oilseeds	0.17	0.30	0.07	0.22

Source: RRA Survey of BIDS based on
(a) BBS: The Bangladesh Census of Agriculture and Livestock - 1983/84
(b) Thana Statistical Office and Agriculture Office, Boalkhali and Patia (1991/92)

The cropping pattern at Boalkhali and Patia thanas are presented in Table 4. It may be remembered that the Boalkhali Irrigation Project under SSISP covers entire Boalkhali thana and part of Patia thana and as such the cropping patterns at these thana reflect the cropping pattern of the project area.

We have already noticed in the earlier sections that net cropped areas for Boalkhali and Patia have increased by 22.7% and 18.6% respectively during 1983-84 to 1991-92 and the corresponding changes of cropping intensities are for Boalkhali 172 (83/84) to 213 (91/92) and for Patia 184 (83/84) to 176 (91/92). This implies that gross cropped area has increased 51.7% for Boalkhali and 13.4% for Patia during 1983-84 to 1991-92. So, it appears from Table-4 that at Boalkhali acreages of most of the crops have increased except for the crops pajam aman, local boro and other vegetables but acreages for total aus, total boro and total vegetables have increased. In case of cereal production, significant increase of acreage has been made for HYV Aus, T. Aman, HYV T. Aman, HYV Boro, wheat and maize. Cropping acreages for pulses (all types), vegetables (all types), spices, oilseeds etc. have also increased. At Patia, cropping acreages for all crops have increased except for the crops B. Aus, T. Aus, Total Aus, Pajam Aman and other vegetables. It is quite evident that upward shift of cropping acreages have taken place for almost all the crops and significantly for HYV paddy, pulses,wheat, vegetables and spices. According to Boalkhali Thana Agriculture Officer, foodgrain production in the thana has increased gradually in the eighties and it has been estimated that foodgrain production increased from 25665 metric ton (in 1981/82) to 34272 metric ton (in 1989/90) which is nearly 34% increase in eight years. Such a dramatic increase is possible due to the diffusion of technology and adoption of modern varieties of rice cultivation by the farmers. The change of cropping pattern and increased production of foodgrain are independent of the activities of Boalkhali Irrigation Project, whatsoever. The process of crop diversification has evolved in the project area without any positive intervention of Government, by the people for necessity of their own in search of remunerative crops.

2.3.4 Yield Rates of Major Crops

Yield of a particular crop depends on various factors such as seed, irrigation, maintenance of plot during the growing period, timely sowing/plantation and harvesting, fertilizer use and other unexplained factors including natural constraints. Yield of a particular crop often happens to vary for reasons not possible to specify properly but the general trend can be stated. We explored in different villages, as mentioned earlier, about the trend of yield rates of major crops in these villages which was again verified with the thana Agriculture office and Block Supervisors of DAE. The yield rates of some major crops in the project area are shown in table-5. The yield rates are estimated very roughly without proper scientific basis and as such should not be used for prediction purposes without further investigation but the quality of data is quite good as the data were collected from the farmers by direct interviews.

Table 5

Yield Rates of Some Major Crops at Boalkhali and Patia, 1985-86 and 1991-92

Crops	Yield Rates (maund/acre)	
	1985/86	1991/92
Broadcast Aus	13	12
T. Aus	17	16
HYV Aus	32	35
Pajam Aus	30	30
Broadcast Aman	14	12
T. Aman (local)	22	20
HYV T. Aman	32	35
Pajam Aman	28	26
Local Boro	25	22
HYV Boro	50	50
Pajam Boro	32	30
Local wheat	10	12
HYV wheat	22	25
Maize	8	10
Masur	8	9
Mung	6	8
Khesari	7	6
Mash Kalai	8	7
Sugarcane	470	500
Mustard	7	7.5
Til	6	6.5
Chillies	7.5	8
Onion	40	40
Garlic	30	30
Potato	110	130
Sweet Potato	120	150

Source: RRA Survey of BIDS on SSISP, January, 1993.

It appears from table-5 that yield rates for the crops broadcast aus, T. aus, broadcast aman, T. aman (local), pajam aman, local boro, pajam boro, khesari and mashkalai have declined due to some reasons. The general yield capacity of these crops are lower than the HYV crops, fertility of land has also declined over time by natural process and farmers are less interested for investment in terms of input use for lower level of yield. On the other hand we have seen earlier that cropping acreages for these crops have also declined. The yield rates for HYV paddy have increased due to intensive cultivation in terms of input use by quality seed, irrigation, fertilization and labour. The increased output has been accounted for HYV (aus, aman, boro) paddy, wheat, maize, masur, mung, oilseeds, spices, potato and sweet potato due to awareness of people, their capability and acceptance of modern technology and access to marketing facility.

It has been observed that smaller farms (per unit land) yield better compared to larger size of farms.

2.3.5 Other Agriculture: Livestock, Poultry, Fishery and Forestry

Livestock, poultry, fishery and forestry are the important sub-sectors of national economy but these were not permeable to the specific objectives of Boalkhali Irrigation Project. Till today due to lack of mechanized cultivation facilities in the project area (only 12 power tillers), livestock has been treated as the significant contributory factor for crop production. Number of bovine animals in the project area has increased by 5-6% during 1983/84 to 1991/92 but this increase is not sufficient enough for cultivation of land as both net cropped area and cropping intensity have increased significantly. It has been observed that grazing land is reduced over the years due to bringing fallow or khas land under cultivation but on the other hand as the cropping intensity increased with crop diversification, supply of fodder has also increased. There are tremendous demand for livestock products, particularly for meat and milk, at Chittagong metropolitan area which is 8-10 miles from the project area. There are 3 diary farms in the project-area and high potential for more farms still exists due to the existence of infrastructure

facilities such as veterinary hospital, artificial insemination centre etc. and ready access to market. The population of goat/sheep in the project area has been reduced by nearly 10% during 1983/84 to 1991/92 due to high demand of meat and reduction of grazing land.

Like livestock products, there are high potentials for poultry birds/products too in the project area as the area is surplus in terms of foodgrain production and good marketing facility prevail. There are 15 poultry farms in the area apart from looking after a flock of birds (10-15 in number) by most of the farm households. Poultry birds are generally reared by the housewives for household consumption and for generating extra income of their own. The entrepreneurs of poultry and dairy farms, established in eighties, have been successful till date and it is expected that more such farms will be established in near future subject to the availability of credit.

The fishery sub-sector at Boalkhali and Patia have been experiencing step-motherly attitude from the concerned personnel and as such availability of fish which is the prime source of animal protein has reduced over time in the project area like elsewhere in the country. The Karnaphuli river and the network of 48 khals together with their adjoining low lying areas within the project constitute the source of capture fishery while 4378 ponds are the source of both capture and culture fishery. The stock of fish in open water bodies has been reduced due to some understandable causes and on the other hand great majority of ponds are derelict and as such total availability of fish is reduced. But attempts have been made for intensifying pond culture fishery which will take a considerable amount of time for large scale operation by the pond owners.

As shown in table - 1, 24.35% land of Boalkhali and 19.95% land of Patia have been considered to be forest area mostly in the hilly area which are either khas or preserved and maintained by the forest department. Perennial crops, particularly fruit trees and other species, account nearly 5.33% land at Boalkhali and 2.26% land at Patia. So, there are potentials for intensifying the activities of forestry particularly for the development of

wood based products at the project area. Moreover,the homestead garden can be enriched by supplying plants and saplings to the household by the concerned agencies of government. Nurseries at both government and private level have been in existence at the project area. The Thana Council (Upazila Parishad) pioneered the road side plantation in recent years.

2.3.6 Tenurial Arrangement in the Project Area

The present tenurial practices in the project area are quite similar to other parts of the country which are as follows:

Owner farmer: This group may consist of small, medium or large farmers but majority are of medium farmers who cultivate own land either by family labour or hired labour or combination of family and hired labour.

Owner cum tenant farmer : This group generally represent small farmers who in addition to cultivation of their own land also cultivate land of others either as a share cropper or on rental basis under a fixed term agreement. Dominance of family labour prevail in this group.

Tenant : This group of people have no land of their own for cultivation but cultivates land of other people either as a share-cropper or on rental basis under a fixed term agreement. They can not afford for hired labour.

Share-Cropping System : Three types of share-cropping practices are prevalent in the project area which are:

(a) Owner of land receives half of produce without sharing cost of production, whatsoever;
(b) Owner of land receives half of produce after sharing 50% input costs such as seed, fertilizer, water charges.
(c) Owner of land receives two-third of produce while they pay the total material input costs.

2.3.7 Land Holding Distribution

Ownership of land is an important aspect of social dynamics in an agrarian economy. So, we enquired and interviewed knowledgeable people at village/union/thana level about the transition of land holding and the process involved in it over the years. Table - 6, shows the pattern of landholding in the project area during 1985/86 and 1991/92.

Table 6

Land Holding Distribution at Boalkhali/Patia

Land Holding Size (in acres)	Percentage of Household	
	1985/86	1991/92
0.0 (landless)	5.0	6.0
Less than 0.50	20.0	25.0
0.50 - 1.50	40.0	35.0
1.51 - 2.50	20.0	19.0
2.51 - 5.00	10.0	9.0
5.01 and above	5.0	6.0
All	100.0	100.0

Source: RRA Survey of BIDS on SSISP.

It appears that landless and large farmers in the project area have increased. Marginal farmers have tended to be the landless and small farmers have become marginal farmers. In some cases marginal and small farmers have started small business of their own after selling their land as land could not produce sufficient crops for their subsistence. On the other hand medium farmers, after selling their surplus farm produce managed to purchase the land of small or marginal farmers and emerged as large farmer. Again, medium/small farmers due to law of inheritance also tended towards small/marginal farmers.

2.4 Non-Farm Economic Activity and Infrastructure

Boalkhali and Patia are one of the developed thanas in the country in terms of physical infrastructure, resource endowment, higher literacy rates, access to market etc. It has been reported while visiting the project area, that at present in some villages near about 40-50% households receive remittances from abroad and as such the people of the area have exposure to higher standard of living and also for non-farm economic activity. According to B.B.S. (The Bangladesh Census of Agriculture and Livestock: 1983-84) non-farm households at Boalkhali and Patia in 1983-84 were 39.70% and 41.30% of total households. Also 8.84% and 10.39% households at Boalkhali and Patia were involved in some activities of cottage type. The involvement of household members in non-farm economic activities has further increased over the years due to (a) increase of landlessness, (b) increased receipt of remittances from abroad, and (c) infrastructure development.

In Boalkhali Thana which is entirely within the project area, there are sufficient diversified industrial activities and infrastructure facilities, developed over time which is independent of the project objectives. At present, 18 saw mills, 4 flour mills, 45 atta mills, 62 rice mills, 35 bakeries, 5 handloom units, 5 engineering workshops, 40 furniture making units, 50 pottery industries, one ship building workshop, one textile mill, one paper mill, one re-rolling mill and one large brick field are located at Boalkhali employing sufficient number of people. In addition there are nearly 1600 shops (small & medium size), 120 boats, 52 launches, 24 buses, 1025 rickshaws, 100 auto-rickshaws/tempos owned and run by the people which also generate considerable amount of employment. The poor or landless who have no permanent arrangement for non-farm works at the project area, cross river Karnafuli daily for suitable works at Chittagong town or port. It is not difficult for the poor or landless people to find gainful work within or outside the project area due to existing good infrastructure facilities which causes higher agricultural wages and during harvesting time labour scarcity prevails.

The communication system in the project area is well developed as each of the union/village are connected to each other by either rail, road or navigable water-ways round the year. At present there are 380 km kutcha roads connecting the villages/unions suitable for rickshaws/auto-rickshaws, 18 km pucca road and 25 km semi-pucca roads suitable for buses, 76 km navigable water-ways of river and canals round the year and railways (Chittagong to Patia) within the project.

At present 18 villages of Boalkhali and another 10 villages of Patia, all within the project area, are fully electrified under rural electrification-scheme. The housing condition of people in the project area is good enough compared to other places in the country as most of the household have tin-shed (or semi-pucca) houses. Only the poor and landless have kutcha houses. The housing is developed possibly due to foreign exposure and influences of Chittagong town or port in earning capacity.

2.5 Institutional Aspects

Institution of any nature has its own importance for any developing exercise. There are 6 Bank Branches of Sonali, Rupali, Agrani & BKB and 4 Branches of Grameen Bank at Boalkhali and 11 Bank Branches of different Banks at Patia which are contributing significantly for trade & commerce and also for other economic activities.

At Boalkhali the following different societies of specific groups of people are working for a long time.

Type of Society	Number
Krishak Samabaya Samittee (KSS)	173
Mahila Samabaya Samitee (MSS)	15
Fishermen Samabaya Samitee (FSS)	14
Multi-purpose Samabaya Samitee (MPSS)	191
Samaj Kallayan Sangstha (SKS)	22
Bittohin Samabaya Samitee (BSS)	10
Weavers Samabaya Samitee (WSS)	3
Shop-keepers Samabaya Samitee (SSS)	12
Other Samitee	45

The type and number of different societies and their existence in the area indicate the extent to which the people of the area are conscious and integrated among themselves but it is a matter of utter disappointment when we observe that BWDB, Chittagong, failed to involve the local people in the project formulation of SSISP.

2.6 Education, Health and Nutrition

At present literacy rates at Boalkhali and Patia are respectively 35% and 28% (according to Thana Statistical Offices) against the national literacy rate 24.82% (BBS - 1991 Census). The number of existing educational institutions by type at Boalkhali and Patia are as follows:

Educational Institution	Number of Institutions	
	Boalkhali	Patia
Govt. College	1	1
Non-Govt. College	2	4
Govt. Boys' High School	1	1
Non-Govt. Boys' High School	16	32
Govt. Girls' High School	1	1
Non-Govt. Girls' High School	5	6
Govt. Primary School	87	147
Non-Govt. Primary School	7	40
Junior High School	3	Nil
Govt. Madrasha	7	7
Junior Madrasha	8	Nil
Khariji/Forkania Madrasha	98	9
Kindergarten School	3	3

The health facility for the project area is good as Chittagong town is only 8-10 miles from the project area. Also, at Thana Head Quarters there are hospital facilities with adequate number of beds and qualified doctors are available for attending the patients round the clock at the hospital. In addition sufficient/number of MBBS doctors are also available for private call and services. At union level too, there are family planning centres. The high literacy rate prevailing in the area and the availability of services of qualified doctors, para-medical personnel etc. the health conciousness of the people in the area are much better than elsewhere in the country.

Nutrition status of a society depend largely on level of income, education, health awareness and availability of foodgrain items. The project area has been experiencing food surplus and high wage rate while compared to ensewhere in the country. Moreso, the people are well aware about their health status due to high literacy rates and urban or foreign exposure. So, evidences indicate that the norm of mal-nutrition does not prevail in the project area. We do not find any evidence whatsoever while visiting the project area about ill nutrition status. The people can afford to have at least two square meals in a day irrespective of their social status.

2.7 Conclusion and Recommendation

The socio-economic rapid appraisal for the Boalkhali Irrigation Project, as made by us and presented in the preceeding sections, briefly focuses on the following aspects.

This is one of the 3rd cycle sub-project designed to be completed in 1989 which started in 1986. But the project was discontinued after June 1992 and during the implementation period substantial amount of investment (exact amount not known to us) was made without tangible benefit. It appears that the project was wrongly conceived by the BWDB personnel without sufficient survey and background data and violating the norms as laid down in the Project Implementation Mannual regarding gross area, proper specification and location of the project and also ignoring the norm of equitable distribution of

national resources in the regions of the country as it has been later on indicated while discontinuing the project that Boalkhali as a coastal project is already at a high standard of production having 83% of net cropped area being irrigated should be dropped from SSISP programme. Though it's name indicates to be a programme for irrigation but flood protection and drainage component were also envisaged which seems to us should be the main consideration in formulation of project. But no attempt was made for flood protection caused due to rainfall run-off from the western slopes of the foothills. And no attempt was also made for canal excavation which might be the main objective of the project by conserving water in the canals for surface water irrigation and also for reducing drainage congestion due to rainfall run-off. It was proposed that 98 LLPs and 50 STWs would be fielded for improvement of boro, aus and aman cultivation but no attempts were made for this. Participation of local people and interaction with the line agencies such as BADC, DAE, BRDB etc. were either ignored or seriously lacking. Inspite of serious drawbacks on the part of BWDB for formulating and implementing the project, the success lies with the initiatives of local people while diffusing the modern technology for higher yield and output and also for promoting crop diversification process, bringing more land under cultivation and higher cropping intensity.

The project area has the success story of its own and the people are quite capable to derive maximum benefit if proper steps are taken to remove the existing natural constraints. The necessary steps must be forwarded in cooperation with the line agencies (BADC, DAE & BRDB) and through the participation of local people in all villages/unions of the project area. It is the local people who know their problems and constraints better than any others and how their problems can be solved is a different issue where BRDB, BADC, DAE can contribute by imparting knowledge and providing logistic supports to them.

BWDB made a rhetoric proposition with the project and though the project is discontinued some positive steps can be done for the welfare of the local people through their participation and active involvement of developing agencies of government such as BWDB, BADC, DAE & BRDB.

The following steps may ventilate the hopes and aspiration of people against the proposition made by BWDB at Boalkhali:

(a) fielding sufficient number of LLPs and STWs and these can be maintained by KSS under the supervision of BRDB;

(b) constructing embankments where needed in order to avoid river flood or rainfall run-off in the north-east region;

(c) improvement of drainage and re-exacavation of existing canals which will conserve more tide water as a source of irrigation by surface water.It will also help to remove drainage congestion during monsoon;

(d) proper maintenance of built-up regulators and embankments that will be made;

(e) supplying proper inputs such as seed, fertilizer etc. to the farmers in times of their necessity and easy access to institutional credit for agricultural activities like poultry, dairy, pond culture and also for crop production.

SECTION III

Tirnai River Sub-Project

The Tirnai River Sub-Project is one of the second cycle projects under SSISP. Original PP was approved on 13-7-82. The physical work of the sub-project started in 1984-85 and completed in 1986-87. But revised PP was approved on 24-9-89 which brought the financial completion of project at a cost of Tk. 68.05 lac. (including foreign exchange component Tk. 1.94 lac.).

The sub-project preparation was done by Directorate of Planning Schemes-II (ADB), BWDB in association with ADB Consultants (Coode & Partners, U.K. and PEC, Bangladesh). The project was implemented by the Panchagarh O & M Division of BWDB but funding arrangement, overall supervision and monitoring were done by the Directorate of Planning Schemes-II (ADB), BWDB. The BRDB is supposed to be responsible for formation and development of farmer's cooperative, while extension services will be taken by DAE under their normal programmes.

Though the physical work of the sub-project was completed in 1986-87 but it is yet to be brought under operation. On the basis of our exploratory visit in the project sites, we would like to firmly contend that the present status of the project will never yield anything more than frustration. Most of the present officials at Panchagarh O&M Division of BWDB opined that not only Tirnai river sub-project but also other sub-projects e.g. Ramchandi river sub-project & Versha river sub-project have been experiencing failure in terms of water control and management.

The word river has its own connotation in terms perennial source of water, navigability at least for some period of time in a year, its length and breadth, and depthness of water. There are no perennial source of water for Tirnai, Ramchandi and Versha river. None of these are more than 6-8 km in length and breadth varies from 8 feet to 40 feet in different places. The river gets near dried up in dry season and local boro is cultivated in the

river bed. The question of navigability does not arise as no boat ply in any season in these rivers. Many canals in Bangladesh are much effective in terms of navigation and flow of water. Possibly the best suited phrase for these rivers should be derelict canal with only difference is that they are naturally created than the men made canals. The Tirnai river/khal originates from Dhaiza Beel in Banglabandah union near India-Bangladesh border and falls into the river Mahananda of India. The area of the beel is around 1 sq. mile and it is around 2-3 km north-east from the barrage. The beel has no perennial source of water but it catches the rainfall run-off during monsoon from the surrounding area and also from the foothills of Himalayas. So, Tirnai is devoid from any perennial source of water and as such only during monsoon sufficient water is available due to rainfall.

3.1 Project Description

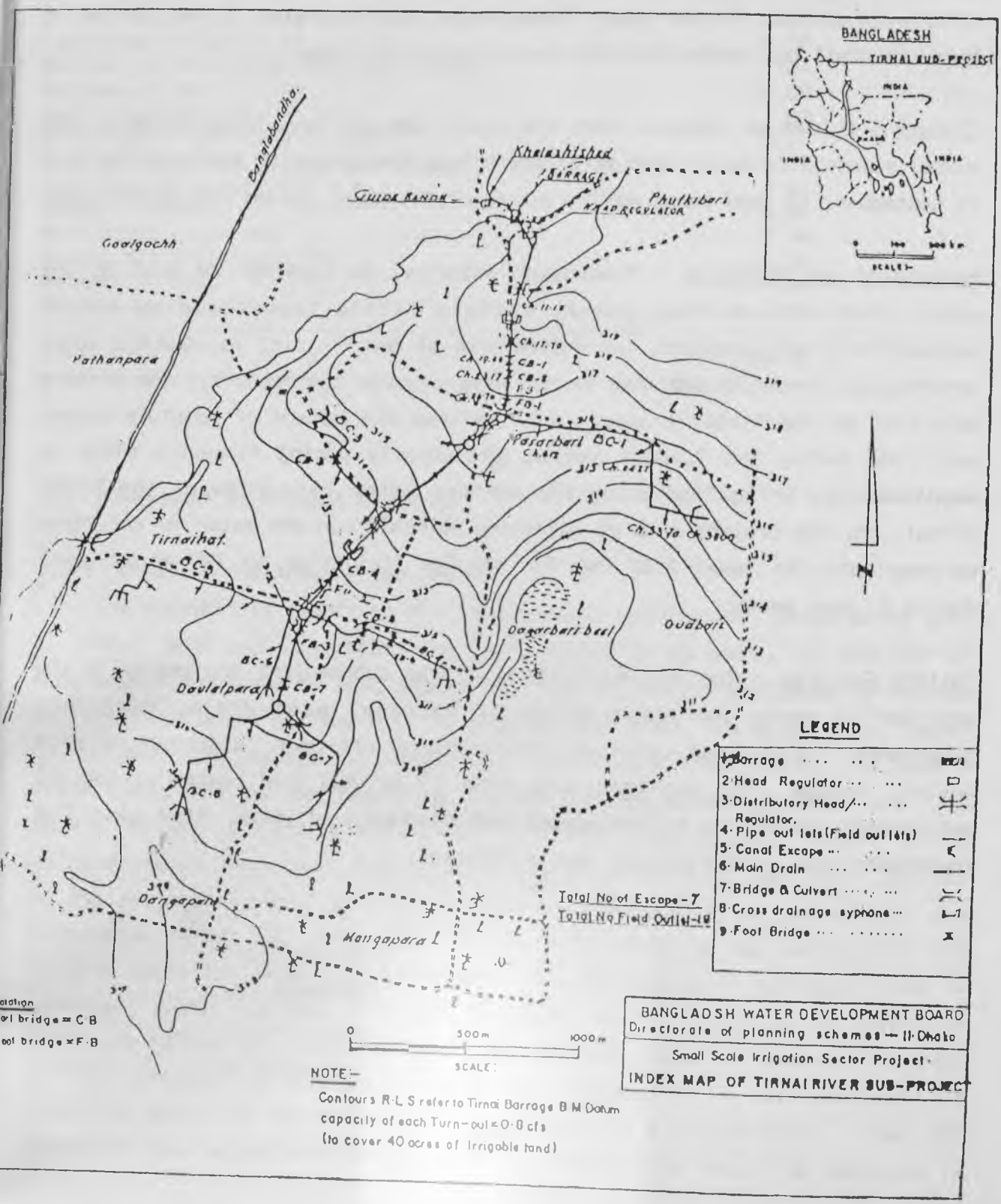
Location : The Tirnai River Sub-Project is located in the most northernly part of the country and in the Tetulia Thana under the Panchagarh district and includes parts of two unions - Tirnai Hat and Banglabandha. Nearly 90% of the project is located in the Tirnai Hat union and 10% in the Banglabandha Union. The main structure - barrage is located at about 10-12 km north-east of Tetulia Thana Head Quarter and is accessible by fair weather road throughout the year from Panchagarh and Tetulia. The all weather Tetulia Banglabandha road passes by the side of the project area.

The project area is located between longitude 88° 23′ E to 88° 25′ and latitude 26° 33′ N to 26° 35′ N (see Figure - 3).

Topography and Soils : The project area lies in a nearly level plain which has low, nearly level to very gently undulating ridges. Elevation ranges from about 305 feet to 320 feet above mean sea level with a gently slope towards the south-west. The soils of the project area are developed on sub-recent sediment laid down by a series of rivers draining the foothills of the Himalayas. These soils are characterized by a thick, black or dark brown, friable loamy top soil which has a relatively high organic matter content and

FIGURE 3

TIRNAI RIVER SUB-PROJECT MAP



is somewhat acidic in reaction. The top soil grades into a brown or grey sandy sub-stratum within 1-2 feet of the surface. The higher ridge soils are friable, sometimes loose, sandy looms which are saturated during period of heavy rainfall but become droughty early in the dry season.

Climate : Evidences indicate that the Tirnai project area experiences a high annual rainfall of about 2300 mm of which some 85% generally falls during June to September. In some years sufficient rainfalls occur during May and October.

Background and Objective : Panchagarh district, in contrast to most of the other districts of Bangladesh, suffers little from flooding and is comparatively well drained. The entire area of the district is commonly known as droughty. Transplanted Aman is the main crop of the locality. The primary objective of the Tirnai project is to relieve the hazard of moisture stress occurring during the T. Aman season particularly during flowering stage by supplementary irrigation using the surface water resources of the River Tirnai. So, the project aims at retaining rainfall run-off water in the river barrage upto the level 318F PWD for gravity irrigation to 780 acres (net) during T. Aman season.

Salient Features : The salient-features of the sub-project are basically the engineering works for construction of barrage, main drain, auxiliary structures, canal head off-take, distributory off-take, distributory pipe outlet, escape etc. and land acquision (7.69 ha) and construction of embankment. According to Panchagarh O&M Division of BWDB, item specific investment cost of the project are as follows :

Investment-Cost of the Tirnai Project

Items	Cost (in lakh Tk.)
Land Acquisition (7.69 ha)	8.09
Residential Building (Khalashi shed)	1.07
Barrage (1 No.)	44.09
Canal Head Off-take (1 no.)	1.02
Distributory off-take (5 nos.)	0.57
Distributory Pipe Outlet (18 nos.)	0.08
Auxiliary Structure (18 nos.)	3.80
Escape (7 nos.)	0.08
Main Drain (4.19 km)	2.16
Canals and Distributories	1.24
Managerial Cost	1.04
Other cost	6.47
Total cost	68.05

3.2 Assessment of Project Features

3.2.1 Location and Area of the Project

The feasibility report on the Tirnai River Sub-Project, prepared by DPS-II (ADB), BWDB and Consulting Engineers (Coode & Partners, UK and PEC of Bangladesh) appointed by ADB, states that 90% of the project area is located at Tirnai Hat union and the rest in Banglabandha union. The gross area, number of villages and mauzas of Tirnai Hat union are 7493 acres, 34 and 4 respectively and the corresponding figures for Banglabandha union are 5193 acres, 28 and 3. It is not clear from the feasibility report which villages/mauzas have been covered under the project. Also, the larger portion of the projects Tulshia Beel sub-project and Ramchandi River sub-project are located at Tirnai Hat union. So, it is not unlikely to be confused by the farmers about the impact of individual projects and their catchment area or coverage. Again, as none of these projects are in operation so confusion increases further among the farmers about possible impact or coverage for each of the projects. In a resource constraint economy it is not desirable to institute more than one project of similar type in a single union. Also, ADB specified the selection criteria that 31 sub-projects should be selected in

order to achieve an equitable distribution of sub-projects throughout Bangladesh. So, concentration of 3 similar type of projects in one or two unions is conspicuously violation of selection criteria as specified by ADB. On the other hand it was aimed that each of the selected projects would achieve immediate results within a period not exceeding three years after construction or completion of the project. But Tirnai Project has been failure in achieving its objective even after 5-6 years of completion of the project. So, location of the project, the barrage construction is not justified. According to feasibility report, the project envisages supplementary irrigation for only T. Aman to a net area of 780 acres. So, this is a small project in terms of area that would be benefited but in terms of loss of net cropped area due to land acquisition for construction of canals, embankment etc. and ponding area, this is not a good project.

3.2.2 Physical Structures of the Project

Construction of all the structures of the project were completed in 1986-87 starting from 1984-85.

Barrage and Canal Head Offtake:

The barrage is located on the right bank of Tirnai river near the village Holasuzut and just upstream on an existing track from Phutkibari to Dighalgaon. The canal head off-take, a standard gated pipe culvert is located on the left bank only. How water can be regulated through the canal head off-take is a serious question as the elevation appears to be comparatively higher than the barrage elevation. Panchagarh O & M Division of BWDB, particularly SO & SDE, endorsed our view that at the present status of the project it is not possible to regulate any water through canal off-take for gravity irrigation. The general condition of barrage including wing walls, apron, steel gates etc. is good enough for operation but it is difficult to store water. Experimentally water was preserved upto the retention level 318 feet PWD only for 24 hours once after completion of the project which caused flood in various degree to 200 acres of crop land. It also inundated all the houses

of 60-65 families in the upstream and as the houses are kutcha so people were badly affected. Since then no attempt is made for operation of the project in absence of alternative arrangement for the people and their crop land. It has been anticipated that in the upstream of barrage 100 acres will be shallowly flooded where crops like sugarcane can sustain, 50 acres may support B. Aman while remaining 50 acres will not be able to support any crop other than rabi crops if project is to be brought under operation. But before that 60-65 families need to be rehabilated either by raising the level of their homestead or rehabiliting them elsewhere which is a matter of time and resources. So, without further investment and alternative strategy the project can not be brought under operation in near future.

Embankment: The embankment stands on the barrage site of the river and it extends nearly 1 km on both banks of the river. The general condition of the embankment is good and no erosion is noticed while we visited along the embankment. The top width of the embankment is around 14-15 ft. and turfing is satisfactory.

Main Canal and Field Canals:

While visiting the project sites, it is difficult on our part to conceive the existence of any canal. The main canal of the project is nothing but a drain having nearly 3-5 feet wide and 1-2 feet deep than the field level. Due to lack of maintenance or non operation of the project the main canal is being silted up by rainfall run-off from the field. In some places farmers also contributed to bring the canal bed to the field level. This has been done due to non use of the canal. Field canals have mostly been demolished by the farmers but they are willing to make field canals of their own initiative if water can be provided to them. The farmers complained that the project could not benefit them by any means.

Pipe Outlet, Auxiliary Structure and Escape: There are sufficient number of pipe outlets, auxiliary structures and escapes as observed by us and condition of each of them is quite good. But some auxiliary structures (e.g. foot

bridge, cart bridge etc.) are not necessary and they are not at all in any use.

3.2.3 Institutional Arrangement and Involvement of Local People

For any development exercise the participation of local people and line agencies are very much essential. But in case of Tirnai Project, participation of BRDB for farmer's group formation and DAE for extension services are almost absent. BWDB did neither incorporate the services of BRDB and DAE at field level nor involved the local people in project formulation. The officials of Panchagarh O & M Division of BWDB emphasised on the rapid construction of works without considering the possible adversities. Now, it is being considered by the BWDB field officers that this project can not be brought under operation without the good will and participation of local people.

3.3 Agricultural Transition

Discussions with the UP Chairmen/Members, local elites and farmers of different category reveal that agricultural activities in the project area have not changed much during eighties. Before fifties the people in the area were dependent mostly on T. Aman crop. It has been expressed by the knowledgeable person (UP Chairman & old people) that a significant number (10-20 percent) of population here are the immigrants from other parts of Bangladesh and from Bihar and West Dinajpur district of West Bengal. Some people settled in the areas through the exchange of property from India to Bangladesh and vice versa during and after the partition of India in 1947. Some people had come to this area as agricultural labour and settled and over the years by dint of hard work they emerged as medium to large farmer. Significant change in agricultural activities have been brought by these outsiders during early fifties.

3.3.1 Net Cropped Area and Cropping Intensity

While we visited the villages in the project area we enquired about the changes in agricultural activities in 1991/92 compared to 1983/84 (before project work). Table-7, below shows the change of cropped area in some villages within and outside the project area. The village within or outside the project area does not have significant implication as the project is not brought under operation.

Table - 7

Change of Cropped Area in Some Villages
(1983/84 - 1991-92)

Village/ Union	Cropped Area in Acres					
	1983-84			1991-92		
	Single	Double	Tripple	Single	Double	Tripple
1. Fakirpara/Tirnai (PV)	100	115	10	50	150	25
2. Bakshigram/Tirnai (NPV)	175	120	5	100	190	10
3. Phutkibari/B.Bandhah (PPV)	150	250	0	100	300	0
4. Hazipara/B.Bandhah (NPV)	15	25	0	11	29	0
5. Goabari/Tirnai (PV)	200	160	20	195	160	25
6. Dagarbari/Tirnai (PV)	82	300	10	60	315	22
All villages	722	970	45	516	1144	82

Note: PV = Project Village, NPV = Non-Project Village, PPV = Partly Project Village.
Source: Rapid Appraisal Survey of BIDS on SSISP, 1993.

It appears from table-7 that net cropped area has remained almost stagnant except for Dagarbari where net cropped has increased by 5 acres but gross cropped area has increased for all the villages which means that cropping intensity has increased for all the villages where the villages are within or outside the project. Cropping intensity has increased from 161 to 175 on an average in the selected villages as revealed from table-7 during the period 1983/84 to 1991/92. The same, picture may be observed for all the project villages if full scale survey is carried out in all the project villages.

3.3.2 Cropping Pattern and Yield Rate

It has been observed that a reasonable increase is made for cropping intensity which have some relationship in cropping pattern change. Table-8 shows the change of cropping pattern in terms of acreage. It appears that cultivation of local T. Aman has decreased while cultivation of HYV Aman has increased significantly under rainfed condition during the period 1983/84 to 1991/92.

Table - 8

Cropping Pattern in Some Villages

Crops	Before Project (1983-84)		At Present (1991-92)	
	Acres	% of gross cropped area	Acres	% of gross cropped area
Local T. Aman	1470	52.90	935	32.97
HYV T. Aman	90	3.24	625	22.04
Local B. Aus	435	15.65	400	14.10
Local Boro	0	-	30	1.04
Wheat	25	0.90	65	2.29
Kaon	287	10.33	246	8.67
Sugarcane	30	1.08	35	1.23
Jute	18	0.65	28	0.99
Til	280	10.08	256	9.03
Potato	45	1.62	83	2.93
Mustard	15	0.54	25	0.88
Pulses	25	0.90	30	1.06
Chillies & other spices	22	0.79	25	0.88
Vegetables	19	0.68	28	0.99
Other rabi crops	18	0.65	25	0.88
	2779	100.00	2836	100.00

Source: Rapid Appraisal Survey of BIDS on SSISP, 1993.

The acreages of local B. Aus, Til, and Kaon have decreased possibly due to the fact that these crops are not remunerative in terms of yield rate and value of output. On the other hand, the acreages for potato, wheat, sugarcane, local boro, jute, pulses, chillies, vegetables and other rabi crops have increased.

The yield rates, as it has been reported by the farmers, for the crops B. Aus, Til & Kaon have decreased near about 5-10 percent while for the crops potato, wheat sugarcane, jute and vegetables have increased more than 10 percent. This increase of yield rates in some crops is due to use of better seed and higher dose of chemical fertilizers by the farmers.

3.3.3 Other Agriculture: Livestock, Poultry, Fishery and Forestry

Draft animal power is the only means of cultivation to the farmers. But livestock population in the project area is declining over the years due some reasons and also for inadequate and expensive veterinary services. But interestingly the price of draft animal is lower in and around the project area than elsewhere in the country. This is possibly due to smuggling of cattle from India. Most of the agricultural household are found to own 4-8 cattle heads.

Like livestock, poultry population has also reduced in the project area due to disease and other reasons. There is no poultry farm in and around the project area but most of the housewives rear 5-20 birds for household consumption and also for generating extra income to the household. Like livestock the price of poultry bird is lower in the project area due to lack of marketing infrastructure.

Fishery in and around the project area is almost in the verge of extinction due to water constraint. Most of the ponds are derelict and get dried up in March/April and there is no perennial source of water for capture fishery.

There is no forest in the project area apart from homestead garden/jungle or bushes where fruit trees and trees for fire-wood are grown. Number of trees in the area has also been depleted over time due to random use of trees as fire-wood and house-building materials.

3.3.4 Tenurial Arrangement in the Project Area

The present tenurial practices in the project area are quite similar to elsewhere in the country but share-cropping system in the area is somewhat different. There are four types of share-cropping prevailing in the project area which are as follows :

a) Owner of land receives half of produce without sharing cost of production, whatsoever;
b) Owner of land supplies all cost of seed and fertilizer and after harvest first of all total cost of seed and fertilizer are realized from the produce and the residuals are shared equally by the owner and tenant;
c) Owner of land receives half of produce after sharing 50% input cost e.g. seed, fertilizer.
d) Owner of land receives two-third of produce while they supply bullocks and also pay the total cost of material inputs.

3.3.5 Land Holding Distribution

According to statistics available to the Tirnai Hat Union Parishad, the landholding distribution in the project area is highly skewed. At present around 50% households are either landless or near landless as they own less than 50 decimal land. The households belonging to small (owning 50-250 decimal land), medium (owning 251-500 decimal land) and large (owning more than 5 acres land) farmers group are respectively 25%, 15% and 10%. It has been expressed by the people that landlessness has increased over time due to various socio-economic factors.

3.4 Non-Farm Economic Activity

The large number of landless people in the project area have created a lot of social problems in the area. As agricultural activities are not developed it has become difficult to absorb the landless people in agriculture as farm labour. On the other hand the number of landless people are increasing day by day. The agricultural wage is lower in the area than elsewhere in the country. The present agricultural wage in the area varies in the range Tk. 18 - Tk. 25, lower (Tk. 18) in the lean period and highest (Tk. 25) during harvesting or plantation period. There is no cottage type processing activities in the area. Some people are involved in petty trade, some are involved in rickshaw, van and cart driving and some people (both men and women) collect stones (boulders) and sand from the nearby Mahananda river (Indian river, bordering Bangladesh) and some are also engaged in breaking the stones. It has been expressed by these people that these activities generate more income than agricultural wage. The general condition of landless people are deteriorating due to lack of infrastructure facilities and non-farm economic activities. Possibly due to these factors crimes like theft, smuggling etc. are increasing in the area.

3.5 Institutional Aspects

At present 3 NGOs, Grameen Bank, RDRS and Gono Shahajjaya Sangstha (GSS) are working for the welfare of the people in and around project area. Grameen Bank has been providing loans to target group people for milch cow, 'dhenki' and goat rearing. GSS is concerned for mass education and construction of mass education centre. RDRS are involved in a number of activities which are :

a) increasing the awareness about sanitation,
b) increasing the literacy rate,
c) providing non-crop loan to target group poor people, and
d) mulberry plantation.

There is no bank branch at Tirnai Hat union. Bank branch of BKB, Agrani and Sonali are located at Tetulia Thana Head Quarter, a distance of 6-7 miles from

the project area. So, it is very difficult for the farmers to initiate the loan application which is cumbrous and lengthy procedure. Moreover, the farmers complained that additional expenditure upto the extent of 10-15 percent of loan amount are spent in order to get loan. So, the farmers are less interested for bank loan. The incidence of non-institutional loans are prevailing in the area with a high interest rate (10% per month).

3.6 Education, Health and Nutrition

There is a Primary School in the project area and recently a mass education centre is established by GSS in the area. The literacy rate at present in the area is around 15% which is lower than elsewhere in the country. Health hazard has reduced much over time due to development of awareness by workers of Public Health and Family Planning Department. Sufficient number of hand tubewells have been installed for drinking water in the area and no people are reported to drink pond water.

The level of nutrition is good for average people but for landless poor people the level of nutrition has gone down.

3.7 Conclusion and Recommendation

To conclude, the Tirnai River Sub-Project is a case of disappointment with wastage of national resources due to lack of commitment to the nation by the concerned personnel. Feasibility study was not properly made regarding possible impact and adversities after implementation of the project. The norm of equitable distribution of national resources is violated by instituting 3 projects of similar nature in one or two unions within the same thana in the border area of the country. The Panchagarh O&M Division of BWDB were possibly interested for early completion of the project ignoring the proper justification and impact of the project. As a result, the project has failed to control and distribute water to any plot in the project. It is apprehended that at the present status of the project no irrigation is possible in future due to wrong site selection for the barrage and Head off-take. As a partial

remedy for such investment, a small hydraulic structure downstream to the barrage but near to the Tirnai Hat Union Parishad may be built which will increase supply of water and can be irrigated by LLP. Ponding at upstream of barrage will damage crops for large area and will effect 60-65 households very badly and as such it is not feasible.

Alternatively, large ponds may be constructed in each of the villages which may serve not only as a source of surface water but can also augment the pond culture activities but for this coordination among the various organisation of government is necessary. Also, a few STW may be installed for irrigation round the year as there is no STW or DTW in the project area.

SECTION IV

Tangon Barrage Irrigation Project

A feasibility report was prepared on the Tangon Barrage Project by the Directorate of Planning Schemes-II (ADB), BWDB in November 1982 and a Project Proforma on Tangon Barrage Irrigation scheme was issued in June 1983 . The need of a project, involving a barrage for supplementary irrigation by gravity means for T. Aman crop, was first identified in mid fifties. Several attempts had been made to secure financing but were not successful and as such the project remained dormant until the initiation of SSISP. In 1983 the project was approved by Government and it was considered that SSISP would provide a suitable vehicle for financing this long awaited project. The approach road embankments, though a small proportion of requirement had been partly constructed over the years under WFP schemes before BWDB started the work. The Tangon Project one of the second cycle projects, started in 1984/85 and was scheduled to be completed by 1987-88. But, due to some reasons or other, the physical work of the project is still on-going. Though 98% of the work has been completed by June 1991 (as revealed from the quarterly reports of BWDB), 1.31 km Irrigation Canal is left due to land dispute. In the mean time construction of the barrage civil works, installation of the gates and installation of gate hoists etc., structures, main irrigation canal, distributory canals on the right bank of the river are complete but still the project is not brought under operation. It is expected that after resolving the land dispute 1.31 km main irrigation canal on the left bank will be completed very soon and the project will be brought under operation.[1]

4.1 Project Description

Location : The Tangon Barrage Irrigation Project is located in the Thakurgaon District and the barrage is located at Rajagaon village at a distance of 16 km north to Thakurgaon town and is accessible by fair weather roads throughout the year from Thakurgaon, Boda and Atwari. The project area is located between longitude $88^{o}25'$E to $88^{o}32'$ E and latitude $26^{o}6'$ N to $26^{o}12'$ N (See Figure 4).

---

1. In January, 1993 when we visited the project site it was found that 1.31 km main irrigation canal was yet to be completed. But it is learnt from BWDB that the remaining 1.31 km canal was completed some time in 1993 and now it can be said that the project work is complete and it should go for early operation.

Topography and Soils: The project area is assumed to be flat in general with only a small micro-topography. The general slope in the project area is observed to be north-south with elevation falling at a high oblique of about three feet per mile. The micro-topography is dominated by a series of north-south ridges and valleys but the local east-west slopes generally exceed the aforementioned north-south trend.

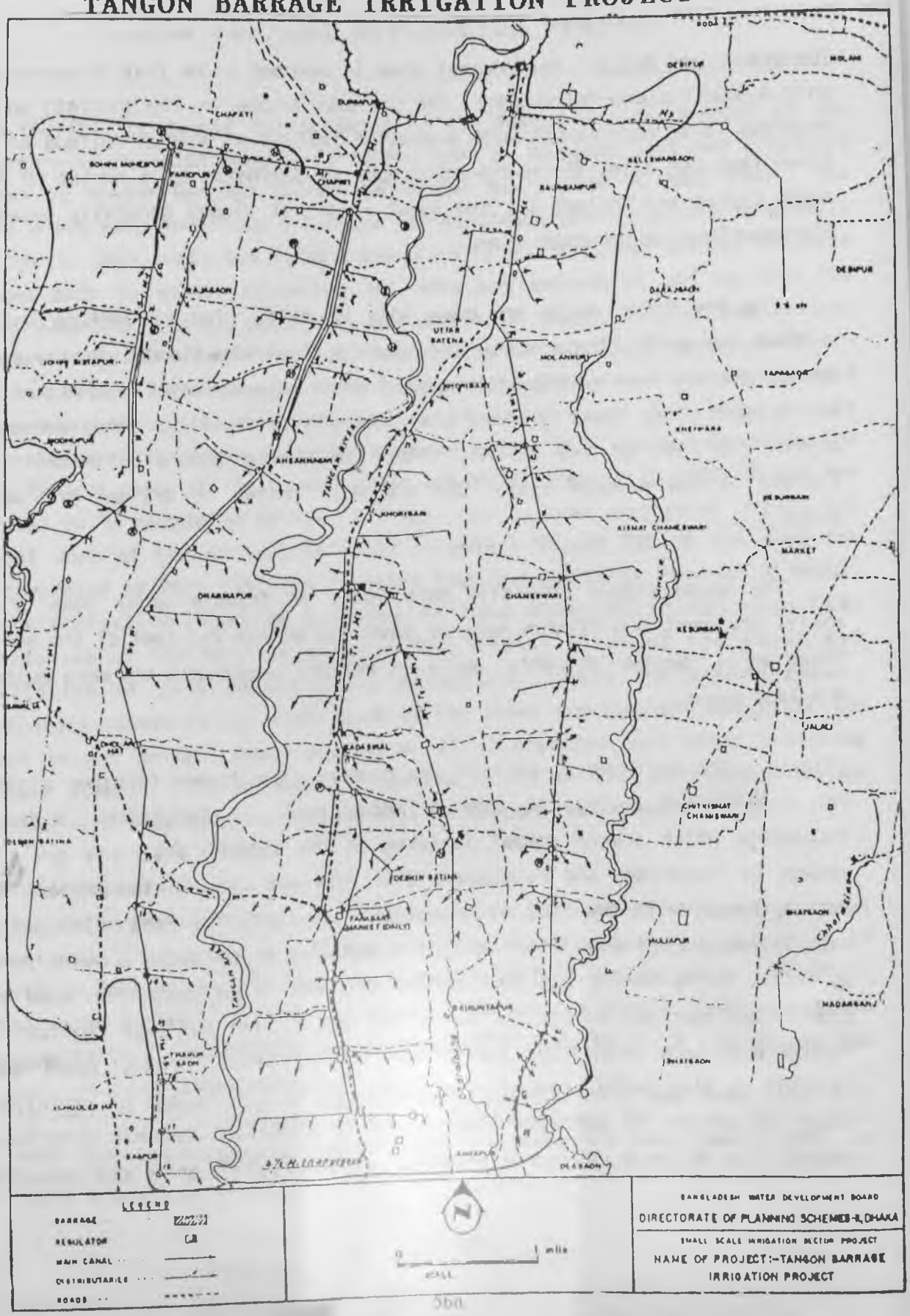
The low lying soils are clay loam to silty clay in texture and have puddled top soils. These soils are usually shallowly flooded in the monsoon season and are best adapted for wetland crops. The soils of the higher lands are friable sandy loams to sandy clay loams, with usually a sandy sub-stratum within 2-5 feet of the surface. These soils are generally intermittently flooded in the monsoon season and are well suited to dryland and wetland crops.

The broad ridges generally have loose or friable sandy loam or loam soils. The sandy sub-stratum here is generally within 2-3 feet of the surface. These soils become 'droughty' early in the dry season and are more suited to dry land crops.

Climate : The north-west, part of the country (the former Dinajpur district) has a different ecology to that of other parts of Bangladesh. Widespread inundation which are of annual features in the eastern districts are almost absent in Thakurgaon and Panchagarh districts and also in the project area. But in common with the rest of Thakurgaon district, the Tangon project area experiences a high annual rainfall of about 2200 mm of which some 85 percent generally falls during the four months of June to September. In some years significant rainfall occurs too during May and October but such rainfall is a random phenomena with high coefficient of variation. Again, total annual rainfall is also being treated as variable having coefficient of variation of about 20 percent on average. Also, there is a marked variability of annual rainfall within a relatively small geographical area and as evapo-

FIGURE 4

TANGON BARRAGE IRRIGATION PROJECT MAP



transpiration is relatively constant from year to year, moisture stress occur frequently during October and November for T. Aman crop. This limiting factor contributes for necessity of supplementary irrigation for T. Aman crop in this ecological area of the country.

Hydrology : Determination of area that could be provided supplementary irrigation is a complex problem as rainfall varies and river flows are correlated with the extent of rainfall. The mathematical simulation (Annex B, Feasibility Report) results suggest that the Tangon barrage would be able to supply an area of 11,000 acres with 1 in 5 years risk of failure. The maximum irrigation water demand in any 10 day period is 220 cusecs.

Objective : T. Aman is the main crop in the project area but its production is constrained by occasional drought during the later part of the growing period. The water holding capacity of land in the project area is very low and the crop cannot sustain a drought regime for more than 7 days. So, the primary objective of the project is to provide supplementary irrigation to T. Aman by developing a gravity irrigation system using the surface water of the river Tangon and also to provide adequate residual moisture for wheat or rabi crop cultivation.

Salient Features : The salient features of Tangon Barrage Project are :

Barrage	1 No.
Head Regulator	2 Nos.
Auxiliary Structures	486 Nos.
Embankment	6.10 km.
Main Irrigation Canal	41.91 km.
Distributory Canal	105.39 km.

4.2 Assessment of Project Features

4.2.1 Location and Area of the Project

The project is located on both banks of the river Tangon and in the downstream it covers the unions Rajagaon, Akcha, Baragaon, Ruhiya, Akhanagar

and Debipur, all being located under Thakurgaon Sadar Thana. The catchment area upstream of the barrage is some villages under Radhanagar union of Atwari Thana. The feasibility report states that project area extends partly over Boda, Atwari and Thakurgaon Sadar thanas but according to our observation and discussion with the people in the project area, there is no land of Boda thana under the project either in the upstream or downstream of the barrage. It indicates that Feasibility report has its own defect in demarcating the project area. The villages that are covered under the project and expected to be benefitted after operation of the project are basically located at the downstream of the barrage which are as follows.

	Village	Location
1.	Uttar Batina	Left bank village under Rajagaon union of Thakurgaon Sadar Thana.
2.	Rajarampur	do
3.	Kharibari	do
4.	Chapati	Right bank village under Rajagaon union
5.	Arazi Faridpur	do
6.	Rajagaon	do
7.	Dharmapur	do
8.	Asan Nagar	do
9.	Dakkhin Batina	Both right and left bank village under Akcha union of Thakurgaon Sadar Thana
10.	Akcha	Right bank village under Akcha Union
11.	Uttar Thakurgaon	do
12.	Kushal Bari	do
13.	Baikuntapur	do
14.	Molan Khuri	Left bank village under Baragaon union of Thakurgaon Sadar Thana
15.	Kismat Chameswari	do
16.	Chameswari	do
17.	Faridpur	Right bank village under Ruhiya union of Thakurgaon Sadar Thana
18.	Gani Moheshpur	do
19.	Modhupur	do
20.	Kaleswarga	Left bank village under Debipur union of Thakurgaon Sadar Thana
21.	Darajgaon	do
22.	Also a few villages (the villages could not be identified due to lack of time)	Under Akhanagar union of Thakurgaon Sadar Thana

According to statistics maintained at Thakurgaon Sadar Thana Statistical Office, the area, population and net cropped area in the project villages are shown in table - 9 as follows :

Table 9

Area, Population and Net Cropped Area in the Project Villages

Villages	Area (in acre)	Population (1991)	Net cropped Area (acre)
1. Uttar Batina	1241	2410	881
2. Rajarampur	425	537	266
3. Kharibari	1603	3495	1283
4. Chapati	1238	2631	1004
5. Arazi Faridpur	67	110	29
6. Rajagaon	1553	2885	953
7. Dharmapur	1629	3690	1272
8. Asan Nagar	978	2230	875
9. Dakkhin Batina	3307	6230	2317
10. Akcha	1814	4620	1153
11. Uttar Thakurgaon	1659	4455	1537
12. Kushalbari	350	834	276
13. Baikuntapur	475	582	383
14. Molankuri	1548	3245	1203
15. Kismatchameswari	479	1601	332
16. Chameswari	1380	3140	1215
17. Faridpur	279	787	215
18. Gani Moheshpur	1232	5038	1003
19. Modhupur	1464	3655	1022
20. Kaleswarga	833	1415	599
21. Darajgaon	901	1685	699
Total	24455	55275	18217

Source: Thana Statistical Office, Thakurgaon.

So, the total area under the project is around 25000 acres or more (as there are some project villages too under Akhanagar union) and net cropped area under the project at the downstream is also more than 18217 acres. But the project envisages to provide supplementary irrigation to 11000 acres of T. Aman crop only. This is possibly due to the fact that in the Tangon area T. Aman (local & HYV) is planted in 78% of net cropped area (feasibility report on Tangon Project) and moreover we observed in our field visit that sufficient land near at both banks of the river are high enough where irrigation by gravity canals are not at all possible but LLP can serve better in these high land. The barrage reservoir has its own limitation for stock and supply of water which can be evaluated better if the project is brought under operation. It becomes really difficult on our part and also to a few knowledgeable people particularly the present chairman of Rajagaon Union to remain optimistic for a longer time about the supply of water to 11000 acres of T. Aman crop since the project is not brought under operation for at least to the land in the right bank of the river though the necessary infrastructure at the right bank was completed two years ago. So, it is a matter of time to evaluate the exact area of the project that will get supplementary irrigation once the project is brought under operation during the drought regime of T. Aman growing/flowering period.

4.2.2 Physical Structures and Implementation

The physical structures of the project include amongst others the salient features of the project which are described below in terms of their present status.

Barrage and Regulators : The construction of Barrage and Head Regulators (on the right and left bank) were completed quite satisfactorily long time ago (more than 2-3 years back) as per design specification of the project. The present physical condition of these are good by any standard and can be brought under operation at any time without any trouble. The location of the barrage and regulators are shown in Figure 4. The barrage is being watched by a contingent of 7 ansars by rotation round the clock and they are

being paid by Panchagarh O&M Division, BWDB. The head regulators are located at a distance of around 200-300 km from the barrage. The gate operating arrangements, wing walls, launching apron, loose apron (blocks) of the barrage and head regulators were found perfectly alright. Barrage consists of 5 vents each of size 6.0 m. x 4.5 m. having radial type of gates and it is 35.36 meter in length. It also serves as a bridge over the river. Each of the head regulator is of one vent each of size 1.52 m x 1.83 m having vertical lift type of gate.

Main Irrigation Canals : Main irrigation canal at the right bank of the river was completed quite a long ago but on the left bank due to some controversy and land dispute the main irrigation canal could not be completed at Uttar Batina village[1] but major portion at the extreme downstream of the left head regulator was completed almost at the same time when main canal at the right bank was completed.

The dispute arises to nearly 150 households for their land who happens to be the immigrants (mohajer) who settled in the land in early fifties and were provided the right of use of land without any proper records of right by the than Relief Ministry, Govt. of East Pakistan. As usufructuary these people have been paying land tax regularly to the appropriate authority. So, dispute arises when they were going to be ejected without proper compensation. It has been learnt that Ministry of Relief and Rehabilitation has resolved the issue but D.C. Thakurgaon in apprehension of violence from the effected people, wants to resolve the issue through Land Ministry so that there is no problem in providing compensation money to the effected people. Anyway, the issue is expected to be resolved very soon. The part of main canal at the left bank which needs to be constructed for operation of the left head regulator is only around 1.31 km in length and stands from near the left head regulator to near the Patiadangi Hat only and in the downstream of Patiadangi Hat the canals were constructed along the time of right bank canals. As the canals were constructed more than 2-3 years back, siltation out of rainfall run-off from adjoining field is seen occasionally and otherwise the condition of irrigation canals are good.

---

1. BWDB claims that dispute was resolved in 1993 and the canal is complted.

Distributory Canal : Secondary and tertiary canals on the right bank of the barrage were completed in 1988/89 and during the time of main irrigation canal construction. But on the left bank the secondary and tertiary canals were completed in part. This is due to the non-completion of main irrigation canals. The physical condition of these constructed canals seems to be not very much effective particularly in the downstream of canals due to process of siltation by rainfall run-off. For effective utilisation these canals need re-excavation once in every three years.

The proposed drainage channels are absent and it is expected that these will be made once the project is brought under operation, in cooperation with the BRDB by KSS. The farmers are ready to make the required drainage channels of their own if the supply of water is ensured.

Embankment : It was proposed (feasibility report) that embankment will be made of 6.10 km in length but in practice as per requirement the embankment is constructed for only 3.50 km. This embankment was partly (in terms of height) made by WFP before initiation of Tangon Barrage under SSISP. The top width and general condition of the embankment appears to be good though turfing is not adequate and in two places on the right bank near Chapati village there are public cuts. According to knowledgeable people, these cuts are due to two reasons (a) non-operation of barrage and (b) since long time ago, the people of Asan Nagar, Dharmapur, Rajagaon and Chapati villages were benefitted by a natural channel from Rashiya beel, a perennial source of water, during and after monsoon but due to embankment the flow of water stopped. So, before operation of the project, these cuts needs to be repaired and if the barrage fails to provide water then such cuts can not be avoided out of necessity of water.

Auxiliary Structures : Necessary auxiliary structures such as distribution boxes, culverts, drainage sluice, cart bridge, foot bridge etc. were completed in scheduled time and all are sufficiently in good condition. Extra structures having air-conditioned recreation rooms with sufficient modern toilet facilities were built for inaugural of the barrage in 1990 by the President of

the country, which has no utility for realisation of the objective of the project. These extra structures were built at a huge cost (exact cost not known, may be more than 10 lacs of taka) for publicity and propaganda of BWDB ignoring the burning issue of land dispute. The President while visiting the barrage site could mitigate the land dispute quite favourably without any problem and the project could be brought under operation much earlier.

4.2.3 Institutional Arrangement and Involvement of Local People

Any agricultural development project in our country needs liaison with the organisations like BRDB, BADC, DAE etc. which was duely envisaged while initiating SSISP by DPS-II (ADB), BWDB. BRDB can play a significant role for Command Area Development (CAD) through its Irrigation Management Programme (IMP) involving the farmers. BADC can contribute in terms of supply of irrigation equipment (LLP/STW/DTW) in different modules according to necessity and suitability for upliftment of the project area. DAE can also contribute in designing and recommending the most suitable crops/cropping pattern for a particular area under the endowed resources together with the corresponding input packages. So, it was expected that appropriate officer of BWDB (Liaison Officer) would make visits to places/unions within the project area and the Thana Parishad Chairman to inform the people about the project and its objectives. The Liaison Officer was also supposed to discuss the ingredients and objectives of the project with the Thana and District level officials of BRDB, BADC and DAE. In our extensive field visit and discussion with the concerned personnel it revealed that liaison of BWDB personnel with the BRDB, BADC and DAE officials were either absent or seriously lacking and XEN, Panchagarh O&M Division, BWDB remarked that involvement of other organisations were not significantly important before operation of the project. The involvement of local people in the project activities is nil and they were never consulted by BWDB either before or at the time of initiation of the project about its objective and positive and negative impact of the project. The land dispute crisis has emerged due to lack of involvement of local people in the project activities and failure of BWDB in contacting people at project area by and large before the initiation of the project. The present status of

the project and discussion at various levels during our field visit as member of RRA survey team, reveal the dynamism of Panchagarh O&M Division, BWDB in terms of speedy completion of construction works ignoring the importance of involvement of other line agencies and local people who were projected to be the beneficiary.

4.3 Agricultural Transition

Nature has its own devices for a change and it influences to some extent in the transition of human lives and activities at least in the long run. The Tangon Project area has been experiencing transition in its agricultural activities particularly in terms of net cropped area, cropping pattern, cropping intensity, yield rate, diffusion of technology, inputs use such as seed, irrigation, chemical fertilizer. This transition has been brought by the people over time due to the necessity of life irrespective of intervention by the project.

4.3.1 Net Cropped Area and Cropping Intensity

According to Feasibility Report of Tangon Project, Part II - Annex, BWDB, net cropped area of the project constitutes 80 per cent of total project area against net cropped area being 77.64 percent of Thakurgaon Sadar Thana (BBS : 1983-84). Our estimate based on Table 9 reveals that net cropped area in the villages under the project is around 74.49 percent of project area. It implies that net cropped area in the project area has been reduced slightly which is possibly true for at least two reasons: (a) 80.79 ha (arable land) has been acquired by BWDB for the Tangon Project on account of irrigation/distributory canals and embankment and (b) number of household increased over time which has eroded the arable land at least to some extent.

Table - 9a shows the cropped area (net and gross) and cropping intensity in some project villages in different unions based on BBS data and data generated by interviewing knowledgeable people and groups of farmers in the course of RRA survey in each of the villages as mentioned. It appears that net

cropped area in the villages while compared with BBS data has either decreased or increased but while considering the views of the villagers, they voiced uniquely that over time the net cropped area has been slightly reduced for a number of reasons. But it has been reported that gross cropped area has been increased in all the villages which implies that cropping intensity has also increased. In table - 9a the reflection of increased cropping intensity is quite obvious though sources are different and according to BBS, the intensity of cropping at Thakurgaon district in 1983/84 and in 1977 were 163 and 153 respectively which means intensity of cropping has increased during 1977 to 1983/84. Again, according to Thana Statistical Office of Thakurgaon Sadar Thana the cropping intensity has increased from 167 (in 1983/84) to nearly 200 in 1991/92. So, there is no doubt that in the project area cropping intensity has increased by around 10 per cent or more inspite of non operation of the nearly completed project.

Table 9a

Cropped Area and Cropping Intensity in Some Project Villages

(Area in Acres)

Village	Cropped area/intensity before project, 1983/84			Cropped area/intensity in 1991/92 based on RRA survey					
	Net	Gross	Cropping intensity	Single	Double	Tripple	Net	Gross	Cropping intensity
Uttar Thakurgaon (Akcha UP)	1537	2478	161	660	495	345	1500	2685	179
Madhupur (Runiya UP)	1022	1740	170	350	500	150	1000	1800	180
Faridpur (Ruhiya UP)	315	515	163	140	140	40	320	540	169
Dharmapur (Rajagaon UP)	1272	2049	161	550	650	50	1250	2000	160
Asannagar (Rajagaon UP)	875	1354	155	400	500	50	950	1550	163
Arazi Faridpur (Rajagaon UP)	29	42	145	12	20	3	35	61	174
All villages	5050	8178	162	2112	2305	638	5055	8636	171

Sources: (a) BBS: The Bangladesh Census of Agriculture and Livestock: 1983-84. Zila Series, Thakurgaon, March 1988.
(b) RRA Survey of BIDS on SSISP, January, 1993.

4.3.2 Cropping Pattern

Table - 10 shows the cropping pattern (percentage of gross cropped area) in some selected project villages in different unions during 1983/84 and 1991/92. Data for 1983/84 have been compiled from BBS (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Thakurgaon, March 1988) and Thana Statistical Office, Thakurgaon Sadar Thana. And data for 1991/92 have been primarily collected from the knowledgeable villagers/farmers in each village and are properly scrutinized and verified with the Block Supervisors in each union and it is assumed that the quality of data is reasonably good though we opted for omitting the minor crops which is less significant in terms of acreage, investment and profitability and as such the crops incorporated in table - 10 cover only 90-95 per cent of gross cropped area. It appears from table - 10 that rice and wheat account nearly 70 per cent of gross cropped area in the project area as against nearly 80 per cent at national level. The lower level of acreage for rice and wheat in the project area has the following justification.

The project area and also the districts of Thakurgaon, Panchagarh and Dinajpur have been considered for a long time as a surplus area in terms of foodgrain production. Also due to lack of suitable infrastructure and marketing facilities, the farmers have been deprived from proper price of their produce particularly for paddy. As for example, Government declared procurement price Tk. 210 per maund paddy but during our field visit in February 1993, we observed that floor price prevailing in most part of Thakurgaon, Panchagarh and also in the markets under the project area was around Tk. 145 - Tk. 155 per maund paddy. So, farmers have the option for remunerative other crops. Also, the presence of sugar mill at Thakurgaon and Panchagarh caused the farmers in the project area to be induced for more sugarcane production which is a cash crop round the year.

Table - 10

Cropping Pattern (Percentage of Gross Cropped Area) in Some Project Villages, 1983/84-1991/92

Crops	Name of the Villages													
	Uttar Thakurgaon		Modhupur		Faridpur		Dharmapur		Asannagar		Arazi Faripdur		All Villages	
	1983/84	1991/92	1983/84	1991/92	1983/84	1991/92	1983/84	1991/92	1983/84	1991/92	1983/84	1991/92	1983/84	1991/92
B. Aus	10.21	10.01	7.99	8.15	8.93	8.95	12.69	12.72	20.97	20.95	14.20	15.30	12.16	12.16
Local T. Aman	44.63	43.40	48.97	38.20	54.75	45.05	45.34	25.05	32.50	19.70	45.20	30.12	44.27	33.70
HYV T. Aman	8.07	10.12	1.90	6.78	3.11	12.89	3.02	25.45	0.30	20.56	-	17.41	3.81	15.01
Local Boro	0.36	0.14	1.29	4.51	-	-	0.09	0.10	-	1.10	-	-	0.40	1.21
HYV Boro	-	0.25	0.33	3.83	-	-	3.03	4.50	-	2.05	-	-	0.82	2.29
Local Wheat	3.01	0.20	5.36	2.40	4.27	0.50	7.37	-	3.03	-	7.14	-	4.71	0.60
HYV Wheat	2.27	5.25	4.00	6.56	3.30	7.50	-	3.30	2.00	4.40	-	7.80	2.06	5.06
Maize	0.52	0.55	-	0.50	-	0.25	-	-	-	-	-	-	0.16	0.29
Kaon	0.40	-	4.65	1.20	-	-	0.50	-	1.50	-	1.10	-	1.49	0.25
Pulses	2.90	2.91	3.68	1.50	3.38	3.92	2.54	1.50	2.58	1.50	4.76	3.50	2.96	2.07
Potato	1.61	2.30	3.50	3.55	2.72	3.15	1.55	2.21	0.50	2.43	1.50	2.50	1.87	2.61
Sweet Potato	0.72	0.32	0.28	0.15	-	-	-	-	-	-	-	-	0.27	0.13
Sugarcane	3.14	4.50	1.90	4.10	2.50	3.10	1.76	2.23	3.03	3.88	-	3.50	2.45	3.68
Mustard/ Oilseed	5.57	3.10	1.44	1.20	1.94	1.95	5.42	3.20	7.31	4.19	1.15	-	4.70	2.82
Jute	6.13	4.25	8.28	5.35	6.40	4.20	5.32	4.40	4.42	3.50	7.14	7.20	6.12	4.39
Vegetables	3.79	5.14	2.47	3.52	2.52	3.57	4.29	5.20	7.01	7.85	4.76	7.14	4.42	5.21
Chillies	0.60	0.62	0.25	0.20	0.10	0.10	0.45	0.10	0.90	0.25	0.20	0.20	0.51	0.01
Other Spices	0.20	0.19	0.15	0.14	0.09	0.10	0.37	0.10	0.50	0.15	0.10	0.10	0.28	0.15

Source: (a) BBS: The Bangladesh Census of Agriculture and Livestock: 1983-84 Zila Series, Thakurgaon, March 1988
(b) Thana Statistical office, Thakurgaon
(c) RRA Survey of BIDS on SSISP, January, 1993.

As shown in the table, the acreage for broadcast aus paddy has remained almost static during 1983/84 to 1991/92 in terms of percentage of gross cropped area but significant changes in terms of acreage for all other crops have been observed. The reasons may be numerous for such changes and it is beyond our scope to study within a short period of time. The percentage of gross cropped area has decreased during the period 1983/84 to 1991/92 for the crops local T. Aman, local wheat, kaon, pulses, sweet potato, oilseeds, jute, chillies and other spices. As stated by the farmers, these crops can not compete with other crops in terms of profitability and their yield rates are also falling gradually but nevertheless the farmers are cultivating these crops as they have no other option due to resource constraint.

A significant increase of acreage is observed during the period 1983/84 to 1991/92 for the crops HYV T. Aman, HYV Boro, HYV wheat, potato, sugarcane and vegetables. The farmers are of the opinion that these crops yield more with sufficient input use and per acre net revenue is comparatively better though input cost is also higher while compared with other crops. So, it appears that diffusion of technology is not a problem to the project area as the farmers have shifted to modern varieties rice and remunerative crops according to their own choice with higher investment cost. It has been expected that if the farmers can be provided with sufficient input-requirements and water can be managed and supplied to them in proper time, the production of foodgrain in near future will increase further to the extent of 100 per cent or more and the process of agriculture diversification will be accelerated.

4.3.3 Yields Rates of Some Crops in Tangon Area

Yield of a crop is a function of so many factors and it requires separate study to estimate the yield rates of different crops in a locality but the general trend can be explained without intensive study or analysis of scientific origin. While visiting the villages in different unions under the project, the study team discussed with the groups of farmers about the present and past production per acre for different crops and these figures were

averaged and verified with the corresponding Block Supervisors of DAE and with the figures maintained at Thana Statistical office. It appears that all crops have experienced some changes in yield rates as shown in table - 11 during 1983/84 to 1991/92. Yield of crops Broadcast Aus, HYV T. Aman, Local Boro, wheat (local and HYV), sugarcane and potato have increased during 1983-84 to 1991-92 and yield of all other crops have reduced. Some people argue that yield rate has increased for better seed and suitable dose of fertilizer use which may be partially true as in case of HYV Boro seed and fertilizer remaining constant, the yield has declined and in case of HYV T. Aman the seed, fertilizer remaining constant the yield has increased. We have no sufficient valid reasons to contend our yield estimates due to the limitation of our RRA survey but we can not also accept sufficiently the estimates of yield rate as provided in the feasibility report which differs significantly from our estimates shown in table - 11.

Table - 11
Yield Rates of Some Crops in Tangon Project Area

(Maund/Acre)

Crops	Before Project (1983-84)	Last Year (1991-92)	Existing Yield Rate Quoted in Feasibility Report	After Project Implementation Expected Yield Rate (Feasibility Report)
B. Aus	13.00	14.00	12	-
Local T. Aman	21.00	19.60	17	30
HYV T. Aman	31.75	37.50	30	45
Local Boro	24.50	25.00	-	-
HYV Boro	57.50	52.50	-	-
Local Wheat	12.00	13.00	15	-
HYV Wheat	19.00	24.00	-	-
Maize	9.00	8.00	-	-
Kaon	10.00	8.00	-	-
Pulses	7.00	6.00	-	-
Musterd/Oilseed	6.50	6.00	6	-
Jute	16.40	14.00	10	-
Sugarcane	400.00	500.00	350	-
Potato	115.00	140.00	-	-
Sweet Potato	130.00	125.00	-	-
Chilies (Dry)	7.00	6.00	-	-

Source: RRA Survey of BIDS on SSISP, January, 1993

4.3.4 Irrigation in Tangon Area

The Tangon project area and the rest of Thakurgaon were quite developed in terms of modern irrigation and number of installed DTW or STW since late sixties to early eighties. But in the feasibility report prepared by BWDB and consultants on Tangon Project there is no citation about the mode of irrigation prevailed in the project area and extent of irrigation by DTW/STW/LLP. The project envisaged for only T. Aman by surface water and why not Boro and other crops had been considered by ground water irrigation is a serious question while launching a capital intensive project. At least there should have been reasonable discussion in the feasibility report in the context of irrigation facilities prevailed in the area and potentials or adversities for Boro and other crops by means of DTW/STW/LLP.

According to Thakurgaon Sadar Thana Statistical Office, there are 419 DTWs, 1333 STWs and 9 LLPs at Thakurgaon Sadar Thana but a significant number (exact number not known to them) are currently out of order and capacity of irrigation by each of DTW, STW and LLP were estimated 60 acres, 10 acres and 56 acres respectively.

The RRA team could not visit all the project area and all the villages and it is neither possible nor desirable to visit all the villages for RRA survey and as such true picture regarding number of DTW/STW/LLP installed and currently being in operation in the project area could not be ascertained. Thana Statistical Office or Agriculture Office also could not help us in this regard. A few project villages which we visited give the following account of modern irrigation with their potentials and practice.

(a) Khaleswarga/Debipur Union:

Net cropped area of this village is 599 acres. Six DTWs were installed in different times and each having irrigation capacity 70 acres but none is under operation currently. Two DTWs were in operation till last year by BWDB. It has been reported that transformers of these two DTWs have been stolen and since then no attempt is made for operation of DTWs in

this village. It is expected as stated by the knowledgeable people that almost all the DTWs in the village can be brought under operation if initiative is taken by BWDB or BADC.

(b) Asannagar/Rajagaon Union:

Net cropped area of this village is 875 acres. There are one DTW and 13 STWs in the village. DTW is out of order for the last 4-5 years and as such 13 STWs have been installed under private management and all the 13 STWs are in operation and each has the capacity of irrigating 10-12 acres of land. DTW owned by BWDB can be brought under operation.

(c) Uttar Thakurgaon/Akacha Union:

Net cropped area in this village is 1537 acres. There are three DTWs and two STWs in the village. DTWs are currently not in operation. Last year one DTW was brought under operation by Grameen Bank but water charge is Tk. 1440 or 33 per cent of farm produce per acre which is high enough and the farmers are reluctant to use water due to high charge. Other two DTWs are owned by BWDB each having irrigation capacity 70 acres. STWs are owned and managed privately quite successfully.

(d) Modhupur/Ruhiya Union:

Net cropped area in this village is 1022 acres. There are one DTW and 12 STWs in the village. Last year DTW was brought under operation by Grameen Bank but due to high price of water farmers are not willing to take water from DTW and as such the DTW is currently remaining idle though its capacity is around 70 acres. 12 STWs are owned and managed by farmers quite successfully and each has the capacity of irrigating 15-20 acres of land.

(e) Dharmapur/Rajagaon Union:

Net cropped area in this village is 1272 acres. There are 4 DTWs and 13 STWs and in this village. The DTWs are currently not in operation. Last year one DTW was brought under operation by Grameen Bank but due to high water charge (Tk. 1440 per acre) farmers are not willing to take water

from Grameen Bank. The STWs are owned and managed privately quite well and water charge for STW is Tk. 400 per acre per season.

(f) Faridpur/Ruhiya Union:
Not cropped area in this village is 215. There are two STWs and one DTW in the village. The DTW was in operation till 1987. The STWs are in good condition and operating quite well each having capacity of irrigating 20 acres of land.

(g) BWDB distributed and installed 20 STWs free of cost to the upstream villages in 1989/90. Each STW was provided to a group of 10 farmers so that they can irrigate at least one acre of land during dry season in order to compensate their losses due to ponding of water for the barrage. Four STWs were provided to Radhanagar village.

The potentials prevailing for ground water irrigation in the project area as revealed in the above project villages are quite high and without exploring and capitalizing the existing facilities of irrigation, the Tangon Barrage project has been launched quite long past without meaningful success rather incurring losses in terms of net cropped area before operation of the project and during operation of the project nearly 400-500 acres of land in the up-stream will be severely flooded and no paddy crop can be produced in these severely flooded area due to ponding of water for Barrage. It can not be properly evaluated about the success or failure of an on-going project like Tangon Barrage Irrigation Project. But time is the best judge to decide the future of an on-going project in terms of success or failure.

4.3.5 Other Agriculture: Livestock, Poultry, Fishery and Forestry

Tangon Barrage Irrigation Project is mainly concerned for increased production of T. Aman. Livestock, poultry, fishery and forestry are the important sub-sectors of national economy and these sub-sectors can not be ignored for variety of reasons and also for accelerating the agriculture diversification process.

In absence of mechanized mode of cultivation, draft animal power has been serving as the only means of cultivation in the project area. According to interviews with the UP chairmen/members and knowledgeable people in the project area, the livestock population in the project area has increased slightly upto the extent of 5-10 percent during eighties but number of animals could not be ascertained. It has been reported that on an average each farm household rear 3-4 cattle heads and 2-3 sheep or goats. Large farm households have larger number of cattle heads. There is no dairy farm in the project area possibly due to lack of infrastructure. With the development of infrastructure facilities commercially viable dairy farm may come up in near future but for this the existing veterinary services and credit facilities should be extended. There are sufficient grazing land in and around the project area for rearing cattle and moreover fodder is also sufficiently available.

In case of poultry, the project area has been experiencing decline of poultry population primarily due to lack of infrastructure facilities and also for lack of medical care facilities against epidemic diseases of poultry birds. There is no commercial poultry farm in the project area but most of the housewives are reported to rear a flock of 5-10 birds for household consumption.

The scope of fishery in the project area at present is very limited as there is no sufficient scope for capture fishery. There is no fishermen community in the project area and the villagers during monsoon occasionally catch fishes from the river Tangon and adjoining low lying areas. The scope of culture fishery is also very limited due to small number of ponds in the area and moreover most of the ponds get nearly dried up during dry season. But with the operation of the project nearly 1400 acres of land in the upstream will be flooded in various degrees which will create congenial atmosphere for habitat of fish species. Bangladesh Fisheries Directorate may be approached for implementation of suitable project for fish culture in the upstream of the barrage and it will increase fish production in the project area.

No forest is noticeable in the project area apart from homestead garden/jungle or bushes where trees for fire-wood and fruit trees are grown. Number of large trees have been reduced over time due to random depletion of trees. There are sufficient scope for large scale plantation of trees in the road side and also in the homestead garden but for this motivational work is necessary.

4.3.6. Tenurial Arrangement in the Project Area

The present tenurial practices in the project area are common to rest of the country and these are owner farmer, owner-cum-tenant farmer and tenant. There are three types of share-cropping arrangement prevailing in the project area as reported to us during our field visit which are as follows:

(a) Landlord receives half of produce without sharing cost of production;
(b) Landlord receives half of produce after sharing 50% of material input cost;
(c) In some cases, landlords are found to supply the total cost of seed and fertilizer but after harvest the total cost of seed and fertilizer are first of all realized from the farm produce and the residuals are then shared equally.

4.3.7 Land Holding Distribution

According to BBS (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Thakurgaon, March 1988) households at Thakurgaon in 1983-84 belonging to landless or near landless group (owning less than 50 decimal land), small (owning 50-250 decimal land), medium (owning 251-500 decimal land) and large (owning more than 5 acres land), farmers group were respectively 40.4%, 27.7%, 15.0% and 16.9%. This picture is supposed to be almost same for Tangon Project area too but over the years during 1983-84 to 1991-92 some changes have taken place in the Tangon Project area as revealed while discussing with the knowledgeable people in the project area. It has been stated overwhelmingly that landlessness has increased in the project area compared to early eighties and on the other hand percentage of large farmers

has reduced slightly possibly due to split up of families and application of law of inheritance.

4.4 Non-Farm Economic Activity

The incidence of growing landlessness (at present around 40%) has caused serious socio-economic problems as the present state of agriculture in the project area can not absorb all labour force. It is assumed as has been stated by the people in the project area that 80-90 per cent labour force population are involved in agriculture. The remaining 10-20 per cent population of labour force depend on various activities. The non-farm activities are very much limited in the project area like elsewhere in the country. So, a significant proportion of landless people remain unemployed for at least 3-4 months in a year. They very often rush to Thakurgaon town for some work of any nature. Some people work as transport workers like van, rickshaw or cart drivers, helpers/assistant of bus or tempo (auto-rickshaw) drivers, some people (men & women) work in rice mills, saw mill and some are involved as workers in construction of buildings, roads and earth cutting. A few people who managed capital by selling their properties are found to run petty business and grocery shops in village hats and some work as vendors. The cottage type processing activities are very much limited in the project area. The incidence of blacksmithy, bamboo products, carpentry, jute products and oil crushing by ghani have been found to some extent in different villages but their contribution as gainful economic activity for sustaining economic pressure of household is very much in sufficient. It has been stated that due to lack of infrastructure facilities sufficient non-farm activities have not evolved in the project area. Due to construction of village roads under WFP some landless have changed their occupation from agricultural labourer to rickshaw/van driver and it has been expressed by them that daily earning from rickshaw/van driving is much higher than agricultural wage. The present agricultural wage in the project area varies from Tk. 15 to Tk. 25 per day. Both men and women are found to work as agricultural labour. The wage rate for women varies in the range Tk. 15-20 and for male labour Tk. 20-25. The nature of work remaining same, female wage rate is smaller than male wage rate

possibly due to lower productivity of female compared to male in agricultural works like transplantation, harvesting and carrying of farm produce from field to the courtyard of farmers. If we want welfare to the people of the locality then emphasis should be given not only to the project for T. Aman production but also towards infrastructure development, extension of credit facilities and development of non-farm activities.

4.5 Institutional Aspects

There is no existing KSS in the Tangon area. Interestingly BRDB is not operating in the Thakurgaon district - the promotion, organisation and supervision of KSS/TCCA activities are currently undertaken by the BWDB (Feasibility Report of BWDB). In our field visit we also could not trace the existence of any KSS. Moreover, the interest charged to the farmers for crop loan from BRDB is 17.5% against 14% interest rate for crop loans from Sonali Bank or BKB (Rajshahi Krishi Unnayan Bank). So, the farmers are less interested to form KSS for loan from BRDB. But each loan processing has its own cost at the rate of 10% incurred by the borrower in case of loan from Sonali bank or BKB as stated by the people in the project area. The same incidence is also witnessed elsewhere in the country. Again, loan money can not be availed from bank in proper time in case of urgent necessity and as such poor people rush for non-institutional loan often with a high interest rate at the rate of 10% per month. For a short period of one or two months people have no other option than non-institutional loan. Recently Grameen Bank and RDRS have been working in the project area and they are providing various loans to the target groups of people which has contributed to offset the influence of moneylenders to the poor people at least to some extent.

The access into the project area is difficult though it has improved recently with the construction of a road under the WFP. The main paddy procurement centres are at a distance of 6-8 miles (Boda and Thakurgaon) and main source of fertilizer is reported as being no closer than Thakurgaon. At government procurement centres of Boda and Thakurgaon farmers can not sell their paddy for no reasons at all but same paddy when supplied by 'beparees'

or through intermediaries get due access to the government godown by the personnel of procurement centres. This bottleneck in the marketing process can not be allowed for years together and the deprivation process to the farmers must be stopped if the farmers are expected to produce more paddy.

The project is expected to be brought under operation before the next T. Aman harvesting period. While brought under operation the project management will require a series of institutional procedures and organisations of which the noteworthy ones may be stated as follows:

a) A committee consisting of knowledgeable people from both upstream and down-stream area of the barrage should be formed which will decide when the barrage gates will be opened and closed.

b) The barrage and head regulators should be under the control of an operator appointed by the BWDB and BWDB will be the monitoring authority.

c) A committee consisting of thana level officials from DAE, BRDB, BADC, local MP/Chairman of Thana Council and SDE/SO of Panchagarh, O & M Division of BWDB may also be set up in order to arbitrate in disputes arising from any corner.

d) In order to equitable distribution of water through the distributory canals, a series of irrigation block associations need to be set up and guided by the BRDB through its IMP team.

e) Extension services of DAE should be intensified. A committee may be set up with the personnel from BRDB, SMO of DAE, UP members/chairmen and SO of BWDB for monitoring the extension services.

f) A separate committee consisting of UP members/chairmen, SO of BWDB, SMO of DAE, ARDO of BRDB and OC of LSD may help the farmers of the project area in order to fetch proper price of their produced paddy from the procurement centres of government.

4.6 Environmental Implication

As the project aims for supplementary irrigation for T. Aman only by gravity means there is no scope for significant distortion in environment. The major concern is the socio-economic ramification of the large area to be flooded upstream of the barrage. The need to minimise this area is recognised and it is being considered that the project can not be implemented without the good will of the people which can only be obtained if irrigation facilities are provided adjacent to the barrage site. To achieve this requires a retention level of 210 ft (PWD) flooding approximately 1400 acres in the upstream. The extent of flooding in this area is not uniform and one-thid area will be shallowly flooded which can sustain the existing cropping pattern, second one third may support B. Aman and the remainder will support no paddy crop. The reason is that the ponded area will fill up two rapidly where B. Aman can not sustain in the deeply flooded area. Once the barrage gates have been opened the ponded area 60% land may yield for rabi crops. But our discussion with the people at the upstream of the barrage reveals that farmers have more preference for paddy than other crops. Considering the loss of people in the upstream, BWDB has supplied and installed 20 STWs free of cost so that they can compensate their losses from rabi crops. Moreover, the households which are supposed to be inundated at upstream due to retention level of 210 ft (PWD) are raised in their level above 210 ft (PWD) by BWDB.

One positive impact on environment is expected with the operation of the project in terms of expanding the scope of fishery. Flooding 1400 acres will create congenial atmosphere for fish species and enormous potentials exist for culture fishery in the long run.

4.7 Education, Health & Nutrition

According to BBS (1981), literacy rate at Thakurgaon district is 19.7% (for both sex), 29.2% (for male) and 9.4% (for female). Our observation and discussion with all possible concern reveal that in the project area the literacy rate is lower than Thakurgaon district average. The present literacy

rate in the project area is assumed (12-13%) for both sex, (16-17%) for male and for female (5-6%). This assumption is based on our interviews or discussions with various people in some villages in the project area. But it is clear to us that literacy rate has gone down compared to past due to either increased landlessness or population increase.

The people of project area though poor in literacy, education etc. but they are not poor in terms of health status. Apart from chronic diseases to some people the general health of people is quite satisfactory. This is due to awareness developed to the people by the Grameen Bank, RDRS, Mission hospital at Ruhiya and urban influence of Thakurgaon district town which is nearly 7-8 miles from the project area and many people have links with town as they daily go to the town for livelihood. Moreover, the Family Welfare Centre in each union has contributed much for development of health awareness. The general health condition of the people in the project area dictates that they are capable of accepting any challenge of life.

As general health condition is good, it is expected that nutrition intake is also good. We met a large number of poor people in the project area but none are found without food for a day or at least during our visits. We stated earlier that landless people have increased over time but now we state that health and nutritious status are good. Question arises how? The answer is not an easy job on the basis of rapid appraisal survey but it is the reality and can be best answered if full scale survey is carried out on nutrition and health status.

The supplementary irrigation of Tangon project has no direct implication for promotion of education, health and nutrition status.

4.8 Conclusion and Recommendation

The project was conceived in 1983 with the approval of government and the project work started in 1984/85 and was supposed to be completed in 1987-88 but the project is still on-going though 98% of project works were completed

before June, 1990. Land dispute causing non-completion of the project work can be overcome if proper initiatives are taken. Such dispute could not at all arise if local people could be consulted before initiation of the project. Irrigation could be provided at least to the area on the right bank of the barrage for the last three aman crops but either no attempt is made by BWDB or BWDB failed to provide water. As the project is still on-going so it is difficult to evaluate the success or failure of the project by rapid appraisal survey. But BWDB field office failed to involve the local people in project formulation which caused the emergence of land dispute and unnecessary delay for full implementation of the project.

The project got the financial approval from government for Tk. 1249.89 (lakh) including foreign exchange component Tk. 35.70 (lakh) and the item expenditures were budgeted specifically but discrepancies are found in actual expenditures while compared with item specific budgeted expenditures and moreover new expenditure heads are created of which a few are ornamental and have no utility. As for example, households at the upstream of barrage which are apprehended to be severely inundated are raised to above the level 210 ft (PWD) and 20 STWs free of cost are also provided to farmers at the upstream villages. These aspects were not conceived properly while the project was initiated which is definitely a case of failure on the part of efficient hydrologist and engineers of BWDB.

The potentials of ground water irrigation facilities by DTW/STW in the project area were neither accounted nor explored properly. Most of the installed DTWs (90% or more) in the project area at present are either idle or not in operation for some reasons but these DTWs could be easily brought under operation with sufficient maintenance and repairing works. The non-operation of installed DTWs have been causing adversely in terms of decline in gross cropped area and net irrigated area.

About 40-50 per cent of households in the project area have the facility of electricity and the DTWs can be profitably operated. The existing DTW/STW if brought under operation then it is possible to irrigate around 30-35 per

cent arable land in the project area round the year. By the project budget amount (Tk. 1249.89 lakh) more than 2000 STWs could be procured and installed for irrigation in and around the project area and more than 20,000 acres could be served for irrigation water round the year. If there is no perceived serious natural imbalance due to large scale installation and operation of STWs, then we find little justification for launching capital intensive Tangon Barrage Irrigation Project for supplementary irrigation to only T. Aman as the project has already swallowed 89.07 hectare arable land and it is apprehended that 400-500 acres of land will be without any paddy crops at upstream once the project is brought under operation.

At the present status of the project, one have no other option than early completion of the project, and bringing the whole project immediately under operation. BWDB field office should be in full control of the project structures and maintenance of the project at least for a couple of years after operation of the project and achievement of the project should be assessed. If the project within three years after operation can achieve upto a certain level of objective (say 75%) then the people in the project area will have some consolation otherwise concerned personnel who pioneered and implemented the project can not be allowed to be unaccounted so that national resources and hard earned foreign currency are optimally utilized in future.

In the mean time before assessment of project's achievement after operation, a full scale survey on the DTW/STW at the project area may be carried out and proper remedial measures should be taken where BWDB can significantly contribute possibly to compensate the people of the project area from the deviation of the desired objective of the project.

SECTION V

Haijda Embankment Project

The Haijda Embankment Project is the biggest sub-project in terms of net area among the sub-projects under SSISP of BWDB. It is situated in the haor area of Bangladesh encompassing a number of haors of which the main ones are Dingaputa haor, Charhaijda haor etc. Boro is the main crop in the project area. It has been estimated that around 65-70 percent of the net cropped area in the project area is single cropped area where only boro (local variety or HYV) is grown in winter and the vast tracts of land remain under water for rest of the year producing no crop as it is not feasible to produce any crop. In the month of April/May, flash flood water rushes in the area through Dhanu and Kangsha river and enters into the project area through the canals and depressed bank of the peripherial rivers and damages the standing crops even at the time of harvesting. As a result, the project was formulated to ensure harvesting of crops of the area by providing submergible embankment along the lower banks of Kangsha & Dhanu rivers and making sluice gates (regulators) on the different canals for protection of flood upto 31st May and also for drainage of flood water during post monsoon.

Originally the project was appraised by M/S Harza Engineering Company of USA for empoldering Charhaijda haor only and was offered, as a candidate for the first cycle 'core' projects. But considering the potentials for inclusion of Dingaputa haor and other haors the concept of the project was changed to cover a bigger area. Accordingly, the project was reappraised by M/S Coode and Partners, UK in association with Minister Agriculture Ltd, UK and Planners, Engineers & Consultant, Bangladesh in 1984. The project was completed in December, 1992 as declared by DPS-II (ADB), BWDB.

5.1 Project Description

Location: The Haijda Embankment Project is located in the Mohonganj thana of Netrokona district. The project area is at about 50 km east of Netrokona district town. It is bounded in the north and east by Kangsha river, in the south and south-east by Dhanu river and in the west by Mohonganj - Chesrakhali Kutcha road (See Figure 5). The general access to the project area is very difficult as there is no road communication to Mohangonj. The only communication to Mohonganj is by a branch line of Bangladesh Railways running from Mymensingh to Mohonganj. The communication within the Mohongonj thana or within the project area is also very difficult as the roads connecting various unions are not usable even by rickshaw. The Mohonganj-Chesrakhali kutcha road is usable by rickshaw only during dry season and it is only a small fraction of road communication within the Mohonganj thana. Country boats or engine boats are the only means of transport during monsoon in the project area.

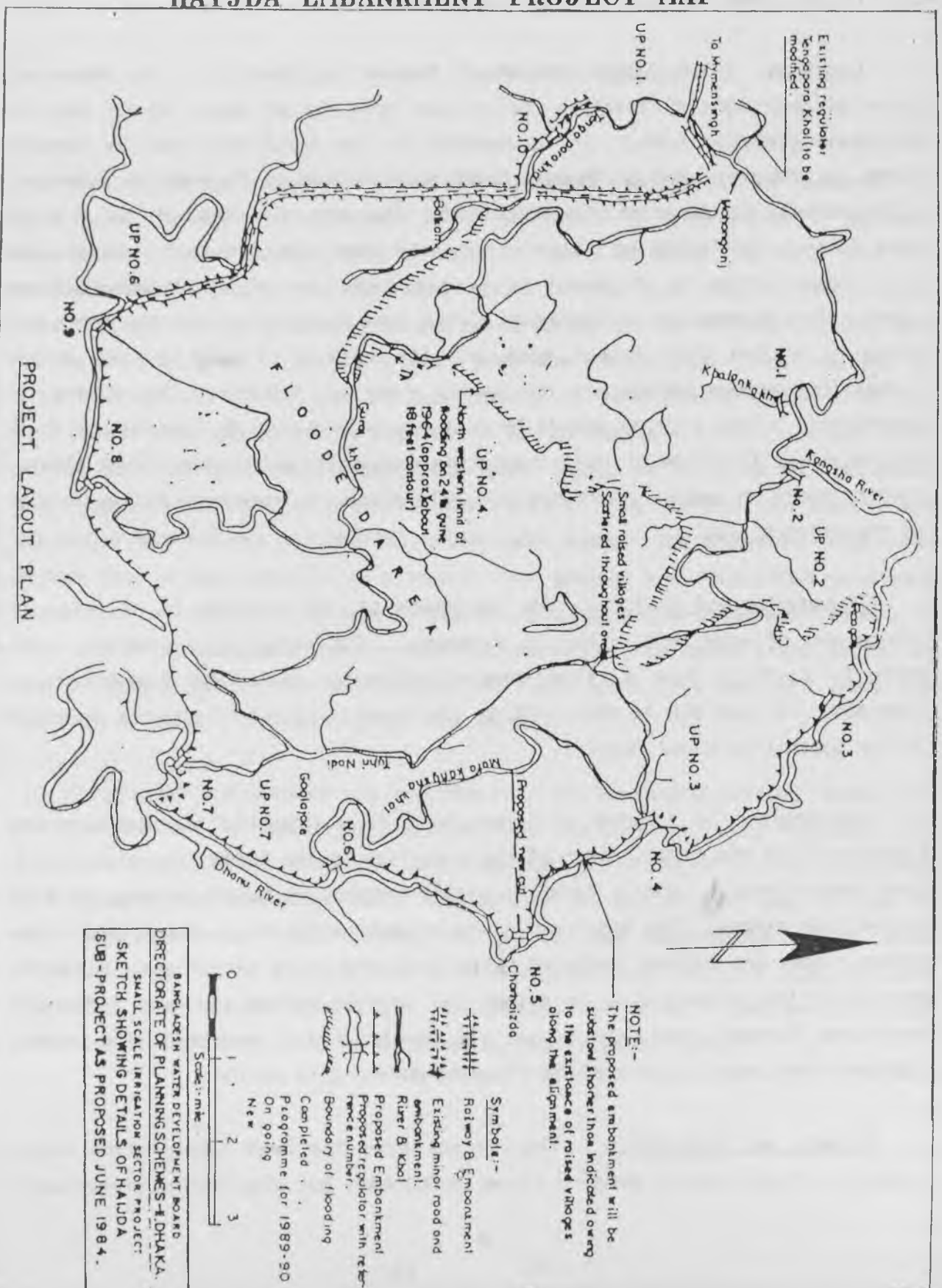
Topography and Soils: The periphery of the project is elliptic in nature and of some 8-10 miles in diameter. The land falls generally from north to south to form a saucer shaped depression with land levels varying from about 27 feet SOB in the north to the lowest pockets of about 4 feet SOB in the south (Appraisal Report).

The project is located on older deposits within the old Brahmmaputra floodplain and the largest part of the area lies on the Surma floodplain which comprises extensive, nearly level to gently undulating basins crossed by some narrow high ridges. The basin soils are predominantly heavy clays, while the higher ridges are lighter textured silty loams and silty clay-loams. About 70 percent of the project area is either low land or medium low land and these lands are flooded deeply to moderately deeply during monsoon. The medium highland also experiences shallow flooding during this period.

Climate and Hydrology: The project area has been experiencing heavy rainfall not only during monsoon (June to October) but also during pre-monsoon

FIGURE 5

HAIJDA EMBANKMENT PROJECT MAP



period from March to May. Two thirds of the project area suffers from early pre-monsoon flooding. Generally water flows from north-east to south-west and the basins are subjected to complete submergence upto the extent of 15 feet. The first flood usually comes during late April or early May. The recession of flood water generally takes place during October and November.

Objective of the Project: The objective of the project is in line with the general objective of SSISP to achieve a substantial increase in foodgain production. But achievement of objective depends on how the specificities of the project area are dealt with the endowed resources. In order to achieve the desired objective the project envisages to provide the following:

(a) Irrigation and drainage facilities to cultivate HYV boro paddy mainly by deepening the existing canals and supplying irrigation equipments (e.g. sufficient number of LLPs, DTWs and STWs).

(b) Early flood protection by constructing submergible embankments with sufficient number of regulators which will protect the project area upto 31st May from early flood while boro paddy can be harvested against the hazard of flood.

Salient Features: As per P.P. the project was expected to be completed in 1989-90 starting from 1983-84 with the approved budget Tk. 961.23 (lakh) which includes foreign exchange component for Tk. 37 lakh. The salient features of the project according to P.P. are as follows:

1.	Land acquisition	=	97.16 Hectare
2.	Embankment	=	28.34 km
3.	Regulators	=	11 Nos.
4.	Canal excavation	=	129.60 km
5.	Modification of existing structure (regulator) at Tangapara Khal	=	1 No.
6.	Supplying LLPs (each of 2 cusecs)	=	264 Nos.
7.	Installation of DTWs	=	11 Nos.
8.	Auxiliary Structures	=	As required.
9.	O & M during construction and there after	=	As required.

According to Netrokona Water Development Division, BWDB, Netrokona (endorsed by Mymensingh O & M Circle, BWDB, Mymensingh) item specific investment costs of the project are shown in table - 12 as follows:

Table - 12
Investment Cost of Haijda Embankment Project

Item of work	As per P.P		Cumulative Expenditure upto June, 1992	
	Qty.	Cost (lakh taka)	Qty.	Cost (lakh taka)
Land acquisition	97.16 ha.	87.46	105.79 ha.	52.62
Regulator	11 nos.	580.00	12 nos.	613.25
Embankment	28.34 km.	86.18	28.34 km.	84.57
Canal excavation	129.60 km.	Not specified	Nil	Nil
LLP (each 2 cusees)	264 nos.	Not specified	Nil	Nil
DTW	9 nos.	Not specified	Nil	Nil
Modification of Tanga-para structure (existing)	1 no.	8.00	Nil	Nil
Box culvert	4 nos.	25.00	4 nos.	6.18
Auxiliary structure	Not specified	20.00	14 nos. (Irrig. inlet)	6.40
O & M during construction	As required	15.00	Repairing of embakt.	23.98
Godown	1 no.	4.00	1 no.	4.55
Boundary piller	As required	1.98	As required	2.86
Leveling instrument	2 nos.	2.00	2 nos.	1.74
Type writer	2 nos.	0.42	2 nos.	0.42
Motor cycle	2 nos.	1.00	2 nos.	1.05
Establishment cost	-	59.17	-	85.84
Consultancy	-	37.85	-	Nil

Source: XEN Office, Netrokona W.D. Division, BWDB, Netrokona.

5.2 Assessment of Project Features

5.2.1 Location, Area and Population of the Project

It has already been stated that the project is located in Mohonganj thana under Netrokona district. There are 7 unions and one municipality under Mohonganj. Total area, net cropped area and population by unions of Mohonganj thana in 1991 are presented in table - 13 below.

Table - 13

Area and Population of Mohonganj, 1991

Name of Unions	Total Area (in acres)	Net Cropped Area in 1991 (in acres)	Population in 1991
1 No. Barkashia Birampur	5325	4180	15368
2 No. Baratali Banihari	6400	5092	16006
3 No. Tetulia	10240	6263	14920
4 No. Maghan Siadhar	8960	6085	17810
5 No. Samaj Shahideo	8320	5405	18758
6 No. Suair	8960	5975	15725
7 No. Gaglajur	11520	7347	17197
8 No. Pourashava	1715	1033	15068
Mohonganj Thana	61440	41380	130852

Source: Thana Statistical Office, Mohonganj.

According to Appraisal Report prepared by the consultants (Coode & Partners, UK), five unions of Mohonganj thana (Nos. 2,3,4,6 & 8 as shown in table-13) are located in the project area but there is no citation of villages/mauzas within these unions which would be benefited or expected to be benefited due to project implementation. It has been stated in the appraisal report that the gross area of the project is 9717 ha and net area 8097 ha. It appears to us after visiting the project area followed by discussion with the BWDB personnel, DAE & BRDB officials at Mohonganj and local elites that the statements made by the consultants in the appraisal report regarding gross and net area of the project are large scale under estimation of the real

picture. Again the gross area and net cropped area in five unions that have been stated to be located in the project area are respectively 18656 ha and 12418 ha (as compiled from table - 13).

Due to lack of communication and infrastructure facilities it is very difficult to visit the nook and corner of the project and it is more difficult for a Rapid Appraisal team to cover all the project area but attempts were made to visit all the unions for knowledgeable information regarding the villages/mouzas and their total area, area within the project, accrued benefit for project implementation etc. The discussion with various people, and our field visits reveal which villages/mouzas within the unions have been brought under the project as shown in table - 14.

Table - 14

Villages by Unions Within Haijda Project

Unions	Villages within the Haijda Embankment Project
2 No. Baratali Banihari (9 villages cover 75% of union)	Banihari, Baratali, Barunka, Basantia, Hatani, Jhimti, Kalanka, Nargar and Samaikona
3 No. Tetulia (8 villages cover 80% of union)	Barapaikura, Fagua, Gajadhar, Hanbir, Jainpur, Noagaon, Tetulia and Udaiypur
4 No. Maghan Shiadhar (19 villages cover 100% of union)	Azampur, Bakharpur, Baldasi, Bara Betham, Betham, Choto Ramnagar, Daspara, Galgali Mallikpur, Garund, Gobindapur, Khorsimuli, Modhupur, Maghan, Maijhati, Manarkandi, Mansri, Ramnagar, Rampasa and Siadhar
6 No. Suair (15 villages cover 70% of union)	Alipur, Ballavpur, Srirampur, Bhatiya, Chhayasi, Dattagati, Hatnaiya, Janadpur, Komargaon, Kulpatak, Naljuri, Pabai, Palgaon, Suair and Sekhupur
7 No. Gaglajur (12 villages cover 90% of union)	Amanatpur, Kanuhari, Bamnikona, Barantar, Chandpur, Darun Banihari, Daruna, Gaglajur, Jamalpur, Kamalpur, Karachapur, Mandarbari and Sympur
1 No. Barkashia (2 villages cover 20% of union)	Char Barkashia and Birampur

Source: RRA Survey of BIDS on SSISP, 1993.

So, it appears to us (as compiled from table 13 & 14 above) that gross project area and net cropped area within the project are 16055 ha and 10747 ha respectively. Our estimates are 65 percent and 33 percent more for gross and net cropped area respectively while compared with the estimates as stated in the appraisal report. While discussing with the SO & SDE working at present under Netrokona WD Division, BWDB about the size and area of the project they

also could not defend about the size and area of the project as stated in the appraisal report. Anyway, the project area is much bigger than as stated in the appraisal report. The under estimation of project area is possibly deliberately done to incorporate the Haijda Embankment Project within the framework of SSISP.

The population at Mohonganj thana is 130852 in 1991 against the figure 107934 in 1981 which means population has increased 21.2 percent in 10 years at Mohonganj. The population of project area in 1991-92 according to our estimates based on union level statistics is around 65-70 thousand which is almost double than the population figure in 1984 as stated in the appraisal report. According to our estimates the project covers 64.5 percent area of Mohongonj thana and accommodates 53.5 percent population in 1991 while according to appraisal report project covers 39 percent of thana area and accommodates 28 percent of population in 1984. It is not possible to have accurate view about population and area of the project without any full scale survey or census.

5.2.2 Physical Structures and their Implementation

The physical structures basically constitute the salient features of the project which are described below.

Land Acquisition: Originally it was planned to acquire 97.16 ha land at a cost of Tk. 87.46 (lakh) but later on 105.79 ha land was acquired at a cost of Tk. 52.62 (lakh) only which means lack of care in project formulation and budget preparation without any meaningful survey work.

Embankment: Construction of submersible embankment to protect flash flood upto 31st May for boro crop is the main component of the project. The project perimeter is nearly 65-70 km in length and the existing kutcha roads (made well before initiation of the project) have been serving as embankments for near about 50 percent or more of the project perimeter. A kutcha road from Mohongonj to Chesrakhali 16 km in length, was made in seventies under

Haor Unnayan Board and it has been serving as embankment in the western side of the project perimeter.

The bank of Kangsha river, kutcha road from Mohonganj to Dharmapasha thana head quarter and village roads in the high land in the north and north-west side of the project have been serving since long ago as proxy of embankment for nearly 17-18 km. Again, in the south from Chesrakhali to Karachapur, there is a road, 6 km in length, made long before the project and has been serving as embankment to some extent. Resectionning was done to this road by BWDB in 1987 and now this road has been serving as road cum embankment.

The main embankment was made for 28.3 km from Noagaon to Karachapur. The work of embankment started in 1984/85 and completed in June 1989 at a cost of Tk. 84.57 (lakh) and part of the embankment (2.1 km) was done under FFW programme. The height of the embankment varies from 6-14 feet and crest is 12-14 feet on an average. The present condition of the embankment can not be stated as good due to lack of O & M. It has been reported that every year during monsoon 1-2 feet soil washes away in various places from the top of the embankment. At present in 28 places the embankment is found disjointed either by public cuts to reduce drainage congestion during post monsoon or by wash away during monsoon. The present status of embankment fails to protect fully the flash flood water and the basic purpose of the project will be jeopardized if remedial measures are not taken at earliest possible time. The Netrokona WD Division, BWDB stated that there is no fund for O & M but concerned SDE & SO of BWDB feel that resectionning is necessary in every year. The provision of O & M at a cost of Tk. 15 lakh was built in for construction period only and actual expenditure made on this account is Tk. 23.98 (lakh). This amount was spent for resectionning of 6 km road from Chesrekhali to Karachapur and no details could be worked out regarding O & M expenditure. In case of fund constraint as stated by the personnel of Netrokona WD Division, BWDB, the embankment should be immediately repaired and necessary resectionning should also be made under FFW in every year otherwise it will not be possible to materialize the basic objective of the project. So, Netrokona WD Division,

BWDB should play the monitoring role for O & M of the project as they conceived and implemented the project.

Regulators: A structure of 2-vent weir cum regulator was built at Tangapara Khal in 1978 for water control and irrigation at Dingaputa haor. Apart from this regulator, originally it was planned to construct 10 regulators of which 8 regulators would be each of one vent and the remaining 2 regulators would be each of two vents and the budget was estimated Tk. 204 (lakh) for these 10 regulators as revealed in the appraisal report prepared by DPS-II (ADB), BWDB and Consultants (Coode & Partners, UK). Later on, the PP was revised and provision was made for constructing 11 regulators at a cost of Tk. 580 (lakh). But concerned SO & SDE of the project reported to our Rapid Appraisal Team Members that apart from regulator made in 1978 at Tangapara Khal, 11 regulators were completed by June 1992 and another one at Chesrakhali Khal was completed in March 1993. So, under the project there are now 13 regulators of which 12 are made under this project at a cost of Tk. 626.75 (lakh) as revealed from the financial expenditure statement made for the month of March 1993 by XEN Office, Netrokona WD Division, BWDB, Netrokona. It appears that XEN Office, Netrokona WD Division, BWDB and concerned personnel are dynamic in introducing larger size and increased number of regulators for the project without paying due attention to the O & M of these structures. The original PP has been revised in phases and approval was also made for these regulators and budget has been increased to three fold than the original one. But question arises why original PP has been changed substantially. The concerned SDE & SO stated it was necessary for upliftment of the project. But for O & M of these structure they have no real answer. According to them, O & M are necessary but due to financial constraint it is not possible at present to look after the O & M of the project structures. The location, ventage, size of vent and time of completion of the regulators are as follows:

Regulator Number and Location	Ventage	Size of Each Vent	Time of Completion
R-1 (Kalanka Khal)	3	4 ft. X 5 ft.	June '91
R-2 (Barunka Khal)	3	Do	Do
R-3 (Poshukhali Khal)	3	Do	Do
R-4 (Jainpur Khal)	3	Do	Do
R-4A (Ratankhali Khal)	1	4 ft. X 4 ft.	June '92
R-5 (Char Haijda)	1	Do	Do
R-6 (Mara Kangsha-Gaglajur)	3	4 ft. X 5 ft.	Do
R-7 (Tunai Nadi)	3	5 ft. X 4 ft.	June '91
R-7A (Gazaria Khal - Barantar)	3	Do	June '92
R-8 (Dhalai Nadi)	3	Do	June '91
R-9 (Chesrakhali Khal)	2	5 ft. X 6 ft.	March '93
R-10 (Ghorautra Khal)	2	Do	June '91
R- * (Tengapara Khal)	2	5 ft. X 4 ft.	1978

The old regulator at Tengapara Khal is found in a deteriorating condition while visiting the site of the regulator as a member of the RA team. The vents were found not working well and the launching apron, loose apron (blocks) etc. needs to be repaired. There is no O & M in this regulator.

In R-8 one vent out of 3 is defective and not working quite for a long time. This can be repaired with minor assessories but there is no attempt to bring it into operation.

The condition of all other regulators as found are apparently good but there is no O & M by the personnel of BWDB. The gates of all the regulators are currently being operated by the villagers and it often creates a lot of confusion and violence in case of timely non operation of gates. In R-10 at Ghorautra Khal, the regulator gates are not sufficient enough to discharge water in case of heavy rain or flash flood and as such standing crops of 2000-3000 acres in the upstream villages are threatened to be damaged heavily. Again, if the gates are kept open then standing crops of 1000-1500 acres in the down-stream are damaged due to inundation while closing the gates damages too seriously in the up-stream. It has been reported that in the past the people of upstream villages at dead hours of night in apprehension of severe

damage of standing crops by inundation, cut the embankment for easy and speedy discharge of water which brought damage to the down-stream standing crops. So, in case of heavy rainfall or flash flood there is always confusion prevailing among the people of up-stream and down-stream of R-10 regulator. In this context there is little justification for R-10 structure. While asked about the possible success or failure of R-10, concerned SO & SDE proposed for another small project having regulators with necessary poldering at the further upstream to have full seccess of R-10 regulator. The RA survey team members could not visit the sites of all the regulators due to lack of time. The same case may be found in some other regulators too as there are large number of public cuts in the main embankment. Our view is that some of the regulators that have been built for the project are not necessary at all atleast before excavation of existing canals. It is amazing to note that expenditure on regulator construction has increased from original budget Tk. 204 (lakh) to Tk. 626.75 (lakh) but there is no fund for O & M of regulators as stated by the personnel of Netrokona WD Division, BWDB, Netrokona. One may critically comment that O & M fail to compete with the regulator construction in terms of expenditure as certain percent of total expenditure goes to the pockets of vested groups.

Excavation of Canal: The project area is endowed with a network of canals and riverine area which are helpful for irrigation purposes as a source of surface water but most of the canals get dried up during dry season. The important canals across the project area are as follows:

i) Ghorautra Canal: It is around 15-16 km in length and about 8-9 km of canal is within the project area. About 75% of the canal gets dried up during February and March in every year and in the remaining 25% of canal water level during dry season is 2-3 feet in depth.

ii) Dhalai River: Basically it is a canal and its length is about 25-30 km of which 5-6 km is within the project area. About 75-80 percent of this canal gets dried up in February and March and the remaining part contains water at a depth of 3-4 feet during February and March.

iii) Tunai River: It is a branch of Dhalai river and it extends for about 12-14 km of which 7-8 km is within the project area. This river/canal gets completely dried up in dry season.

iv) Baitakhali Khal: This is entirely within the project area and extends for about 12-13 km in lengths but it gets completely dried up in dry season.

v) Betai River/Khal: It is 10-12 km in length and is completely within the project area. About one third of this canal contains water round the year.

vi) Kalankar Khal: About 4-5 km of this khal is within the project area but it contains water round the year and during February and March water level is around 3-4 feet.

vii) Mara Kangsha Khal: It is entirely within the project area and extends for about 5-6 km. About 80 percent of this khal gets dried up in dry season.

viii) Chesrakhali Khal: It is about 10-12 km in length of which 7-8 km is within the project area. About 80-90 percent of this khal gets dried up during dry months of the year.

x) Tangapara Khal: It is 4-5 km in length and is entirely within the project area. About 50% of this khal contains water round the year.

xi) Shialjani Khal: It is a branch of Kangsha river and extends for about 12-14 km within the project area. It is navigable round the year.

Besides there are large number of small khals within and across the project area e.g. Barunka Khal, Poshukhali Khal, Joinpur Khal, Ratankhali Khal, Char Haijda Khal, Gazaria Khal etc.

Considering the importance of these naturally endowed resources for irrigation and drainage purposes of haor basins, the project in its original

PP envisaged for excavation of 129.00 km canals. But for nor reasons known to us Netrokona WD Division, BWDB, Netrokona failed to excavate even a single inch of canal. As observed by us while visiting the project sites and also on the basis of discussion at various levels e.g. thana level officials, local elites, UP members/chairman etc., it appears that excavation of canals in the project area would immensely benefit the people of the project area in the following ways :

(a) Excavation of canals will bring relief to the drainage congestion during post monsoon period.

(b) Due to drainage congestion, as noted earlier, the main embankment has been experiencing public cuts in almost every year. Such disruption can be avoided if the canals are excavated.

(c) The most of the canals get dried up in dry season. The canal excavation will increase the retention level of water round the year and during dry season the canals may serve as a source of surface water for irrigation either by LLPs or by traditional means.

(d) Water in the canal round the year after excavation may also serve as habitat of fish species for brood stock.

(e) The navigability of canals will increase and farmers will be benefited while carrying the harvested crops from the haor to their courtyard by country boat. It will also help in marketing of products and increase communication facilities.

(f) The duckery is a common feature in the project area and as such villagers adjacent to the canals after excavation will be induced for rearing larger number of ducks.

Modification of Existing Structure: It was envisaged in the original PP that the existing structure (2 vent regulator) at Tangapara Khal will be modified at a cost of Tk. 8 lakh but no such attempt was made.

Installation of LLP/DTW: The project in its original PP considered for installation of 264 LLPs (each of 2 cusec capacity) and 9 DTWs in the project area to facilitate the irrigation facilities. The estimated budget was also formulated where LLPs accounted Tk. 118.80 (lakh) and DTW accounted tk. 18.00 (lakh). But in the implementation of the project the provision of LLP/DTW installation has been graved in the revised PP. While asked the concerned SDE/SO of Netrokona WD Division, BWDB, Netrokona about installation of LLP/DTW as per original PP they stated that these are not necessary as there are sufficient number of DTW/LLP under BRDB/BADC in the project area and large farmers have also initiated some STWs of their own. The statements of the BWDB personnel have no reasons to qualify for omission of the provision of LLP/DTW from the project's budget.

Auxiliary Structure: In the original PP the provision of auxiliary structures and their numbers were not categorically mentioned but it is necessary subject to the requirement while implementing any development oriented project. It has been already mentioned in table 12 about the O & M, installation and expenditure on account of auxiliary structure, other structures and equipments. We do not find justification about the construction of go-down at a cost Tk. 4.55 lakh in the premises of SDE office located at Mohangonj thana head quarter. The said go-down is currently being used as residence for Class III & IV employees of BWDB. Again establishment cost Tk. 85.84 lakh (cumulative expenditure upto June, 92) appears to be too high in absence of O & M of project structures. It has been felt that other auxiliary structures e.g. sufficient number of irrigation inlet, drainage channel etc. are yet to be constructed but the project has been declared completed. It appears that the project money has not been spent judiciously for maximum benefit of the people.

5.2.3 Institutional Arrangement and Involvement of Local People

The involvement and interaction of organisations like BRDB, BADC, DAE etc. at field level are necessary while formulating the project and it was duly envisaged while initiating SSISP by DPS-II(ADB), BWDB. Discussion with

the thana level officials and local elites it reveals that personnel of BWDB measurably failed to contact with the personnel of DAE, BADC & BRDB while formulating or implementing the Haijda Embankment Project. The involvements of local elites, UP members/chairmen in formulating and implementing the project were nil. The only involvement of local people is found for operating the sluice gates of regulators who have no sufficient technical knowledge for O & M of regulators. It appears that the personnel of Netrokona WD Division, BWDB have no interest for involvement of line agencies or local people for maximum utilisation of endowed resources and realisation of project objective.

5.3 Impact on Agricultural Activities

Before evaluating the impact of the project in agricultural activities one must have no other option than bringing into focus the objectives of the project and the process of implementation for different components. The success or failure of the project depends on how the individual components are implemented. The objectives, salient features of project structures and their present status of implementation have already been stated in the previous sections and as such without repeatation it may be said that ignoring the important components of the project like canal excavation, supplying modern irrigation equipments (e.g LLP/DTW/STW) and O & M the success can not be achieved upto the desired level. The project has been recently completed by BWDB. It will neither be proper nor possible to have full impact evaluation unless 2-3 years have passed after completion and operation of the project. Moreover in almost every year we find in newspapers that during late April or May standing crops in vast tracts of land in Mohonganj thana and in neighbouring areas are severely damaged due to on rush of flash flood coming from the Indian Garo hilly areas. The heavy rainfall and flash flood also have been causing adversely in the Haijda Embankment Project area till the current year and as such the basic proposition of the project for greater reliability of harvesting boro crops is greatly jeopardized. Anyway, in our exercise for the project impact evaluation on agriculture we will try to compare the present status of the project in terms of intensity of cropping, cropping practices or diffusion of technology and yield rates of major crops

with the level prevailing in the project area during initiation of the project (1983/84).

5.3.1 Net Cropped Area and Cropping Intensity

The possibility of increasing net cropped area in the country is very much limited or almost nil but for Haijda Embankment Project area it was assumed that with the increased reliability of crop harvest farmers would come forward to bring under cultivation the existing fallow land of the area as the scope of increasing cropping intensity is very limited.

In about 70 percent of net cropped area in the project villages only one crop, dominated by boro paddy is grown. As shown in table 15, net cropped area in the Mohonganj thana during 1983/84 to 1991/92 increased very marginally and the increase is only 0.3 percent. Also, cropping intensities in all the unions whether within the project or beyond have also increased marginally and the overall increase for the entire thana is only one percent. So, it appears that the implementation of project at the present status have no significant contribution in terms of net cropped area or cropping intensity increase.

Table - 15

Net Cropped Area and Cropping Intensity in Mohonganj, 1983-84 to 1991-92

Name of Unions	Cropped Area in Acres (1983-84)					Cropped Area in Acres (1991-92)				
	Net	Single	Double	Tripple	Cropping Intensity	Net	Single	Double	Tripple	Cropping Intensity
1. Barkashia Birampur	4135	450	3670	15	189	4180	420	3730	30	191
2. Baratali Banihari	5077	2996	2059	22	141	5092	2972	2080	40	142
3. Tetulia	6217	5567	650	-	110	6263	5575	688	-	111
4. Maghan Siadhar	6070	3650	2348	72	143	6085	3610	2385	90	143
5. Samaj Shahideo	5400	1832	3518	50	167	5405	1785	3550	70	168
6. Suir	5970	3650	2300	20	139	5975	3595	2345	35	140
7. Gaglajur	7345	6800	545	-	107	7347	6802	545	-	107
8. Pourashava	1042	115	917	10	190	1033	100	905	28	193
Mohonganj Thana	41256	25060	16007	189	140	41380	24859	16228	293	141

Source: Thana Statistical Office, Mohonganj, 1993.

5.3.2 Cropping Pattern

While initiating the project it was assumed that significant change in cropping pattern would be made in the project area particularly in introducing HYV crops to a large extent in place of local varieties. Table 16 provides the cropping pattern (acreages of major crops) in 1983/84 and 1991/92 in Samaj Shahideo Union, Mohonganj thana and in project area. Cropping pattern as percentage of gross cropped area and its change during 1983/84 to 199192 for Samaj Shahideo Union (outside the project area), Mohonganj Thana and Project Area are presented in Table 17. It appears from table 16 that gross cropped areas for Samaj Shahideo Union and Mohonganj Thana have increased by 0.47 and 0.38 percent respectively during the period 1983/84 to 1991/92 while in case of project area the gross cropped area has decreased by 0.62 percent during the same period. In case of Aus (HYV), T. Aman (HYV) & Boro (HYV) there are some increase of acreages in terms of percentage of gross cropped area during 1983/84 to 1991/92 for Samaj Shahideo Union, Mohonganj Thana & Project Area but such increase is the smallest in case of Project Area while compared with Samaj Shahideo Union or Mohonganj Thana. So, we do not find any significant outcome from the project implementation in terms of introducing HYV paddy to a large extent replacing the local varieties as was supposed to be achieved. The HYV technology that has been adopted is due to the own initiative of farmers and it can not be claimed to be the outcome of project intervention as adoption rate is found to be much higher in non project area while compared with the project area.

Table - 16

Cropping Pattern in Mohonganj, 1983-84 and 1991-92

(Area in Acres)

Name of Crops	1983-84			1991-92		
	Samaj Shahideo Union	Mohonganj Thana	Project Area	Samaj Shahideo Union	Mohonganj Thana	Project Area
B. Aus	975	4971	2337	650	4467	2240
Aus (HYV)	150	1205	719	525	1935	880
Jute	650	3758	1869	655	3530	1801
Til	5	29	12	8	39	17
Summer Vegetables	6	51	28	15	85	42
B. Aman	1100	5850	3062	1020	5770	3057
T. Aman (Local)	1448	7266	3713	1250	6465	3385
T. Aman (HYV)	200	1321	651	410	2230	1071
Boro (Local)	1800	11200	7037	1550	10260	6600
Boro (HYV)	1400	13200	8942	1675	14185	9407
Wheat	13	74	42	25	126	64
Mustard	435	3016	1906	390	2894	1480
Potato	31	152	75	45	195	94
Pulses	28	203	109	30	226	132
Winter Vegetables	23	159	88	45	199	98
Spices	9	48	25	15	76	42
Other crops	6	44	25	10	66	40
All Crops	8279	52547	30640	8318	52748	30450

Source: Thana Agriculture Office, Mohonganj.

Note: Acreages within Project Area have been compiled on the basis of weights specified in table 14.

Table - 17

Cropping Pattern as Percentage of Gross Cropped Area (1983-84 to 1991-92) in Mohonganj

Name of Crops	Samaj Shahideo Union			Mohonganj Thana			Project Area		
	1983/84	1991/92	% of I/D	1983/84	1991/92	% of I/D	1983/84	1991/92	% of I/D
B. Aus	11.78	7.81	3.97 (D)	9.46	8.47	0.99 (D)	7.62	7.36	0.26 (D)
Aus (HYV)	1.81	6.31	4.50 (I)	2.29	3.67	1.38 (I)	2.35	2.89	0.54 (I)
Jute	7.85	7.87	0.02 (I)	7.15	6.69	0.46 (D)	6.10	5.91	0.19 (D)
Til	0.06	0.09	0.03 (I)	0.06	0.07	0.01 (I)	0.04	0.06	0.02 (I)
Summer Vegetables	0.07	0.18	0.11 (I)	0.10	0.16	0.06 (I)	0.09	0.14	0.05 (I)
B. Aman	13.29	12.26	1.03 (D)	11.13	10.94	0.19 (D)	9.99	10.04	0.05 (I)
T. Aman (Local)	17.49	15.03	2.46 (D)	13.83	12.26	1.57 (D)	12.12	11.12	1.00 (D)
T. Aman (HYV)	2.42	4.93	2.51 (I)	2.51	4.23	1.72 (I)	2.12	3.52	1.40 (I)
Boro (Local)	21.74	18.63	3.11 (D)	21.31	19.45	1.86 (D)	22.97	21.67	1.30 (D)
Boro (HYV)	16.91	20.14	3.23 (I)	25.12	26.89	1.77 (I)	29.18	30.89	1.71 (I)
Wheat	0.16	0.30	0.14 (I)	0.14	0.24	0.10 (I)	0.14	0.21	0.07 (I)
Mustard	5.25	4.68	0.57 (D)	5.74	5.49	0.25 (D)	6.22	4.86	1.36 (D)
Potato	0.37	0.54	0.17 (I0	0.29	0.36	0.07 (I)	0.24	0.31	0.07 (I)
Pulses	0.34	0.36	0.02 (I)	0.39	0.43	0.04 (I)	0.36	0.43	0.07 (I)
Winter Vegetables	0.28	0.54	0.26 (I)	0.30	0.38	0.08 (I)	0.28	0.32	0.04 (I)
Spices	0.11	0.18	0.07 (I)	0.09	0.14	0.05 (I)	0.08	0.14	0.06 (I)
Other crops	0.07	0.12	0.05 (I)	0.08	0.13	0.05 (I)	0.08	0.13	0.05 (I)
All Crops	100.00	100.00	0.47 (I)	100.00	100.00	0.38 (I)	100.00	100.00	0.62 (D)

Source: Compiled from table-16.

Note: I = Increase, D = Decrease.

5.3.3 Yield Rates of Some Crops

With the intervention of project structures it was expected that the average yields of major crops would increase substantially. Boro being the major crop in the project area it was also expected that significant switch from local variety to HYV variety would take place after implementation of the project which did not take place in the project area as reveals in the previous section. Again control of flash flood upto 31st May by submersible embankments was expected to induce farmers for increased use of modern inputs such as chemical fertilizer, irrigation, insecticides etc. for higher yields of Boro crops. The present status of the project fails to contribute in augmenting higher yield for various reasons. In practice the yield depends upon a variety of factors and as such the yield rates provided in Table 18 might have deviation from other estimates based on large sample. The estimate of crop yield rates as shown in table 18 are very crude and these are based on discussion with the groups of farmers in three project villages and in one non project village of Samaj Shahideo union. The discussion with various groups of farmers reveals divergent estimates. While they were asked to compare the present yield rates of various crops with that of period before the project (i.e. 1983/84) they unanimously reacted that yield rates of most of the crops are either declining or in stagnant position except for the crops boro (HYV), wheat and potato.

Table - 18

Yield Rates of Some Crops in Mohonganj

(maund per acre)

Crops	Samaj Shahideo Union		Project Area	
	1983/84	1991/92	1983/84	1991/92
B. Aus	12.85	12.35	12.75	12.40
Aus (HYV)	26.87	27.50	25.00	25.00
Jute	13.00	12.00	11.50	10.00
B. Aman	13.68	13.65	13.60	13.55
T. Aman (Local)	17.74	17.45	17.50	16.75
T. Aman (HYV)	32.12	32.10	32.40	32.50
Boro (Local)	19.50	18.20	17.50	16.75
Boro (HYV)	42.56	45.00	40.00	42.20
Wheat	20.80	21.00	18.50	18.60
Mustard	8.55	7.20	7.10	6.50
Potato	65.20	85.50	65.00	66.00
Pulses	7.60	6.90	6.50	6.50

Source: RRA Survey of BIDS on SSISP, April, 1993.

5.3.4 Irrigation

Extension of irrigation facilities are very important for increased output and diffusion of technology in agriculture. In consideration of its importance it was decided to supply 264 LLPs (each of 2 cusecs) to the farmers of the project area and install 11 DTWs in the project area as revealed in the appraisal report. But none was supplied or installed by BWDB which may be a contributing factor for non increasing of yield rates of most of the crops in the project area as discussed in the earlier section of this report. The RRA survey team could not ascertain the exact nature of irrigation by area, mode and time of irrigation for specific crops in the project area due to lack of time and resources. But Thana Statistical Office at Mohonganj provided us some information on mode and area of irrigation in 1983/84 and 1991/92 by unions which are presented in table 19. It appears that total area of irrigation in Mohonganj thana has been reduced by nearly 4 percent in 1991/92 compared to 1983/84. Irrigation by modern means such as DTW/STW/LLP has

increased substantially but irrigation by traditional means such as doons/swing bakets has been significantly reduced. Total area of irrigation within the project area appears to be reduced in 1991/92 compared to 1983/84 as among the 5 unions within the project area there are substantial decrease of irrigation in 3 unions which are the major constituencies of project area.

We have seen in the earlier section that most of the existing canals within the project area get dried up during dry season which causes reduction of irrigation by traditional means or by LLPs. So in order to increase the irrigation facilities the existing canals should be deepened and widened at the earliest possible time.

Again according to BRDB office of Mohonganj, number of DTWs installed in various times in association with BADC is 63 but only 28 DTWs are reported to be currently under operation. The remaining 35 DTWs which are at present either idle or out of operation due to technical troubles should be immediately brought under operation.

Irrigation by LLP or STW have been promoted mostly by private initiatives in Mohonganj thana. It has been reported that currently 183 LLPs are in operation at Mohonganj but only 30 were commissioned by BRDB in association with BADC.

Table - 19

Irrigation in Mohonganj Thana, 1983/84 & 1991/92
(Area in Acres)

Unions	Irrigation in 1983/84					Irrigation in 1991/92				
	DTW	STW	LLP	Tradi-tional	Total	DTW	STW	LLP	Tradi-tional	Total
Barkashia Birampur	-	-	325	112	437	230	30	370	35	665
Baratali Banihari	-	-	330	260	590	450	75	435	80	1040
Tetulia	-	40	1680	1459	3179	-	100	1825	930	2855
Maghan Siadhar	-	35	1215	1242	2492	480	105	1300	770	2655
Samaj Shahideo	-	15	1012	1330	2357	560	76	1325	635	2596
Suair	-	25	1318	1845	3188	210	60	1500	1075	2845
Gaglajur	-	45	2172	2177	4394	-	85	1750	1360	3195
Pourashava	-	-	50	10	60	70	-	85	-	155
Mohonganj Thana	-	160	8102	8435	16697	2000	531	8590	4885	16006

Source: Thana Statistical Office, Mohonganj.

5.3.5 Other Agriculture: Livestock, Poultry, Fishery and Forestry

The project is mainly concerned for increased output of foodgrain by securing reliability of harvest and switching from local variety to high yielding varieties of crops with necessary augmentation of logistic support. But livestock, poultry, fishery etc. can not be ignored for various reasons of national interest.

The livestock has its own specific role in our agriculture . In absence of mechanized cultivation draft animal power has been serving as the only means of cultivation in the project area like elsewhere in the country. It reveals from our discussion with the knowledgeable people particularly with the UP members/chairmen that the livestock population in the project area has been reduced by 20-25 per cent if not more. The reasons may be numerous but main reasons is lack of veterinary services. The poor or landless people can not afford to have cows/bullocks in general but they are found to rear goats/lamb. Most of the poor household, have 2-4 goats/lambs on an average. The goat or lamb population appears to be static over the years. Some landless are found to have horses which aid in their livelihood. The farm households are found to possess 2-10 cattle heads depending on the size of operational land holding. Very recently in some villages power tillers are introduced by some large farm households of their own initiative which is also a contributing factor for reduction of cattle population.

There is no noticeable poultry farm in any village within the project area or Mohonganj thana but the project area is endowed with the potentials of duckery due to large number of canals, ponds, beels and riverine area. According to the knowledgeable people poultry birds are being reared in around 40 per cent households and each household on an average rear 4-6 birds while in case of duckery more than 85 per cent households have ducks and swans. About 5-10 ducks or swans are found in almost all the households but there are 2-4 households found in almost all the villages within the project area who may be called as entrepreneurs of duckery as these households rear 50-200 Khaki Camble/Indian Runner type of ducks for eggs. Each duck of these type

gives around 270 eggs annually. The entrepreneurial class has emerged during eighties of their own initiatives and a significant number of them are either marginal farmers or near landless who have improved their living condition by their own merit and labour where project has nothing to do.

Not only the project area but also the entire Mohonganj thana and other neighbouring areas have been endowed with natural resources for capture fishery since long time past and as such six ice mils were established at different times in Mohonganj for fish processing as an item of export in different parts of the country. The scope of capture fishery in the area is being gradually reduced over the years due to over catching of fishes in the leased jalmahals and faulty fishery management practices. The embankments and regulators have further reduced the availability of fish but nevertheless in the project area and also in the entire Mohonganj thana the availability and scope of fishery are much higher than elsewhere in the country. The availability of fish in the project area can be increased significantly if the existing canals are excavated so that these can retain water round the year. The practice of culture fishery in ponds or beels are almost absent in the project area but potentials exist for culture fishery as there are large number of ponds in the area. The department of fishery may come forward for proper management and practice of both culture and capture fishery in the areas which will augment the supply of fish both regionally and nationally.

The geographic condition of the project area does not permit any possibility for large scale promotion of forestry. The plantation in homestead garden has been serving as a source of fire-wood or domestic requirement and as such number of trees of any type have been reducing. But scope exists for plantation in the road side.

5.3.6. Tenurial Arrangement in Project Area

The tenurial practices in the project area are more or less same to elsewhere in the country but share-cropping system are found as follows:

(a) Landlord receives half of produce without-sharing cost of production;

(b) In case of HYV boro, landlord shares 50 per cent of material input (seed, fertilizer and water) cost and receives half of farm produce;

(c) Landlord in some cases rents out their land on yearly basis. The rent of land depends on type and quality of land. The rent generally varies within the range of Tk. 800 - Tk. 1400 per acre per year.

5.3.7. Land Holding Distribution

Time and resources do not permit us to derive the land holding distribution meaningfully in the project area. This is a gigantic task and can not be wise to do without census or full scale survey. As an alternative we resorted to BBS (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Netrokona, November 1988) which provides land holding distribution in Mohonganj Thana as shown in table 20. It appears from table - 20 that about one-third households are completely landless and another 37.4 per cent households are characterised by small farm households having 5-249 dec. land for cultivation. So landholding distribution is very much skewed in Mohonganj thana and we do not find much deviation in the project area from the thana aggregate while discussing about the pattern of land holding distribution with the knowledgeable people in various villages within the project area. Our discussion at various levels with groups of people in different villages within the project area reveal quite satisfactory information while comparing thana level statistics which are as follows:

	Project village	Mohonganj Thana (BBS)
a) Landless household	30%	32.75%
b) Small farm household	30%	37.39%
c) Medium farm household	25%	21.82%
d) Large farm households	15%	8.04%
e) Agri. labour households	40%	45.36%

Table 20

Land Holding Distribution in Mohonganj, 1983-84

Size of land holding	Households		Agri. Lab. H/Holds	
	Number	%	Number	%
No land	741	4.05	679	3.71
Only homestead	4373	23.89	3614	19.74
Cultivated area (1-4 dec.)	881	4.81	751	4.10
Non-farm Households	5995	32.75	5044	27.55
Cultivated area (5-49 dec.)	2178	11.90	1608	8.78
Cultivated area (50-99 dec.)	1426	7.79	838	4.58
Cultivated area (100-149 dec.)	1225	6.69	446	2.44
Cultivated area (150-249 dec.)	2016	11.01	367	2.00
Small Farm Households	6845	37.39	3259	17.80
Med. Farm Households (250-749 dec.)	3994	21.82		
Large Farm Household (750 and above)	1471	8.04		
All Households	18305	100.00	8303	45.36

Source: Compiled from Table 1.1 (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Netrokona, Nov. 1988).

5.4 Non-Farm Economic Activity

The role of non-farm economic activities is complementary to an agricultural economy as with the growth of agriculture the non-farm activities particularly the agro-processing industries also evolve. So the importance of non-farm economic activities can never be ruled out and these play a vital role in bringing a balance towards social harmony between have or have not groups in terms of asset or land ownership. In a backward economy where abundance of landless or near landless people prevail the non-farm activities are significantly important.

The present study does neither demand all the details of non-farm activities in the project area nor it is possible to explore with limited resources and time. But considering the extent of landlessness and marginal farmers in the project area as stated in the earlier section, the issue of non-farm activities comes as an implied interest to all. Due to lack of infrastructure and in accessibility in the project area non-farm activities have not evolved much. Moreover there is no current reliable statistics about non-farm activities in the project area. According to BBS (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Netrokona, November, 1988) in 1983-84 about 4.64 percent households in Mohonganj had some involvements in cottage type industries. The number of households by activities were as follows:

> Handloom - 6, Blacksmithy - 22, Pottery - 154, Bamboo & Cane products - 320, Carpentry - 112, Brass Works - 22, Jute & Cotton Products - 117, Ghani (oil crushing) - 52, and others 44.

Our observation and discussions with informed sources reveal that none of these activity generate enough revenue for healthy livelihood and as such these activities are currently practised as a part time or seasonal work and not by all active members of household. There is no handloom or pottery unit at present in the project area as stated by the UP members/chairman. Apart from these activities a large number of households (600-800) are reported to belong to the fishermen community who catch fish in rivers/canals or in other

water bodies almost round the year. The male members are engaged in catching and marketing of fish while females are engaged in net weaving or repairing. During monsoon a few male members in some households of this community are also found to work as boatman for livelihood. During harvesting time too they work as agricultural labour on contractual basis where wage rate is accounted to be high. It happens that in apprehension of damage by flash flood farmers want to harvest quickly the standing crops by employing larger number of workers at a higher rate or by contractual arrangement. The nature of contractual arrangement varies subject to the necessity and labour demand. The contracted labourer can earn for about 7 days during boro harvesting time upto the extent of 15-20 percent of total harvest as the labourer receives one bundle for each of five to seven bundles of harvest.

The other non-farm activities as found or reported in the project area are duckery, plying boats, rickshaw, van, cart, horses for carrying goods, small trades, seasonal trade on foodgain or jute etc. Exact number of households involved or dependent on these activities could not be ascertained but well informed sources report that the number of people involved in these activities will exceed 1000. Also, a significant number of people are engaged or involved in 6 ice mills, 12 rice mills, 6 saw mills, one oil mill, educational institutions and other offices at thana head quarter and also in repairing activities.

The great majority of landless and marginal farmers are engaged as agricultural labourer in medium and large farm households. About 40 percent of agricultural labourer are attached to the large or medium farm households as permanent worker and the rest 60 percent work as casual labour. It may happen that in a landless household one young male member is attached to a large farm household as a permanent worker, the second member may work as a casual labour and third member may be self employed in non-farm activities. Though the number of landless and marginal farmers are proportionately high in the project area but we did not find much of extremely poverty stricken features.

5.5 Institutional Aspects

There is no bank branch within the project area. But Sonali, Janata & BKB have one branch of each at Mohonganj thana head quarter. The distance of project villages from thana head quarter varies from nearest 2 km to 35 km in the longest. The distance and inaccessibility due to lack of infrastructure cause the main hindrance for loan application and its processing. It has been reported that loan money can not be received easily and in time of necessity though each loan application has its own cost of about 10 percent of loan money. Moreover the borrower incurs the cost of visiting banks on several occasion for a single loan case. So accounting the bank interest, incidental costs and personal expenses for each of transaction the aggregate cost of loan raises to 30-40 percent of loan money which brings frustration in the process of bank loan. As an alternative, borrowers rush to conventional money lenders for short term loans which are available in times of necessity but at a high interest of 10 percent interest per month. There is an NGO called Palli Unnayan Sangstha in the project area and its activities are spread in two unions - Maghan Siadhar and Suair. Its regional office is located at Netrokona and it has been working in the project area for the last 4-5 years. The basic thrust of this NGO are as follows:

(a) Providing relief in times of natural disasters;
(b) Installing hand tube wells in case of acute shortage of drinking water in some villages;
(c) To develop awareness in the grass-root level about sanitation and providing necessary ingredients of low cost sanitary latrines.

In different unions of Mohonganj there are large number of cooperatives under the control of the department of cooperative which are as follows:

(a) Multipurpose cooperative - 6
(b) Agricultural cooperative - 54
(c) Fishermen's cooperative - 11
(d) Rickshaw/Van cooperative - 2
(e) Other cooperatives - 7

Again under the supervision of BRDB at Mohonganj there are 168 KSS in different unions having enrollment of 3990 members. Also, there are 12 BSS and 30 MBSS in the thana as stated by BRDB office.

5.6 Environmental Implication

In any developmental project where intervention is made to natural process, it always has its own implications in both positive and negative ways for the ecology and environment. The Haijda Embankment Project was initiated with the aim of providing flood control upto 31st May by submersible embankment and also to provide drainage and irrigation facilities. But the project implementation has serious limitations in terms of extension of drainage and irrigation facilities. The construction of submersible embankment has brought some positive impact in terms of reliability of boro harvest but it has intensified the drainage congestion in the project area. This drainage congestion could be reduced to a large extent if the existing canals could be excavated as proposed in the original P.P.

Due to submersible embankment the project has partially succeeded in preventing early flash flood particularly in the low lying areas within the project but rain and flood water that overflow the embankment during monsoon are stranded in the area by the embankment causing serious water logging problem which prevents farmer for plantation of boro seedlings in time. Some times the extent of water logging is so serious that villagers have no other option than to breach or cut the embankments in order to get rid of water logging problems for plantation of boro crops. Moreover, water logging has been causing adversely in terms of mineral deficiency and soil fertility. Again, due to late incoming of flood water the natural process of fertilisation of land is reduced as flood water brings complex combination of sediments and blue-green algae which enriches bio-chemically the nutrient contents of the soil.

The scope of fishery and navigation in the project area has been reduced to a great extent by the embankment. If the existing canals which cannot

retain sufficient water during dry seasons are excavated then the scope of fishery and navigation will increase.

All the regulators which have been constructed have no sufficient justification as in case of R-10 at Ghorautra Khal there are adversities either in the up-stream or down-stream of the regulator while keeping closed or open the regulator gates which inundates the standing crops.

5.7 Education, Health & Nutrition

Very often level of education, health and nutrition status are being considered as the basic indicators in evaluating the general condition of people which may be attributed by any development project but in the case of Haijda Embankment Project there is no such explicit objective rather implied impact, if any, may be looked at.

There is no significant change of literacy rates in the project area during eighties to nineties as revealed from our discussions with the informed sources. The present level of literacy rates in Mohonganj is 19 percent (for both sex) which is below the national average. But literacy rate at Mohonganj thana is higher than the Netrokona district average. There are various educational institution in various unions within the thana which are as follows:

Educational Institution	Number
i) College	1
ii) Boy's High School	7
iii) Girl's High School	1
iv) Junior High School	4
v) Govt. Primary School	50
vi) Non-Govt. Primary School	9
vii) Madrasha	15

The enrollment of boys and girls in different primary schools is quite satisfactory but rate of drop out is very significant.

The general health of the people in the project area does not seem to be good due to lack of medical care facilities and absence of qualified doctors in the project area. The people in case of dysentery or fever can not afford to go to the thana head quarter for treatment where there are medical care facilities at the Thana Health Complex. Moreover as there is no all weather roads it is very difficult for any body to contact at thana level. In case of necessity the people have to depend on the quacks (village doctors) who have no formal training on medical care and as such vary often the situation aggravates beyond any measure.

Though medical care facilities have not improved in the project area but conciousness of people for drinking water and sanitation have increased to some extent over time due to the operation of an NGO (Palli Unnayan Sangstha) in two unions of project area. It has been stated that about 75 percent household in the project area currently use tube-well water for drinking purposes and the rest are dependent on well, pond or river water. Some people are found to use medicine in purifying water.

The exact level of nutrition intake can not be said without any survey but the general level of nutrition intake is quite good in the project area since long time past. The reasons may be numerous but the most possible reason may be as follows:

a) Sufficient scope of capture fishery prevails in the area where poor or landless people can catch fish and earn their livelihood.

b) The price of food grain is lower in the project area than elsewhere in the country and as such non-farm household have no difficulty to take reasonable amount of food grain in their day-to-day dietary intake.

c) In most cases of landless household at least one member either male or female is attached with medium or large farm household who have better nutrition status as they take 3 full meals per day.

d) The emergence of duckery entrepreneurship helps much in attaining nutritional level upto the satisfactory level among entreprenurial households.

5.8 Conclusion and Recommendation

Before we conclude it is necessary to focus critically on a number of issues which may reflect the impact of the project.

This is the biggest sub-project and our field visits explore that the net cropped area of the project is larger by the extent of 33 per cent than the stipulated norm of maximum 8000 ha for any sub-project to be commissioned under SSISP. So, there is a clear violation of norm as laid down in the Project Implementation Mannual of SSISP, prepared by DPS-II (ADB), BWDB.

The project was first appraised by M/s. Harza Engineering Co. of USA and offered as a candidate for the first cycle 'core' projects. But the concept and area of the project was changed and later on it was re-appraised by M/S. Coode and Partners, UK in association with Minister Agriculture Ltd. UK and Planners, Engineers & Consultants, Bangladesh in 1984. The project was completed in December, 1992 as declared by DPS-II (ADB), BWDB but evidences from the XEN office, Netrokona WD Division, BWDB indicate that regulator (R-9) at Chesrakhali Khal was completed in March, 1993 though as per PP the project was expected to be completed in 1989-90.

Originally it was planned to construct 10 new regulators at a cost of Tk. 204 (lakh) but later on size, number and budget for regulators were modified and finally 12 regulators were made at a cost of Tk. 626.75 (lakh) of which at least one regulator has no necessity at all as we observe in case of regulator (R-10) at Ghorautra Khal. Moreover, the regulators face problems for operation and maintenance as we find in case of regulator at Dhalai Nadi where one out of 4 vents is defective quite for a long time which can be easily repaired with minor accessories. Also, it was proposed to modify the weir cum regulator at Tangapara Khal (built in 1978) at a cost of Tk. 8 lakh but no modification is made.

The original PP envisaged for 129.6 km canal excavation. This is one of the important component of the project to substantially reduce the drainage congestion in the project area but this component is dropped later on and as such due to drainage congestion during post monsoon the plantation of seedlings for boro paddy is delayed and occasionally the embankment faces public cuts.

The condition of submergible embankments has been deteriorating due to lack of O & M. At present in 28 places the embankments are disjoint either by public cuts or by washed away during monsoon. It has been reported that during monsoon 1-2 feet soil washes away in various places from the top of the embankment. The O & M of the project are totally absent.

The project in its original PP envisaged for installation of 11 DTWs and 264 LLPs in association with BADC and BRDB in order to facilitate irrigation facilities but no such attempt is yet made for irrigation extension in the project area and working relationships of BWDB, Netrokona with BRDB or BADC at field level offices of Netrokona are seriously absent.

The success of any project intervention depends largely on the efficient planning, management and timely implementation of different components. The process must accommodate the participation of local people particularly the expected beneficiaries and also the line agencies at field level. In evaluating Haijda embankment project by the technique of Rapid Appraisal we find serious deficiencies and anomalies right from the inception to implementation of project as described earlier. Again, it is improper to evaluate the socio-economic impact of project intervention unless a couple of years have passed after the completion of the project. But considering the maxim 'morning shows the day', we have attempted to evaluate the impact of the project. The project management has failed measurably to implement some important components of the project and as such it is not possible to achieve the desired objective upto satisfactory level rather faulty management and incompleteness of officially completed project has contributed the process of degradation and adversities.

The early flood protection have so far been partially successful by the existing status of submergible embankments. It was assumed that embankments will increase reliability of boro harvest which is the only crop in about 70 per cent project area but due to lack of O&M of the project the reliability could not be increased significantly and the net cropped area remains almost same during 1983-84 to 1991-92. Again, in case of intensity of cropping the change during the same period is only one percent for the entire Mohonganj thana and the gross cropped area in the project area has been reduced by 0.62 per cent while it has been increased by 0.47 per cent for Samaj Shahideo Union which is beyond the project area. It was expected that the farmers of project area will come forward to bring more fallow land under cultivation after the project implementation but in practice no such progress is made. Also, it was expected that the project will accelerate the diffusion of technology in cereal production but no significant achievement is made in adopting high yielding varieties of foodgrain by the farmers in the project area. There are some increase of acreages for high yielding varieties of foodgrain in Mohonganj thana during 1983-84 to 1991-92 but such increase in terms of percentage of gross cropped area has been smaller in the project area while compared with the non-project area. The adoption of HYV technology is due to the initiative of farmers or influence of market forces and it can not be claimed to be the outcome of project intervention as adoption rate is found higher in non project area than the project area.

The present status of project has nothing to materialise the objective of the project to a satisfactory level. In a few villages of Gaglajure and Suair unions some farmers reported that they are being benefited by the project intervention but their number is a small proportion to the people who denied any accrued benefit of the project. Also, a large number of people in various unions opined that the embankments have caused severe drainage congestion which delayed plantation of seedlings and consequently output was reduced. This problem can only be overcome if the existing canals are excavated.

On the basis of discussions at various level about the socio-economic upliftment of people within the project area, the recommendations may come as follow:

- Existing canals which have been silted up and fail to retain water sufficiently in dry season should be re-excavated and deepened so that these can store water for irrigation in dry season and drain out excess rainfall water from the field into the canal through drain inlets.

- Sufficient number of LLPs, STWs and DTWs should be installed in close association with BADC and BRDB. In case of private initiative for installing LLPs or STWs, sufficient measures should be taken for institutional credit.

- For full protection of early flooding the submersible embankments should be repaired and maintained periodically in every year which can be done under the Food-for-Works Programme.

- Drainage outlets should be constructed sufficiently subject to the necessity for removing drainage congestion in relevant sites of project area.

- The O & M must be followed and BWDB personnel must bear the full responsibility for these aspects of the project. The defects prevailing in some regulators should be immediately addressed for proper remedy. Lubrication of gate hinges and paintings where necessary should be done periodically. Also, involvement of local people in O&M must be designed so that the problem of public cuts can be avoided.

- The expansion of HYV boro area is far below expectation. Subject to the natural constraint (70% land suitable only for boro cultivation) the objective of the project will be jeopardized unless large area of the project is brought under HYV boro. In order to achieve this aspect large scale extension and credit services are warranted in close association of DAE, BRDB and BADC for the people within the project area. It is important to establish a cell for regularly monitor and evaluate the project performances which will augment the process of enhancing the project benefit.

SECTION VI

Baisari - Saidkati Project

This is one of the 4th cycle sub-projects under SSISP located in the upazilas of Banoripara, Swarupkati and Uzirpur in the districts of Barisal and Pirojpur. The project was conceived for full flood protection, drainage and irrigation to a gross area of 12900 acres of which 9000 acres would be net benefited area. It was designed to construct 19 miles embankment, 30 miles canal improvement, construction of 6 regulators and installation of 90 LLPs each of 2 causec capacity at a cost of Tk. 875 lacs during 1986-1988. The project aimed at increasing the area of irrigation upto the extent of 9000 acres from the existing irrigated area 600 acres which would bring additional yearly output of 14800 tons paddy in the project area.

The feasibility study of the project was carried out in 1986 by the Directorate of Planning Schemes-II (ADB), BWDB and Consulting Engineers (Coode and Partners, UK in association with Minister Agriculture Ltd., UK and Planners, Engineers and Consultants, Ltd., Bangladesh).

There were some considerable views of opposite direction expressed by the people in Barisal town while appraisal team visited the project area during the course of feasibility study. But the concerned personnel of BWDB at Barisal did not pay sufficient attention to the pros and cons for the project formulation. Also, they failed to contact and motivate the local people and the expected beneficiaries before the process of implementation started.

Construction of embankment work started in 1987. Authorization was received for 8.5 miles embankment at a cost of 49.11 lac. Contractors were appointed for embankment but after a few days of work the project ceased due to the local people's objection, representation and adversities. It has been reported that when work order was issued to the contractors, a group of people went to the court for remedial measures who tried to intervene the work by

seeking injunction from the court. The honourable court after hearing from both the parties ordered for carrying on the work of embankment. At this stage people of vested interest group attacked, snatched away the belongings and also kidnaped 2 of 17 embankment constructing contractors. The situation worsened when legal measures were sought from the court. Violence increased alarmingly which stopped the implementation process and the then Member of Parliament (MP) of the locality intervened the matters and communicated it to the Irrigation Minister, Government of Bangladesh. The daily Ittefaq (dated 4.5.1987) reports that Irrigation Minister gives hope to cancel the project. Later on Irrigation Minister terminated the project.

In the mean time BWDB arranged a contract for detailed design services by M/s. Bangladesh Engineering and Technological Services Ltd. who also substantially completed the design of eight other sub-projects under SSISP. This was done so that the project can be implemented once the burning social issues are resolved.

6.1 Project Description

6.1.1 Location, Area and Access

The project is located in the upazilas of Banoripara, Swarupkati and Uzirpur in the districts of Barisal and Pirojpur. The project area is about 15-20 miles west of Barisal town. Our field visit explores that the project was conceived to cover 33 villages in different unions under 3 upazilas which are as follows:

(a) 17 villages of Saidkati union under Banoripara upazila;
(b) 11 villages of Baisari union under Banoripara upazila;
(c) 3 villages of Harta union under Uzirpur upazila and
(d) 2 villages of Swarupkati union under Swarupkati upazila.

The gross area of the project is 12900 acres of which 9000 acres were expected to be the net benefited area due to project intervention.

The project is located mainly in the two unions of Banoripara which is also indicated by the very name of the project. Banoripara is an important trade centre in the context of foodgrain marketing in Bangladesh and as such it is well connected by both road and river ways. From Banoripara one can get into the project-area by boat across the river Krishnakati. Again, the project area is endowed with a net work of riverine areas and canals which are navigable for country boats round the year. So, access to the project area is not very difficult.

6.1.2 Topography, Hydrology and Type of Land

The project area has been experiencing topographically the status of flat land since time immemorial but there is a slope towards the basin area in the north-west. About 65% of land has been found to be within 3 feet - 5 feet PWD.

The project periphery is about 60-65 miles from the Bay of Bengal. River levels within and near project area experience a tidal range of upto 7.5 feet. These are also influenced by the annual variation in the Bay of Bengal level, the local flow in the river and storm surges particularly those of cyclones. Tidal flooding is very common in the project area and it covers 30 percent (during the dry months March/April) to 75 percent (during peak monsoon period of August) of project area.

Type of land plays an important role in the cropping pattern. But it is difficult to segregate the types of land in the project area. The appraisal report of BWDB points out the following pattern of land in the project area which is apparently reasonable.

Type of land	Area in acres	Percent
Medium high land	3100	24%
Medium low land	4500	35%
Low land	1400	11%
Total net cultivable area	9000	70%
High land (dwelling areas)	3500	27%
Water bodies	400	3%
Gross project area	12900	100%

The higher soils are fine textured and these are mainly loam soils. The lower soils are silty clay to clay soils with some peat. With the improvement of drainage facilities and flood control, all the soils may contribute in rice production.

6.1.3 Project Objective

The project was conceived in line with the basic objective of SSISP for increased production of rice crops. The project aimed for increase in output of foodgrain to the extent of 14800 metric tons by providing total flood protection and extension of irrigation facilities. For realisation of project objective, it was proposed for construction of 19 miles embankment, construction of 6 regulators, 30 miles canal improvement (deepening) and installation of 90 LLPs each of 2 cusec capacity for irrigation from canals and also for setting up auxiliary structures where necessary in order to provide irrigation by gravity means. So, the general objective of the project was to achieve an integrated engineering and agricultural development for the increase of foodgrain production in the area. With the implementation of proposed structures and extended use of irrigation, the project envisages two major changes in cropping pattern:

- mixed aus/aman or fallow to HYV aus followed by HYV aman; and
- HYV boro being grown prior to LT aman.

6.2 Agricultural Transition

The project was formulated to bring a major shift in cropping pattern: a large expansion of HYV boro followed by LT aman and the replacement of mixed aus/aman with HYV aus followed by HYV aman and then possibly a rabi crop. This change depends to a large extent on the provision of mechanised irrigation. It has been reported that apart from traditional methods of irrigation or tidal flooding no mechanical pumping equipment exists in the area and as such the area of HYV boro has remained almost static during 1986-1993. In case of local boro there is no significant shift in terms of acreages or yield rates. At present local boro is planted in about 1100 acres and it require no supplementary irrigation as it is grown in low lying areas with tidal flooding.

The project envisaged aman crop in some areas of the project to be irrigated by gravity means by construction of flushing sluices on the higher land which would increase the existing yield rate of aman crops. But due to failure of project implementation there is no sign of increase in yield rate. In 1986 (according to Appraisal Report), 65% of the cropped area was under single crop of T. aman - fallow or mixed aus/amon - fallow, fallow area was due to flooding and slow drainage. The remaining land supported two crops per year and an insignificant amount of land was suitable for tripple cropping. The provision of full flood protection and tidal sluice drainage would enable the production of two transplanted rice crops per year. Boro - T. aman, T. aus - T. amon and B. amon - rabi crops would be the possible cropping patterns. With the supplementary irrigation the cropping intensity and yields of boro and T. amon could be increased. But due to failure of implementation the potentials of project could not be realised.

The cropping intensity in the project area according to Appraisal Report (1986) of BWDB is 138 but while we visited in the project area it has been

reported by knowledgeable people that present cropping intensity in most of the villages are within the range 160-175. It means that present cropping intensity in the project area is 21 percent higher than the figure of Appraisal report. On the contrary while asked the people about any change of cropping intensity in the project area during 1986 - 1993, they responded that such change is only 5-10 percent on an average. This implies that there are under enumeration in case of computing cropping intensity in the project area while preparing the Appraisal report by BWDB.

During eighties there is a significant shift of cropping practices by the marginal farmers in the project-area as reported by the people which is locally called 'kandi' cultivation but there is no citation of this aspect in the Appraisal report. The 'kandi' cultivation has its own merit to be mentioned for its special feature of composite cropping practices. The features of 'kandi' cultivation may be stated as follows:

Generally a piece of medium high land is selected for 'kandi' cultivation. The land is divided into several possible number of blocks or rows such that each block is 8 feet in width. Suppose, for simplicity and illustration, the piece of land is 100 feet in length and 80 feet in width. The land is divided into 10 blocks such that each block is 100 feet in length and 8 feet in width. These blocks are numbered 1,2,3, ---------, 9,10. Now the blocks bearing even number are deepened upto the extent of one to two feet and their soils are placed in the blocks of odd number consecutively so that the bed of blocks of odd numbers are raised by one to two feet. Now plantation is made in the blocks of odd number having higher level for fruits like banana, papaya, guava etc. After plantation in the higher bed, in the open space seasonal vegetable crops like brinjal, ladies finger, tomato etc. are grown round the year. Also, in the land adjacent to the boundary of each higher blocks, crops like bitter gourd, beans, water gourd, striped gourd, snake gourd, sweet gourd, patal etc. are grown. These plants spread over the roof made over the adjacent lower blocks. The blocks of even number which are deepened are interconnected and these are again connected with the canal for tide

water. The tide water brings prawn and its fingerlings and farmers also release fries of shrimp for cultivation. The blocks of lower bed (even number blocks) also serve as source of irrigation water for crops in the blocks of upper bed. The alluvial deposits made by tide water in the beds of lower blocks are transferred to beds of higher blocks once in each year as if the land of higher blocks are fertiled almost naturally but sufficiently. This process of 'kandi' cultivation has brought significant positive change in the living condition of people particularly among the marginal farmers as reported to us while visiting the project area. It has been reported that revenue earned per year from one acre 'kandi' cultivation is around 60-70 thousand.

The process of 'kandi' cultivation will be hampered to a large extent if embankment or polder is made and as such the 'kandi' cultivators are of the opinion that the implementation of proposed project will effect them adversely. The marginal increase in gross cropped area or cropping intensity is possibly due to innovation and practice of 'kandi' cultivation by large number of farmers in their homestead or fallow land.

In old days Barisal area particularly Banoripara upazila and its neighbouring areas within which the proposed project is located were being treated as the food go-down of Bengal for the surplus of foodgrain. But over time due to population pressure and other socio-economic factors this status of the area in terms of agricultural production has changed significantly but still the area deserves agriculturally developed while comparing with the rest of the country. On this account one may ask question for justification of the proposed project.

6.3 Other Agriculture: Livestock, Poultry, Fishery and Forestry

The cattle population in the project area as reported has the trend of reduction due to socio-economic factors and also for reduction of fallow grazing land. Small farmers can not afford to have cattle due to higher price and for risk of disease. Moreover, in many villages, large farmers overtime

have managed to own power tillers for cultivating their land. These power tillers are also being used for cultivating the land of small or marginal farmers on rental basis.

Commercial poultry farm has not been noticed in the project area but about 60-70 percent households in each village, where we visited, rear 5-10 poultry birds per household. It has been reported that rearing of poultry birds has increased in the project-area for its high demand.

The project area is endowed with the natural resources of water bodies like riverine areas, canals and low laying areas. So, capture fishery is an important aspect of landless people who survive mainly on catching fishes from the rivers, canals or low lying areas. It was apprehended by a group of people that with the implementation of project the scope of catching fish from the open water bodies will diminish to a large extent.

The supply and availability of fish in the markets within and outside project area has been reported to be almost static during the last 7-8 years but its demand has increased much. There are sufficient number of ponds in the project area but the practice of pond culture for increasing fish production is limited. Very recently only a few pond owners are practising semi-intensive fish cultivation in their ponds. It is expected that in near future the pond culture will increase at a faster rate due to high demand of fish all over the country.

The scope of forestry is very limited in the project area. Homestead garden and road-side plantation may be increased and for this extension work is needed.

6.4 Farm Size and Tenurial Arrangement

On the basis of our field visit, average farm size is 1.5-1.8 acres but 60-70 percent households own less than one acre land who also cultivate land as sharecropper. The sharecroppers are basically marginal farmers who have no

enough means to buy or share LLPs for irrigation and as such they were pessimistic about the project and its outcome.

The prevalent tenurial arrangement in the project-area is quite similar for a long time. In case of share-cropping, the owner of land receives half of produce without sharing cost of production, whatsoever. The incidence of renting out land for a fixed term (season or year) is almost nil.

6.5 Non-Farm Economic Activity

At present about 30-40 percent people are landless within the project area and the major bulk of landless people work as agricultural labour. The rest of the landless are engaged in various occupation such as boatmen, fishermen, carpentry, weaving, pottery and blacksmithy but incidence of weaving, pottery and blacksmithy are very limited and these are declining over time. In some villages poor women are found to make 'Hoogla' mat. But none of these activities generate sufficient income for the household. Women are also found to work as agricultural labour in some villages in addition to household works but their main involvement is in foodgrain processing as wage earner to the large farm households.

6.6 Institutional Arrangement and Involvement of Local People

It is imperatively necessary the involvement of personnel of BRDB, BADC and DAE at field level for any agricultural development project formulation. The participation of local people particularly the intended beneficiaries is also equally important. But BWDB field office paid little attention to the concerned line agencies while the project was formulated. The local level participation was also nil rather a group of people opposed the project in apprehension of adversities. But BWDB marched forward for implementation of proposed project and eventually failed.

6.7 Conclusion and Recommendation

To conclude, it is an unique case of failure of BWDB for implementation of proposed project. The project was abandoned due to resistance and violence from the public. It indicates that the project was formulated in a wrong place without proper study regarding the pros and cons of the project area and without participation of local people. The local people rightly or wrongly apprehended the adversities of project intervention which are (i) loss of open water fishery, (ii) reduction of soil fertility by natural process, (iii) diminishing the scope of 'kandi' cultivation, (iv) problem of boat access within the project area, (v) water logging and (vi) high cost of mechanised irrigation against the traditional means from the tide water flow.

The failure of implementation process for the project gives us lesson that in future before formulating any project wider participation of local people and personnel of concerned line agencies should be warranted and also series of studies concerning socio-economic,engineering, hydrological and environmental aspects should be conducted in order to stop drain out of the valuable and scarce resources.

The existing canals which are silted up in many areas may be excavated under any suitable programme (e.g. FFW) which will ensure the participation of local people. Such programme, free from adversity, will reduce drainage congestion due to rainfall run-off.

Promoting mechanized irrigation by installing sufficient number of LLPs under suitable programme with necessary extension services from DAE may provide incentives to the farmers for their participation in the process of diffusing technology for higher yield and output. Financial institutions like Bangladesh Krishi Bank and other commercial banks may contribute in accelerating and augmenting the process if they come forward with sufficient credit programmes for different crops such that the farmers are guaranteed of their credit requirement in time of necessity for purchase of inputs. Also, co-ordination of BRDB, BADC and DAE at field level are warranted for sustaining the development process.

SECTION VII

Patuakhali Polder 55/3 Project

This is one of the 4th cycle project under SSISP. The project is basically an island in the coast of the Bay of Bangal and it encompasses a gross area 9845 ha (Appraisal Report, March, 1988). The project was supposed to be completed in 1990 starting from 1988. The project is still on-going but about 94 per cent of project work has been completed in December, 1992 as reported by the XEN Office, Patuakhali O & M Division, BWDB, Patuakhali. Only one out of 13 closurses remains to be completed by June 1994 but by this time some plausible impacts have been noticed as stated by the inhabitants of island within the project area.

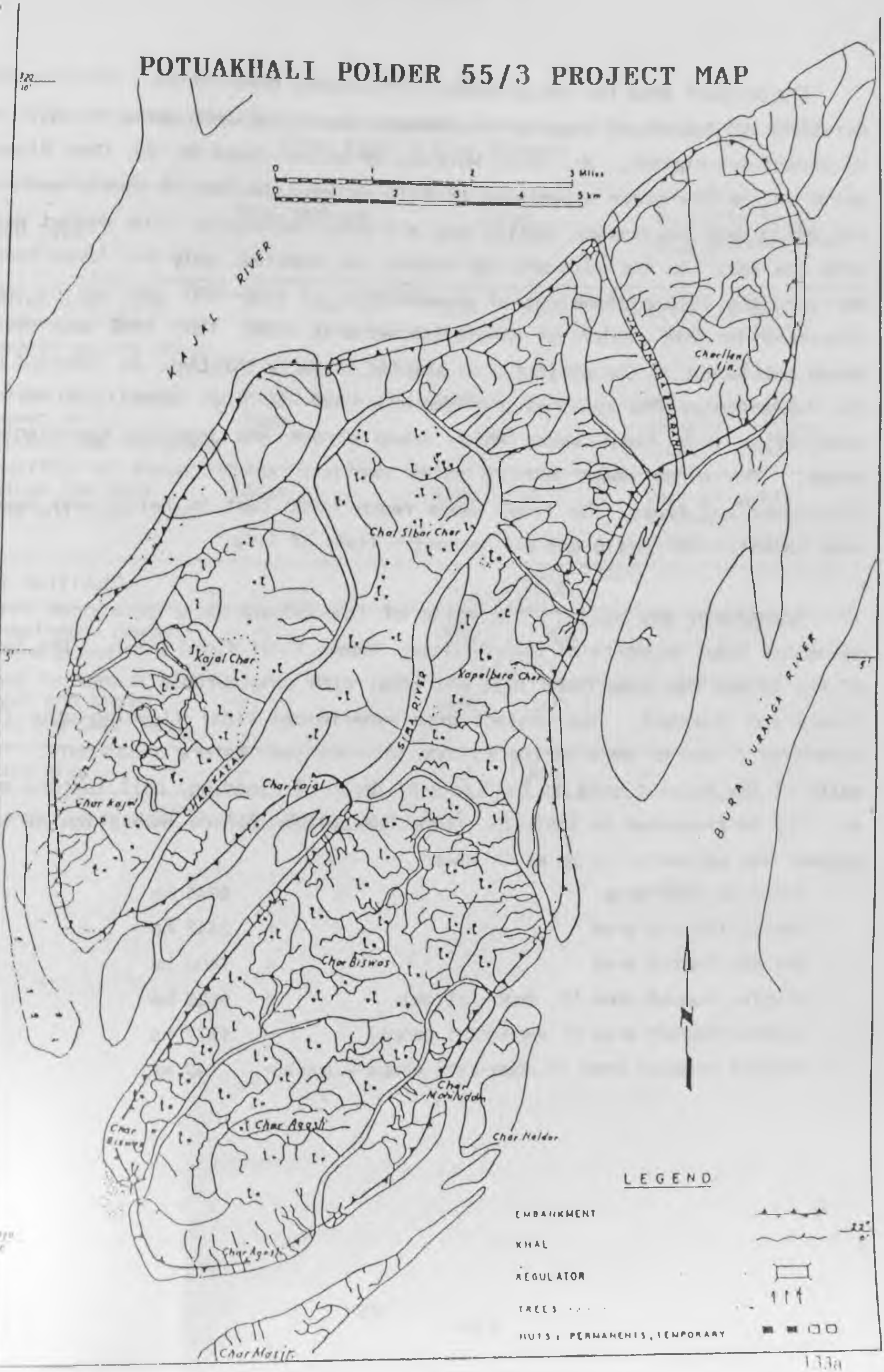
7.1 Project Description

Location: The project is located in Galachipa Thana in the district of Patuakhali. It is an island on the fringe of the Bay of Bangal. It is about 2 km from the south west coast of Bhola island and about 30-32 km from Galachipa Thana Headquarter (See Figure 6).

The polder is surrounded by the Kajal river in the west, Tentulia river in the north and by the Buragauranga river in the east and south. It consists of char areas. Access from Galachipa is by engine boat or by motor launch. It takes about 4 hours time by motor launch to reach at the polder from Galachipa and there is no other communication facilities available to reach at the polder from Galachipa or Patuakhali.

Climate: Climatic condition all over Bangladesh is almost similar having warm season during May/June to September/October and cool season from November to February. The annual rainfall in the project area is around 3468 mm as it has been recorded in the nearest station Khepupara.

FIGURE 6


POTUAKHALI POLDER 55/3 PROJECT MAP
0 1 2 3 Miles
0 1 2 3 4 5 km
KAJAL RIVER
Chal Sibar Char
Kajal Char
Kapalbera Char
SIBA RIVER
Char Kajal
Char Kajal
Char Biswas
Char Agasti
Char Biswas
Char Haldar
Char Agasti
BURA GURANGA RIVER
N
LEGEND
EMBANKMENT
KHAL
REGULATOR
TREES
HUTS : PERMANENTS, TEMPORARY

The project area has the proneness of cyclonic devastation. The District Gazetteer of Patuakhali reports the consequences of cyclone in the island area as beyond description. Mr. Abdul Motaleb, UP member (Ward No. 2), Char Biswas union states his grave experience of 1970 cyclone. He lost 8 family members out of 11 and his houses, cattle and all other belongings were washed away into the sea. In the neighbouring island, as reported, only six inhabitants survived the 1970 cyclone out of a population of 1000-1500. Earlier cyclone disasters in this region of Bangladesh were in 1965, 1960 1958 and 1957. Human settlement in the project area started in early thirties, as reported by the inhabitants. The cyclones are characterized by high velocity winds in association with tidal waves which sweep across and inundate unprotected areas. The winds reach 100-125 miles per hour which causes to collapse structures and tress. The tidal waves reach 15-20 feet in height and sweep away human lives, cattle and all necessary items of life.

Topography and Soils: The soils of the island were developed from estuarine tidal deposits of the old lower Meghna tidal flood plain. The land of the island has been found flat and level with considerable number of some creeks and channels. The project area experienced tidal flooding upto the extent of 2 feet or more during monsoon in every year before embankment. The soils of the project area on the basis of depth of flooding, soil texture and salinity is presented in table 21. Land use pattern before initiation of the project was estimated to be as follows.

Gross project area	=	9845 ha
Non-cultivable area	=	2442 ha
Net cultivated area	=	7403 ha
Single cropped area (T. aman-fallow)	=	5986 ha
Double cropped area (T.aman-rabi crops)	=	1377 ha
Tripple cropped area (T.aman-rabi crops-B.aus)	=	40 ha

Table - 21

Type of Land, Soil Texture, Area and Salinity Level in Polder No. 55/3 (Char Kajal & Char Biswas)

Land Type	Soil texture	Area		Salinity level (EC_e Micromohs/cm
		in ha	in (%)	
Medium high land (higher parts) Ramgati saline phase	Silt loam to silty clay loam	2264	23.0	Slightly saline (4600 - 6700)
Medium high land (lower parts) Nilkamal saline phase	Silty clay loam	3996	40.6	Very slightly to slightly saline (3000 - 4700)
Medium low land (Mud and Char land)	Clay	1143	11.6	Very slightly saline (3300 - 3700)
Net Cultivable	-	7403	75.2	-
Homesteads. Ramgati saline phase	-	966	9.8	-
River and Khals (Mud and Char land)	-	1476	15.0	-
Gross area	-	9845	100.0	-

Source: Appraisal Report, March 1988, BWDB.

Objective of the Project: The general objective of the project apart from minimising loss of lives and wealth due to devastating cyclones, is to achieve an integrated engineering and agricultural development which will increase foodgrain production and cropping intensity. So, the main objective is to increase agricultural production with the following works.

i) Full flood protection against tidal inundation by peripheral embankment which will allow the soils to be leached of their salinity.

ii) Provision of improved drainage of internal rainfall run-off by sufficient number of regulators.

iii) Provision of supplementary irrigation by surface flushing sluices during dry spell of monsoon and post monsoon period.

Salient Features: The main feature of the project is making a ring embankment round the island to a satisfactory level of height and breadth which will provide protection against storm tidal surges. Associated with the embankment there is provision for closures across the estuaries, regulators for drainage of the polder at major canals and flushing sluices for supplementary irrigation.

So, the salient features of the project are:

Embankment	58.00	km.
Regulators	7	nos.
Auxiliary structures	20	nos.
Canal/river closure	13	nos.

7.2 Assessment of Project Features

7.2.1 Location, Area and Population of the Project

The location of the project and erratic climatic condition within the area, as described in the earlier section, demand implementation of the project not only as a safeguard against periodically random devastation of

cyclone and tidal surges but also for gradual leaching of salinity in the island.

The gross area of the project is 24317 acres of which net cropped area is 18285 acres (Table 1, Appendix 3, Appraisal report, March 1988, BWDB). But while visiting the project area it appears to us that the embankment might have poldered larger area than stated in the appraisal report. It has been stated by the UP Chairmen/Members that perimeter of the embankment is actually 54.87 km of which about 15 km embankment is within Bhola district encompassing three mauzas namely Jahajmara, Induriar Char and Char Wahab.

According to Chairmen of Char Kajal and Char Biswas, the total area of these unions which have been mostly poldered is around 80 sq. mile (51200 acres or 20729 ha) but it has been mentioned in the appraisal report that total area of these unions is 10941 ha of which 9845 ha is within the polder. Our view based on discussion with knowledgeable people (e.g. UP Chairmen and Members) is that polder might have encompassed larger area than 9845 ha which is also evident from Table 22. This table reveals the villages/mauzas which have been poldered, their location, area and population (according 1981 census). It appears that in 7 mauzas there is no human settlement yet now though land is being utilised for crop production, grazing field or fishery. So, actual area within these mauzas could not be ascertained.

According to Appraisal Report based on population census of 1981, the population within the polder in 1981 has been estimated 25203. The islanders are of the view that the population has increased at least 30 per cent if not more during the last 10-12 years.

Table - 22

Area and Population of Villages/Mauzas by Union Within the Polder 55/3

Village/Mauza	Union	Area (in acres)	Population (in 1981)
Bara Char Kajal	Char Kajal	5205	5181
Chotto Char Kajal	Do	2854	2905
Chotto Char Siba	Do	3302	3662
Baro Char Siba	Do	1940	1423
Char Kapal Bera	Do	2451	1763
North Char Biswas	Char Biswas	2768	5335
South Char Biswas	Do	1944	3965
Char Agasti	Do	3060	4097
Char Mahiuddin	Do	1035	132
Char Chotto Maya	Do	Not known	N.H.S
Char Baro Maya	Do	Do	Do
Char Bangla	Do	Do	Do
Char Halda	Do	Do	Do
Char Jahajmara	Within Bhola District	Do	Do
Char Wahab	Do	Do	Do
Char Induria	Do	Do	Do

Note: N.H.S = No Human Settlement

Source: RRA Survey of BIDS on SSISP, April, 1993 (Based on information supplied by the concerned unions)

7.2.2 Implementation of Physical Structures

The physical structures are basically the ring embankment, regulators, closures and flushing inlets. The project was originally designed to complete with all the physical structures by 1989-90 starting from 1987-88. But subsequently the implementation process was rescheduled to be completed in 1992-93 though physically 94.42 per cent work of the project was completed in June 1992 as reported by XEN Office, Potuakhali O & M Division, BWDB, Patuakhali. The status of implementation and present condition of physical structures are described below.

Embankment: The original PP envisaged for 58 km embankment at a cost of Tk. 800.00 (lakh). The embankment was completed before June 1991 at a cost of Tk. 667.92 (lakh) but actual length of the embankment is 54.87 km. Well established procedures suitable for Coastal Embankment Project were applied for the embankment which is similar in nature to that was adopted for Bhola island which saved much of Bhola islanders in the 1970 cyclone. The embankment top level is 4.92 m (16.1 ft. PWD). This provides 1.5 m (5 ft.) freeboard above the 1 in 20 year high flood level. The embankment is in two sections. The southern part, exposed to the frontal attack of storm surges coming directly from the Bay of Bangal, has an outside slope of 1 on 7 and an inside slope of 1 on 3. The northern part has an outside slope of 1 on 5 and inside slope of 1 on 2.

The success of any project depends on its O & M. The embankment can be preserved best if it is protected by a good standard of sodding and by a border of trees planted outside the embankment at the margin of the land. While walking over the embankment it has been found that necessary turfing is not made in many places. Again, no plantation of trees is made outside the embankment at the margin of land. As plantation is beyond the budget of project, Department of Forestry may come forward for plantation particularly on the southern side of the embankment facing sea shores immediately.

The embankment requires necessary turfing, plantation and regular maintenance. After any major tidal wave attack repair must be made as quickly as possible and even by the islanders themselves without waiting for BWDB personnel and funded projects. BWDB may help to allocate some funds under FFW for re-profiling where necessary but these tasks should be performed by the islanders themselves. Char kajal and Char Biswas union parishads may form village committees for each village to monitor the maintenance and re-profiling of embankment. These committees may also be entrusted with the responsibility of tree plantation across the embankment in close cooperation with the Department of Forestry.

Apart from lack of proper turfing and absence of tree plantation, the general condition of the embankment appears to be reasonably good all over the embankment where we visited.

Regulators: On the basis of hydrogical studies the required regulator capacity at Polder 55/3 was estimated to a total of 18 vents each of standard 5 ft. X 6 ft size (Appraisal Report, March 1988, BWDB). So, it was proposed that 7 regulators (4 regulators each of 2 vents, 2 regulators each of 3 vents and one regulator having 4 vents) would be constructed by the end of June 1990. These regulators along with the embankment were constructed within June 1991.

The experience of regulators on Bhola island acted as the guiding factor while regulators at the Polder 55/3 were constructed. The important consideration is to ensure that large vortex produced by slightly uneven flow through the regulator gates does not damage the structure or its side embankment.

The location of the regulators, their vantages and gates have been constructed as per design specifications and as such all the regulators (while we visited) are found effective and in good condition. The wing walls, aprons, steel gates and their operating arrangements are fairly good. The operation of the gates (i.e. opening and closing) is done only by the selected people of SDF/SO, BWDB among the beneficiaries but the maintenance works of all the structures are still with the personnel of BWDB.

Canal Closures: In order to avoid salinity hazard out of tide water from the sea, the PP envisaged for 13 river/canal closures across the island. The work of ten closures were completed in 1990-91, one was completed in 1991-92 and another one was completed in March, 1993. The remaining one which is the biggest, located at Kapal Bera was supposed to be completed in 1992-93 but its work is yet to be started. It has been reported that the work order for closure at Kapal Bera was issued but the contractor did not start work in apprehension of high cost for high tide. So, the budget for closure at Kepal Bera has been revised and significantly increased and it is expected that its work will be completed in 1994. Due to absence of closure at Kapal Bera, the regulator at Mayer Char which is near to Kapal Bera could not be effectively brought under operation since each regulator is linked with one or more closures.

Auxiliary Structure: The original PP envisaged for construction of 20 flushing inlets which were materialised in 1991 along with the construction of embankment. The condition of the flushing inlets are fairly good and have been found in operation since its construction. We visited in 4 flushing inlet area and found the gates were missing in case of 2 flusing inlets. While it was reported to the BWDB personnel at Galachipa they stated that the gates were not actually missing as the selected farmers might have taken these to their home and they would properly install the gates in case of necessity in time.

In addition one bridge and one 'khalashi' shed were constructed at Char Kajal village in 1992. The people of Char Kajal union are benefited with the construction of the bridge particularly in the context of communication. The 'Khalashi' shed is not being used till date and it is under the supervision of SO/SDE of BWDB.

7.2.3 Institutional Arrangement and Involvement of Local People

The involvement and interaction of organisations like BRDB, BADC, DAE etc. at field level are necessarily required for effective outcome of the

project intervention and as such due importance of these organisations were recognized while initiating SSISP by DPS-II (ADB), BWDB. Pre-project involvement of these organisations has been found to be almost nil in case of Polder 55/3 but after completion of physical and engineering structures some involvement of BRDB and DAE have been noticed while discussing with the knowledgeable people. The local people hadn't had any involvement during pre-project period but they had been involved in the process of implementation. The islanders are of the opinion that they had been eagerly waiting for years together for any project intervention which might save their lives and properties and as such they welcomed project intervention and actively cooperated in the implementation process of physical structures. The landless labouring class tendered their cheap labour to the construction of embankment and other structures. The selected farmers in the villages where regulators and flushing inlets are constructed are now volunteering in the opening and closing of the gates of regulators or flushing inlets. It has been expected that with the completion and full implementation of the project the involvement of local people and personnel of BRDB and DAE will increase further. The immediate involvement of the Department of Forestry, Government of Bangladesh, for plantation and afforestation is desireable as a safeguard of embankment and upgradation of environment in the coastal island area.

7.3 Impact on Agricultural Activities

The positive impact on agricultural activities depends largely on the successful implementation of project components and also on the active cooperation and responsibilities of line agencies associated with the development process. It may be mentioned that the project is not yet completed and the line agencies are yet to be actively involved and it is too early for evaluating the impact of project intervention in agricultural activities unless 2-3 years have passed after completion and operation of the project. Anyway, in the exercise of rapid appraisal of the project while discussing cross-section of islanders it appears that the islanders are happy enough with the implementation of project in the coastal area. In the mean time they have witnessed, as reported to us, significant changes in

agricultural activities such as increase of net cropped area and cropping intensity. Change in cropping pattern and yield rates of crops have also been noticed in the mean time. In our exercise for the project impact evaluation on agriculture we will try to compare the present agricultural activities in terms of gross and net cropped area, cropping pattern, yield rates, diffusion of technology etc. with the level prevailing before initiation of project.

7.3.1 Net Cropped Area and Cropping Intensity

The scope of bringing more land under cultivation in the context of Bangladesh is very limited but in case of coastal belt such scope can be widened with necessary infrastructure and intervention. In case of Polder 55/3, it is not easy to have estimates on net cropped area or cropping intensity due to lack of infrastructure and data base. With the limited resources and time and in absence of census or any large scale survey it is not possible to have meaningful estimates of net cropped area or cropping intensity for the island area. Alternatively, we sought the perception of knowledgeable islanders about any change in net cropped area or cropping intensity during the period before initiation of the project to present time. The islanders in different villages to whom we met, invariably expressed their feeling that net cropped area in each village after the embankment has increased 5-10 per cent due to greater security of crops against the storm and tidal surges. The islanders expressed their hope that net cropped area will further increase in near future after completion of enclosure at Kapal Bera.

The total net cropped area in Char Kajal and Char Biswas Unions in 1983-84 was estimated to 15312 acres by BBS (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Patuakhali, August, 1988, B.B.S) but BWDB (Appraisal Report, March, 1988) estimated the net cropped area in these unions to be around 18285 acres in 1987-88. The estimates in 1983-84 and 1987-88 of two different sources have deviation from one to the other and the estimate in later period is about 19 per cent higher than the former estimate of BBS. It may be the fact that BWDB included the possible increase of net cropped area

while computing net cropped area of the project as it has been kept constant during pre-project and post-project situation.

The cropping intensity for the project area was projected to 201 after the project against the pre-project cropping intensity 120 (Appraisal Report, March, 1988, BWDB). But on the basis of knowledgeable information from various villages the cropping intensity in the project area have been estimated by the RA team members to be 130 and 162 during pre-project time and at present respectively. In the appraisal report, the net cropped area during pre-project and post project has been kept constant. But net cropped area and cropping intensity have significantly increased due to the influence of project and it is expected that net cropped area and cropping intensity will increase further after completion of project if marketing and credit mechanism can be effectively improved.

7.3.2 Cropping Pattern

The Appraisal Report (March, 1988) of BWDB identified and estimated the cropping pattern by area during pre-project period in contrast to the projected cropping pattern after the implementation of project which are presented in Table 23 below.

Table - 23

Pre-Project and Projected Cropping Pattern at Polder 55/3

	Cropping Pattern	Area (in hectare)
a)	Pre-Project Situation:	
	T.aman-Fallow-Fallow	5986
	T.aman-Rabi Crops-Fallow	1377
	T.aman-Rabi Crops-B.aus	40
b)	Projected Situation:	
	T.aman-Fallow-Fallow	1403
	HYV aman-Rabi Crops-Fallow	1000
	T.aman-Rabi Crops-Fallow	2500
	T.aman-Fallow-B.aus	1000
	HYV aman-Rabi Crops-B.aus	1500

Source: Appraisal Report, March, 1988, BWDB.

It appears from table 23 that T.aman was grown in 100 per cent arable area before project which is not true as cultivation of cash crops like sugarcane and jute have been found during our visit within the poldered villages. Also, the rabi crops in this table are not specified by type. While asked the villagers about the pre-project and present cropping pattern they responded with interest that there are some changes in cropping pattern and some new crops are being grown within the area due to increased security of crops by the embankment and there is an increasing trend of net cropped area and cropping intensity. Major crops in the project area are found to be T.aman, Pulses (Mung and Masur), Chilli (Pepper), local boro, sweet potato, B.aus, T.aus, B.aman, oilseeds (til, soyabean and mustard), jute, sugarcane, wheat, other spices and some minor cereals. In the appraisal report there is no mention about jute, sugarcane, T.aus, B.aman and minor cereals. It is difficult to estimate the acreages of different crops in a geographical location like Polder 55/3 and it is more difficult in absence of full scale survey, so we resorted to appraise the pre-project and present cropping on the

basis of our discussion with the groups of farmers and knowledgeable information in two villages within the project area. We asked the groups of farmers in each village to mention all the crops that are at present (last year) grown and were grown before project in their villages. Then they were asked to give appropriate acreages under each crops and also net cropped area within the village. This process gives us some indication about the cropping pattern and its change during pre-project period to present time which are presented in Table 24. It appears that acreages for the crops T.aman, B.aus, local boro, wheat, sugarcane, oilseeds (mustard), chillies, potato, sweet potato, pulses and vegetables have increased in the project villages. Crops like T.aus, HYV boro, groundnut and soyabean have recently been introduced in the project villages which were not cultivated before initiating the project. The acreages for the crops mixed aus-aman, jute and kaon have been reducing due to some reasons or other.

Table - 24

Cropping Pattern (Percentage of Net Cropped Area) in Two Villages Within Polder 55/3

Crops	South Char Biswas		Chotto Char Siba	
	Pre-project	At Present	Pre-project	At Present
T. Aman (local)	82.0	85.0	83.0	86.0
B. Aman	5.5	5.0	6.0	6.0
Mixed Aus-Aman	3.0	1.5	2.0	-
B. Aus	7.0	9.0	7.0	9.5
T. Aus	-	5.0	-	6.5
Local Boro	6.0	9.5	3.0	8.5
HYV Boro	-	1.5	-	2.5
Wheat	1.0	2.5	0.5	2.5
Sugarcane	1.0	1.5	0.5	1.5
Jute	3.5	3.0	3.5	3.0
Mustard	2.0	5.0	3.0	5.0
Til/Tishi	1.0	1.5	1.0	1.0
Soyabean	-	1.0	-	1.0
Chillies	4.0	6.0	4.0	6.0
Onion/Garlic	1.0	2.0	1.0	1.0
Other spices	1.0	1.5	1.0	1.0
Sweet Potato	2.5	4.5	2.0	3.0
Groundnut	-	1.0	-	1.5
Potato	1.0	1.5	1.5	2.5
Khesari	2.0	4.0	3.5	4.0
Mung	1.0	2.0	1.0	2.0
Masur	1.0	2.0	1.0	2.0
Water-melon	0.5	0.5	0.5	0.5
Summer Vegetables	1.5	2.0	2.0	2.5
Winter Vegetables	2.0	3.0	2.0	2.5
Kaon/Other cereals	0.5	0.5	1.0	0.5
Cropping Intensity	130.0	161.5	130.0	162.0

Source: RRA Survey of BIDS on SSISP, 1993.

7.3.3 Yield Rates of Major Crops

Yield of crop depends on large number of factors which is beyond the scope of this study but significant changes in the yield rates of some major crops within the project villages during pre-project to present time have been observed. Our discussion with the knowledgeable informants and groups of farmers reveal that yield rates of T. aman, B. aman and jute have experienced significant decline but for the crops pulses, oilseeds, chillies, potato, sweet potato and vegetables the yield rates have increased, and the crops B. aus, local boro, wheat, sugarcane, water-melon have been found to remain static in terms of yield rates. There might have numerous reasons for change of yield rates over time but it has been reported that chemical fertilizer is being applied to some crops with proper management which have been yielding better at present while compared with the pre-project position when practice of chemical fertilizer was very insignificant. The water logging due to construction of embankment in some areas within the polder and absence of proper chemical fertilizer use etc. are the contributory factors for low yield at present for some crops while compared to pre-project situation. It has been stated by the knowledgeable people that in the neighbouring polder it happened that after embankment salinity increased for a couple of years and then salinity gradually decreased within a few years. The increase of salinity caused fall of yield rates which after a few years with the leaching of salt by rain water the land regained its original fertility. This may also happen within polder 55/3 and the farmers hope that yield rates will be restored by natural process within next a few years in absence of chemical fertilizer. Whatever be the changes of yield rates, the farmers within the polder at present are found enthusiastic about the possible positive outcome of the project.

7.3.4 Irrigation

Diffusion of technology for high yielding varieties of crops depends to a large extent on modern irrigation. The practice of irrigation in the project area, as was observed and reported by knowledgeable informants, is virtually

nil in absence of any DTW, STW or LLP. The crop production in the project area is yet now based on rainfed condition but there are incidences of irrigation by gravity canals in some suitable plots within the project area. This process of irrigation by gravity means has increased to some extent with the construction of flushing inlets under the project. It is expected that irrigation coverage under this process will increase in future with full completion of project but it will require excavation of existing canals within the project area. The incidences of irrigation by manual and traditional means of swing baskets or 'doons' are also found in some villages to a limited extent. Irrigation by DTW or STW is not feasible within the project area due to physiographic constraints.

7.3.5 Other Agriculture: Livestock, Poultry, Fishery and Forestry

There is no spcific objective for promotion of livestock, poultry, fishery and forestry in the context of project's intervention within the polder. But these aspects of rural economy have their own implication for socio-economic development. About 70-80 per cent of cattle population within the project area after the cyclone of 1970 were washed away into the sea but gradually the situation improved. BBS (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Patuakhali, August, 1988) reported that in 1983-84 the number of bovine animals at Char Kajal and Char Biswas unions were 13276 and number of sheep & goat were 4373. Every farm household is found to keep at least 1-2 cattle for agricultural crop production activities. In absence of mechanized mode of cultivation, draft animal power is the only means of cultivation to the farmers. Large farm households are found to keep large number of cattle heads (20-30) per household. Though grazing land has decreased due to bringing fallow land under cultivation but cattle population have increased about 10 per cent or more during mid-eighties to 1992-93 as stated by the knowledgeable people within the project area.

Almost every farm household, as reported, are found to have a few number of poultry birds but its population has substantially decreased due to hazard of diseases.

The project area is endowed with the natural resources of water bodies. It has been estimated that about 15 per cent of gross project area are water bodies suitable for inland fishery and as such capture fishery from open water bodies were developed since long time past. The marginal and landless people are mostly engaged catching fishes as a source of livelihood. But due to lack of infrastructure and marketing facilities the fisherman can not derive proper revenue from their catches. Recently, a few people have also been engaged in marine fishing but the concept of culture fishery in the available ponds and closed water bodies has been remaining almost absent possibly due to lack of infrastructure. If proper infrastructure and marketing facilities can be developed then more people may also be attracted for catching fishes as a source of livelihood.

The project area demands development of forestry as a safeguard of their lives and properties against any cyclone or natural calamities but the project has no explicit explanation in this regard. In order to meet the own requirement of construction and fuel for household, the islanders have developed their own homestead forestry which is quite significant and this scope may be increased further if the department of forestry or other line agencies come forward with certain package for marketing the forestry products. More importantly, plantation of trees along the periphery of embankment is urgently required as a safeguard against collapse from any cyclonic storm with tidal surges which may be done by the forestry department of government.

7.3.6 Tenurial Arrangement

Land-man ratio within the project area has been observed favourable to some extent than elsewhere in the country as net cropped area available per family is 2.21 ha (Appraisal Report, BWDB). But the pattern of land ownership is highly skew and it has been stated that about 75 per cent farm households operate as owner cum tenant farmer. So,the tenurial arrangement prevailing within the project area differs with the rest of the country.

Share cropping system in the project villages varies from one crop to another and also by type of land and whether particular plot is within the periphery of polder and beyond the polder. In case of plots beyond the polder, the landlord receives half of produce withiout sharing input cost of any type. In case of plots within the polder, the landlord receives two-third of produce but he bears the cost of seed and fertilizer.

There are also incidences of contractual arrangement for use of land under rental basis for fixed term. The rent of land also depend on type of land for suitability of specific crops. The plots suitable for remunerative crops have higher demand in the rental market. The rent of one acre land within the polder for a calendar year varies from Tk. 800-1500 but for plots beyond the polder it varies in between Tk. 600-800.

7.3.7 Land Holding Distribution

It is reasonably understood that in Char island area of coastal belt where human settlement started only in thirties, the land holding distribution is highly skew. It has been stated by the knowledgeable respondents that in some large villages within the polder there are 5-7 households where each household owns land more than 30 acres, and number of households owning land 25-30 acres, 20-25 acres and 10-20 acres are 6-8, 10-12 and 30-40 respectively but about 40 per cent households are near landless owning less than 50 decimal land per household. The landholding distribution at Char Kajal and Galachipa thana was estimated by BBS (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Patuakhali 1988, BBS) which is presented in table 25 below. It may be mentioned here that Char Kajal union (in 1983) has now been splitted into two unions, namely Char Kajal and Char Biswas and these two unions are the constituents of the polder 55/3.

Table 25

Landholding Distribution at Char Kajal and Galachipa Thana, 1983

Landholding (in decimal)	Char Kajal Union		Galachipa Thana	
	No. of H/H	Per cent	No. of H/H	Per cent
0 - 5 (non farm H/H)	1563	34.6	12440	27.1
5 - 249	1356	30.0	19738	43.0
250 - 749	814	18.0	9656	21.0
750 and above	790	17.5	4052	8.9

Source: Compiled from Table 4.1 (The Bangladesh Census of Agriculture and Livestock: 1983-84, Zila Series, Patuakhali, 1988, BBS).

It appears from Table 25 that land holding distribution at Char Kajal is much more skewed than Galachipa thana as a whole since percentage of large farm households at Char Kajal was almost double than Galachipa thana. The number of both large farm households and landless people within the polder has increased to some extent during the last 10 years.

7.4 Non-Farm Economic Activity

In a backward area particularly in the context of Polder 55/3 where more than one-third of population are landless, the non-farm activities are extremely important. Due to lack of infrastructure and in accessibility it was not possible on our part to explore the details of non-farm activities within the project area with the limited resources and time.

The bulk of landless people work as agricultural labour to the large farm households and the rest are engaged mostly in catching fishes from the open water bodies as a source of livelihood. The women folk of landless are found

to work in the household activities of large farm households particularly in drying and processing of paddy. In absence of any rice mill in the area paddy husking and processing has been considered as an important source of earning for the poor women-folk. In some villages 'Hoogla' mat is also being made by poor women but they face marketing problem due to lack of infrastructure. There are some incidences of oilseeds crushing by 'ghani' but this activity is on the verge of extinction. There are some carpenters but they are mostly engaged in boat making, house construction and repairing. Gur making, processing juice of sugarcane and marketing, is an important non-farm activity but it is limited to a particular season. There are a few blacksmiths available in the project area who contribute much in farm economy by making agricultural implements and repairing them but their economic condition is very poor.

7.5 Institutional Aspects

In a backward area of the country and in absence of infrastructure, it is difficult to have and establish institutional linkages. The periphery of the polder is about 30-32 km at the nearest from Galachipa Thana Head quarter. Engine boat or motor launch is the only mode of communication to reach at the Polder from Galachipa. So, the project area suffers a lot of set backs from institutional support of government. There is no bank branch within the project area. People have been demanding a bank branch and a police camp within the area. In absence of banking facilities, and with the supply constraint of credit, the dominance of conventional money lending at high interest has emerged which is one of the contributory factor for pauperization of poor people.

Very recently CARE located at Galachipa Thana head quarter, has deputed one field trainer for Char Kajal and Char Biswas unions to motivate farmers with the help of locally recruited extension workers. Their main thrust will be for development of homestead gardening. While discussing at BRDB office at Galachipa, it appears that there are 12 KSS (300, members), 9 BSS (200 members) and 4 MBSS (100 members) at Char Kajal and Char Biswas union. At

present, BRDB office is involved for VGFP programme for Polder 55/1 and it is expected that BRDB will also be involved for maintenance of Polder 55/3 after completion of project under the same programme.

7.6 Environmental Implication

So far we discussed with the islanders about the environmental aspects, it appears that they are quite happy with the embankment or the project. There is no perceived degradation of environment with the process of implementation of project. The people by this time feel a sense of security against damage of crops or lives against tidal surges or cyclonic storms.

7.7 Education, Health and Nutrition

The literacy rate and level of education is very poor in the project area, as was observed while visiting the area and discussed with the knowledgeable people. The original settlers who migrated into this area were basically illiterate and belonged to the labour class. So, the level of education and literacy rate could not increase much. Literacy rate at Char Kajal in 1981 according to Thana Statistical Office is 18 per cent against 26 per cent at Galachipa Thana. There are at present 8 primary schools, one junior high school, 2 high schools and 9 'ebatadayee' madrashas within the project area but literacy rate does not seem to improve much.

There is no sufficient medical facilities but the general health of the people appears to be better in the project area compared to other places in the country. This is possibly due to hard working nature of the people, conducive natural environment and sufficient protein intake due to abundance of fish and rice.

The better health indicates that nutritional level is good enough. The project area is one of the surplus area in terms of foodgrain production. Moreover, due to easy availability of fish and low price of both fish and rice in the project area compared to elsewhere in the country, consumption level is high which contributes for better nutrion level.

It has been perceived by the knowledgeable people that though the level of education is almost static during the last decade but status of overall health and nutrition has improved to some extent due to conciousness aroused among the people. Previously people were habituated with river water for drinking purposes but now most of the people use water from hand tube well for drinking purposes.

7.8 Conclusion and Recommendation

The project has its own merit for locational importance to safeguard the islanders in case of natural hazards such as cyclone and tidal surges. The project was conceived and initiated by XEN office, Patuakhali O&M Division, BWDB under SSISP quite successfully. The project was supposed to be completed in 1990 starting from 1988 but it is still on-going though 94 per cent works of all physical construction were completed in 1992. Only one closure at Kapal Bera has been left and expected to be completed in 1994 and otherwise the project is complete. In the mean time, people within the project area have experienced some accrued benefit of the project and have developed a sense of security against natural calamities of tidal surges with the completion of 54.87 km ring embankment. With the completion of embankment and regulators the following benefits have accrued to the islanders:

a) Crops are protected from the salinity or intrusion of saline water from the sea;
b) Some proportion of fallow land have been brought under cultivation and as such net cropped area has increased and it will increase further;
c) As crops have attained security against tidal surges, cropping intensity has also increased and expected to increase in future with the completion of project;
d) Significant change in cropping pattern has been observed where remunerative crops has emerged;
e) Yield rates of some crops have increased and it is expected that the yield rates will further increase in future with the leaching of salinity;

f) The islanders have developed a sense of confidence and integrity for diffusion of technology in introducing HYV crops particularly for boro crops. The embankment has eased their communication at least to some extent within the polder and also with Galachipa Thana Head quarter.

The success of any project intervention depends to a large extent on the O&M of physical structures which appears to be absent in case of Polder 55/3. It has been stated that O&M will be launched once the project is completed. Necessary turfing on the embankment is not made and most of the canals within the polder are silted up causing drainage congestion due to heavy rainfall and problems for irrigation by gravity means.

At the present status and performance of the project we must say that the closure at Kapal Bera must be completed at the earliest possible time. The O&M must be mentained for all structures. BRDB may be entrusted for maintenance of embankment under VGFP where necessary turfing must be made. Department of forestry may be invited for necessary plantation at the margin of land in and outside the embankment. Again, after any tidal wave attack repair of embankment must be made as quickly as possible even by the islanders themselves under the supervision of union council without waiting for BRDB or BWDB personnel. The silted up canals are required to be excavated and it may be done under FFW programme. This will increase irrigation facilities by gravity means in the area. The extension services of DAE should be strengthened so that suitable remunerative HYV crops can be grown effectively which may also augment the process of crop diversification and diffusion of technology. A bank branch and a police camp are urgently required in the island area for easy access to credit and social security. If proper institutional credit facilities along with the extension services of DAE can be strengthened then after completion of the project the island area in the southern coastal belt of Bangladesh will surely prosper.

SECTION VIII

Concluding Remarks

The Small Scale Irrigation Sector Project (SSISP) encompassing 31 small projects (sub-projects) was initiated and designed within the Medium Term Foodgrain Production Plan (MTFPP) under the Second Five Year Plan of Bangladesh to increase foodgrain production. This was expected to be achieved through implementation of small projects comprising the construction and rehabilitation of irrigation, drainage and flood protection facilities, and the installation of appropriate equipment such as low-lift pumps, deep and shallow tubewells. The Bangladesh Water Development Board (BWDB) was responsible for the identification, appraisal, design and construction of the civil works for the sub-projects. The Bangladesh Agricultural Development Corporation (BADC) was initially made responsible for the procurement and distribution of irrigation equipments required under the project but the procurement of irrigation equipments was taken out of the Project Proforma (PP) at the early stage of project formulation which led to virtually no role of BADC. The project management identified Bangladesh Rural Development Board (BRDB) and the Department of Agriculture Extension (DAE) as the cooperating agencies.

Success of any project intervention depends to a large extent on the process of planning, implementation and operation. Generally, a set of rules are formulated by the appropriate authority or policy makers which must be followed while launching the implementation of project. In this connection the Directorate of Planning Schemes-II (ADB), BWDB with assistance from the consultants (Coode and Partners, UK and Minister Agriculture Ltd., UK) prepared Project Implementation Mannual (PIM) in conformity with the basic criteria specified by the Asian Development Bank (ADB). The PIM embodies the specific guidelines, procedures and formats with respect to (i) selection, preparation, appraisal, approval and processing of sub-projects; (ii)

procurement, contracting and financial procedures; (iii) construction supervision and quality control; (iv) marketing irrigation facilities; (v) farmer's organisation; (vi) operation and maintenance; and (vii) project monitoring.

Also, ADB specified the basic norms (presented in section 1.1) that must be fulfilled while promoting any sub-project. In the selection of sub-projects, first of all Directorate of Planning Schemes-II (ADB), BWDB invited nominations of suitable sub-projects from BWDB field XENs as a candidate for inclusion in the SSISP. The nominations were presented in a structured format, as prescribed in the PIM, to facilitate the screening, ranking and selection process. In case of any deficiency in data or any irregularities in terms of basic objectives and norms set by ADB for any proposal (nomination) of sub-project, the sceening committee outright rejected or postponed the proposal but the postponed proposal was sent back to concerned XEN for correcting the anomalies which was re-submitted for consideration and inclusion in the next cycle of sub-projects under SSISP. Once the nominations forwarded by BWDB field XENs passed the screening process and ranked in the top order of selection process, sub-projects were considered to be included in the SSISP. Now, after selection of the sub-projects, Appraisal Report (or Feasibility Study) for each of the sub-projects was prepared by the Directorate of Planning Schemes-II (ADB), BWDB in collaboration with the Consulting Engineers (Coode and Partners, UK in association with Minister Agriculture Ltd., UK and Planners, Engineers and Consultants Ltd. Bangladesh).

Each of the Appraisal Report covered all the components of the sub-project in detail which include item specific cost elements, time and mode of implementation, expected benefit in terms of net cropped area, irrigation and overall increase of foodgrain production. The identification of suitable sub-projects and its implementation process as laid down in the PIM, appear to be rigorous enough and as such all the selected sub-projects were expected to deliver tangible benefit but the outcomes of most of the sub-projects have some thing to narrate other way round as reveal from the Rapid Appraisal of sample sub-projects.

Each of the sub-projects under SSISP has its own implication in terms of location, objectives and modus operendi. So, individual sample sub-projects have been separately dealt for Rapid Appraisal in the previous sections where background and objective of the project, the time, mode and process of implementation, the present status of the project, perceived benefit accrued or adversities faced by the project, problems associated in the process of implementation or non function of specific component of the project and the possible remedial measures etc. are highlighted. Conclusion and recommendation at the end of each section are also provided for each of the sample sub-projects. Now, in our exercise of Rapid Appraisal about the sample sub-projects, we are at the concluding stage in generalising the impact of SSISP as promoted by BWDB which may have some implication to the policy makers for over all sustained growth of the economy in future.

Before coming to the general conclusion about the performances of SSISP we must critically assess the performances of BWDB as an executing agency for implementation of each of the sample sub-projects in terms of realisation of objective. One important observation is that though selection of sub-projects went through rigorous process but a few sub-projects were later on discontinued. This is due to lack of knowledge or absence of judicious mind and violating the norms of project selection procedure as laid down in PIM. The concerned BWDB field XEN office failed measurably to contact the personnel of BRDB and DAE while formulating and implementing the sub-projects and as such the project is deprived from the expertise and services of BRDB & DAE personnel. Also participation of local people for whom the project had been designed were nil for all the sub-projects. Any development project can neither sustain nor attain satisfactory level of achievement in absence of local level participation. So, in absence of local level participation during formulating and implementing period of the project, the fate of most of the sub-projects are bleak.

The success or failure of a sub-project depends on a large number of factors but the extent of success/failure varies from one sub-project to another due to specificities in terms of location, area and mode of operation.

So, project specific evaluation of success or failure are desirable which are as follow.

Boalkhali Irrigation Project: The project was initiated in 1986 and was expected to be completed in 1989 but it was discontinued after June, 1992 but substantial investment had been made in the mean time without tangible benefit. The main objectives of the project were (i) improved drainage of internal run-off and hilly run-off by re-excavation of canals and providing sufficient ventage of regulators with unhindered navigation facilities, and (ii) improved irrigation by deepening the existing canals for retention of high tide water and fielding sufficient LLPs. ADB reviewed the status of the project in October-November 1989 as follows.

- Boalkhali as a coastal project is already at a high standard of production having 83 per cent of net-cropped area being irrigated, should be dropped from SSISP programme but ongoing regulators were to be completed but no new work should be taken up. The remaining work of the 3 on-going regulators were completed in June 1992 and since then the project is discontinued. It may be mentioned that no attempt was made for deepening the existing canals which were necessary prior to construction of regulators. At present O & M of built up regulators are also absent which indicates wastage of national resources. This is a case of total failure on the part of BWDB field XEN and also on the part of DPS-II (ADB), BWDB as the project was wrongly planned without sufficient survey and background data and violating the norms laid down in the PIM regarding gross area, proper specification and location of the project.

Tirnai River Sub-Project: This is a small barrage project started in 1984-85 and completed in 1986-87. It is a case of utter disappointment with wastage of national resources as the project failed measurably to control and distribute water even after six years of completion of the project. At the present status of the project no irrigation is possible due to wrong site selection for the barrage and head off-take. The Panchagarh O & M Division of

BWDB were possibly interested for early completion of the project without having mind for justification and possible impact of the project. On the other hand it is amazing to note that 3 projects of similar nature (Tirnai River Project, Tulshia Beel Project and Ramchandi River Project) are located in one or two unions within the Tetulia thana of Panchagarh district which is a gross violation to the norm of equitable distribution of national resources as specified by ADB.

Tangon Barrage Irrigation Project : This is one of the second cycle projects, started in 1984-85 and was expected to be completed in 1987-88. About 98 per cent of all physical works of the project were completed in June 1991 but 1.31 km main irrigational canal on the left bank could not be completed due to land dispute.[1] The land dispute would not at all arise if local people could be consulted before initiation of the project. The project aimed to provide supplementary irrigation in 11000 acres for T. aman crop only by gravity means. The potentials of ground water irrigation facilities by DTW/STW in the project area were not explored. The STWs, installed in the project area by private initiatives, have been contributing significantly without any problem. About 40-50 per cent households in the project area have the access to electricity and as such DTWs can be profitably operated but it has been observed that most of the installed DTWs (90% or more) are either idle or not in operation for some reasons but these DTWs can be brought under operation with sufficient maintenance and repairing works. The existing DTWs/STWs if brought under operation then it is possible to irrigate 30-35 per cent net cropped area of project area round the year. More than 2000 STWs could be procured and installed with the amount of money that was budgeted for the project and these could irrigate more than 20000 acres round the year. As there is no perceived natural imbalance for large scale installation and operation of STWs, we do not find justification for capital intensive Tangon Barrage Irrigation Project for supplementary irrigation only to T. aman as the project has already swallowed 89.07 hectare arable land and it is apprehended that 400-500 acres of land will be without any paddy crops at upstream once the project is brought under operation. Also, BWDB failed to distribute water to the villages in the right bank of the project where necessary structures and

---

1. Sometime in 1993 after the RRA team of BIDS visited the project site, the remaining 1.31 km main irrigation canal was completed as claimed by BWDB but the project is yet to brought under operation.

auxiliaries were completed quite long time past and as such knowledgeable people in the project area are pessimistic about the outcome of the project.

Haijada Embankment Project : This is the biggest sub-project under SSISP. Our field visits explore that the net cropped area of the project is larger by the extent of 33 per cent than the stipulated norm of maximum 8000 ha. The project completed in December, 1992 as declared by DPS-II (ADB), BWDB but one regulator was completed in March, 1993 though as per PP the project was expected to be completed in 1989-90. To achieve the desired objective the project envisaged to provide (i) irrigation and drainage facilities to cultivate HYV boro mainly by deepening the existing canals and supplying irrigation equipments (e.g. sufficient number of LLPs, DTWs and STWs and (ii) early flood protection by constructing submergible embankments with sufficient number of regulators.

The original PP envisaged for 129.6 km canal excavation which is an important component to substantially reduce drainage congestion but this was not at all materialised causing adversity of drainage congestion and as such occasionally the embankment faces public cuts. Originally it was planned to construct 10 new regulators at a cost of Tk. 204 (lakh) but later on budget was modified and 12 regulators were constructed at a cost of Tk. 626 (lakh) of which a few regulators have no necessity at all, as observed, rather causing adversities. The proposed modification of weir cum regulator (built in 1978) at Tangapara Khal was not done. There is no O & M of regulators causing problems to the functioning of a few regulators. The submergible embankments have been deteriorating due to lack of O & M and at present the embankment is disjoint in 28 places, as observed, either by public cuts or by washed away during monsoon. The O & M of the project are totally absent. The project in its original PP envisaged for installation of 11 DTWs and 264 LLPs in association with BADC and BRDB but no attempt is yet made for irrigation extension and working relationship of BWDB, Netrokona with BRDB, BADC or DAE at field level are seriously absent. The early flood protection have so far been partially successful by the existing status of submergible embankment but the project failed to increase substantially the reliability of boro harvest

which is the only crop in about 70 per cent project area. The present status of project has nothing to materialize the objective of the project to a satisfactory level though in a few villages some farmers reported that they are being benefited with the project intervention but their number is a small proportion to the people who denied any accrued benefit of the project. The project management (XEN office, Netrokona WD Division, BWDB) has failed measurably to implement some important components of the project and as such it is not possible to achieve the desired objective up to a satisfactory level rather faulty management and incompleteness of officially completed project has contributed in the process of degradation and adversities.

Baisari-Saidkati Project : The project was conceived for full flood protection, drainage and irrigation to a gross area of 12900 acres of which 9000 acres would be net benefited area. It was designed to construct 19 miles embankment, 30 miles canal improvement, construction of 6 regulators and installation of 90 LLPs. The feasibility study was carried out in 1986 by DPS-II (ADB), BWDB and Consulting Engineers (Coode and Partners, UK in association with Minister Agriculture Ltd., UK and Planners, Engineers and consultants Ltd., Bangladesh) when people in Barisal expressed their views in opposite direction but the concerned personnel of BWDB at Barisal did not pay sufficient attention to the pros and cons for the project. Also, personnel of BWDB failed to contact and motivate the local people and the expected beneficiaries before the process of implementation started about the scope and potentials of project. Construction of embankment started in 1987 but after a few days of work the project ceased due to local people's objection, representation and adversities as the then Irrigation Minister, Government of Bangladesh, terminated the project.

It is an unique case of failure of BWDB for implementation of proposed project. The project was abandoned due to resistance and violence from the public. The failure of implementation process for the proposed project gives us lesson that in future before formulating any project wider participation of local people and personnel of concerned line agencies should be warranted and also series of studies concerning socio-economic, engineering, hydrological

and environmental aspects should be conducted in order to propagate the potentials of project among the expected beneficiaries and also to stop drain out of the valuable and scarce resources.

Patuakhali Polder 55/3 Project : The project is located in Galachipa thana in the district of Patuakhali. It is an island on the fringe of the Bay of Bengal. The project area has the proneness of cyclonic devastation. The District Gazetteer of Patuakhali reports the consequences of 1970 cyclone in the island area (project area) as beyond description. So, the project has its own merit for locational importance to safeguard the islanders in case of natural hazards such as cyclone and tidal surges. The project was supposed to be completed in 1990 starting from 1988 but it is still on-going though 94 percent of all physical construction works were completed in 1992 as reported by XEN office, Patuakhali O & M Division, BWDB. Only one closure which is the biggest one, has been left and expected to be completed in 1994 and otherwise the project is complete. In the mean time, people within the project area have been experiencing some benefit and have developed a sense of security against natural calamities of tidal surges with the completion of 54.87 km ring embankment. The construction of regulators and embankment were made as per standard specification of coastal belt project and these were found in a good condition but O & M for the structures are absent. It has been stated that O & M will be launched once the project is completed. The people within the polder are enthusiastic for O & M even by themselves for the greater security and accrued benefit of the project.

If we are allowed to score on the basis of Rapid Appraisal about the sample sub-projects regarding their scope, potentials and overall success or failure in terms of their status of implementation and modus operendi then it appears that all the sample sub-projects except Polder 55/3 are in the list of failure projects with the wastage of time and resources which BWDB may not agree for their prestige and expertise but 'Time' in due course of time will speak the truth and at the moment cross-section opinion survey may reveal some picture near truth.

Rapid Appraisals of sample sub-projects reveal that success or failure of a sub-project depends on the good will and application of judicious mind by the concerned personnel for identification and selection of the project in terms of location, area, suitability and participation of local people. The planning and implementation of proposed components also play significant role but farcical completion (non completion of some components without sufficient logic) can not derive expected benefit to any project. Moreover, before initiating any investment on any project, present scenario vis-a-vis expected scenario must also be compared in terms of output and adversities. There must also have comparative picture among all the possible options and it must be derived by competent personnel of appropriate discipline. BWDB personnel might have expertise in engineering aspects of physical structures, hydrology, water management but the prevailing socio-economic condition along with the expected or alternative scenarios should be studied by a competent team including Sociologist and Economist before selection and implementation of any project.

Members of Evaluation Study Team for Rapid Socio-Economic Appraisal of Small Scale Irrigation Sector Projects (SSISP)

BIDS-SSISP Research Team

1.	Dr. Quazi Shahabuddin	Project Director
2.	Dr. Rushidan Islam Rahman	Agricultural Economist
3.	Dr. Mustafa K. Mujeri	Agricultural Economist
4.	Mr. Bimal Kumar Saha	Agricultural Economist
5.	Mr. Md. Sayeduzzaman	Agricultural Economist
6.	Mr. Karimullah Bhuiyan	Agricultural Economist
7.	Dr. Shahidullah Talukder	Irrigation Engineer
8.	Dr. Parvin Sultana	Agronomist
9.	Ms. Nasima Sultana	Sociologist
10.	Mr. Md. Salimullah	Statistician
11.	Mr. M. R. Dhaly	Economist

Word Processing

1.	Mr. Hamidul Hoque Mondal	Key Punch Operator
2.	Mr. Bulbul Ahmed	LDACT

Research Cum Field Coordinator/Officer

1.	Mr. Ayub Ali Khan	Field Co-ordinator
2.	Mr. Ful Kumar Modak	Field Officer
3.	Mr. Ainul Islam Sarkar	Field Officer
4.	Mr. Md. Afazul Islam	Field Officer
5.	Mr. Fazlul Haque	Field Officer