: THESIS

MODEL FOR AGRICULTURAL DEVELOPMENT : ULASHI - JADUNATHPUR

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ABSTRACT

Ulasi-Jadunathpur became prominent for its successful completion of the canal which was excavated by self-help. Subsequently a Two Year Development Plan was chalked out for the all sided development of the area (8 unions of Sarsa and Jhikargacha thana, Jessore) which encompsses the fields like Agriculture, Family Planning, Employment, Physical Infrastructure etc. The plan was to be implemented during the 1977-79 period at a cost of Taka 11 crores of which 52% of the fund to be provided by the villagers as self-help. In this thesis an attempt has been made to provide a development strategy for the agricultural sector on the basis of the Two Year Development Plan of the area.

The project area has a total land of 50803 acres of which 39312 acres are cultivable land with a cropping intensity of 133% which is well below the present national average of 150%. The present production level of different crops is very low considering the potentiality for the agricultural development. As a result the area is facing food shortage and it is estimated that for about 25% of the population of the area there is no food at all if 20 ounce of unclean rice is considered as the daily average requirement per person.

The area has a tremendous potential for agricultural development, which is normally free from flood hazard and though her surface water is negligible but her extractible ground water is sufficient to supply irrigation water in the dry season. It is estimated that the extractible ground water in the area is 36946 acre feet and can be used for irrigation in the dry season and high yielding varieties of crops can be cultivated.

On the basis of resources in hand and potentiality of the area it has been proposed to increase the present cropping intensity of 133% to 186% with the introduction of high yielding varieties by providing necessary inputs and services. Thus it is found that by 1983 the area not only becomes self-sufficient in food but also provide a surplus of 01 million maunds of food grain with the investment proposed for agricultural development in the Two Year Development Plan of the area.

Lastly a financial analysis of the costs and benefits of the project has been made and found that the benefit/cost ratio at 15% rate of interest (present opportunity cost of capital in the country) is 1.21% with an Internal Rate of Return of 43% which is very much encouraging for agricultural projects.

Title of the Thesis. : MODEL FOR AGRICULTURAL DEVELOPMENT : ULASHI-JADUNATHPUR

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1 INTRODUCTION

Nowadays it has become evident that all developing countries should promote agriculture to regenerate their economy, releasing surplus from this sector and thus avoid high levels of primary imports. In Bangladesh this approach is more necessary due to her meagre resources in other sectors and her economy being agrarian in nature. Bangladesh agriculture contributes 57% of the G.D.P. and absorbs 75% of the labour force, while 92% of the population live in rural areas.

"But Bangladesh agriculture faces a set of circumstances which may well constitute the most difficult development problem in the world; a large population of 80 million in relation to a limited amount of available cultivable land a third of which is subjected to annual floods. The agriculture, as a whole remains to be traditional with its century old cultural practices and primitive crop varieties. Yield of major crops like rice, sugarcane, potato, tea, pulses, oilseeds etc. are one of the world's lowest."[1]

The gross annual income from farm input here is most inadequate. "Even with present level of high prices of farm products it comes to about 1000 taka per acre per annum."[2] While in the Indian province of the Punjab annual income per acre is Rs.1900/- not to refer to the agriculturally developed countries of the world.

"With an average farm size of approximately 2.5 acres having a family of three adults and three minors the present income is grossly inadequate. The life of landless labourers in the village is even more grim. It is estimated that one fifth of the villagers are landless.

1. Ahmed, Nuimuddin, "Development Agriculture of Bangladesh," Bangladesh Books International Ltd., Dacca, 1976, page-1.
2. Ibid. Page-2.

They work mainly as field hands or labourers in various odd jobs. It is obvious that the present agriculture can neither bring adequacy to the farm level nor to the national level."[1]

The importance given to the agricultural sector is reflected in the First Five Year Plan and the Two Year Plan of the country. But the desired goal is far from being achieved though the agricultural methodology of Bangladesh is not an isolated techniques from the rest of the world. Many recent approaches for agrarian development have been evolved out of the experiences gained else where. This is particularly true in the event of Green Revolution. Green Revolution in Bangladesh started in 1967 with the introduction of IRRI 8. The main features of the Green Revolution were installation of l rge number of low lift pumps in Boro season, supply of large quantity of chemical fertilizers and introduction of co-operative societies and farm credits which together are commonly termed as agricultural inputs.

"The agricultural inputs programme has developed rapidly since 1968; fertilizer consumption has increased by 23% a year and in 1969-70 2.8 lakh tons were used and in 1972-73 it reached about 3.4 lakh tons of urea, tripple super phosphate and potash. Use of pesticides in 1970 is estimated to have reached 8.8 million acres and in 1971-73 over 12 million acres. In the 1972 aman season 06 million acres were sown to IR 20. In all, about 2.5 million acres were sown with high yielding varieties in the 1972-73 season. This however covers only 10% of the rice cropped area.

During the last decade rice production increased only 2.8% a year and lagged far behind food requirements. Bangladesh with rise of population has thus become increasingly dependent on food imports, which grew from 77.5 thousand tons a year during first half of the

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1. Ibid. Page-2.

last decade to about 1.5 million tons during the second half (9% per annum) and to 2.5 million tons in 1973."[1]

On the other hand the added return, in most cases, has been largely retained by the farm owners or operators, large farmers have received most of the benefits, while relatively little has flown down to the landless labour. It is observed on wheat farms in India and Pakistan that landless labour received only 10% of the increased return although they were 92% of the total population.[2]

So, it is revealed that the development strategies undertaken by Bangladesh to achieve the desired goal in the development of agricultural sector have not fared well. This suggests that a suitable strategy for agricultural development has yet been evolved by our planners. The present study intends to evaluate one of the most recent strategies and seeks to develop a suitable development strategy for agricultural development in our context.

Recently the Government has launched 'Swanirvar Movement' (Self-reliance) in a wider scale, whereby it is attempted to achieve the desired goal by mass participation at the grass root level. The failure of the traditional city based development efforts to improve the quality of life in the less developed countries has made the planners pause and ponder. Of late the realisation has dawned on every one concerned that in the labour abundant and capital poor countries of the third world rural development alone through the utilisation of unutilised and under-utilised human resources can make possible the desired break-through in the stagnant economies of less developed countries and save the hungry millions from the clutches of poverty perpetuated by the vicious of the low income saving investment circle.

The initial focus of swanirvar or self-reliance was the Ulashi-

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1. Ibid. Page-14,17.
2. Illustrated Weekly of India, Independence Day issue, 1972.

Jadumathpur self-help project in Jessore which has created a national impact as the first major self-help endeavour of the country. The successful completion of the excavation of 2.6 mile long canal was the outcome of the self-help endeavour. The project also present a case in which the local resources (man and material) can be harnessed by the local people for their own development. This is also evident from the investment plan which has been drawn up for the development of the area. Thus out of the total amount to be invested, 52% will come from the local contribution. As the government is not in a position to meet all the development needs of the country, such local contribution would go a long way in reducing the time span required for rural development.

The Ulashi-Jadumathpur canal excavation project and the subsequent 'Sarathi Swanirvar' (self-help pilot project) programme symbolise a new approach to rural development through self-help. The successful completion of the canal digging project through proper mobilisation and utilisation of the masses led many to believe that the U-J approach to rural development holds out a new hope for a self reliant Bangladesh.

It is therefore felt that Ulashi-Jadumathpur area presents a suitable case where a study concerning the development of appropriate agricultural strategy can be carried out. Before the study of the swanirvar approach with U-J experience is made, the background analysis of the historical origins of swanirvar i.e. Village-AID, Comilla Model etc. is being made.

U-J is Ulashi-Jadumathpur.

2.1 WHAT AGRICULTURE WAS IN THE PAST

Bangladesh agricultural practices have been adjusted over the centuries to the rythm of seasons. The heavy rainfall accompanied by high floods from the rivers in summer, followed by a long period of drought in the winters, determined the nature of agricultural practices in the country. Crops were cultivated according to the suitability of the climate; people were used to it and the outcome could anyhow equally meet the local demand for food grain. In the past we have knowledge of two famines[1] and for rest of the period the food situation, as accounts are available, was within the reasonable limit where it could feed the population of the region which now comprises Bangladesh.

With the passage of time demand for food grain increased due to increase in the population and first serious crisis for food was felt after the two consecutive floods in 1954 and 1955. But the crisis of fifties were later on eased and till 1964 the food production could feed the people and in that year a surplus of 1 lakh ton was recorded. But that was the last. In the very next year i.e. 1965 the country registered a food shortage of 2 lakh tons and from then the food shortage is gradually increasing making it 23 lakh tons in 1979.[2] Volume of food grain import multiplied and need for the improvement of agricultural development received importance in the policy framework of the governments after the partition of the sub-continent into two independent states of Pakistan and India, still they failed to get hold of the problem. Moderate allocations in the 5 year plans were

1. First famine in the Bengali year 1270 (1869 A.D.) known as famine of '76 and the other one in 1350 (1943) during the World War II.

2. Mohammad Nur Alam, The Weekly Bichitra, 'Hungry Asia', Vol. 8, No.39, Dacca, Bangladesh, 1979, page-21.

made for agricultural development. Different agencies were employed and multifarious approaches like Village-AID and Comilla Model and lately Swanirvar were being practised. Against this background Bangladesh emerged as a new nation after a bloody revolution in 1971.

2.2 VILLAGE-AID

The Village-Agricultural and Industrial Programme known as Village-AID was launched in 1952 to foster leadership, initiative and co-operation among the rural people to enrich village life by promoting social and cultural activities and to improve the economic condition of the villages by assisting them to increase production from agriculture and small industries on a self-help and mutual basis.[1]

Probably this was the first government attempt to improve the rural life by taking village as the focal point. The operational unit of the Village-AID was a development area inhabited by about 1.4 lakh people and served by a team of government officials consisting of development officer, supervisors and village workers who in turn were assigned to co-ordinate the total resources of the government and people for a concerted effort to reconstruct the village life.

Initially the programme achieved some success but in the long run it failed to create any significant and lasting impact on the economy and rural society of Bangladesh. The gap between the government and people instead of narrowing down, rather widened amidst confusion and mistrust. The villagers could not by themselves take decision and mobilise internal resources as they depended too much on government for man and material resources. They could not realise the fact that the very aim of the programme was to develop projects in the villages which by direct participation of the villagers through man and material would reach a self-sustaining stage. At the same time bureaucratisation of the whole process shattered all

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1. The Second Five Year Plan, Planning Commission, Government of Pakistan, Karachi - 1960, page- 393.

possibilities of breaking the ice and ultimately failed to make any significant contribution to agricultural development. The programme was eventually abandoned.

2.2.1 COMILLA MODEL

The need for a more efficient model of development initiated the Comilla Academy of Rural Development to evolve a model for rural development known as Comilla Model which was made up of following components:

a. Rural Works Programme (RWP)
b. Thana Irrigation Programme (TIP)
c. Two-tier Co-operative System (TTCS)
d. Thana Training and Development Centre (TTDC)

2.2.1.1 RURAL WORKS PROGRAMME

'The traditional pattern of economic development does not necessarily provide an answer to the problem of employment in an over populated country. Surplus labour is generally reflected in under-employment and seasonal unemployment in the rural economy. It is necessary to provide additional and seasonal work for them near their places of residence.'[1] Thus Rural Works Programmes were initiated in the country in 1962 with an aim to create work opportunity by taking up projects of local significance in the lean seasons.

Rural works programme during 1960-1972 period provided more than 10 thousand man years of employment opportunities and 82.5 crore taka in wages (3 taka per day and 275 mandays to the year).[2] But the success of the Rural Works Programme has been ever shadowed by mis-appropriation of funds and inefficient management by the executives. This programme also provided additional power to the rural political elites who used it to dominate the rural people in order to establish their hegemony upon the villagers.

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1. The Fourth Five Year Plan, Planning Commission, Government of Pakistan, July 1970, page- 339.
2. Sarwar Jahan, Unpublished thesis, BUET, Dacca, 1978.

2.2.1.2 THANA IRRIGATION PROGRAMME (TIP)

During the mid-sixties Thana Irrigation Programme was launched to bring wider areas of the country under irrigated agriculture. This programme envisaged organisation of small farmers into cohesive groups which would become co-operatives in due course. Thirty nine thousand low lift pumps have been fielded till 1978 under this programme, yet the programme has many defects. The major defects of the programme lie in the fact that it failed to develop the irrigation groups at the village level to organise themselves as self-reliant and self-managed unit. Lack of efficiency can also be found with respect to procurement and installations programme as well as fielding and servicing of pumps and tube-wells. Also these units failed to make the capacity utilisation of pumps.

2.2.1.3 TWO TIER CO-OPERATIVES

Two Tier Co-operative System sponsored by Integrated Rural Development Programme (IRDP) is organised through village based primary Co-operatives and their federation at the thana level, the Thana Central Co-operative Association (TCCA), for providing supplies and services. Other components of the programme are implemented through o other agencies with system of coordination at the national level. The Two-tier Co-operative system is being replicated and administered by IRDP throughout the country. By June, 1978, 250 thanas has been brought under this programme and by 1980 this will be expended to another 50 thanas making it 300 to provide institutional support for agricultural and rural development programme.[1]

2.2.1.4 THANA TRAINING AND DEVELOPMENT CENTRE (TTDC)

It provides facilities for extension and training to farmers and tries to encourage coordination between government departments by housing all the thana level offices concerned with development in one place. IRDP organised this centre which serves as a transmission centre for diffusion of technology through training of Chairman and model farmers

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1. The Two Year Plan 1978-80. Planning Commission, Government of the People's Republic of Bangladesh, March, 1978, Page - 136.

of primary co-operative societies.

The over all performance of the IRDP in the field of mobilising the local resources successfully seem to be far from satisfactory. Mahbub Alam Chashi points out that, the most fundamental defect of the Comilla Co-operative system was that there was no scope to husband all the resources of all area to attain specific targets. No institutional frame was conceived through which one could see all economic classes of a locality, reach some consensus with regard to social and economic objectives and act accordingly.

The necessity of a more effective approach towards development moved the government to launch the 'Swanirvar' (self-reliant) movement officially in 1976, On the conclusion of the First National Swanirvar conference held on 24th and 25th September, 1975. The movement aims at mobilising local resources on the basis of self-reliance to obtain additional output by using unutilised and under utilised local resources on the basis of self-reliance to obtain additional output by using unutilised and under utilised local resources. The important feature of this approach was the mobilisation of human resources and active participation of the local people in the development process.

But Now in 1980's the present govt.

2.3 SWANIRVAR MOVEMENT AND APPRAISAL OF ULASHI-JADUNATHPUR EXPERIMENT

2.3.1 SWANIRVAR MOVEMENT

Swanirvar in Bengali means self-reliance or dependence on one's own-self. Mahbub Alam Chashi defines,[1] 'Swanirvar in broadest sense meaning self-sufficiency at each level of society, starting from the home base to the national level. To be more precise, an overall national self-sufficiency is not the sole goal as even after the attainment of such a goal a large segment of people, individually or area wise, may continue to depend on others or on the economy as a whole. The programme aims to make each family, each village, each union, each thana, each sub-division

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1. Mahbub Alam Chashi, 'Political Economy', 'Self-Reliant Bangladesh-Problems and Prospects' Vol. 2 No.1 Conference 1976, The Bangladesh Economic Association, Dacca-1977, Page-172.

each district and the nation self-sufficient. The goal is to try to make as far as possible all these strata self-reliant in every aspect of their need.' As the task is huge and time consuming, the initial thrust will be directed to self-sufficiency in food by increasing production while reducing population growth simultaneously.

2.3.2 ULASHI-JADUNATHPUR CANAL : ITS IMPACT AND LATER DEVELOPMENTS

The Ulashi-Jadunathpur self-help canal digging project was launched on 1st November, 1976 to connect river Betna at its bend immediately the north of village Ulashi with that down village Jadunathpur (Map). The canal is 2.65 miles long having a top width of 120 feet, an average depth of 13 feet in the range of 18 feet for the maximum and 9 feet for the minimum and involved earth work of about 16.8 million cft. The canal course along with embankments totalled 109 acres of mostly one crop land and was procured at a cost of Tk:0629 milli The project was finally completed on 30th April 1977 except few minor works of dressing etc.[1]

The project originated from the need of draining out excess water from a water logged area of 28.5 square miles comprising 4 main beels namely Somamukhi, Kagmari, Sommander and Rajapur. The main purpose was to reclain an acreage of 18000 acres to produce 3 crops a year by retaining the required quantity of water for irrigation i the dry season.

The obvious need of the digging of the canal necessitated self-help activity due to physical and monetary constraints. Benefits that would be accrued were substantial and motivation for voluntary participation was sure to draw attention. The Deputy Commissariat, Jessore, in association with Water Development Board drew up the detail plan and programme of the project and was approved by the national leadership. An executive committee of the Deputy Commissariat to look to to the work was formed which met every night to evaluate the days work and assign next days task.

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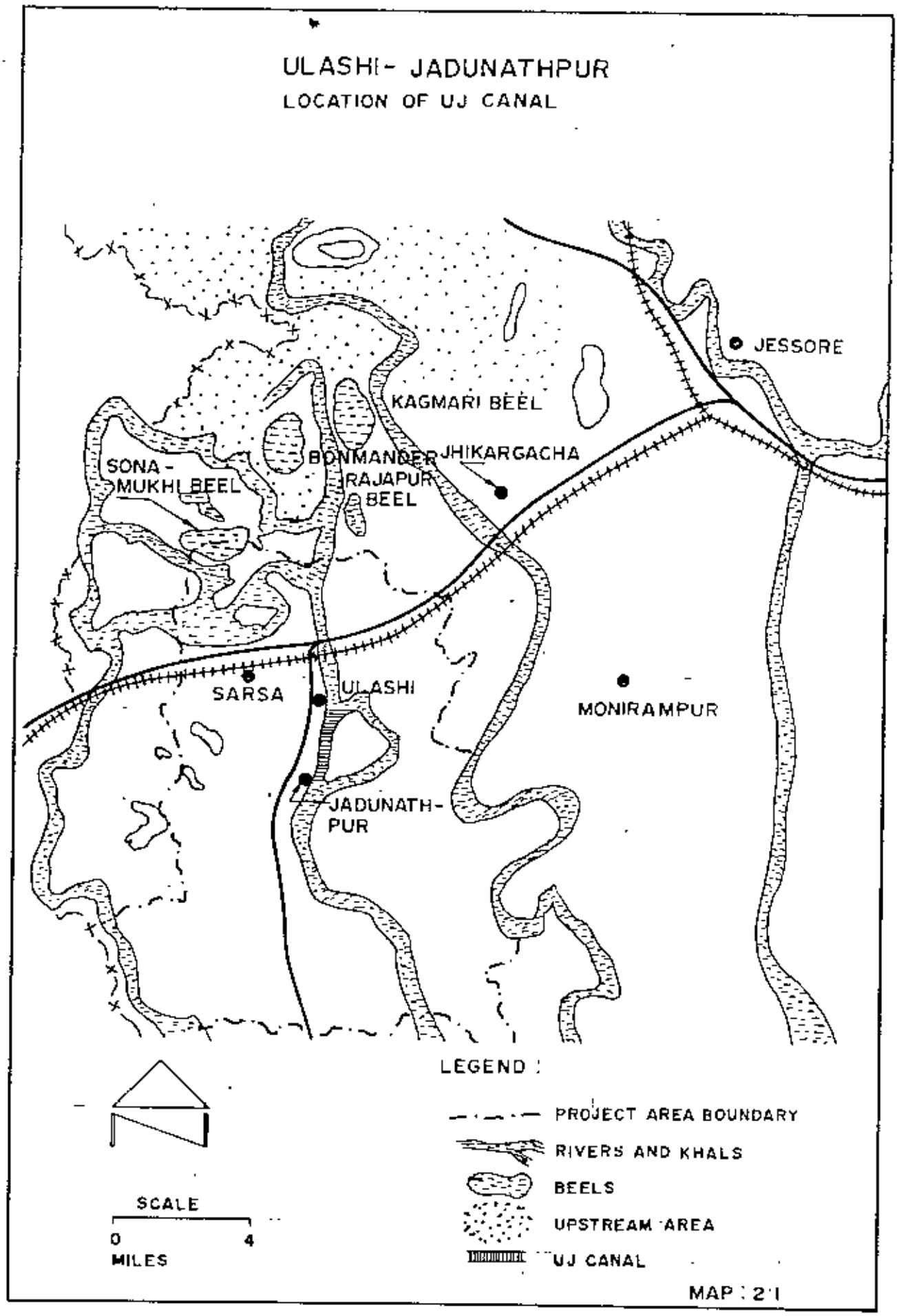
1. Mohiuddin Khan Alamgir, Participatory Development in Bangladesh, Ulashi-Jadunathpur, U-J Swanirvar Pilot Project, Deputy Commissariat, Jessore, Bangladesh Page -9.


ULASHI - JADUNATHPUR
LOCATION OF UJ CANAL
JESSORE
KAGMARI BEEL
JHIKARGACHA
BONMANDER
RAJAPUR
BEEL
SONA -
MUKHI BEEL
SARSA
ULASHI
MONIRAMPUR
JADUNATH-
PUR
LEGEND :
PROJECT AREA BOUNDARY
RIVERS AND KHALS
BEELS
UPSTREAM AREA
UJ CANAL
SCALE
0
4
MILES
MAP : 2·1

The entire work was done through a system where participants were organised into groups of 10 to 30 under a supervisor or a natural leader and was assigned to do ' as and when you like ' manner. The leaders and supervisors were not exempted from the physical work but rather were encouraged to join the other members of the group. One important aspect of the project was the distribution of work load according to benefits to be received by the owners of land in the area.

On the first day of the work over 4 thousand volunteers drawn from local farmers, students, government functionaries and the armed forces participated and 10 thousand people who gathered on the site could not be provided with spade and basket. However at a later stage the initial enthusiasm faded. Inspite of these drawbacks the job was done and all the groups fulfilled their quota of work.

The successful completion of the digging of the canal has ushered a possibility of additional production of atleast 3.6 lakh maunds of food grain and 50 thousand maunds of other crops valued at 25.5 million taka with another 1.44 million taka from fish. If an cost 40% of crop and 30% for fish are deducted then net gains would be around 16.3 million taka.[1]

On the other hand the increase in the drainage capacity of the Betna, has led to immediate reclamation of 1884 acres of hitherto uncultivable land submerged under water. In addition, the scheme has freed 15234 acres of land from flood hazard, making possible the production of crops with certitude rather than by chance.[2]

2.3.3 TWO YEAR DEVELOPMENT PLAN : U-J

The most spectacular feature of the U-J canal digging is the attempt to sustain the spirit of self-help among the people of the area. Instead of the spirit dying out it rather infused further and led to the preparation of a very ambitious scheme to improve the socio-economic condition of the area. Thus a project by the name 'Ulashi-Jadunathpur

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1.Ibid Page-12.
2.Ibid Page-26.

Swanirvar Pilot Project' popularly known as'Sarathi Swanirvar' has been adopted. In pursuance of the project through 'bottom up' process the villagers with the help of Deputy Commissioner has surveyed villages, determined the requirement and potential of each village, consolidated them into union plans and then to an area plan. The plan encompasses a total investment of Taka 11 crores for maintenance of law and order, agricultural production, eradication of illiteracy and expansion of education, improvement of health and sanitation and adoption of family planning and population control. The investment plans to get about 52% of the finances to be met by self-help through direct and indirect participation of the villagers. Following Table No. 2.1 gives the detailed investment allocation under the two year plan:

TABLE 2.1

FINANCIAL SIZE OF D.J PILOT PROJECT
A TWO YEAR PLAN (JULY,1977-JUNE,1979)

Sector	Source self-help in taka	Source government in taka	Total in taka	% of self-help
Law & Order	2005760	142200	2147960	93.00
Food production	13541924	18630592	32172516	42.10
Other production	3108760	52500	3161260	98.34
Population control	483200	494200	977400	49.50
Primary education	4028000	6065400	10093400	39.90
Adult education	3221922	2383440	5605362	57.47
Employment	16276216	17652558	33928774	48.03
Health	13943415	7764200	21707615	64.23
Total	56609197	53185110	109794307	51.55

Source: Mohiuddin Khan Alamgir, Participatory Development in Bangladesh Ulashi-Jadunathpur Swanirvar Pilot Project, Deputy Commissariat, Jessore, Bangladesh, Page-30

The major allocation of the government fund has been made available with the agricultural development where the total investment will be Taka 3.2 crore. Out of this allocation Taka 1.5 crore or 42% will be from self-help and rest of the fund amounting Taka 1.8 crore will come from government source.

2.3.4 ACHIEVEMENTS

The plan was set to start from July, 1977, was delayed till February 1978, when the first instalment of Taka 1.5 crores of the government investment was made available with the Sarathi people.[1] Government attached the following conditions that every village must have committees for each of the following fields in order to get any allocation from the government fund:

1. Agriculture
2. Health and Family Planning
3. Education
4. Security

The swanirvar committee has chalked out a programme of distributing the fund among the different sectors under the condition that the fund will be available only when the self-help component will be realised. The allocations have been made to Agricultural development, Education, Employment and Road Construction.

In the agricultural sector fund has been allocated for construction of pump house for deep tube wells and their paved irrigation channels. The investment procedure is: The project fund will grant Taka 20 thousand for each of the schemes provided another Taka 30 thousand is contributed by the local people. Till February 1979, 37 schemes involving Taka 14.8 lakh have been under taken. As per plan each drain shall be one thousand feet long. But the progress of the work is grossly unsatisfactory and till 20-3-79 only 8 projects have been completed.

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1. Resolution adopted in the meeting of Swanirvar Committee dated 22.2.1978.

In the Education sector 43 primary school building have been constructed, each costing Taka 60 thousand, project fund providing Taka 51 thousand. But the work has remained confined in the construction of the structures only and functioning of normal school activities are extremely poor.

Earth work and brick soling of roads connecting the different parts of the Sarathi area has been done. The Total length of the roads is 27 miles in which people participated in earth cutting and brick soling work on self-help basis while brick, sand and roller were provided by the project fund.

In order to create employment opportunities for the unemployed and under employed, a number of schemes were prepared. The schemes aim to provide employment by distributing rickshaw vans on hire purchase basis and to provide short term loan for live-stock husbandry and pisciculture. Some significant results has been achieved in this sector. Till February 1979, 72 persons received rickshaw van on hire purchase while 38 more cases were under consideration. Taka 3 thousand each for a family has been granted for live-stock raising and till February 1979, 76 families has received the loan. For pisciculture 5 co-operatives has received a total fund of Taka 3 lakh, who have been also settled in the old Betna Course for fish-farming.

It is observed that not much work has been done till February, 1979, specially in the field of agriculture the achievement is really negligible. Lack of proper realisation of the problems of agriculture in the area may be a cause of this slow progress. There may be other reasons like slow disbursement of the government fund and poor performance of self-help sector.

Government has so far provided a fund of Taka 1.5 crore out of the promised Taka 5.3 crore which is insufficient considering the volume of work in hand. Many schemes could not be undertaken due to non-availability of fund. It is necessary for such types of schemes to get the sanctioned fund within time to sustain the enthusiasm with which the villagers are motivated.

The self-help component which was to come as physical participation of the villagers could not fulfil the required volume of work and later it was converted to cash contribution by the villagers. The poor villagers were unable to pay the cash and they were not provided with the fund they were alloted for construction of irrigation drains. Naturally most of the schemes remained incomplete. In the circumstances it is necessary to review the self-help factor and make it more practicable on the basis of past performances and capacity in hand. So the study proceeds towards this goal.

3 RESEARCH METHODOLOGY

3.1 OBJECTIVE OF THE PRESENT RESEARCH

The study has been under taken to design the agricultural programmes of the project area Ulashi-Jadunathpur. The area being a deficit area in food supply, the main objective of the agricultural planning is to make it surplus by increasing agricultural production. This will be done by identifying the problems and potentialities of the area in the field of agriculture. On the basis of findings programmes will be formulated and in formulating programmes self-help will be considered as an effective measure. The work will be rounded up with a financial analysis of the investments to be proposed. Thus the objectives of the research are:

1. Study the present condition of agriculture which includes the study of level of technology, cropping practice, per acre production, cost of production, cropping intensity etc.
2. Investigate the potential agricultural production in the project area on the basis of resources available.
3. Identify the constraints that are resulting in an agricultural production which is less than the potential.
4. Determine the present and future demand of food grain and other agricultural products.
5. Formulate programmes and provide an investment schedule taking self-help as an effective tool.
6. Financial analysis of the project.

3.2 SCOPE OF THE PRESENT RESEARCH

The scope of studies in this thesis are focussed on the investment plan for agricultural development in the project area. As such in the present study our works have been to find out the major problems

of agriculture like causes of low productivity, level of technology in practice, input supply, landlessness and unemployment also the analysis of the potentiality of the area on the basis of land capability and water availability for the purpose. All types of test like soil test and others could not be done by the researcher himself. Reports of the relevent authorities were consulted in this regard. No test of different cultural practices has been done and crops chosen and recommended are based on tests done elsewhere in the country by the department of agriculture. On the other hand only financial analysis of the cost and benefits of the project has been done. In view of the nature of the project it was decided not to go for economic analysis of the costs and benefits of the project.

3.3 METHODOLOGY

The collection of data in this study was the most difficult part of the research. A large population spread over about 79 square miles made the task more difficult as to determine the size of the sample. Time and cost constraints further put limits on the size of the sample which prevented the taking of a large sample. Considering all these problems it was decided to follow a two stage sampling design where 15% of the total villages were selected in the 1st stage. Then 8% households from each of the selected villages were drawn for surveying. The seventeen villages spread over 7 unions were selected as 15% sample drawn at random.

We took households as the units of sampling and a household was defined as a family with one kitchen and head of the family was our respondent. In case of his absence, the senior most member next to him was interviewed irrespective of male or female.

The union councils maintain lists of households known as D.P. list. On the basis of this list a total of 171 households were selected by the use of Random Number Table. The sample size 171 on the whole

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D.P. list is the Distribution Priority list which is prepared by union council to distribute relief.

represents about 1% of the total households in the Ulashi-Jadunathpur area.

A structured questionnaire with questions like land ownership, occupation, agricultural products, ownership of live-stock and poultry bird, fertiliser and irrigation water use etc. was prepared. A pilot survey to test the shortcomings were under taken and changes alterations of the questionnaire were made accordingly.

The next problem was the administration of the questionnaire. The farmers in Bangladesh do not generally keep records of their outputs and inputs of the year. As a result some checks were put in the questionnaire. Thus questions like adoption of high yielding varieties was followed by questions on access of irrigation water to the field and fertiliser use, which authenticated the respondents answer. There were similar other checks in the questionnaire. Field workers were employed to conduct the survey who were selected from the local degree college. The day before sending them to field, the researchers trained them and tought them the techniques of interviewing. In order to get accurate result check surveys were also conducted by the researcher so to test the work of the field workers. Data thus collected through field survey were brought to Dacca for checking, editing and tabulation which were done manually by the researcher himself.

Apart from data collected through field survey, secondary sources of information were also utilised. The most important among the sources was the survey results of the villages which were carried out by the villagers themselves on 100% household. This source provided quite a good amount of important information. However data for all unions were not available.

Different agencies like Thana Krishi Office, Krishi Bank, Jute Extension, Cotton Development Board and branches of IRDP were visited by the researcher for getting accounts of their activities in the area. This information was later tallied with field survey results.

Reports by Soil Survey Department and Water Development Boards were

also consulted to determine the soil-potentiality and water availability in the area. The IRDP feasibility report of the Jhikargacha and Sarsa thanas were also consulted.

My fellow class mate Mr.Akhter Hussain Choudhury who is doing his research on the social services facilities in the same area has also provided me with some information. It was decided beforehand to feed back each other with respective data and accordingly questionnaires were designed and prepared.

4 PROJECT AREA : ULASHI-JADUNATHPUR

4.1 GENERAL

The project area Ulashi-Jadunathpur is located in the south western part of the district of Jessore and is under the administrative jurisdiction of Jessore Sadar Sub-Division of Jessore district and spread over two thanas. The two thanas are Jhikargacha and Sarsa. The thana head quarters are situated in the Jhikargacha town and Sarsa. Sarsa is located within the project area while jhikargacha town is about 5 miles from the project area. Jessore town is about 20 miles from the UJ area and is connected by a fine metalled road. The area has also a good link with Satkhira town in Khulna district and Benapole, an important border post of the country. The area is also served by a rail and road service, of which some remains suspended since 1965 Indo-Pak war.

The seven unions are Sarsa, Ulashi, Dagachra in the Sarsa thana and Navaran, Sankarpur, Nazirbag and Nirbaskhola in the Jhikargacha thana (maps: 4.2 and 4.3). The seven unions, which encompasses 119 villages, cover an area of 50803 acres or 79 square miles. Another union, Kaiba, was included in the Swanirvar project area but in our study Kaiba has been excluded to avoid some problems with due permission of our supervisor.

4.2 CLIMATE

Records of Jessore meteorological station are discussed below.

Jessore district has a pronounced tropical monsoon climate. According to C.W.Thornth Waite, this type of climate with cool, dry winter and hot wet summers is termed as 'Mega Thermal Humid climate (An approach towards a rational classification of climate)'.[1] There are three main

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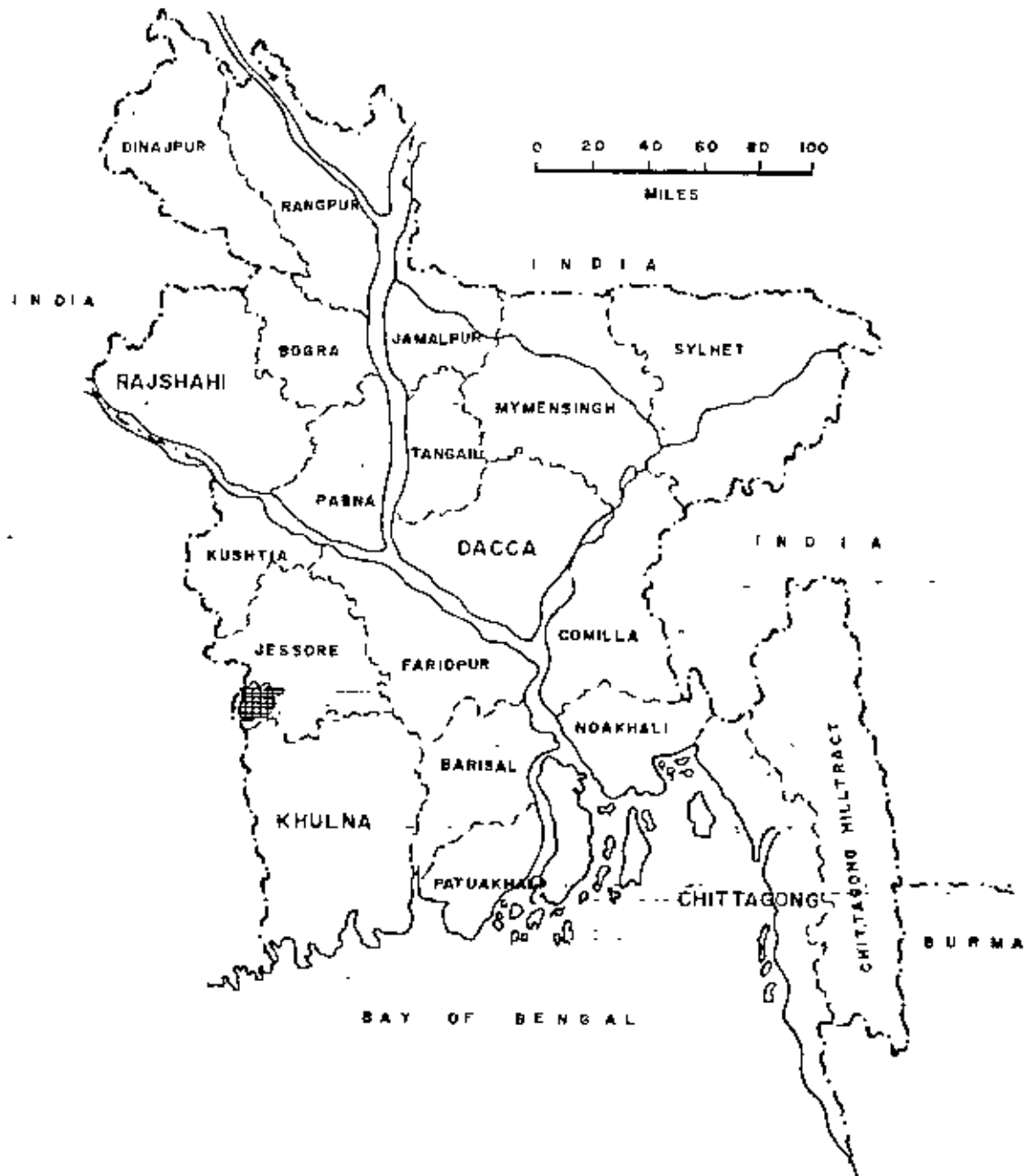
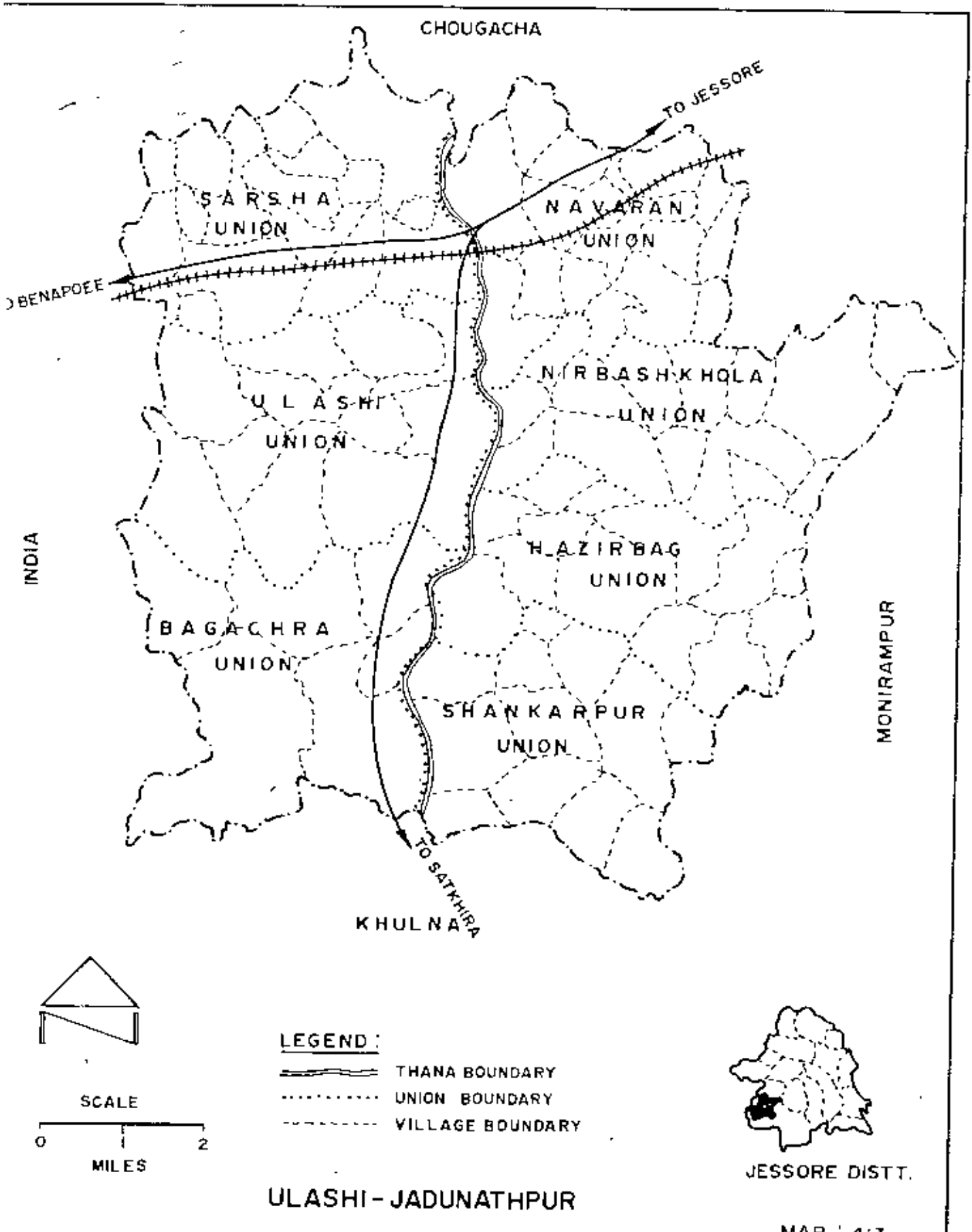
1. EPWAPDA Master Plan : Supplement A : Climate and Hydrology. As recorded in Reconnaissance Soil Survey, Jessore District, Department of Soil Survey, Government of the People's Republic of Bangladesh, 1970 Page 4.

BANGLADESH



PROJECT AREA

MAP : 4·2



ULASHI - JADUNATHPUR

MAP : 4·3

seasons: the monsoon or rainy season from May to October during which about 80% of the total annual rainfall is received; the winter or dry season during November to February which has very little rainfall and pre-monsoon (or hot) season from March to April which has the highest temperature and evaporation rates of the year and during which occasional showers fall following violent thunder storms called 'Nor westers'.[1]

Rainfall in the DJ area is one of the lowest in the country and shows a general increasing trend from the north west to south west. Mean rainfall (annual) as recorded is 64 inches in Jessore. The highest and lowest rainfall recorded in the nearest station at Benapole is 77.11 inches and 47.33 inches.[2]

The mean monthly temperatures of Jessore vary from 70.5° F in February to 85.6°F in April. The mean annual temperature is about 79° F. Absolute maximum and minimum temperature of 108° F in April-May and 41°F in January have been recorded.[3]

There is an excess of rainfall over evaporation in the rainy season; it averages 32" at Jessore. In contrast during the dry season there is an excess of evaporation over rainfall of 18 inches. The total average evaporation is 44.68 inches. The mean monthly evaporation varies from a minimum of 2.30 inches to a maximum of 5.56 inches.[4]

Mean monthly relative humidity ranges from about 77 percent in the dry season (November to February) to about 89 percent in the rainy season (June to October).[5]

Winds are ordinarily light throughout the year, but stronger winds blow for short periods in the pre-monsoon (hot) season often in association with thunder storms and hails. These storms may cause damage to crops, lives and properties (Table no.4.1 and Illustration no.4.1 provide detail climatic data).

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1. Ibid page 3
2. Ibid page 5
3. Ibid page 6
4. Ibid page 6
5. Ibid page 6

TABLE 4.1

CLIMATE DATA FOR JESSORE AND NEIGHBOURING STATIONS

JESSORE

Temperature °F	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Absolute Maximum	90	88	103	108	102	101	95	94	95	96	90	88	
Mean Maximum	80	78	92	99	97	92	88	89	89	88	84	84	79
Mean Temperature	67	67	79	87	86	86	85	84	83	81	72	68	
Mean Minimum	53	55	67	75	77	79	79	79	78	74	61	54	
Relative humi%	77	73	69	70	80	87	91	91	90	88	79	80	
Wind velocityMPH	1.8	1.8	3.1	4.7	6.3	4.1	4.0	3.1	3.0	2.6	1.5	1.5	

RAINFALL INCHES

JESSORE

Absolute Maximum	3.06	6.23	7.57	12.58	20.40	26.55	27.28	24.28	17.07	20.58	4.89	1.89	91.57
Mean	0.42	1.10	1.76	3.66	7.44	11.58	12.78	11.85	7.90	3.47	0.89	0.12	64.11
Absolute Minim	0	0	0	0	0.60	3.31	4.32	3.14	2.08	0.07	0	0	41.57

MAGURA

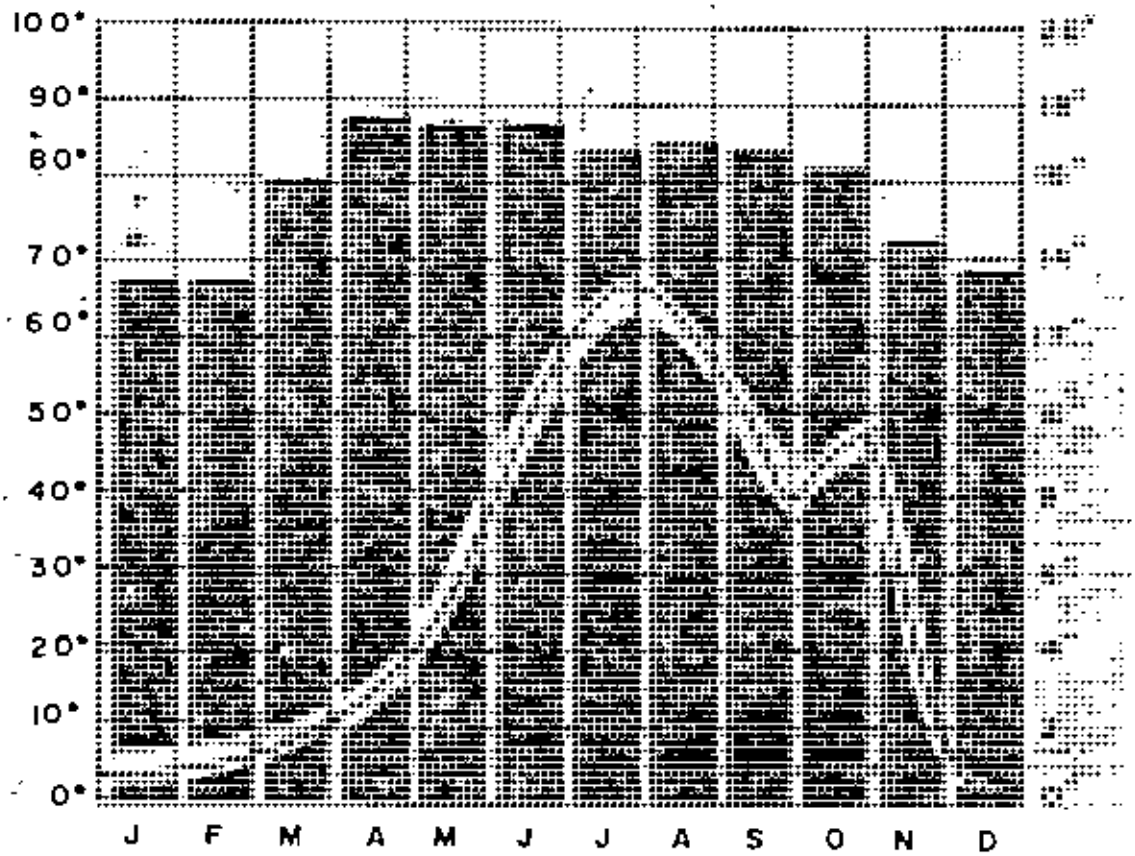
Absolute Maxim	2.39	4.53	7.38	13.67	24.40	33.50	35.62	20.45	20.78	13.52	7.42	1.53	115.09
Mean	0.39	0.99	1.94	4.73	8.53	11.48	13.16	10.83	9.48	4.66	0.66	0.10	67.41
Absolute Mini	0	0	0	0	3.26	2.63	5.47	4.01	4.15	0.11	0	0	43.09

EVAPORATION (INCHES)

Mean	2.50	3.12	5.39	5.65	5.49	3.84	3.86	3.66	3.67	3.67	2.93	2.39	45.95
Mean excess rainfall	-	-	-	-	1.95	7.72	8.92	7.82	4.43	1.50	-	-	32.44
Mean excess evaporation	2.08	2.02	4.29	2.17	-	-	-	-	-	-	2.24	2.27	15.07

Source : Data from tables and figures in EPWAPA Master Plan : Supplement A : Climate and Hydrology. As recorded in Reconnaissance Soil Survey, Jessore Dist., Department of Soil Survey, Government of the People's Republic of Bangladesh, 1970 Page 6

MONTHLY RAINFALL & TEMPERATURE : UJ



SOURCE, : PREPARED ON THE BASIS OF DATA IN WAPDA MASTER PLAN AS RECORDED IN THE RECONNAISANCE SOIL SURVEY REPORT FOR JESSORE DISTRICT.

ILLUSTRATION : 4·1

4.3 SOILS:

Soils in the project area developed in the recent Ganges alluvial sediments, characterized by calcareousness. Most of the soils are either calcareous throughout the profile or at some depth and olive to olive-brown or greyish brown to dark grey, loams and clays. The area is divided into two major physiographic units namely: (1) Ganges meander flood plain and (2) Peat basin. The Ganges meander flood plain has further been sub-divided into five units mainly on the basis of relative age of the deposits. The U-J area is comprised of the following two sub-units:[1]

A. Old Ganges meander flood plain
B. Mixed young and Ganges meander flood plain

4.4 WATER RESOURCES:

The district of Jessore is a dry area in comparision to other areas of the country. The project area, thus, is also dry and water supply in the area is limited.

The average annual rainfall is about 64 inches and highest and lowest rainfall as recorded are 77.11 inches and 47.33 inches. The only river in the project area is the Betna which has been cut off from its origin by siltration and does not have a flow throughout the year. There are few beels and baors in and around the area which also store water in limited quantity and lack of proper water management makes their use erratic.

Section to follow contains a study of the water resources both from surface and ground sources. The IRDP feasibility report, Soil Survey Report and Reports from Water Development Board have been consulted in doing this.

4.4.1 SURFACE WATER:

The Betna is the only river that flows through the UJ area. It was a

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1. Ibid ... page 33

distributory channel of the Kobadak-Dhairab. The head at Maheshpur, where it originates from Kobadak-Dhairab is unclosed. It flows from north to south. At present it drains only the rainfall run off of its catchment. In dry months there is no flow in the channel. The frequency analysis for annual high and low water levels of the river along with the water levels 80, 50, 20, 10 percent frequencies has been worked out by IRDP Feasibility Study. As calculated by the same the maximum discharge of the Betna is 2180 cusecs and minimum is zero at Navaran. There are other sources of surface water in the area from where water is available in limited quantity. These are several beels located beyond the northern boundary of the UJ area and one in the middle western boundary namely Kanuyadah. From analysis of all these sources it is estimated that the surface water storage in the area is about 2858 acre feet.[1]

4.4.2 GROUND WATER

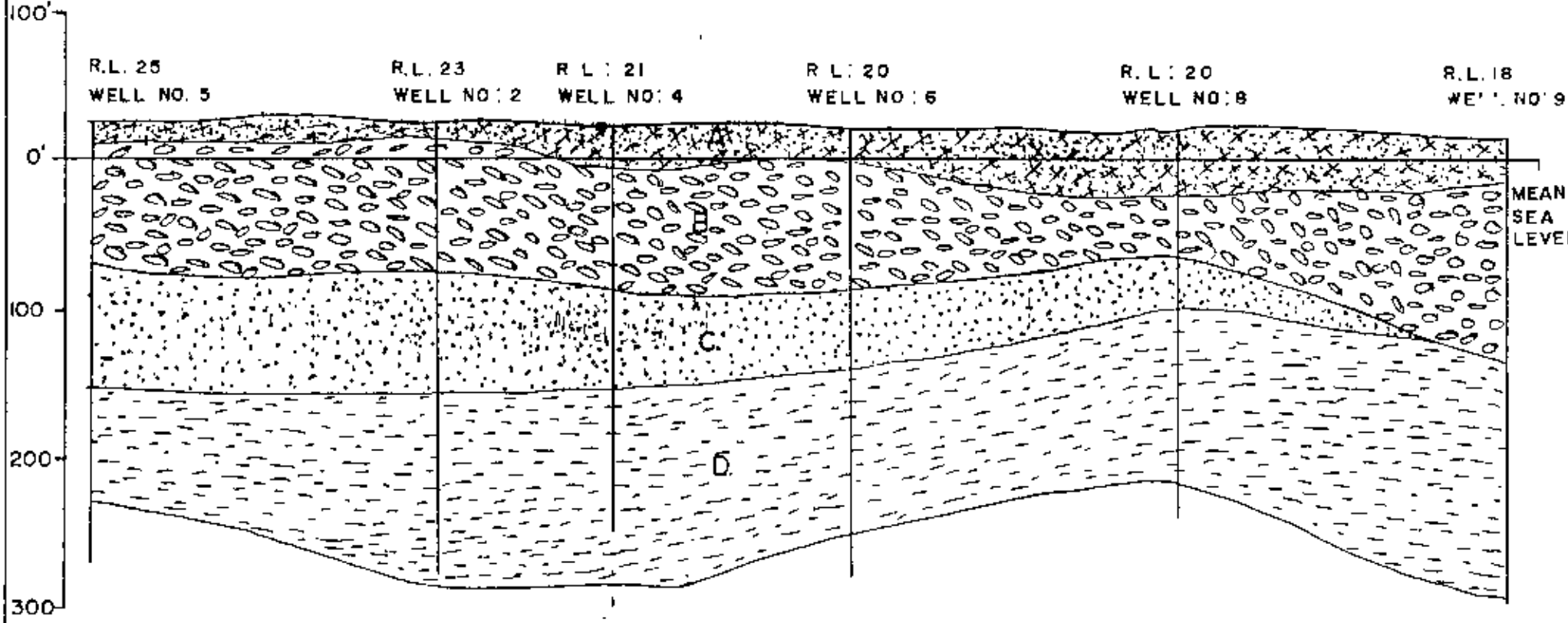
Ground water is an important source of irrigation water supply. Most of the land in the project area is well suited for ground water development. It has well structured clays in basins interrupted by ridges mainly loamy at the surface and underlain by aquifers of sand. Sufficient ground water reserves suitable for irrigation are found in the area and the surface deposits are very permeable and rain water can percolate easily during the rainy seasons.

4.4.2.1 GEOLOGIC CROSS SECTION

Quite a good number of deep, shallow and hand pumps have been sunk in the project area. Geologic sections have been prepared from only deep tube wells bore logs to have the idea about the aquifer condition of the area. In order to do this 4 seperate geologic sections have been drawn. These sections are NS 1-1 & NS 2-2 and WE 1-1' & WE 2-2' (Illustrations 4.2, 4.3, 4.4 and 4.5). Deep Tube Wells location also can be seen in the map no.4.4. As seen from these cross sections that the top most formation is of clay known as aquicluds. The layer below this formation

1. IRDP Feasibility Report of Sarsa and Jhikargacha thanas.

GEOLOGIC SECTION N S (I-I)



LEGEN : UJ : AQUIFER CONDITION			
A	B	C	D
AQUICLUDE	POOR AQUIFER	MODERATE AQUIFER	GOOD AQUIFER

SCALE :

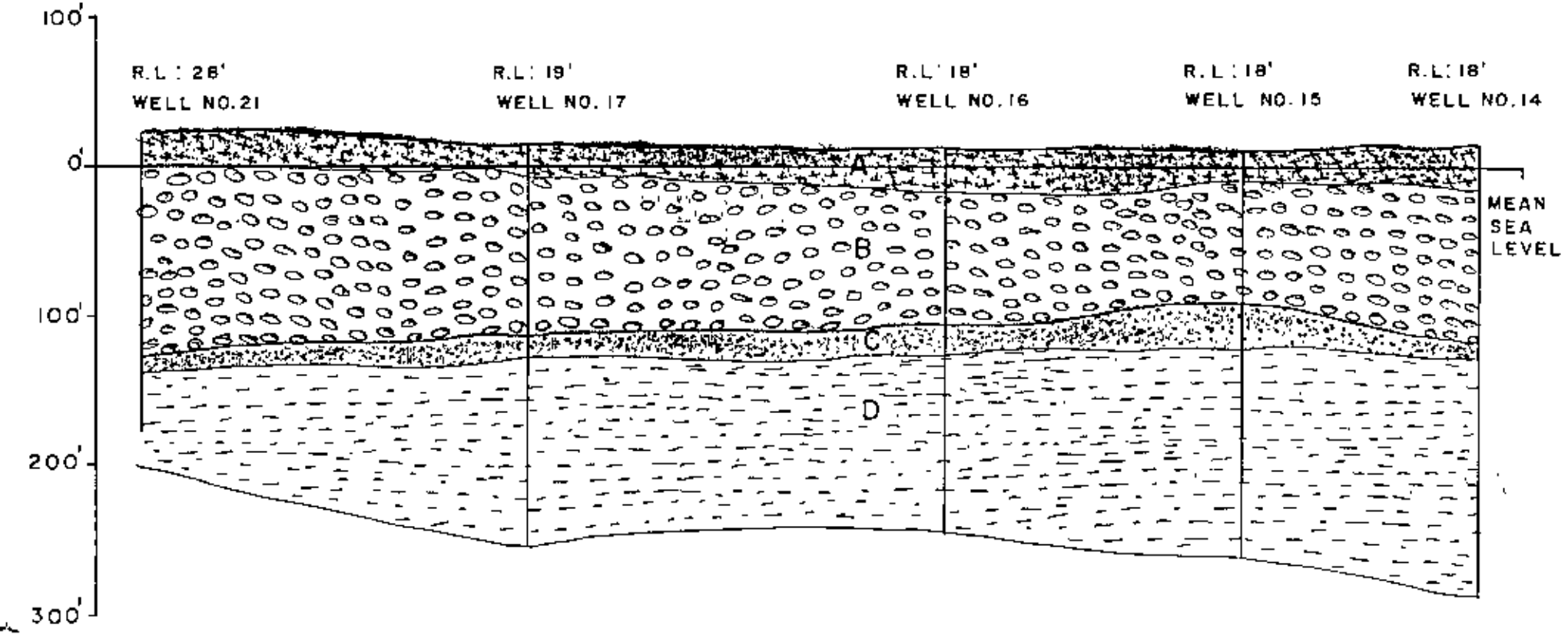
VERTICAL : 1" = 100'

HORIZONTAL : 1 = 1 MILES

CE : PREPARED ON THE BASIS OF DATA IN REPORT ON GROUND WATER BY SWDB

ILLUSTRATION : 4·2

GEOLOGIC SECTION NS (2-2)



LEGEND: UJ : AQUIFER CONDITION			
A	B	C	D
AQUICLUDE	POOR AQUIFER	MODERATE AQUIFER	GOOD AQUIFER

SCALE

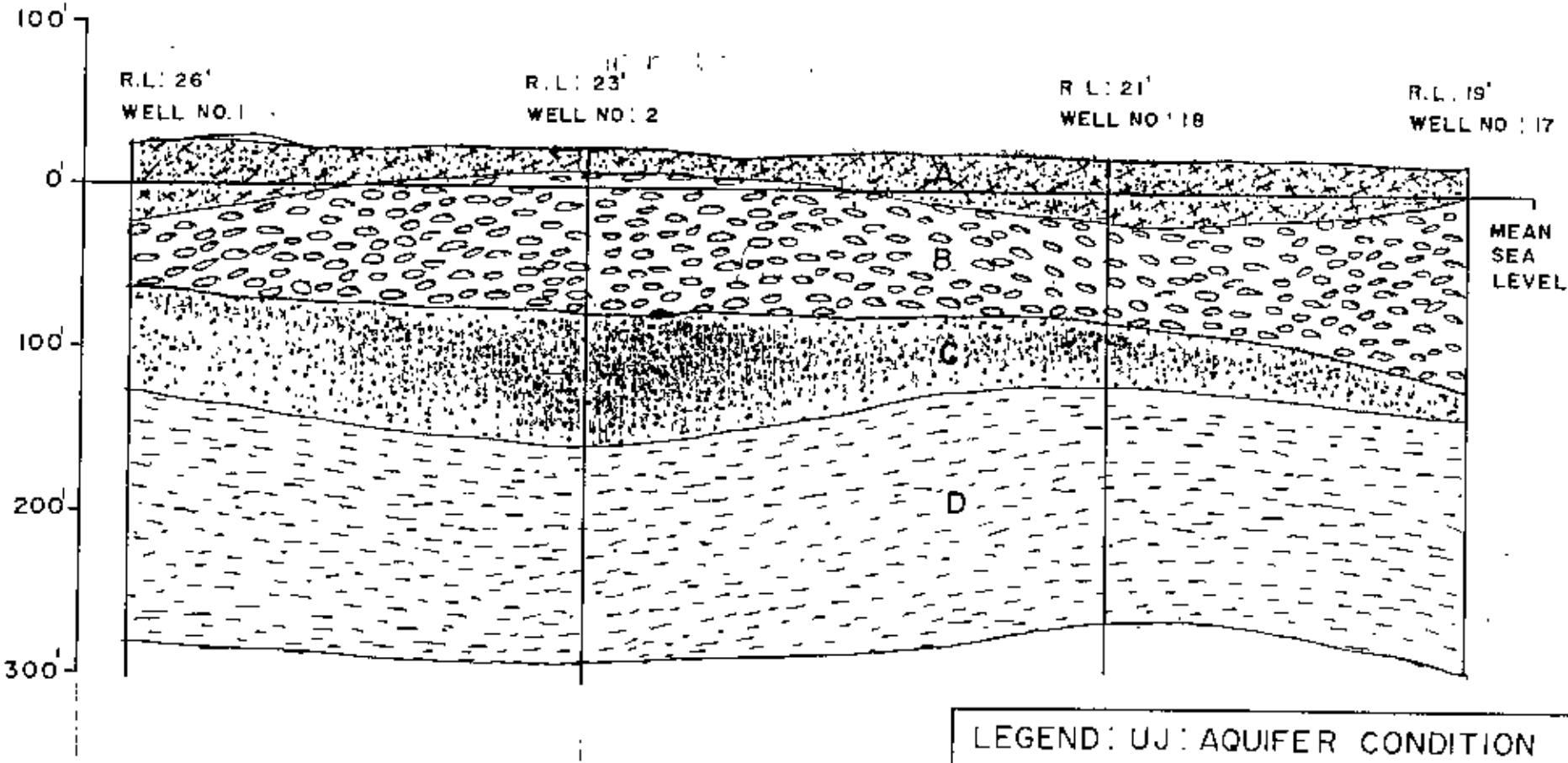
VERTICAL : 1" = 100'

HORIZONTAL : 1 = 1 MILE

SOURCE : PREPARED ON THE BASIS OF DATA IN REPORT ON GROUND WATE BY BWDB.

ILLUSTRATION : 4·3

GEOLOGIC SECTION WE (I-I)



LEGEND: UJ: AQUIFER CONDITION			
A	B	C	D
AQUICLUDE	POOR AQUIFER	MODERATE AQUIFER	GOODAQUIFER

SCALE :

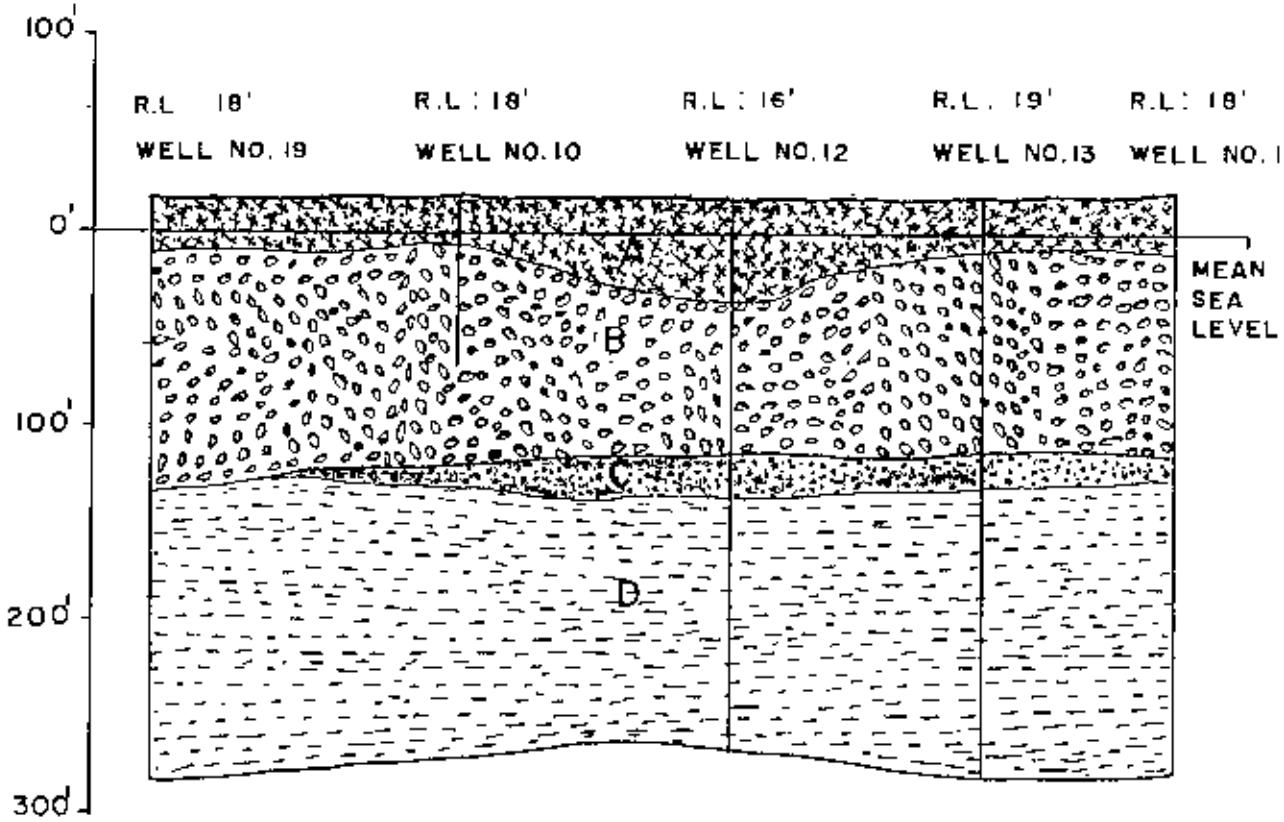
VERTICAL : 1" = 100'

HORIZONTAL: 1" = 1 MILE

SOURCE : PREPARED ON THE BASIS OF DATA IN REPORT ON GROUND WATER BY BWDB

ILLUSTRATION : 4 4

GEOLOGIC SECTION WE (2-2')



LEGEND : UJ : AQUIFER CONDITION			
A	B	C	D
AQUICLUDE	POOR AQUIFER	MODERATE AQUIFER	GOOD AQUIFER

SCALE :

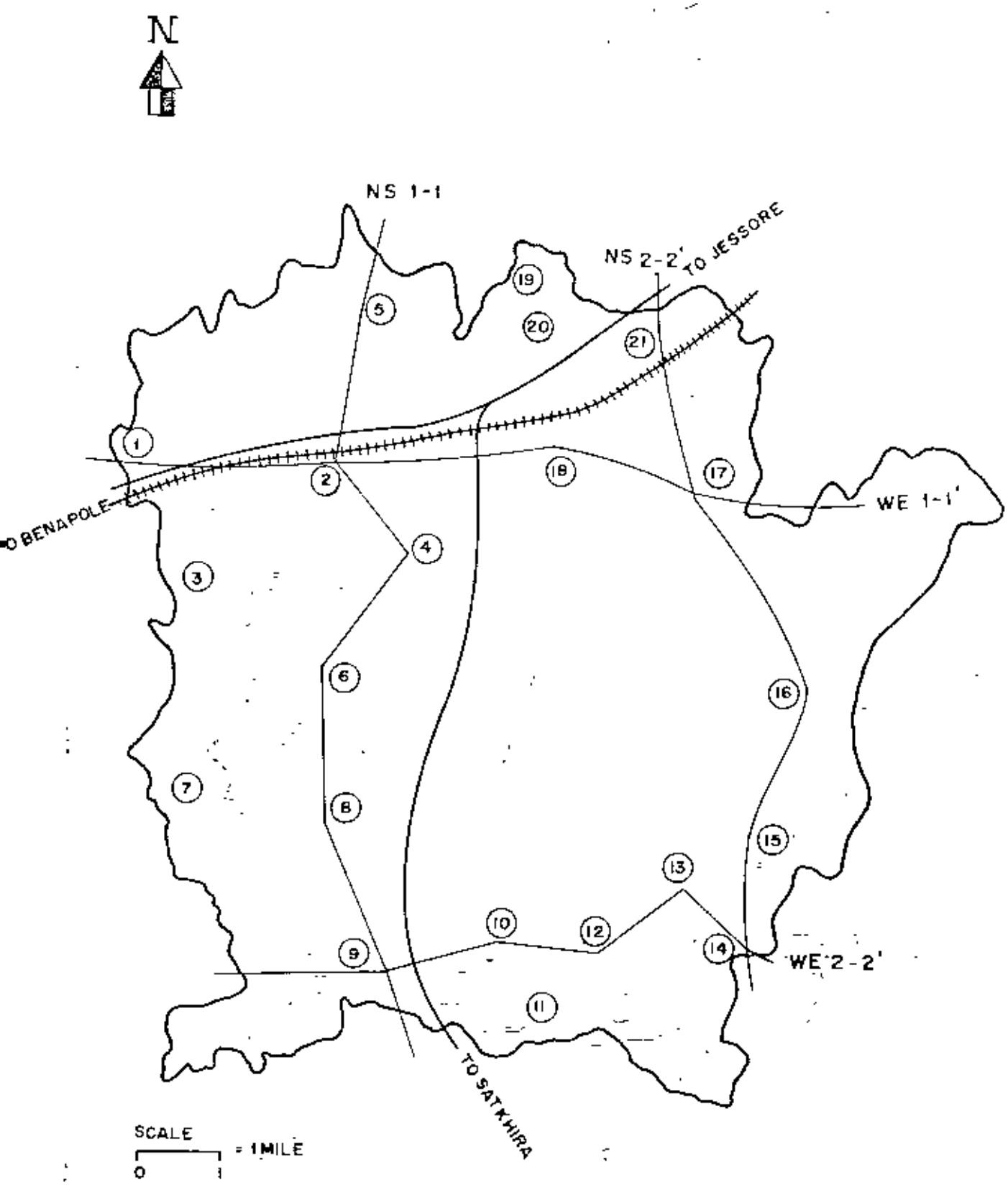
VERTICAL : 1" = 100'

HORIZONTAL : 1" = 1 MILE

SOURCE : PREPARED ON THE BASIS OF DATA IN REPORT GROUND WATER BY BWDB

ILLUSTRATION : 4 5

DEEP TUBEWELL LOCATION AND GEOLOGIC CROSS SECTION LINES : UJ



SOURCE : PREPARED ON THE BASIS OF DATA IN REPORT ON GROUND WATER BWDB.

MAP : 4 4

is composed of clay and silt and is of poor aquifer. The next layer is mostly of silt and fine sand and is of moderate aquifer. While the fourth layer is mainly of medium and coarse sand and is considered as good aquifer. The average thickness of the aquicludo is 20', poor aquifer 0', moderate aquifer 107' and good aquifer 152'. As such it is found that this area is suitable for Deep Tube Well irrigation.[1]

4.4.2.2 TYPE OF AQUIFER AND AQUIFER PROPERTIES

The aquifers of the area are composed of mostly medium sand with some finer materials. Out of 35 DTW in the project area data on pump test of 21 wells were available for analysis and is shown below calculated in Theis method:[2]

Mean of specific draw down (ft/Cft)	Mean of pumping level (ft)	Mean of specific capacity (USG/ft)	Mean of transmissivity (USG/day/ft) in thousand	Mean of conductivity (permeabity) K_{10}-3 (ft/sec)
7.57	34.26	07.52	133.08	1.50

Storage co-efficient calculated from two detail pump test data that were available in Jessore shows the range from 9.23×10^{-5} to 1.10×10^{-4} (calculated in Theis method).[3]

4.4.2.3 MODERATE AND GOOD AQUIFER DEPTH CONTOUR

Contour map showing the depth of moderate or good aquifer from surface level at contour interval of 10' is shown in map no.4.5. From this map it is seen that moderate and good aquifer are available at the minimum of 80' to the maximum of 150' depth.[4]

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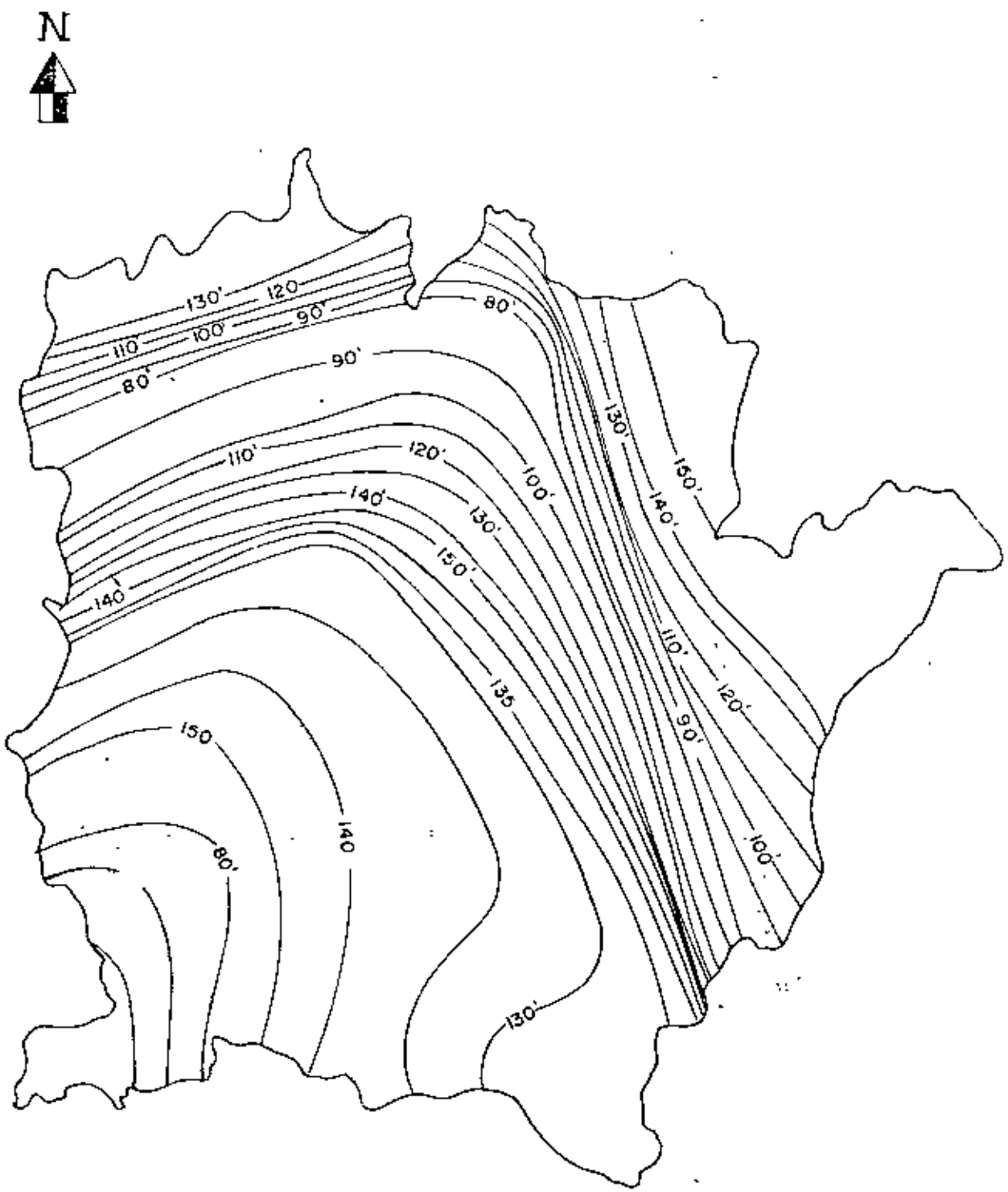
1. Report on Ground Water : Bangladesh Water Development Board Water Supply Paper.
2. Ibid
3. Ibid
4. Ibid

GROUND WATER CONTOUR AT 10' INTERVAL SHOWING MODERATE AND GOOD AQUIFER : UJ



SCALE

0 1 = 1 MILE

SOURCE : PREPARED ON THE BASIS OF DATA IN REPORT ON GROUND WATER BY BWDB

MAP : 4·5

4.4.2.4 QUANTITY OF GROUND WATER AVAILABLE

The quantity of ground water available during the different months of the year has been calculated and shown in Table no. 4.2. In order to find out the quantity of extractible water from the ground sources account has been taken of the average depth of water in different months from the surface.[1] Out of the 38 DTW in the area data showing depths of water of 6 wells were available and average of those 6 wells were considered in the calculation of the quantity. The volume of water that are available within the 20' depth from the surface is considered as extractible water. Water beyond 20' is not recommended for extraction by the Planning Commission as that may cause serious problem to the existing vegetations. The 20' depth from surface is composed of clay, clay & silt and silt and fine sand. The average depth of clay is 13' and silt is 3' while silt and fine sand is 4'. Saturated thickness for each group has been worked out and the storage provision of clay is 0.05, clay and silt 0.058 and for silt and fine sand 0.08. Thus the volume of water for each month has been calculated. The water required for irrigation is in the dry season and will be extracted during November-May period. In order to find out the total extractible water during this period, the water available in the months of November and May have been averaged and the total thus comes to 36946 acre feet of water. This quantity of water can be used for irrigation during the dry season.

4.4.3 QUALITY OF IRRIGATION WATER

It is important to know whether the quality of water to be used for irrigation is suitable or not. The quality of water depends on mineral composition of the rocks through which it moves and rate of movement. It has been found that solid contents of the surface water in the area ranges from 276-296 mg/litre in the dry season which makes the water, medium salinity class.[2] On the other hand the ground water in the project area is 266/mg/litre. The group below 400 mg/litre is

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1. Ibid
2. Soil Survey Report of Jessore District.

TABLE 4.2

MONTHLY GROUND WATER STORAGE OF KJ AREA

Month	Average depth of water	Project area acre	Clay Th(ft)	Clay St(ft)	Clay Storage Provisi	Clay Volume of water	Clay Silt Th(ft)	Clay Silt St(ft)	Clay Silt Storage Provision	Clay Silt Volume of wat	Silt & Fine Sand Th(ft)	Silt & Fine Sand ST(ft)	Silt & Fine Sand Storage Provision	Silt & Fine Sand Volume of wat	Total Water
Jan	7.57	50803	13	5.43	.05	13703	3	3	.055	8382	4	4	.08	16257	38432
Feb	8.55	50803	13	4.45	.05	11304	3	3	.055	8382	4	4	.08	16257	35943
March	9.04	50803	13	3.96	.05	10059	3	3	.055	8382	4	4	.08	16257	34698
April	9.54	50803	13	3.46	.05	8789	3	3	.055	8382	4	4	.08	16257	33428
May	9.96	50803	13	3.04	.05	7722	3	3	.055	8382	4	4	.08	16257	32361
June	9.41	50803	13	3.59	.05	9119	3	3	.055	8382	4	4	.08	16257	33758
July	7.87	50803	13	5.13	.05	13031	3	3	.055	8382	4	4	.08	16257	37670
August	6.33	50803	13	6.67	.05	16943	3	3	.055	8382	4	4	.08	16257	41582
Sept	5.77	50803	13	7.23	.05	18365	3	3	.055	8382	4	4	.08	16257	43004
Oct	5.80	50803	13	7.2	.05	18280	3	3	.055	8382	4	4	.08	16257	42920
Nov	6.35	50803	13	6.65	.05	16893	3	3	.055	8382	4	4	.08	16257	41531
Dec	7.05	50803	13	5.95	.05	15114	3	3	.055	8382	4	4	.08	16257	39753

Source : Report on Ground Water of Bangladesh
Bangladesh Water Development Board
Water Supply Paper.

Th= Soil Depth
St= Saturated thickness

practically safe as far as salt content is concerned, although salt sensitive crops may be adversely affected by the irrigation water having dissolved solids contents in the range of 130-400 mg/litre. As such, if the salt sensitive crops are avoided the water is suitable for irrigation. But the present researcher has received complaints of salinity in the Sankarpur, the extreme southern part of the project area which caused due to sea water intrusion. So it is necessary that there should be an arrangement for testing the quality of irrigation water at regular intervals to examine the quantity of salt intrusion. However results of chemical analysis of ground water and mean, median and standard deviation of total dissolved particles in the project area is provided in the Table no 4.3.

4.4.4 PUMPS IN OPERATION

Water from both surface and ground sources is being used in the UJ area. Low lift pumps are mostly 2 cusec with few 1 cusec fielded in the Betna, UJ canal and Kannyadah baor. All the Deep Tube Wells are 3 cusec, while the shallow tube wells are of half cusec capacity. The use of shallow tube wells are on the increase, though the IRDP feasibility study does not recommend shallow tube wells. The Cotton Development Board and BADC are the main agencies responsible for fielding of Shallow Tube Wells. The list of pumps in use in the UJ area is given below:

TYPES OF PUMPS	NUMBER	CAPACITY
Low Lift Pump	142	18.5 acres per cusec
Deep Tube Well	35	18.7 acres per cusec
Shallow Tube Well	145[1]	16.0 acres per cusec[2]

4.4.5 POPULATION AND FAMILY COMPOSITION

The present population of the project area according to the 1974

1. Thana Agricultural Office
2. IRDP feasibility report on Sarsa and Jhikargacha thana
   BADC is Bangladesh Agricultural Development Corporation

TABLE 4.3

RESULTS OF CHEMICAL ANALYSIS OF GROUND WATER COLLECTED FROM DIFFERENT STATIONS IN PROJECT AREA DURING DIFFERENT YEARS 1976 TO 1977.

Station	Depth of Well	PH value	Total dissolved Solids (PPM)	Silica SiO_2 PPM	Calcium (Ca) PPM	Free Carbondi	Iron (Fe PPM)	Magnesium MG (PPM)
Jhikargacha	276'	9.00	248.0	32.0	48.0	-	0.4	11.6
Bavaran	320'	9.5	332.0	34.0	40.0	-	1.3	28.1

Alkali Metals (Calculated as (Na) PPM	Boron (B) PPM	Chloride (CL) PPM	Sulphate (SO_4) (SO	Carbonate (CO_3) PPM	Bicarbon (HCO3) PPM	Nitrate (NO_3) PPM	Sodium Ratio	Absorption
13.04	N.T	7.0	N.T	Nil	232.0	1.5	2.9	
32.1	N.T	10.5	N.T	Nil	332.0	0.8	5.51	

N.T.Not traceable

MEAN, MEDIAN AND STANDARD DEVIATION OF TOTAL DISSOLVED SOLIDS CALCIUM, IRON, MAGNESIUM, ALKALI METALS, CHLORIDE, SULPHATE AND BICARBONATE IN GROUND WATERS OF THE DJ AREA

Parameter	Total dissolved Solids/Micro CM(PPM)	Calcium PPM	Iron PPM	Magnesium PPM	Alkali Calculated as NaPPM	Chloride PPM	Sulphate PPM	Bicarbonate PPM	Sodium Absorption Ratio (SAR)
Mean	450.28	25.36	2.30	25.15	82.18	58.47	11.33	257.84	21.41
Median	344.40	33.50	0.95	27.00	38.95	16.50	6.50	224.00	7.39
StandardDeviatio	309.19	24.20	3.77	12.07	84.27	81.20	8.39	146.01	29.57

Source: Report on Ground Water Quality of Bangladesh : DWDB Water Supply Paper-403 (1978) Page 45,49

census was 104335 persons. Male and female population as enumerated was 53534 and 50801 respectively. The 1981 census provided a figure of 64168 people in the project area which means an increase of 62% between the two censuses. The district and national increase for this period was 52% and 41% respectively. Thus the present density per square mile is 1320 as against 613 persons in 1961, whereas in 1974, district density was 1306 persons per square mile against the national density of 1297 persons per square mile.

From the field survey it is also observed that most people fall in the landless group and this group has the highest percentage of older people. Table 4.3 below gives the population statistics of different age group on the basis of farm size. It is found that farm size 0.0-1.0 acre was 12.11 percent, 1.0-2.5 acres was 22.38 percent, 2.5-5.0 acres 6.29 percent, 5.0-7.5 acres was 8.41 percent, 7.5 acres and more was 6.10 percent and the landless covers 44.68 percent of the total population.

TABLE 4.3

POPULATION, FARM SIZE AND AGE GROUP

in percentage

Farm size in acres	Average Family Size	M A L E			F E M A L E			Total
		0-14 years	14-55 years	55+ years	0-14 years	14-55 years	55+ years	
0.0-1.0	6.5	3.23	3.14	0.37	3.23	2.03	0.09	12.11
1.0-2.5	7.5	5.46	6.29	0.37	5.18	4.90	0.09	22.38
2.5-5.0	6.1	1.94	1.75	0.18	1.11	1.20	0.09	6.29
5.0-7.5	7.5	2.03	1.94	0.55	1.66	2.12	0.09	8.41
7.5+	9.4	1.11	1.75	0.18	1.75	1.29		6.10
Landless	5.8	8.69	11.58	1.29	11.10	11.66	0.37	44.68
Total	6.5	22.66	26.46	2.96	24.08	23.21	0.74	99.97

Source : Socio-economic survey conducted in January 1979

4.4.6 FARM SIZE

The total area of UJ area is 50803 acres and net cultivable area is 39312 acres. This covers 77.38% of the total land area. The over all prevailing condition does not allow any more land to be brought under agriculture. The project area has a total number of 17041 households making the average farm size 2.3 acres. The farm holdings are heavily fragmented reducing the size of a plot to less than quarter of an acre. The farm size varies from less than a acre to 7.5 acres and more. On the other hand the number of landless is quite high and fast increasing (landlessness during our survey was 50.3%). The land ownership pattern shows that 12.1% families had less than an acre of land, 19.4% families had 1 to 2.5 acres, 6.7% families 2.5 acres to5 acres, 7.3% families 5 acres to 7.5 acres, 4.2% familie own 7.5 acres or more and 50.3% families had no cultivable land at all (Table 4.4 below).

TABLE 4.4

LAND OWNERSHIP: UJ AREA

Farm size in acre		Percentage
0.0	1.0	12.1
1.0	2.5	19.4
2.5	5.0	6.7
5.0	7.5	7.3
7.5 +		4.2
Landless		50.3

Source : Socio-economic survey conducted in January 1979

It is found that the larger farm sizes has the larger family size. Thus we find that farm size group 0.0-1.0 acre has an average family size of 6.5 persons per family; for landless it is 5.8 persons per family; whereas it is 3.4 persons per family for the highest farm size

Landless is defind as a person who does not have any cultivable land land though may have some homestead land.

group i.e. 7.5 acres and more group. It is also observed that highest number of families has no land whereas lowest number of families have the highest amount of land. Thus though the farm size group 7.5 acres and more covers only 4.2 percent families they own 34.8% of the total land in the UJ area. On the other hand marginal and sub-marginal farmers (0.0 to 1.0 acres and 1.0 to 2.5 acres who comprised (12.1 + 19.4) 31.5 percent of the families own 20 percent of the total land. Table 4.5 below gives a picture of the relation between the farm size, family size and land ownership and amount of land own by each farm size group.

TABLE 4.5

FARM SIZE, FAMILY SIZE AND LAND OCCUPIED BY FARM SIZE GROUP

Farm Size	% of Families	Av.Family Size	% of Land Owned
0.0 1.0	12.1	6.5	4.0
1.0 2.5	19.4	7.5	16.5
2.5 5.0	6.7	6.1	17.4
5.0 7.5	7.3	7.5	27.3
7.5 +	4.2	9.4	34.8
Landless	50.3	5.5	nil

Source: Socio-economic survey conducted during January, 1979

4.4.7 OCCUPATION

The project area has an agrarian economy and most people live on agriculture directly or indirectly. But a high rate of landlessness has forced many to work on other's land as farm labour. A few find employment in other forms of non-farm labour; rickshaw puller; petty business; service and small manufacturing activities like tile brick making; rice husking, pottery and weaving. Very recently biri making on work as and when you like at home for a big manufacturer has gained ready acceptance throughout the project area. It is found that many women along with man are working on biri at their houses

which fetch them a good income. Due to the nature and style of work, biri making is an additional source of income specially for the lower age group and womenfolk in the area. Fishing is also becoming popular as the water bodies in the area are being increasingly used for pisciculture.

Though agriculture is the main occupation, many of the families having land have to depend on subsidiary income as their land holding do not provide them with an income sufficient to live on. In the land holding category we have found that a total of 31.5% families are marginal and sub-marginal farmers and many of them work as farm labour on others' land.

There is a saying in the project area that some people are engaged in smuggling of goods across the border. This factor needs to be considered as this area is a border area and very close to Benapole, at present a main point of Bangladesh-India land trade. During our stay in the area, we found that it is an open secret that some people live on smuggling.

4.4.8 CO-OPERATIVES

Co-operatives form a major organisational infra-structure in rural Bangladesh. The main function of the co-operatives is to provide loans to their members. There are at present two types of co-operatives working in the country and both the two are in existence i the project area. The co-operatives are traditional Union Multi-purpose co-operative societies supervised by the Department of Co-operatives and the Thana Central Co-operative Association supervised by IRDP.

The spirit of self-reliance that has been induced by the canal digging has sustained and led to the formation of many co-operatives in an attempt to make the area self sufficient by co-operative efforts. As a result co-operatives of many form and purposes have been organised here and most of them have survived and are working moderately. The co-operatives are Union Multipurpose Co-operative

Societies, Krishi Samabaya Samity, Mahila Samabaya Samity, Landless Co-operative (Bhumihin Samabaya Samity) societies. There are 131 UMPCS, 111 KSS, 24 Bhumihin Samabaya Samity with 15166 members in all. The total paid up share capital amounts to Taka 2.7 lakh.Table 4.6 below is the presentation of total co-operative societies as on 31-3-79 in the project area. The UMPCS figure id for 3 unions only. From the membership figure it is observed that about 14.5 percent of the UJ area are co-operators. In actuality the figure may be a little less. Membership of different societies overlaps which means a member is attached to more than one society.

TABLE 4.6

CO-OPERATIVES IN UJ

Type	No	Members	Share Capital in Taka
Union Multipurpose[1] Co-operative Society UMPCS	131	8607	97733
Krishi Samabaya Samity KSS	111	4097	161000
Bhumihin Samabaya	24	1352	4614
Mahila Samabaya Samity	26	1110	12974
Total	292	15166	276321

1. Figure for only 3 unions namely, Sarwa, Ulashi and Bagachra

Source: Socio-economic survey conducted during January, 1979

The IRDP organised KSS, Mahila Samabaya Samity and Bhumihin Samabaya Samity were established with an aim to bring all fallow land under cultivation, creation of employment opportunities, agricultural development and effective use of the female work force. With this aim they have during 1978-79 has advanced an amount of Taka 3.7 lakhs as loan to members.

About 9.83 acres of land have been resettled with the 'Bhumihin Samabaya Samity' in the village Jadunathpur of Sankarpur Union with a cash loan of Taka 28,000.00 during 1978-79. The old Betna source has been leased to 4 Bhumihin Samabaya Samity with a cash loan of Taka 1.6 lakh for pisciculture.

The future programmes of the IRDP organised co-operatives are as follows:

1. Forming of KSS in every village
2. Bringing every family under co-operative societies
3. Teaching of modern agricultural techniques
4. Large scale introduction of family planning
5. Provide loan for purchase of cattle

The UMTCS are engaged in providing loans during different crop growing season. They depend on sanctions from the central co-operative. It is given to understand by the Thana Co-operative Officer of Sarsa that loan recovery rate is slow.

Complain has also been received of the malpractices in the destribution of loans. The power elite in the vilinges has grabbed the societies and in actuality the benefits are being increasingly used by the power elites who are mainly wealthy farmers. However an awareness has been observed among the poorer section of the community to be organised for collective bargain and co-operative efforts to improve their lot. This will ultimately serve as a very important point to make the self-help programmes successful as self-help necessarily requires co-operative efforts.

In this chapter we have discussed about different aspects of the project area. Our next step will be to look into the agricultural sector in detail to have a clear picture of the situation in that sector.

5 AGRICULTURE

5.1 PRESENT LAND USE

The project area Ulashi-Jadunathpur has total land of 50803 acres. Available statistics show that out of the total land 39312 acres are cultivable land of which 26240 acres are single crop land, 12972 acres are double crop land and 93 acres are tripple crop land. Detailed land use of the area is given below:[1]

Total land	50803	acres
Forest		nil
Not available for cultivation	11491	acres
Net cultivable land	39312	acres
Total cropped area	52474	acres
Single cropped area	26240	acres
Double cropped area	12972	acres
Tripple cropped area	93	acres
Cropping intensity	133.5%	

Total land available for cultivation accounts for 77% of the land area under the project. The area under 'non-cultivable land' seems to be a little high which may be attributed to the frequent bazars, railway track and numerous fruit gardens and bamboo bushes. The area 'not available for cultivation' includes settlements, water bodies, roads and so on.

1. The figures are derived from different sources like Thana Agricultural Office, Sarsa; Mr. Alamgir Mohiuddin's Monograph on Ulashi-Jadunathpur and survey conducted by the Thana Krishi Office for Intensive Aman Cultivation Programme in 1979. As all these sources provided different figures, the researcher calculated this figure mostly on the basis of the survey conducted by Intensive Aman Cultivation Programme which was made on 100% aman land and the researcher's survey conducted in January 1979.

5.2 CROPPING PATTERN

The major factors determining the kinds of crop grown, cropping pattern and intensity of land use are the elevations of land in relation to flooding during the rainy season, and soil moisture contents in the dry season. Soil permeability and the location of the land in relation to rivers and depressions also influences the cropping pattern.

The main cropping systems are double with some single cropping, mainly of rice. The important cropping sequences are Aus/Tossa jute followed by rabi crops mainly on high land soils, aus or deshi jute followed by rabi crops, transplanted aman usually preceded by aus or occasionally followed by rabi crops mainly on medium soils. Broadcast aman is generally followed by rabi crops on medium high la land and medium low land soils. With irrigation, transplanted or broadcast aus, or to a much lesser extent followed by boro. This is grown on high land and medium high land soils.

5.3 CROP GROWING SEASONS

Rice : Rice is the main crop and mostly rainfed. However irrigation water is also used in limited areas for rice cultivation. Aus, aman and a limited quantity of Boro are cultivated in the study area. Aus is shown here in March-April while land preparation starts from February-March and seeds are broadcast with the first rain. This is mostly cultivated on high land soils and harvested during the months of July-August. High yielding, local improved and local, all three types of aus are employed here. Broadcast aman is shown during the months of March-April and harvested during the months of October-November. For Transplanted Aman, seedling is done during the months of June-July and transplantation during the July-August and harvested in the months of November-December.

Boro and IRRI are cultivated in the low lying areas or in areas with irrigation facilities. Generally seedling is done during November-December, transplantation in January-February and is harvested during April-May.

Wheat: Wheat is a winter crop and is cultivated in the areas with irrigation facilities. Generally high yielding variety is sown and sowing is done during November-December while harvested in the months of March-April, and an early variety in the month of February. There are also wheat lands without irrigation facility in the project area.

Jute: Two types, deshi and tossa are generally grown in the area. Deshi jute is sown during the period 15th March to 15th April and Tossa during 15th April to 15th May while both the types are harvested during July-August.

Cotton: In the project area during the recent times Cotton has been introduced by the Cotton Development Board. Cotton is grown in areas where rain water does not stand. It is a rabi crop sown through dibbling method in the months of September-October and harvested during March-April.

Tobacco: Tobacco is also grown here but is very limited in acreage. Seedling is done during September-October, transplantation in November-December and harvested in March-April.

Sugarcane: Sugarcane is a perennial crop planted in October-November or February-March. But sugarcane acreage has largely declined due to marketing problem in recent years.

Pulses: Different varieties of pulses like Mesari, Khesari, Gram and Arhar are cultivated here. All pulses excepting arhar are sown in November-December, a small quantity in January and harvested in May.

Oilseeds: Mustard and Linseed are common varieties and sown in October-November and harvested in February-March.

Potato: Very recently potato has been introduced and generally planted during November-December and harvested in the months of February-March.

Vegetables: Both winter and summer vegetables are cultivated here. Winter vegetables are generally planted in November-December and harvested in March-April.

5.4 CROPPING PRACTICE

Rice is the most extensive crop in the Ulashi-Jadubathpur area. Aus and Transplanted Aman are the major kind grown. Broadcast Aman is also important and Transplanted Aman is grown is rainfed condition. Nowadays transplanted paddies of both Aman and Boro varieties with irrigation water are on the increase. Jute, Sugarcane pulses and in a limted quantity cotton are the main cash crops. Due to erratic marketing system sugarcane cultivation is on the decline and for hogh return cotton cultivation is on the increase. Wherever in the project area any land is found suitable for cultivation, cotton is being planted. Jute comprising tossa and deshi varieties is generally grown by replacing Aus. There are blocs of 400 acres each, organised and supervised by the extension workers under Extensive Jute Cultivation Programme. In all there are six blocs in the area one each in six unions. Tobacco is a dry land rabi crop commercially grown in a very limited areas. Kharif and rabi vegetables are grown on high land also on commercial basis. Wheat, Gram, Khesai, Mashkalai, Musur, Arhar, Mustard, Linseed, Chilies, Tobacco, Onion, Potato and vegetables are the main rabi crops. Coconuts, Betelnuts and Datepalms are grown on high land. Date palm is particularly impertanat here and is grown both on homestead lands and field lands.

Cropping practice is dependent on the Land Use Association. The soil survey report of the Jessore district identified 10 types of Land Use Association and the project area is stratified into 4 types of Land Use Association. These Associations have been developed from the existing topography and submergence level, fertility and capability. The Following Table 5.1 identifies the cropping pattern, gross acreage and total cropped acreage by Land Use Association while Table 5.2 reveals the total crop acreages by Land Use Association. A graphical representation of the same is provided in the Illustration no 5.1.

TABLE 8.1

CROPPING PATTERN GROSS ACREAGE TOTAL CROPPED AREA

Land Use Association No	Description of Association	Cropping Pattern	Gross Acreage / Net Acreage	Total cropped acre / Intensity
6	Mainly double with perennial cropped land	Mainly Aus/Jute Rabi crops with some Aus T. Aman-fallow/rabi crops mango, coconut, date and Sugarcane	26981 / 20859	26003 / 124.68%
8	Mainly double with single cropped land	Mainly Aus/Jute rabi crops with some Aus-T.Aman Fallow/rabi crops and mainly Aus/Jute-rabi crops and Aus T. Aman-fallow/rabi crops with some broadcast Aman/ fallow/rabi	12272 / 9515	16389 / 172.24%
9	Mainly single with some double cropped land	Mainly broadcast Aman-fallow/rabi crops with Aus/ Jute-rabi crops	10181 / 7763	8585 / 110.13%
10	Predominantly single cropped land	Predominantly broadcast Aman-fallow	1369 / 1140	1527 / 133.94%

Source: Soil Survey Report of Jessore District and Field Survey Conducted during January 1979

TABLE 5.2

CROP ACREAGE BY LAND USE ASSOCIATION

Crop	Crop acreage in each Land Use Association				
	No.6	No.8	No.9	No.10	Total Acreage
Aus	10369	5993	1612	221	18195
Aman	6152	6494	3418	1026	17090
Boro	700	1192	1610		3502
Wheat	3831	1069	546		5446
Jute	2766	673	929	280	4648
Kusari	909	296	135		1340
Potato	306	374	171		851
Mustard	92	67	7		166
Sugarcane	53	44	18		116
Vegetables	389	76	42		507
Cotton	107	44	22		173
Others	329	67	45		441
Total Cropped Area	26003	16389	8553	1527	52474
Cropping Intensity	134.48%	172.24%	110.13%	133.94%	135.48%
Development Possibility by increasing cropping intensity	Highly possible	Possible	Highly possible	Possible	

Source: Soil Survey Report on Jessore District, Thana Agriculture Office: Saras and Field Survey Conducted During January, 1978

CROPPING INTENSITY : UJ

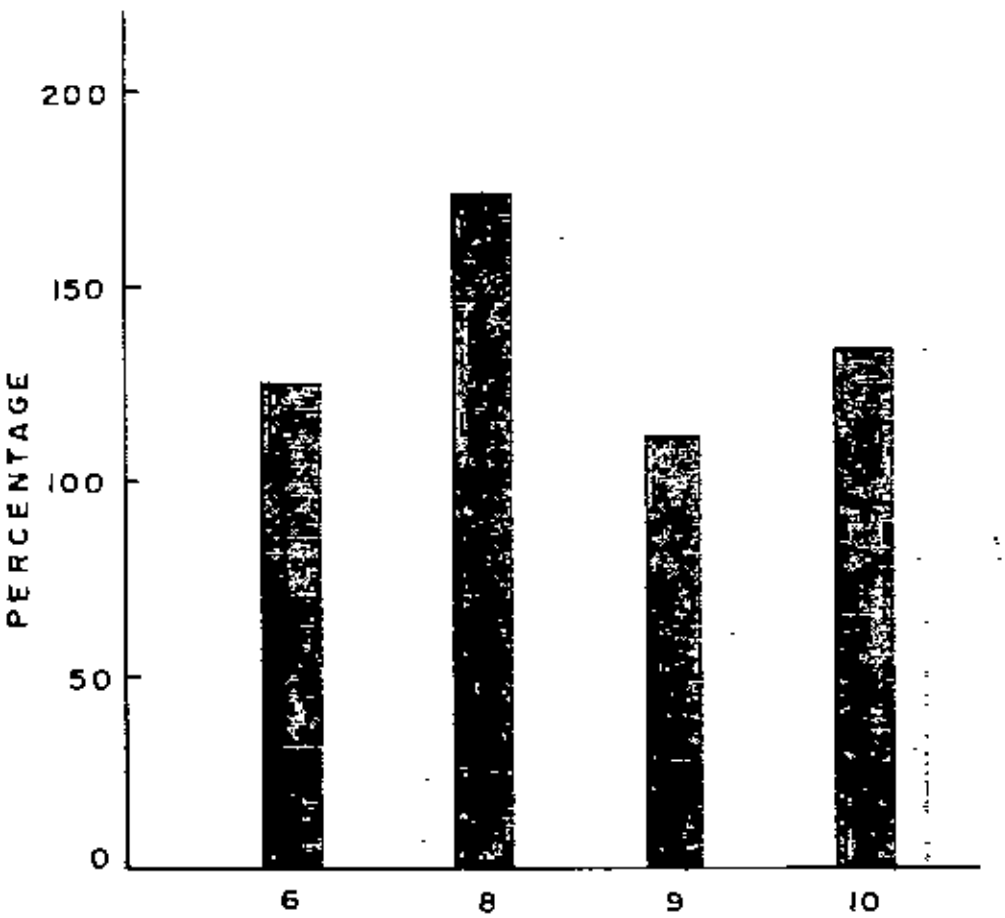

ILLUSTRATION : 5·1

The foregoing Table 5.2 shows that out of the net cultivable area of 39312 acres only Land Use Association no.8 has a slightly higher cropping intensity. The rest of the areas bear a cropping intensity which is less than the present national average of 150%. In the Land Use Association no.8 cropping intensity is 172.4% which can be easily increased. The area is flood free and suggests that the land in the area can be used more intensively. The present intensity of 124.48% in Land Use Association no. 6, 110.13% in Land Use Association no. 9 and 133.0% in the Land Use Association no. 10 can be easily enhanced by creating the atmosphere by such conditions necessary for agricultural development.

5.5 PRESENT CROP PRODUCTION

5.5.1 CROPPING INTENSITY

Cropping Intensity: The gross area of the UJ project is 50803 acres cultivable land is 39312 acres. Thus about 77.4% of the total land are under cultivation. Though the district figure shows that 90% of the land area in the district is under cultivation, the prospect of bringing more land under cultivation seems not possible in near future. It is supposed that quite a substantial area of the non-agricultural land forms depressions, which lack drainage facilities to make agriculture possible in them. On the other hand, though there is no recognised forest in the area, there are plenty of trees in the area occupying quite a large amount of land. For reasons of environmental balance it is not desirable to bring this land under agriculture.

5.5.2 Crop AREA

Different crops occupy different amounts of land and like other parts of the country, paddy enjoys the major share. The total cropped area including single, double and tripple cropping comes to 52474 acres and paddy is cultivated in 38787 acres which covers 73.9% of the total cropped area. Table 5.3 in the following page gives detail account of the acreage under different crops. It is interesting to note that wheat is the second important crop in the area while Jute is found to

occupy the third position. The respective share of wheat and Jute are 5446 and 4648 acres which in percentage terms come to 10.4% and 8.9% respectively. In the past sugarcane used to be extensively cultivated in the project area. Due to unfavourable marketing facilities for the growers, in the recent past sugarcane cultivation has fallen to a great extent and at present only 115 acres or 0.2% land is under sugarcane production. On the other hand Cotton is being introduced in the project area which is a promising new cash crop in the area. Quite a substantial amount of land in this area has been found suitable for Cotton cultivation and gradually acreage under Cotton is increasing and at present 173 acres or 0.3% land are under Cotton which is sltghtly higher than the sugarcane acreage. The favourable response on the part of the farmers for Cotton cultivation will raise the acreage and soon will be placed among the first few crops. Crops like Musari, potato, mustard, vegetables and others cover 2.6%, 1.0%, 0.3%, 1% and 0.8% respectively.

TABLE 5.3

ULASHI-JADUNATHPUR CROP ACREAGES IN THOUSAND ACRES

Name of crop	Area in acres (thousand)	percentage
Paddy	38.707	73.9
Aus : 18.105 Aman : 17.090 Boro : 3.502		
Wheat	5.446	10.4
Jute	4.648	8.9
Musari	1.340	2.6
Potato	.661	1.6
Mustard	.166	0.3
Sugarcane	.115	0.2
Vegetables	.507	1.0
Cotton	.173	0.3
Others	.441	0.8

Source: Field survey conducted during January 1979

3.5.3 CROP YIELDS

Quantity of crop grow in the area is show in the following Table 3.4

TABLE 3.4

CROP PRODUCTION

Name of Crop	Production in thousand maund	Percentage
Paddy	601.12	59.5
Aus : 273.0 Aman : 205.1 Boro : 123.1		
Wheat	130.7	13.0
Jute	91.6	9.1
Musari	10.7	1.1
Potato	102.1	10.1
Mustard	1.3	0.1
Sugarcane	28.8	2.8
Vegetables	34.6	3.4
Cotton	4.1	0.4
Others	5.3	0.5
	1010.6	

Source: Field survey conducted during January 1979

Rice occupies the highest position in terms of yield. Out of the total production of 10 lakh maunds or 37 thousand tons, rice contributes 6 lakh maunds or 22 thousand tons which is about 59% of the total production by weight in the area. The share of rice slightly rises if bulky crops like potato and vegetables are counted seperately. Wheat accounts 10.4% of the total weight amounting to 1.3 lakh maunds or 4.7 thousand tons and is quite encouraging. Sugarcane contributes 2.8% of the total weight though it is practised only in 0.2% of the area, this is due to the nature of the crop as

it is bulky. This is also same for potato which contributes 10.1% of the weight though occupies only 0.3% of the total acreage. The total potato yield is about 1 lakh maunds or 3.7 thousand tons. Jute contributes 18 thousand bales and is about 9% of the weight. Vegetables are another important crop contributing 3.4% of the total weightage.

Table 3.5 in the next page reveals the per acre production of different crops. The paddy figures for boro is high yielding variety. It may be mentioned here that boro crop is all HYV in the area. The wheat figure is the average of irrigated and non-irrigated yield and like boro wheat is HYV on the whole. Jute is the average of capsularies and olitrioes. As a very small quantity is under meshta, it has not been taken into account.

5.5.4 HIGH YIELDING RICE

The acreage under high yielding production in the project area is still very low considering the importance put on it. At the same time the tendency to avoid HYV which is very much dependent on regular and smooth supply of inputs has been observed. Due to consecutive failure of timely and adequate supply of water the cultivators have suffered very much and as such they are presently reluctant to HYV cultivation. Major reasons of scanty supply of water are insufficient surface water and recurring power failure and short of oil. On the other hand all the boro crop in the area is of high yielding variety and as given to understand by the Thana Agricultural Officer, Sarsa, no local variety of boro is practiced here. The total boro area in the project area is 3502 acres.

5.5.5. USE OF FERTILIZER

The soci-economic and agricultural survey reveal the fact that the use of fertilizer, especially chemical fertilizer, is very low in the area. There are many farms using no fertilizer of any kind at all. On the other hand there are farms using only cowdung as fertilizer.

TABLE 5.5

CROP YIELD PER ACRE

Crop	Yield Maund/Acre	Remark
Paddy	20.4	Weighted average of all varieties of uncleaned paddy
B.Aus	13.0	
B.Aman	12.0	
T.Aman HYV & Boro	30.0	
T.Aman local	20.0	
Wheat	24.0	High yielding variety
Jute	10.7	Average of deshi & Jat
Musari	8.0	
Potato	120.0	Average of improved imported variety and local variety
Mustard	9.0	
Sugarcane	250.0	
Vegetables	80.0	Average of all types of vegetables
Cotton	8.0	American long staple
Others	12.0	Kharif and rabi pulses excluding musari and including tobacco

Source: Field survey conducted during January 1979

From the Table 5.6 in the next page it can be seen that 72% of farms use some kind of fertilizer irrespective of minimum required quantity. 28% of the farms use no fertilizer at all, while 11% use cowdung only. Urea, T.S.P., and Potash (all the three together) are used by only 27% of farms.

TABLE 5.6

PERCENTAGE OF FARMS USING FERTILIZER

Fertilizer Use	Percent
Use Fertilizer	72
Use only Cowdung	11
Use Urea, T.S.P., Potash	2.7
Use only Urea	38
Do not use Fertilizer	28

Source: Field survey conducted during January 1979

The following Table 5.7 shows the per acre use of fertilizer in different crops in the UJ area:

TABLE 5.7

PER ACRE CROP WISE USE OF FERTILIZER IN ULASHI-JAGANNATHPUR

Name of crop	Urea Maund/Acre	T.S.P. Maund/Acre	M.P. Maund/acre
Aus HYV	0.1	-	-
B.Aus	0.201	-	-
B.Aman	0.104	-	-
Boro HYV	0.073	0.448	0.383
T.Aman	0.383	0.165	0.141
Wheat	0.317	-	-
Jute	0.551	0.275	0.456
Cotton	1.155	0.962	0.962
Others	0.126	-	-

Source: Field survey conducted during January 1979

From the preceding table it is found that Boro, Jute and Cotton has comparatively more use of fertilizer. This is due to the fact that Boro is all HYV and farmers take care for it. For Jute and Cotton the

Extensive Jute Cultivation Programme and Cotton Development Board who supply fertilizer on credit and keep watch on the use to some extent.

The BADC makes out a sales programme based on seasonal crop production for each district. The major demand for fertilizer is for paddy crop. Though per acre fertilizer use for paddy crop is much low, due to the higher acreage the quantity required during paddy season is much higher. For Jute and Cotton, fertilizer is distributed as loan by the relevent authorities, and during the wheat season quite a good demand for fertilizer is found. In the UJ area fertilizer is distributed through IRDP who work as BADC dealers of fertilizer in the area. As the area is spread over two thanas two branches of IRDP one located in Sarsa and the other in Jhikargacha are responsible for distribution of fertilizer. They do not keep union wise record of fertilizer sale, nor any record of fertilizer sale in the UJ area is kept. As a result total sale and use of fertilizer in the project area is difficult to enumerate. On the other hand the area is near to Indian border and smuggling of fertilizer is rampant. As such total sale does not mean total use. Actual use may be much less than the actual quantity of sale.

From the previous analysis it is obvious that the fertilizer use in the area lacks far behind the required dose. Actual dose of fertilizer to be used suiting the local condition has not been ascertained though general out line on the use of fertilizer is available for the country. Fertilizer dose to be used depends on the quality and nature of soil. Proper experiment is needed to determine the required dose of fertilizer in the area.

5.3.6 USE OF PESTICIDE

In the present day agricultural practices pest control occupies a very important position to ensure fullest harvest as and when required. Proper control of pest is a must as many of the crop varieties presently cultivated are susceptible to pest attack specially HYV paddy and cotton. Various posticides are used for the purpose of pest control

and The Thana Agricultural Office located in Nawabganj Bazar is presently responsible for distribution of pesticides in the project area. They sell the pesticides to their dealers who work as retailers.

Pest control measures, sometimes suffer due to short supply of pesticides and delays in the supply. Again farmers are reluctant to use the substitutes for a particular pesticide. Lack of knowledge of the proper dose also hampers the pest control measure. Like fertilizer, no account is kept of the union wise distribution of pesticides. As a result the quantity supplied in the project area could not be ascertained.

5.5.7 PRESENT COST OF PRODUCTION, VALUE AND GAIN

Ascertaining the actual cost of production is a very difficult task though due emphasis has been given in the survey to find out the cost of production per acre per annum. Table 5.8 reveals the per acre cost of production of different crops in the project area. From the table it can be seen that highest cost for per acre production is for potato which is Taka 2072.76 per acre followed by sugarcane which costs Tk: 1202.60 per acre. Transplanted Aman costs Taka 878.18 per acre and HYV boro Taka 844.66 per acre whereas per acre cost of mustard is lowest being Taka 401.00 only.

Table 5.9 gives the total cost of production for all the crop acreages. Average cost of production thus comes to Taka 783.2 per acre. The value of production is shown in the Table 5.10. It is found that average value of production per acre is Taka 1563.6 only. Thus the net gain stands at Taka 880.4 (Taka 1563.6-Taka 787.2) per acre. Table 5.11 shows the gain per acre of different crops and the total gain from the agricultural production during 1978-1979. From the table it can be seen that potato gives the maximum net gain per acre followed by cotton and jute.

Total gain derived from individual crops is highest for Aus Paddy which contribute 32% of the total net gain while rice as a whole contribute 64% of the total gain. Jute and wheat follow it wit 14% a and 12% respectively. Table 5.12 gives the details of percentage wise net gain contribution by the different crops in the project area.

TABLE 5.9

COST OF PRODUCTION (AGRICULTURE) ULASHI_JADUNATHPUR.

Crop	Labour No	Labour Taka	Tillage Charge	Seed Taka	Water Taka	Fertiliser Urea Md.	Urea Tk.70/=	T S P Md.	T S P Tk.55/=	Potash Md.	Potash Tk.40/=	Pesticide Tk.39.50 lb.	Pesticide Tk.39.50 Tk.	Total cost Tk.
B.Aus	55	440	120	60	-	.291	20.37	-		-	-	.024	9.48	649.82
Aus HYV	65	520	150	80	-	1.0	70.00	-	-	-	-	.024	9.48	829.48
B.Aman	55	440	160	60	-	.194	13.58	-	-	-	-	.027	10.66	684.24
T.Aman	84	672	180	40	20	.583	40.81	.165	9.07	.141	5.64	.027	10.66	978.18
Boro HYV	75	600	120	40	60	.973	68.11	.448	24.64	.383	15.32	.042	16.59	944.66
WheatHYV	55	440	120	80	40	.317	22.19	-	-	-	-	.011	4.34	706.53
Jute	85	680	90	40	-	.551	38.57	.275	15.12	.456	18.24	.010	3.95	885.88
Musari	55	440	60	80	-	.126	8.82	-	-	-	-	.083	32.78	621.60
Potato	100	800	80	600	120	3.0	210.00	2.00	110.00	3.0	120.00	.083	32.78	2072.78
Mustard	30	240	80	40	-	.126	8.82	-	-	-	-	.083	32.78	401.60
Sugarcane	120	960	80	100	-	.426	29.28	-	-	-	-	.083	32.78	1202.60
Vegetables	80	640	120	50	-	.126	8.82	-	-	-	-	.083	32.78	851.80
Cotton	60	440	120	22.5	120	1.133	80.71	.062	67.34	.962	67.34	.846	32.78	950.67
Others	60	480	160	100	-	.126	8.82	-	-	-	-	.083	32.78	781.60

Source : Field, Survey conducted during January, 1979

TABLE NO 8.9

PRESENT CROP ACREAGES AND COST OF PRODUCTION 1978-1979

Crop	Acre in thousand	Cost of production per acre	Total cost of production in thousand taka
Aus	18.2	649.62	11826.72
Aman[1]	17.1	831.21	14213.69
Boro	3.8	944.66	3506.31
Total paddy			29346.72
Wheat	5.4	706.53	3815.26
Jute	4.6	885.88	4075.04
Kusari	1.3	621.60	808.08
Potato	.9	2072.78	1865.50
Mustard	.2	401.60	80.32
Sugarcane	.1	1202.60	120.26
Vegetables	.5	851.60	425.80
Cotton	.2	950.67	190.13
Others	.4	781.60	312.64
	53.4		41039.75

Average per acre cost of production Taka 783.2

1. Total of broadcast aman and transplanted aman

Source: Field survey conducted during January 1979

TABLE 5.10

PRESENT PRODUCTION AND VALUE

Crop	Acreage in thou acre	Yield Md/acr	Total Pro in thou maunds	Price Taka maund	Total Value in thousand taka	Gross Value of crop per acre in taka
Aus	15.2	15	273.0	95	25935	1425
Aman	17.1	12	205.2	110	22572	1320
Boro	3.5	30	105.0	65	6825	2550
Total paddy	38.8		583.2		57432	
Wheat	5.4	24	120.8	70	09072.0	1680
Jute	4.6	19.7	90.6	115	10419	2265
Musari	1.3	8	10.4	130	1352	1040
Potato	.9	120	108.0	40	4320	4800
Mustard	.2	9	1.8	120	216	1080
Sugarcane	.1	250	25.0	10	250	2500
Vegetables	.5	80	40.0	40	3200	1600
Cotton	.2	8	1.6	360	576	2880
Others	.4	12	4.8	70	336	840
Total	52.4		1050.2		87173	

The average gross value of production per acre Taka 1663.6
The net gain per acre works out to Taka 680.4
The average gross value of production per nrt cultivable acre comes to:

$$\frac{87173 \times 1000}{39313} = \text{Taka } 2217.67$$

Source : Field survey conducted during January 1979

TABLE 5.11

COST OF PRODUCTION : GROSS AND NET VALUE OF TOTAL PRODUCTION

Crop	Cost of production per acre	Total value per acre taka	Gain per acre taka	Crop Acre in thousand acre	Total gain in thousand taka
Aus	649.82	1425	775.18	18.2	14106.00
Aman	831.21	1320	488.79	17.1	8358.30
Boro	944.66	2550	1605.34	3.8	5516.69
Gain from all paddy					28058.97
Wheat	706.63	1680	973.47	5.4	5256.74
Jute	885.86	2265.50	1379.62	4.6	6346.74
Nunari	621.61	1040.0	418.4	1.3	543.92
Potato	2072.78	4800	2727.22	.9	2454.5
Mustard	401.60	1080	678.4	.2	135.68
Sugarcane	1202.60	2500	1297.4	.1	129.74
Vegetables	851.60	1600	748.4	.5	374.2
Cotton	950.67	2880	1929.33	.2	385.87
Others	781.60	840.00	58.4	.4	23.36
Average of all crops	783.20	1663.6	880.4	52.4	43738.53

Source : Field survey conducted during January 1979

TABLE 5.12

PERCENTAGE OF TOTAL GAIN BY DIFFERENT CROPS

Crop	Total gain in thousand taka	Percentage of the individual crop
Aus	14108.29	32.3
Aman	8358.30	19.1
Boro	5618.69	12.8
Gains from all paddy	28065.27	65.2
Wheat	5256.74	12.0
Jute	6346.35	14.5
Musari	543.92	1.2
Potato	2454.5	5.6
Mustard	136.68	.3
Sugarcane	129.74	.3
Vegetables	374.2	.9
Cotton	385.87	.9
Others	23.36	.9
	43735.53	

5.5.8 FOOD REQUIREMENT

The Two year Development Plan drawn and adopted by the villagers envisages to double the food production and thereby converting the deficit area into a surplus area. Presently the project area has to depend on other areas or share from the national import to meet the shortage. If we calculate on the basis of 20 ounce of uncleaned rice per head per day requirement then the annual requirement per head comes to about 5.6 maunds. The population on the basis of 1974 census was 104335 persons and at the present growth rate of 2.8% population by the end of 1979 would be 119783 persons. The present food production and food availability in the project area is calculated and shown in the following Table No. 5.13

TABLE NO. 5.13
FOOD PRODUCTION SITUATION

Population	104335	as per 1974 Census
Population	119783	as per projection at the rate of 2.8% in 1979
Total paddy production	583200 maunds or	23075.75 tons
10% for seed/wastage	58320 maunds or	2140.18 tons
Available for consumption	524880 maunds or	19261.65 tons
Total rice requirements at the rate of 20 ounce uncleaned rice per head	670785 maunds or	24661.2 tons
Total deficit	145905 maunds or	5354 tons

The above Table 5.13 indicates that the project area is at present hard hit by food shortage. On the basis of 5.6 maunds of paddy per head the present production of 58.3 thousand maunds after deduction of 5.8 thousand maunds (10% of the total production) for seed and wastage, can feed only 83 thousand people. Thus for rest of the people numbering about 36 thousand constituting 28% of the present

population has no food at all. If the production remains at present level and population continues to increase at 2.8% growth, the situation will only worsen year by year. The UJ development Plan aims to reduce the birth rate to 1% per annum. But the progress in achieving the family planning target is very low. Considering the very slow progress in reducing the birth rate the growth rate has been assumed to remain at the present rate of 2.8% till 1986 and from 1986 and onward at 1% per annum. The projected population in the year 1995 thus comes to 1.3 lakh persons. Then the total food requirement will be 6.7 lakh maunds or 33 thousand tons. Keeping 10% allowance for seed and waste total requirement of food grain will be 9.6 lakh maunds or 35.3 thousand tons in that year. If production does not increase, the total food grain deficit in the year 1995 will be 4.3 lakh maunds or 16 thousand tons. As such in order to make it a surplus area the food production has to be increased to atleast 9.6 lakh maunds or 35.3 thousand tons in 1995.

8.6 PRODUCTION CONSTRAINTS

Many factors are responsible for crop damage and low production. The important factors that are responsible for crop damage and low productivity are discussed below :

Flood : Normally the Ulashi-Jadunathpur area excepting few depressions is flood free. River water flooding is almost nil. What ever flooding there is caused, is mainly by accumulation of rain water and usually happens during the early monsoon and late monsoon. Rain water flooding when lasting for more than two weeks, causes major damage to the standing crop and during 1977-1978 Aman season the crop of vast areas were lost for excessive rain. The only river, Betna, which flows through the area has lost its draining capacity due to siltration, but with the digging of UJ

canal capacity has increased to some extent. Inspite of the canal, the drainage capacity can not drain the over flow caused by the additional discharge by the Indians in the upstream. This is a very recent problem and the present researcher has come to know about it from his discussion with the local people. One of the causes of the crop damage during the last Aman season was the additional discharge of water in India. Drought : Drought is one of the major limitations to intensive use of cultivable land and optimum crop production in the area. Normal rainfall in the area is low in comparision with other places of the country and highly irregular rainfall hinders crop production to a great extent in the area. Most of the land on ridges and basin margins produces rabi crops during the dry season, but the yields are often poor mainly because of drought. In the later part of the dry season all the land become very dry and this often delays the sowing of kharif crops. Even in the rainy season, drought during the intermittent dry spells affect the production of these crops. Yields of Aman crops are sometimes seriously affected by the drought in the late monsoon and early dry season.

Disease and Pest : The damages caused to crops by diseases and pests are significant in the project area. Various diseases are found in the area and most common are Blast disease, Helminyhosporium, stemrot and Sheath blight and those affect the local varieties. High yielding varieties are very much susceptible to diseases and pest, and common among them are Bacterial Leaf Streak, Sheath blight, Seedling blight, Tungo virus etc. Cotton, the growing important cash crop in the area, easily falls prey to various pests and during 1978-79 season it was observed that the pest attack has caused crop loss to a great extent. Farmers use pesticides to fight the disease and pest. But short supply and impure pesticides and absence of knowledge of proper dose of insecticide hampers the work of pest and disease control. However development of resistant varieties could be a major relief to this problem and preventive measures like seed treatment, and soil protection from soil pest, may also help in driving out these problems.

Defective Input supply : Production also suffer from the short and untimely supply of different inputs like seed, fertiliser, water and credit. Seeds used in the UJ area as found in the survey, are mostly own seed, preserved at the time of harvesting a crop. Preservation and quality of seed are not up to required standard and sometimes losses occur due to pest attack. The BADC seed supply can not meet the total demand. Cost involved in BADC seed is unbearable to many farmers, who finding no way out, use their own seed. Some times due to short supply, not all the prospective buyers get them and they are to get it from the black market at exorbitantly high prices. On the other hand, sometimes low quality seeds are supplied by the government agencies. Selection of specific variety of seed is also defective and some times due to ignorance, farmers select a variety not recommended resulting in the production loss. Due to a poor distribution system, seeds lie in the BADC godown but farmers do not get them. Serious complaints regarding non-distribution of BADC seed, though stored in the godown have been made and in the fortnightly meeting of the Sarathi held on 20-7-78 the matter was discussed.

Fertiliser : We have already observed that the fertilizer use level in the area is very low, yet the demand and supply always hang in a delicate balance. Due to an erratic distribution system farmers do not get the supply in time and naturally short supply occurs. When there is short supply, price go high and poor farmers can not buy them and use in their field. This reduces the production. Delayed supply of fertiliser by the relevent authority causes non-application of fertiliser when fertiliser is very much needed for the smooth growth of plants, and thus results in the low production. Complaints regarding the quality of the imported fertiliser was lodged and it was reported that the application of fertiliser imported from Saudi Arabia did not produce any result (Sarathi meeting). Dishonest traders, by hoarding, create artificial shortages and the price goes very high, beyond the capacity of an ordinary farmer.

Water : There are several irrigation schemes in the UJ area based on LLP, DTW and SGT irrigation. Due to power politics not all the farmers within the command area of such pumps get water to increase their production. On the other hand short supply of fuel and power failure greatly impedes the irrigation when water requirement is great. Mechanical trouble and shortages of spare parts reduces the working hour of a pump. Very few technical hands are trained in repairing and maintenance of pumps, and they fail to call all the pumps that go out of order, consequently reducing the possible production.

Credit : The system of distribution of credit in the area is complicated and poor and illiterate farmers do not have access to it. Modern agriculture needs pretty good investment and the poor farmers with their meagre income can not save for investment in agriculture. Naturally they need credit to complete the sowing and harvesting of a crop. But majority of the credit seekers fail to get it from the institutional sources where the interest rate is quite low. The agencies that are responsible for credit dtstributions are Commercial banks and krishi bank the system is very cumbersome that practically only very few can get credit. On the other hand malpractices by the officers make it more complicated for the illiterate farmer. The rich or influential people get them and in many cases they readvance it to the loan seekers at a very high rate of interest and earn profit. Again the fund available for advance is much below the total need and demand for credit. Thus due to shortage of cash-poor farmers cultivate their land poorly, resulting in the poor harvest.

Others : There are other problems that hampers production in the area. Above all of them is the level of technology in practice. The technology is obsolete, equipments used are traditional and age old. In the survey findings there was no case found to use modern equipments. The only modern equipment used by the farmers is sprayer for insecticides. Even no improved equipment has been evolved locally. In the survey it was found that quite a good number of farmers do not have draft animal for ploughing and threshing of crops. This also impedes agriculture in the area.

Production is considerably reduced due to wastage during the harvesting transportation, thrashing and storing. Rats also damage crop both in the field and store. But the actual quantity of loss incurred due

to these could not be ascertained due to non-availability of statistics which is very difficult to canculate.

The area being a border zone there are restrictions on movement of many goods that are needed for agriculture. This restriction hinders agriculture as in emergencies, inputs cannot be sent to the area with out prior permission from the relevent authorities. This slows down the process.

6 PROPOSED AGRICULTURE

6.1 GOALS

The proposals for agricultural development aim to turn the present deficit area into a surplus area, revitalise the economy of the area and thereby contribute to the national income. In order to achieve this goal efforts will be made to optimise the returns from all investments proposed for the area. Investments and proposals for agricultural development that are being made aim to achieve the following goals :

1. Double the food production and thereby turn the present deficit area to a surplus area.

2. Optimum use of the available resources both man and material.

3. Increase the employment opportunities for landless and small farmers thereby enhancing the purchasing power of the people of all category.

4. Make the area self-sufficient on self-help basis.

5. To contribute to the national goal of self sufficiency in food.

6.2 POTENTIALITY

The general condition of soil in the area is highly suitable for agricultural development and production can be increased with little efforts. The optimum use of soil is dependent on proper water management and timely supply of inputs. Water management encompasses irrigation in the dry season and drainage in the monsoon. The water management in the area leaves scope for development as in our

discussion of water resources we have seen that irrigation water supply can be increased by utilising ground water source. Surface water storage can also be increased by reexcavating the Betna course and maintenance of numerous beels and tanks which will also increase the drainage capacity, enabling cultivation in certitude.

Production can be increased by mainly two ways

1. By increasing the cropping intensity
2. By introducing high yielding varieties.

1. In the previous chapter we have seen that the present cropping intensity is very low specially land use associations 6.9 and 10 are extremely low and much below the national average. This can be very easily enhanced, even 100% increase can be possible.

2. The present cropping practice in the area is mostly of local varieties excepting for wheat and Boro which covers only 17% of the cropped area. HYV in the other crops is negligible. So, if sufficient and timely input supply is ensured, quite a large area can be given to HYV cultivation and naturally production will increase. All these factors have been considered in proposing future cropping pattern under project condition.

6.3 POTENTIAL CROP VARIETIES

The HYV to be introduced should be selected from the available varieties and provision should be kept for the adoption of new varieties to be evolved in the future. The varieties selected should be capable of sustaining the local condition and should be able to yield maximum possible return. The varieties should also be able to sustain sudden catastrophy that may fall upon for very short period like that of sudden heavy rainfall. The varieties should have higher resistance power against pest and diseases. Maturity time and fertilizer response should also be a factor in selecting a particular variety.

8.4 SEED

The role of improved seeds in agricultural development is great and to a large extent improved seed is responsible for higher yields of crop. Better seed produces better crop is particularly true for rice, wheat, Jute, Potato and sugarcane. The organisation responsible for procurement and distribution of seed is BADC. Seed to be used in the area has to be approved by the relevant authority, but much more research is yet to be carried to evolve better seed suiting the local conditions. Considering the urgency of the seed, it is here proposed to have local seed programme. The aim of this programme will be to produce better seed locally.

8.5 FERTILIZER

Fertilizer is a key input for increasing the agricultural production. The result of fertilizer use is conspicuous and though fertilizer use in the country has increased over the years, yet the total is far behind the recommended doses. It is assumed that about 50% increase in the production can be achieved by the use of fertilizer alone. We have already seen that the fertilizer use in the area is very low which has to be increased. It is expected that the country will be self sufficient in urea production by 1980 and requirement of other fertilizers will be met from both internal and external sources. So it is possible to make fertilizer available to the farmers in time by 1980. To have fertilizer available at farm gate sufficient stock of fertilizer will be made within the study area and for this purpose a fertilizer godown will be constructed. Cash credit will be provided to the farmers for purchase of fertilizer and may be the farmers will be provided fertilizer on loan.

8.6 PESTICIDE

The present high yielding varieties are susceptible to pest attack and resistant varieties are yet to be evolved. In order to ensure their yield potential the recommended doses need to be applied in time. The type and the quantity of the pesticides requirement will vary with incidence of pest and diseases.

6.7 CREDIT

Credit is often a key element in the modernisation of agriculture. Credit not only removes financial constraint but helps adoption of new technologies. Credit also helps commercialisation of the agricultural commodities. However success in this respect is dependent on factors like availability of complimentary inputs and services, sound credit policies, well managed institution and appropriate delivery channels. [1]

6.8 PROPOSED MEASURE FOR AGRICULTURAL DEVELOPMENT

In the previous paras we have spelt out the factors which are responsible for agricultural development. Now we shall make individual proposals for all the factors under following heads :

1. IRRIGATION
2. DRAINAGE MANAGEMENT
3. INPUT SUPPLY
4. CREDIT
5. SERVICES
6. TRAINING AND EXTENSION

6.8.1 IRRIGATION

Highly seasonal distribution of rainfall and the present insufficient irrigation and drainage facilities hinders agriculture. The intensive use of cultivable land depends on water management. We have already taken account of the water resources both from surface and ground sources. The total available water from both the

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1. Agricultural Credit : Sector Policy Paper : World Bank May, 1975, Page 5.

sources amounts to about 40 thousand acre feet. This water is to be used according to requirement during different crop seasons. The total water that is available is to be used during the period from November to February when there is no rain in the UJ area. During the period between early monsoon and late monsoon the water can also be used for irrigation, as during the late monsoon the recharge will fill the withdrawn water and will be available during dry months.

With the total water available from both surface and ground sources about 11 thousand acres of land may be given to HYV paddy cultivation in the Boro season if water requirement per acre is 3.6 acre feet. The present Boro acreage is 3502 acres. If wheat is cultivated the acreage that can be irrigated is 25 thousand acres with per acre water requirement of 1.5 acre feet. This means that the whole of the cultivable land in the area in winter can be brought under irrigated agriculture by changing the cropping pattern. This will help greatly to introduce HYV. During Aman season transplantation will be done in time by irrigation if rains starts late. Thus Aman production will not suffer due to longer intermittent drought.

There is also possibility of increasing the surface water storage capacity in the UJ area. The Bangladesh water Development Board has prepared a plan for the re-excavation of the Betna from Baukhali beel to Sankarpur. There is a plan of excavation of a loop cut from Sialghona to Navaran, deepening of Ulashi-Jadunathpur canal and construction of a regulator over the Betna at Sankarpur down Ulashi cannal. The total length of the channel is 31 miles which is a pretty large area to be used as a storage channel of water to be used in the dry season. On the other hand this will increase the discharge capacity which will save a substantial low lying area from ponding during the heavy rain. This channel will also be used for pisciculture as both the ends of the channel will have regulators making it a good ground for close water fish culture.

6.8.2 DRAINAGE

The area is generally flood free except few depressions, covering a very small area. But in the rainy season during heavy shower, some of the areas suffer drainage congestion. The re-excavation of the

Betna course will increase the drainage capacity of the main channel and here it is proposed to exnavate few feeder channel to drain the rain run off to mother channel. The drainage channels to be excavated, ,should be designed in such a way, that, these will serve as irrigation drain also. Then the area will have a network of irrigation and drainage channel. The extra drainage capacity will help bringing more land under cotton and wheat cultivation as these crops can not survive standing water in the field.

8.8.3 INPUT SUPPLY : SEED, FERTILIZER, PESTICIDE.

Inputs like seed, fertiliser and pesticide help very much to the development of agricultnral production. It is possible to achieve drastic increase in the production by timely and adequate use of these inputs. It is therefore proposed that an effective programme for adequate and timely supply of these inputs be undertaken. The storage facility to be provided for storing these inputs exclusively for the study area will be one of the measures. The area has no exclusive storage facility for any of these inputs. BADC godown at thana headquarters located at Navaran and Jhikargacha has a total storage capacity of 1600 tons of fertiliser with a floor space of 10 thousand square feet spread over 8 godowns, one in Jhikargacha and 6 in Navaran. Ministry of food has in all 7 godowns of 3100 tons capacity with a floor space of 23 thousand square feet spread over seven godowns, 4 in Jhikargacha and 3 in sarsa. There are also some private godowns for short time storing of Jute and other agricultural commodities. BADC has seed storage godown of ten ton capacity with a floor area of 300 square feet located at Jhikargacha. The Directorate of Plant Protection has an office-cum godown of a capacity of 1500 tons with a floor space of 12,000 square feet, located at Navaran under sarsa thana. But presently most of the floor space of this godown is being used as residence. So it is proposed that one godown with a capacity of 230 tons (225 for fertiliser. 5 tons for pesticide and 20 tons for seed) will be constructed in the project area for keeping a revolving stock of fertiliser. The godown will have seperate arrangement for pesticides and seed.

Arrangements will be made with the relevant authorities to keep sufficient stock round the year for use in the project. The new cropping pattern will demand supply of these inputs throughout the year. This additional storage facility will help greatly in this matter.

Pest will be controlled by community management. New cropping pattern will have uniformity and this will help in community management and shall be done on the self-help basis. This will also minimise the cost.

Seed supply will also be looked after. Newer improved varieties will be introduced in the area. BADC seed supply programme will be strengthened in the area and farmers will be encouraged to adopt high yielding varieties. Seed programme will include the training of farmers in procurement and preservation of seed from own fields. This may take a little time but within few years it will be alright with the farmers. This will not involve any cost as it will be carried out by the extension workers to be employed exclusively for the area.

6.8.4 CREDIT

We have already observed that credit availability is meagre in the area. But credit is very much essential for the smooth operation of farms. Keeping this in mind it is proposed that the credit facilities will be increased in the area. Presently credit is being distributed by commercial banks, Krishi Bank, Cotton and Jute Extension services, IRDP and UMPCS. The complication in the credit distribution will be removed and replaced by a simple system. The security may be the crop for which credit will be provided. It is expected that the farmers will have sincereity and commitment in proper use of credit and repayment. It is proposed that a substantial amount of the investment plan be kept for the revolving fund for credit distribution. This will be 15% of the total fund allocation of the two year Development Plan amounting to Taka 28 lakh. The total cultivable land in the UJ area is 39 thousand acres.

The credit facility will be only for marginal and sub-marginal farmers. In our discussion in the previous chapter we have seen that about 20% of the cultivable land which comes out to 8 thousand acres belong to these groups. Time about Taka 350/= per acre will be available for them. Their interest rate will be simple 5% per annum. 2% will be given to the commercial banks who will disburse the fund and the remaining 3% will meet bad debts and add to the fund. Other farmers who do not fall under this provision shall continue to get credit from the institutional sources at present, are responsible for credit distribution. This means that the present institutional credit system shall continue along with the new provision.

6.8.5 SERVICES

In order to keep the process running, back up services are needed. Repair and maintenance of agricultural implements like pumps, sprayers etc. will be looked after effectively. For this purpose a team of experienced persons along with workshop facilities will be employed in the area. There will be another team who will look after the extension services like teaching the farmers in the modern techniques and practices.

An organisation for co-ordination and implentation of all the proposed schemes shall be formed. This organisation will look after all the matters relating to every thing of the project area. The D.C. Jessore shall be the ex-officio chairman of the proposed committee. This will be some thing like present swanirvar committee but with more full time members.

6.8.6 TRAINING

The programme encompasses a scheme of training of villagers. As not all the farmers can be trained in the training institutions, selected persons shall be trained at the cost of the project fund who after training shall return to the villages and teach the villagers different aspect of modern agricultur. In this regard 5% of the total fund will be allocated. Fund thus available amount

to Taka 9.3 lakh. With this amount of money 3 persons from every two villages of the area will be trained in the different aspect of agriculture. Three persons for agriculture and two persons for live stock and pisci-culture. In all three hundred people will be given training for six months in appropriate institutions. Tk. 500/= per month will be the cost. The total cost will be Tk. 500/= X 6 months X 6 300 persons Taka 9 lakh. Taka 30,000/= will be spent on their transportation and buying of few implements.

These people after training will return to their respective villages and train, teach and demonstrate modern farming techniques to the villagers. They will be entitled to a moderate allowance as decided and paid by the villagers and this will comprise the self-help component. The amount may be taka two hundred per month and will involve an amount of Taka 7.2 lakh per annum meaning per acre annual cost of Tk. 18.3 which is not very high. As the local people will be recruited Tk. 200/= will be enough for them as they will work as part time worker. All the trainees will execute a bond to serve the area for atleast a period of 10 years, before they are sent for training.

6.9 PROPOSED CROPPING PATTERN

In order to increase the over all production of agricultural produces cropping pattern in the different land use Associations has been revised and rearranged. Local conditions, available resources both men and material and the facilities to be provided have been taken into consideration in proposing the cropping patterns under project condition. It is assumed that the necessary inputs, services and facilities will be available at farm gate and due attention will be given at the time of any problem emerging under any adverse condition.

The over all cropping intensity is proposed to increase from the present 133.6% to 186% under full development of the project. Total acreage with different acrops is shown in Table No. 6.1 Tables 6.2, 6.4 and 6.5 present the new cropping patterns for land use associations 6, 8, 9 and 10 respectively. It can be seen from the table:

that the cropping intensities in land use association 6 has increased from 124% to 194%, in land use association 8 from 172% to 195% in land use association 9 from 110% to 155% and in land use association 10 from 133% to 147% (Illustration 6.1).

Per acre cost of production under project condition has been calculated on the basis of present market price of all inputs. The cost of labour has been arbitrarily fixed at Taka 20.00 per labour day. This is very high rate in comparision to present rate, but to be conservative in cost estimate this high rate has been fixed. The total cost of production with project is shown in Table No.6.6 and crop wise cost of production can be seen in Table No. 6.7 while details cost of production is shown in appendices. The total value of production is shown in Table No. 6.8. From this table it is seen that the per acre average value is Taka 3324 which gives a net gain of Taka 1265 per acre against a net gain of Taka 880 in per project condition. The main purpose of the food production is thus served under project condition. In chapter 5.5.0 we have seen that the projected requirement of grain in the year 1995 will be 9.6 lakh maunds. But under project condition paddy production alone will be increased to 15.6 lakh maunds from 1982 and onward. This provides a surplus of 6 lakh maunds of paddy in the year 1995. But the surplus will be much higher when wheat production is also taken into account. The estimated annual wheat production will be 2.6 lakh maunds which make the total surplus in 1995 at 8.6 lakh. The year wise surplus food production is shown in Table 6.9 . Illustration 6.2 provides a comporative production situation of different crops with and without project.

TABLE 6.1

PROPOSED CROP ACREAGE UNDER PROJECT CONDITION

Crop	Total Acreage Crop acreage in each land use association				
	No 6 Acres	No 8 Acres	No 9 Acres	No 10 Acres	Total Acreage
Aus HYV	5300	2000	1500	300	9100
T.Aman HYV	14000	6500	3800	700	25000
Boro HYV	3000	2000	2500		7500
Wheat	7500	3000	500		11000
Jute	2500	1500	1000	800	5800
Musari	1000	300	100		1400
Potato	1100	550	50		1700
G.Nut	450	410	40		900
Mustard	1500	510	975	115	3100
Sugarcane	150	100	50		300
Vegetables	650	400	230	20	1300
Cotton	1700	1200	1000	50	4000
Miscellaneous	1600	150	350		2100
					73100

Cropping intensity. 185.04%

CROPPINING INTENSITY : U J

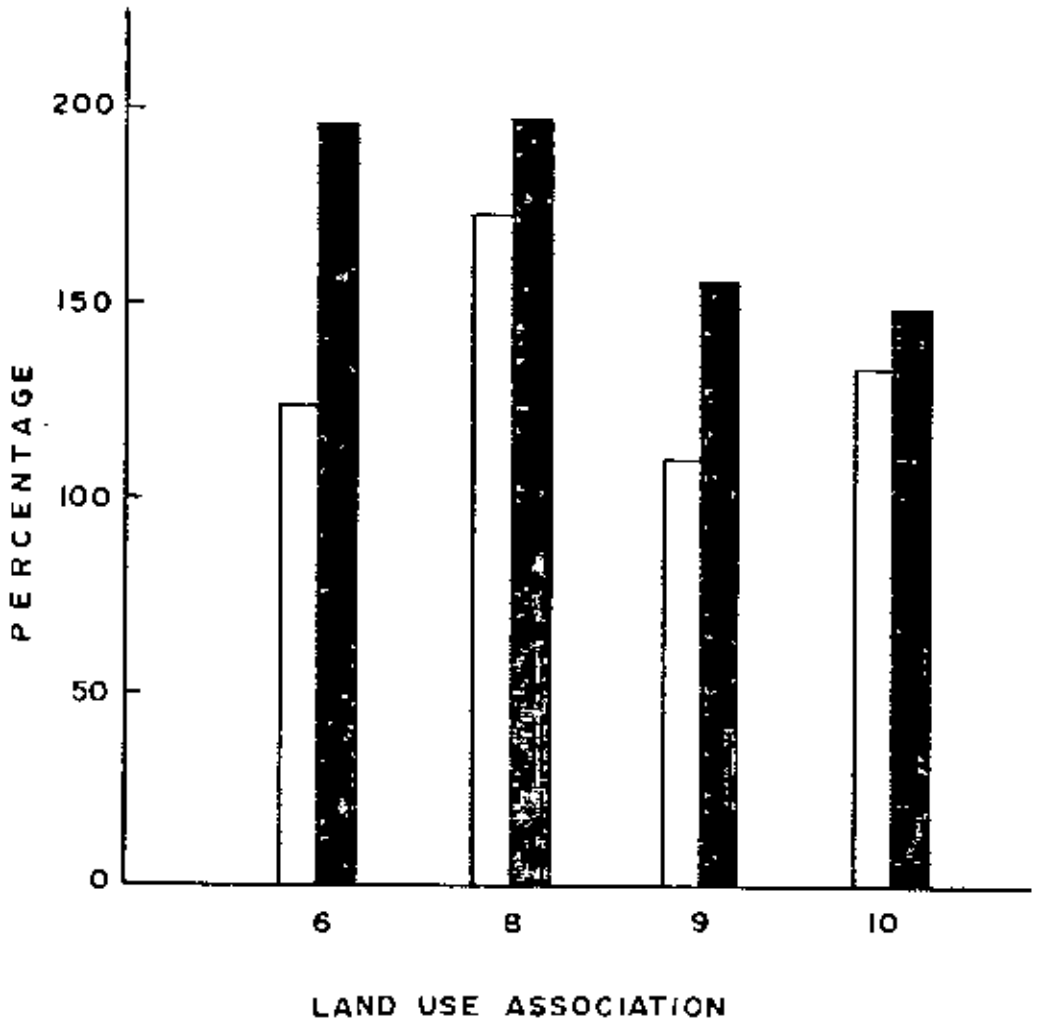

ILLUSTRATION: 6·1

TABLE 6.2

PROPOSED CROPPING PATTERN : LAND USE ASSOCIATION NO : 6

in acres

	Summer	Monsoon	Rabi
Aus HYV	2300		
T.Aman HYV		14000	
Boro HYV			5000
Wheat			7500
Jute	2500		
Musari			1000
Potato			1100
G.Nut		450	
Mustard			1500
Sugarcane	150	150	150
Vegetables			850
Fodder	7939		2469
Cotton			1700
Miscellaneous			1500
Fallow	5000	6289	
	20889	20889	20889

Total Cropped Area 40650 Acres

Cropping Intensity 194.60%

TABLE 6.3

PROPOSED CROPPING PATTERN : LAND USE ASSOCIATION NO . 8

in acres

	Summer	Monsoon	Rabi
Aus HYV	2000		
T.Aman HYV		6500	
Boro HYV			2000
Wheat			3000
Jute	1500		
Musari			300
Potato			530
G.Nut		410	
Mustard			510
Sugarcane	100	100	100
Vegetables			400
Fodder	2915		1305
Cotton			1200
Miscellaneous			150
Fallow	3000	2505	
	9515	9515	9515

Total cropped area 18020 acres

Cropping intensity 189.69%

TABLE 6.4

PROPOSED CROPPING PATTERN : LAND USE ASSOCIATION NO. 9

in acres

	Summer	Monsoon	Rabi
Aus HYV	1500		
T.Aman HYV		3500	
Boro HYV			2500
Wheat HYV			500
Jute	1000		
Masari			100
Potato			80
G.Nut		40	
Mustard			978
Sugarcane	50	50	50
Vegetables			230
Fodder	3500		2013
Cotton			1000
Fallow	1718	3878	
Miscellaneous			350
	7768	7768	7768

Total cropped area 12093 acres

Cropping intensity 155.7%

TABLE 6.8

PROPOSED CROPPING PATTERN : LAND USE ASSOCIATION : 10

in acres

	Summer	Monsoon	Rabi
Aus HYV	300		
T.Aman HYV		700	
Boro HYV			
Wheat HYV			
Jute	300		
Musuri			
G.Nut			
Potato			
Mustard			
Sugarcane			115
Vegetables			20
Fodder	90	40	985
Cotton			50
Fallow	250	400	
Miscellaneous			
	1140	1140	1140

Net cropped area 1095 acres

Cropping intensity 147.6%

Table 6.6

COST OF PRODUCTION UNDER PROJECT CONDITION : U.J.

Crop	Area in thousand acre	Cost per acre in Taka	Total cost in thousand Taka
Aus HYV	9.1	1836	16707.6
T.Aman HYV	25.0	2252	57050.0
Boro HYV	7.5	2324	17430.0
Wheat HYV	11.0	1903	10933.0
Jute	5.5	2142	11781.0
Ground Nut	.9	1499	1349.1
Nunari	1.4	1098	1537.2
Potato	1.7	3455	5873.5
Mustard	3.1	1173	3636.3
Sugarcane	.3	3144	943.2
Vegetables	1.5	1783	2674.5
Cotton	4.0	2343	6972.0
Miscellaneous	2.1	1295	2719.5
	73.1		150506.9

Per acre cost of Production Taka 2059.00

TABLE 6.7

PER ACRE COST OF PRODUCTION WITH PROJECT

In Taka

Crop	Labour	Tillage	Seed	Fertiliser	Pesticide	Total
Aus HYV	1100	150	120	318	150	1838
T.Aman HYV	1580	175	36	316	175	2282
Boro HYV	1500	200	25	424	175	2324
Wheat HYV	1100	175	125	343	60	1803
Jute	1700	150	75	142	75	2142
G.Nut	1000	100	60	232	97	1490
Musari	800	100	40	133	25	2098
Potato	2000	150	600	555	150	3455
Mustard	800	100	20	215	38	1173
Sugarcane	2400	150	100	294	200	3144
Vegetables	1300	150	50	208	75	1783
Cotton	1400	200	35	308	300	2243
Miscellaneo	900	100	50	170	75	1295

TABLE 6.8

VALUE OF PRODUCTION WITH PROJECT : ULASHI- JADUNATHPUR

Crop	Area in thousand acre	Yield in maun -d acre	Total produc in tho- usand maund	Price per maund Taka	Value per acre ...	Total value in thousand Taka
Aus HYV	9.1	25	227.5	100	2500	22750
T.Aman HYV	25.0	40	1000.0	105	4200	105000
Boro HYV	7.5	45	337.5	100	4500	33750
Wheat HYV	11.0	24	264.0	90	2160	23760
Jute	5.6	24	132.0	115	2760	16180
G.Nut	.9	22	19.8	120	2640	2376
Musari	1.4	15	21. 0	120	1800	2520
Potato	1.7	150	255.0	40	6000	10200
Mustard	3.1	12	37.2	150	1800	5580
Sugarcane	.3	375	112.5	12	4500	1350
Vegetables	1.5	80	120.0	40	3200	4800
Cotton	4.0	15	60.0	375	5625	22500
Miscellaneous	2.1	15	31.5	120	1800	3780
	73.1		2618			253546

Per maund average value Taka 100.69

Per acre average value Taka 3324.84

per acre average Production 35.81 maunds.

TABLE 6.9

POPULATION FORECAST AND FOOD SITUATION WITH PROJECT

Year	Population	Growth rate %	Food Prod in thousand maund	Food Requir in thousand maund	Deficit in 000 maund	Surlus in 000 maund
1979	119783	3.8	583	671	88	
1980	123137		583	758	175	
1981	126585		722	779	57	
1982	130129		722	801	79	
1983	133773		1828	823		1005
1984	137518		1828	846		982
1985	141369		1828	870		958
1986	142782		1838	879		949
1987	144210	1.0	1828	887		941
1988	145653		1823	896		932
1989	147109		1828	905		923
1990	148580		1828	914		914
1991	150065		1828	923		905
1992	151564		1828	933		896
1993	153083		1828	941		887
1994	154613		1828	950		878
1995	156159		1828	961		867

PRODUCTION WITH & WITHOUT PROJECT : UJ

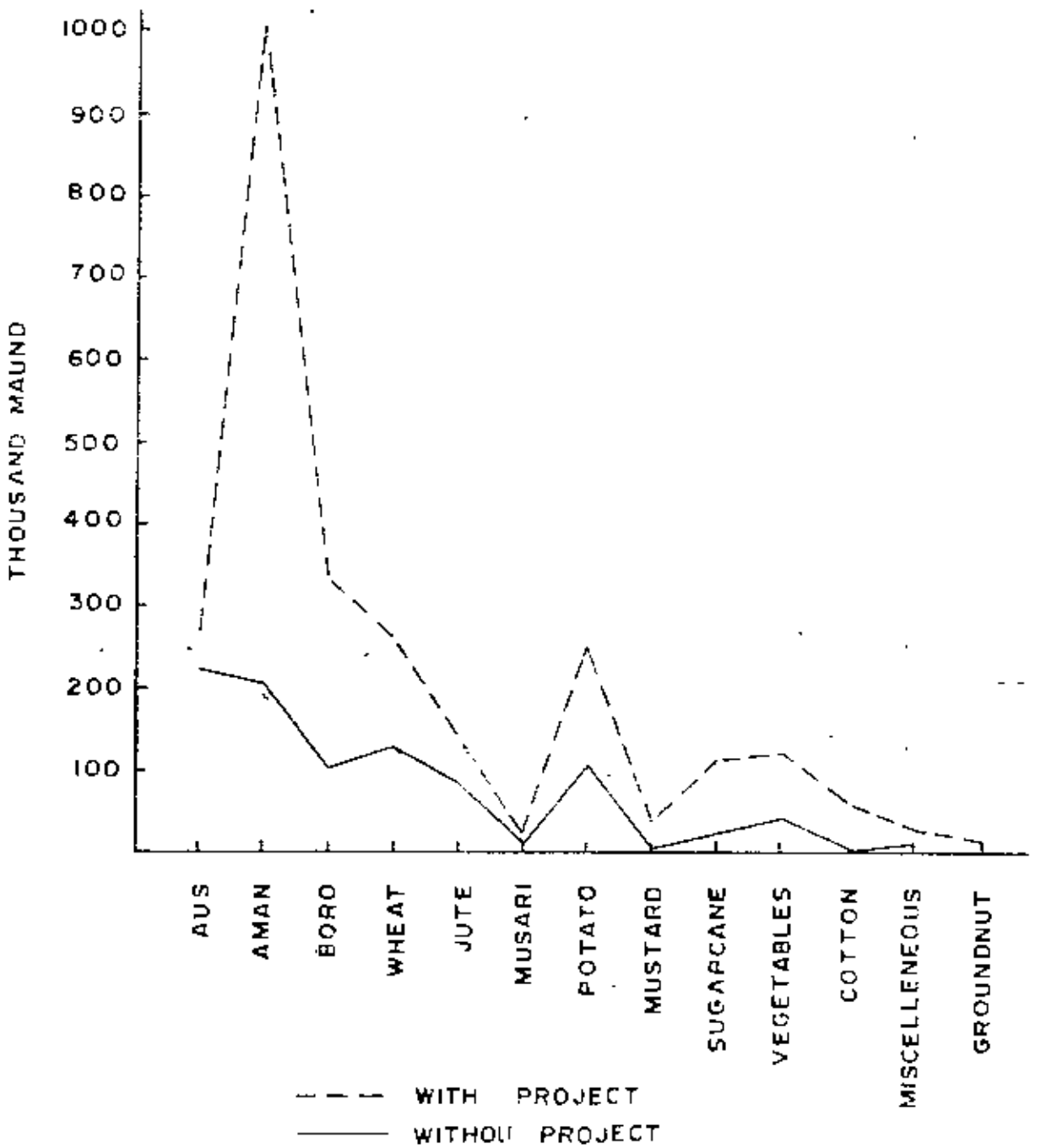

ILLUSTRATION : 6 : 2

7 LIVE STOCK AND FISHERY

7.1 LIVE STOCK

7.1.1 PREVAILING CONDITION

Live stock is a very important factor in the agricultural field and like other parts of the country ploughing is done almost in entirety by animal power in the UJ area. All agricultural activities including the supporting services, land preparation, harvesting, thrashing, carrying etc. depend on animal power.

The live stock population in the project area is constituted by cattle, buffaloes, ship, goats, chicken and ducks which are of indigenous origin and well suited to the local prevailing condition. Improved varieties of animal species are being introduced in a limited quantity as a part of the development programme and they are yet to adjust themselves with the local condition. As such outcome is yet to be accountable. On the whole the general condition of animal stock is poor.

The major factor affecting the healthy growth of live stock population is the lack of proper animal feed. Shortage of fodder and nutritious feed with cereals and local crop contribute to the poor condition of animals. The present small size of the live stock and the poor output and lower labour capacity is the result of age old poor and unnutritious feeding. One important and deplorable factor of the animal stock in the project area is that the same cow here is used for tripple purposes i.e. for milk, ploughing and drawing of carts.

7.1.2 PRESENT LIVE STOCK STATISTICS

There is no practice of annual stock taking of the animal population in the area by any organisation. As such no official figure of live stock population was available. The village survey conducted by the villagers was consulted in order to ascertain the live stock population. The table below no 7.1 has been prepared by comparing the village survey and socio-economic survey under taken by the researcher and the figures have been rounded.

TABLE 7.1

LIVE STOCK POPULATION IN THE UI AREA 1978 - 1979

Animal	No
Draft Animal	
Bullock	17900
Dairy Animal	
Cow	9900
Calf	5100
Others	
Goat	3600
Sheep	1300
Poultry Bird : Chicken	86100
Duck	27100

Source: Village Survey by the Sarathi People and field survey conducted during January, 1979

7.1.3 CONDITION OF LIVE STOCK

Housing : In a condition where men are not properly housed, the housing condition of the animals can well be understood. Housing provided for the animals are really poor consisting of shed mostly temporarily built of straw and thatching grasses. In most of the sheds there exist no wall and the floor in all cases are unpaved with no drainage facility for removal of dung and urine. The sheds are mostly situated by the side of ditches and bamboo bushes to facilitate drainage of dung and urine which practically deteriorates the environmental condition. Actually the animals are kept in a very unhealthy condition. Housing for poultry birds and goats are no better than the above. Goats are some times kept with cows and in some cases live in the verandah or in the living room under the same roof with the inmates of the house hold. Poultry houses are small boxes or cave made in the 'bhiti ' of the houses and lacks ventilation. Some times poultry birds are kept in the living room giving it a very small space. For reasons of unhealthy housing animals fall victim of pest and disease.

7.1.4 FEEDING

Probably the biggest reason of the unhealthy condition of the live stock population is the lack of sufficient feed and fodder in quantity and quality. Practically there is no permanent ground for the animals and they live on by products of crops grown for human need. The land man ratio provides no scope for keeping apart any piece of land for producing animal food.

Like other areas of the country the project area is also devoid of any grazing land. Mostly used grazing lands are narrow strips between pieces of lands locally known as ' ail '. On the other hand in the marshy areas hyacinth are preserved for use throughout the year. Rice straw are also not sufficiently available and quite a substantial quantity of rice straw are used as fire wood and making of fence and roofs of houses, oil cakes from different oil seeds and cotton are

need in limited quantity. It is expected that oil cakes from cotton seed will provide some quantity of animal feed in near future in the project area. The poultry birds also depend on natural supply of food like insects and wild grains available on land and water. However kitchen wastage provide substantial poultry feed.

7.1.5 BREEDINGS

The present poor condition of animals are largely due to indiscriminate breeding. There is no selection and practically no consideration is made of age, health and quality of bull. As a result calves obtained from them are small in size, weak and unhealthy. For human consumption milk is squeezed leaving no share for the calves and they never get the minimum required quantity of milk needed by them as the average production of milk is well below 2 pounds. Consequently calves can not grow properly and face under nourishment. This is a continuous process and serious attention is not given to this problem though two centres of artificial insemination has been established in the project area, these centres provide good seed but no feed . As a result improvement by means of cross breeding and improved breeding is yet to be accountable, same is the case of goats and poultry. Though some improvement for poultry is being attempted by means of cross breeding with improved varieties imported from abroad, but no attempt is made to improve the lot of goat and sheep population. The obvious result due to above conditions are low productive capacity of the live stock population of the project area.

7.1.6 ANIMAL HEALTH

It has already been observed that the general animal health is poor and they become easy victim of different diseases. Specially the poultry birds are very often attacked by diseases and people complain of inadequate veterinary services. Preventive services are provided only when the Thana Live Stock Offices receive supply of medicine while treatment facilities are provided only when the animals are brought to the dispensaries. As no union wise account is kept for

animals treated and vaccinated and the project area is spread over two thanas the actual number of cases of attack and treatment could not be ascertained. But the rates of diseases are very high as in almost every fortnightly meeting of the ' Sarathi ' complains are lodged against disease of live stock and poultry birds.

Though the actual number of attacks could not be ascertained but the common diseases in the area are Mastitis, Humpsore, Parasites, Anthrax, New Cattle disease (Ranikhet) and Rinder pest. These diseases are treated with 152 items of medicine as and where required.

7.1.7 INSTITUTIONAL SUPPORT

As the area is spread over two thanas the area is served by two seperate offices of the Department of Live Stock situated one in each thana headquarter. Both the thanas have two seperate dispensaries for treatment of animals. In addition to the treatment of diseases they also serve as the artificial insemination centre for cow. A third centre for artificial insemination has been recently established in Dagachra within the project area. Number of cows served in the insemination centres daily averages seven to eight. But seed is not always available and complain of some mismanagements are there. Following staff are employed in the offices who are responsible for both curative and preventive aspect of anival treatment.

A.	Thana Live Stock Officer	1
	Field Assistant	2
	Peon	1
		4
B.	Veteranarian	1
	Assistant Veterinarian	2
		3

7.1.8 OUTPUT FROM CATTLE AND POULTRY

Though there is higher potential for milk and egg production the actual production is far from satisfactory. The average production of milk per day per cow is less than 2 pounds and a hen on an average lays 90 to 120 eggs per annum. This is very low in comparision to the production of developed countries of the world.

7.1.9 SCOPE AND SUGGESTION FOR DEVELOPMENT

The state of affairs in the agricultural field suggest that animal power will continue to play its present role in years to come. Replacement of animal power by mechanisation is not possible in near future, neither it is desirable as it will deprive employment to already over crowded labour market. At present the total number of working cattle is 17900 or 8950 pairs for cultivation of 32 thousand acres which means per pair of cattle has to work on 3.86 acres of land.

The demand for animal power will significantly increase at full development stage of the project. As such considering the problems of introduction of mechanised power, the situation will worsen. In order to cope with the situation the quality and quantity has to be increased inspite of the limited scope available at this end. This can be achieved by means of arranging better feed for which provision has been kept in the future cropping pattern to cultivate fodder crops. Extension services has to be strengthened and all possible field in this regard shall have to be harnessed. Better species should be introduced and regular and continous medical services should be made available as and where needed.

7.1.10 PROGRAMMES

Live stock development demand a greater attention in the project area. In order to improve the live stock situation the following programmes will be under taken :

A. Introduction of improved variety and cross breeding with local varieties to improve the local stock.

B. Provision of effective extension services.

C. Cultivation of fodder.

A. Better quality bulls and cows will be introduced in the area in larger number. The breeding of all local stocks will be gradually withdrawn and replaced by cross breeding with better stock. Improved variety of poultry birds will also be introduced to improve the poultry products.

B. Extension Service : It has been observed that lack of medical care causes loss to live stock aand poultry population in the area. To fight this situation seperate service for project area will be under taken.

C. Cultivation of fodder : In the cropping pattern provision for fodder cultivation has been made. Munufacturing unit for poultry feed from indigineous source will be established here and funds has been allocated in this peapect.

7.2 FISHERY PRODUCTION

7.2.1 GENERAL CONDITION

Fish is a very important diet component and provides 80% of protein in Bangladesh. Major source of fish is inland fisheries which include rivers, haors and baors, Ponds and tanks. In the project area pissi-culture is becoming popular day by day and during breeding season it is found every now and then that hawker carrying fish fry on an and jars to sale them to prospective cultivators. It has been

reported by both the Thana Fishery Officers of Jhikargacha and Sarsa that the demand for fish fry was so high during the 1978-1979 season that they could supply fish fry to a part of the buyers that came to them. In order to meet the growing demand several private farms for production of fish fry has been established in and around the project area. The project area is suitable for pisci-culture. After the construction of UJ canal the old meander course of the river Betna has been converted to a field for pisci-culture. Organised cultivation of fish has been reported in the Betna course though the canal itself is yet to be used for fish culture due to non-availability of sufficient water round the year.

Inspired by the zeal of self-help and self-reliance most of the ponds are being gradually brought under pisci-culture. Some of the ponds in the area dry up during the dry season and need reexcavation for pisci-culture.

Better income from smuggling of fish also motivate some people to cultivate fish in the project area.

7.2.2. FISH SPECIES

The major fish species available in the project area are carp of all varieties i.e. Rohue, Catla, Mrigal, Nilotika and Japani Carp. Japani carp has been newly introduced in the area. In haors specially in the Kanyadaha baor of Ulashi shrimps are cultivated.

7.2.3 METHODS

Mostly nets are used for the purpose of catching. Fish is also caught by traditional bamboo traps. No modern mechanised fishing method is used, neither it is required as most of the fishing

grounds are closed. There is indiscriminate catching of legal varieties, but very recently care is being taken in catching the major varieties. Consideration is made of size and maturity. There are obvious attempts to increase income from fishery resources. Consequently systematic rearing of fish is found in private ponds, baors and old Betna course where several fishery co-operatives are working.

7.2.4 YIELDS

No estimate of per acre yield of fish has been made for absence of proper data. However it is understood that the per acre yield of baors and the old Betna will be much higher than the ponds and tanks. A rough estimate indicate that average per acre yield of all types of water bodies is six to ten maunds per year.

7.2.5 MARKETING AND PROCESSING

Though pisci-culture has received a favourable response in the area, the products are yet to be ready for catching and marketing. Out of the present catch major portion is locally consumed and a little is marketed in the district town of Jessore. It is apprehended that some quantity of fishes are smuggled out to India.

7.2.6 INLAND WATER RESOURCES

The total water areas available for pisci-culture in the area is described in the following table No. 7.2.

TABLE NO. 7.2

WATER BODIES FOR PISCI; CULTURE IN UJ.

Derelict Ponds	375 acres
Beels and Baors (Appr)	350 acres
Old Betna	76 acres
UJ Canal	21 acres
Closed water (Ponds and Tanks)	1395 acres

Source Field Survey, Village Survey, Thana Fishery Office, Sarsa.

The project area has quite a good number of ponds where fish fry has been liberated during 1978-1979. The ponds are divided into various categories according to their size. Table No. 7.3 gives detail of ponds in the project area with the number of fish fries liberated in them.

7.2.7 DISEASE

Fish culture is also not free from diseases and this causes fish losses to some extent. The major disease that is found in fish is mal-nutrition. Water pest also causes damage to the fish fry in the initial stage. The cause of mal-nutrition is inadequate supply of food. Some times due to ignorance some people liberate huge quantity of fish fry beyond the capacity of a pond. Thus crowding is resulted and too many species in a too small place fight for survival and do not get proper food. Naturally many die or can not grow to proper size resulting in the low yields. The recommended amount of fish fry is about 6500 number of 3" to 4" long for one

acre of water area. Water pollution also causes some losses of fish population. But for want of data actual loss thus encurred couldnot be ascertained.

TABLE NO. 7.3

NUMBER SIZE ACREAGE AND QUANTITY OF FISH FRY LIBERATED IN THE PONDS OF PROJECT AREA DURING 1978-1979.

Size	Number	Acreage	Fish fry in lakh
below 1 bigha	2766	1396	10.9
1 to 3 bigha	353	194	1.8
3 to 9 bigha	98	178	1.7
Total	3217	1768	14.1

Source : Thana Fishery Office, Jhikargacha and Sarsa.

7.2.8 FISHERY CO-OPERATIVES

There are 4 fishery co-operatives in the project area who has received the old Betna Course as lease for pisci-culture. These co-operatives have received loans amounting Taka 1.6 lakh. Table 7.4 gives the details of the fish co-operatives whose members are incidentally land less.

TABLE 7.4

FISHERY CO-OPERATIVES IN UJ AREA (BETNA CHANNEL)

Name	Acre	Loan in Taka
Samlagacha Bhumihin Samabaya Samity	24.07	Tk. 50,000/=
Trimohini Bhumihin Samabaya Samity	21.35	Tk. 43,000/=
Uttar Burua Dagan Bahumukhi Samabaya	20.35	Tk. 42,000/=
Kasirber Mahila Samabaya Samity	10.00	Tk. 25,000/=

Source : Minutes of Sarathi fortnightly meetings. Till May, 1979 80% of the loan money has been disbursed.

7.2.9 INSTITUTIONAL SUPPORT

The thana Fishery Offices located in Jhikargacha and Bagaahra look after the extension activities of fish cultivation. They provide fish fry and species as and when available. They at the same time advice the people the techniques and procedure of fish culture. The thana fishery offices are staffed with following personnels :

Thana Fishery Officer	1
Field man	3
Peon	1
Sweeper (Part time)	1
	6

7.2.10 OUT PUT AND GROSS PRODUCTION VALUE

In absence of proper data relating to actual production it has been assumed that average yield per acre is 6 maunds. Thus the total yields come to 2215 X 6 = 1329 maunds. We assume that the per maund price is Tk. 400/= and when clculated gross production value comes to Taka 53 lakh. As major portion of the fish catch is for house hold consumption the above amount is the indicative of the value at market price.

Though pisci-culture has received good response, it is yet to be scientific and methodical. Few ponds are provided with fish feed and the only cost at present incurred is the price of fish fry.

These fish grow in natural condition. As such no attempt is made here to compute the cost of production.

7.2.11. SCOPE AND SUGGESTION

Fishery production can be increased substaintially by proper utilisation of the available water bodies. A large number of water bodies dry up in dry seasons. These water bodies needs reexcavation to retain water through out the year. For irrigation and drainage purpose the Betna and Of canal will be reexcavated. Now in the present content maximum number of ponds as permitted by fund will be reexcaveted for pisic-culture Thana Fishery Offices will be given additional allocation from the project fund to increase their capacity of reising fish fry and extension service. The number of ponds to be developed will be decided by the swanirvar committee on the basis of fund availability.

8 PHASING AND SCHEDULE OF INVESTMENT COST

8.1 BUDGET

The total investment cost involved in this project is estimated to be Taka 3.7 crore. The investment schedule of the two year Development Plan of the project area provides a total of Taka 3.2 crore for food production (Page13,Table - 2.1). But the estimated investment cost for the project exceeds this amount by about Taka 50 lakh. This amount is proposed to be transferred from the allocation of employment sector where the total investment is Taka 3.3 crore, government contribution being Taka 1.7 crore. The entire amount of Taka 50 lakh proposed to be transferred will be from government share. We have already seen that most people in the project area earn a living from agriculture. It is likely that any investment for agricultural development will generate more employment in this sector, the transfer of capital to agriculture is reasonable.

8.2 INVESTMENT PERIOD

The investment will be made in two years starting from 1980 and will be completed in the second year that is in 1981. The major investment of Taka 2.9 crore will be made in the first year and the rest will be made in the year 1981 totalling Taka 79 lakh.

8.3 SOURCES OF FUND

The cost of proposed investment in the project area is designed to be met both through government grants and local contribution by the villagers. The respective share as calculated was 42% by self-help and the government contribution 58%. In view of the success achieved till now it is here proposed that 64% of the total budget shall be obtained from government contribution and self-help will contribute 36% of the investment cost.

The allocation has been done arbitrarily and the reduction in the self-help contribution has been done to reduce the burden on the people who mostly are not capable of paying such amounts.

Considering the ability to pay factor, self-help contribution has been kept limited within the items of pumps, irrigation and drainage channel, land and pisci-culture. The villagers will bear 23% of the cost of Pumps which they will be willing to pay as it will be their pumps. The irrigation and drainage channel is the major sector where majority of the works will be done through self-help. 58% of the total cost is to be borne by the villagers on self-help basis. As the villagers can physically take part in construction of channels it is possible that they contribute most here.

100% of the cost for land needed for different purposes should come from villagers. It is expected that land will be donated by the villagers and this will not involve any investment from government side. Self-help can be efficiently utilised in fish cultivation. The villagers will be willing to bear the cost of reexcavation of ponds beels and baors by themselves. As such it is estimated that self-help will contribute about 62% of the cost. Rest of the fields will have no self-help contribution. This has been done considering the nature of work where physical participation will not minimise the cost significantly.

8.4 INVESTMENT COST

The proposed investment in the project area will cover different fields like installation of pumps for irrigation, excavation of channels for irrigation and drainage, construction of godown, training and credit, workshop for repair and maintenance of parts of agricultural equipments and pumps. The proposed investment cost even provide fund for management and over head, contingencies and

miscellaneous expenses. Pisci-culture and live stock development receive large allocation in the investment budget. The major allocation has been made to excavation of irrigation and drainage channel. This receives 44% of the total budget allocation. The next major allocation has been made to installation of pumps which receives about 36% of the proposed investment. Other important fields are ere credit receive 7%. Live stock and poultry 3%, training 2%, pisci-culture 2%, workshop and equipments 1%, godown 1% (Table 8.1).

It is proposed that 250 new Deep Tube Wells will be installed in the project area at a cost of Tk.1.3 crore. The cost for each DTW will Taka 50 thousand. The Bangladesh Agriculture Development Corporation will supply DTW. Though the cost of each DTW is Taka 1.7 lakh. BADC supply that on payment of Taka 50 thousand by the farmers. The balance amount is paid by BADC as subsidy. The cost also covers the construction of a pump house.

In addition to 250 DTW, 350 hand pumps at a cost Taka 70 thousand will be installed in the project area. Per hand pump cost will be Taka 2 thousand which is also subsidised. Of the total cost of pumps local people will contribute Taka 29 lakh which is about 23% of the total cost. With the installation of these pumps the irrigation facility will be available to about 25000 acres of land which is about 64% of the total cultivable land in the preject area. Channels for irrigation and drainage is very important for any scheme aiming to utilise irrigation water and drain out excess water during heavy shower. Considering the importance of these channels, highest fund allocation has been made to it. The total amount proposed to be spent in this field has been estimated to Taka 1.6 crore. With this amount 392 thousand feet of pucca drain will be constructed. All the 285 deep tube wells will have 1000 feet of pucca drain each.

all the 142 low lift pumps shall have 800 feet of pucca drain each and all the shallow tube well shall have 250 feet of pucca drain each. This will involve an amount of Taka 1.5 crore at the present rate of Taka 40 per feet of pucca drain. The remaining Taka 6.7 lakh will be spent for excavation of distributory and drainage channel involving earth work only. The self-help component here is Taka 93 lakh or 88% of the total fund allocation in this field.

It is already stated that land will be entirely provided on self-help basis while pisci-culture will meet 62% of the expenses by self-help. Rest of the expenses will be met entirely from government fund. Expenses on credit and training has been explained in chapter-6 while expenses on management, contingencies and miscellaneous account to be decided by the Swanirvar Committee to be set up for implementation of the present project.

8.8 ANNUAL COST

The investment cost will require some annual service cost. There are operation costs of pumps, maintenance cost of irrigation channels, godowns, fish-ponds, workshop etc. The live stock and poultry service, management, training and miscellaneous account will need annual recurring cost. The total amount needed is estimated to be Taka 83 lakh (table 8.4).

The annual operation cost of deep tube wells will be 14000 taka each, shallow tube well 8650 taka each, low lift pump 8000 taka each and 300 taka for each hand pump (appendix). Thus annual cost for irrigation alone will be taka 64 lakh. The maintenance cost of irrigation channel has been estimated on the basis of 0% of the investment cost. In this manner annual cost of godowns,

live stock and poultry, fish ponds, workshop and equipments have been calculated and fixed at 2%, 5%, & 10% respectively. Annual costs for management and miscellaneous account have been calculated on lump sum basis and fixed at 1.2 lakh taka and 50 thousand taka respectively.

TABLE 8.1

PROPOSED INVESTMENT COST FOR AGRICULTURAL DEVELOPMENT

in thousand taka

Items	Self-help	Government contribution.	Total	Percentage
Pumps	2967	10213	13200	35.5
Irrigation and drainage channel	9334	6800	16334	44
Land	500		500	1.3
Godown		450	450	1.2
Pisci-culture	600	300	900	2.1
Credit		2600	2600	7.0
Live-stock and poultry		1200	1200	3.2
Training		930	930	2.5
Workshop and equipments		500	500	1.3
Management and Over head		200	200	0.5
Contingency		138	138	0.4
Miscellaneous		100	100	0.3
Total	13541	23631	37172	

TABLE 5.2

PROPOSED INVESTMENT COST IN THE YEAR 1990

In thousand Taka

Items	Self-help	Govt. Contribution	Total
Pumps :			
200 Deep Tube Well			
350 Hand Pump	2675	8025	10700
Irrigation and Drainage Channel	6466	5900	12366
Land	500		500
Godown		450	450
Pisci-culture	225	200	425
Credit		2800	2800
Live stock & poultry		500	500
Training		930	930
Workshop and Equipments		500	500
Management and Overhead		100	
Contingency			
Miscellaneous		50	50
Total	9866	19355	29221

TABLE 8.3

PROPOSED INVESTMENT COST IN THE YEAR 1981

in thousand taka

Items	Self-help	Govt. Contribution	Total
Pump			
50 Deep Tube Well	312	2188	2500
Irrigation and Drainage Channel	3088	1000	4088
Land			
Godown			
Pisci-culture	275	100	375
Credit			
Live-stock & poultry		700	700
Training			
Workshop and Equipments			
Management and Overhead		100	100
Contingency		138	138
Miscellaneous		50	50
Total	3675	4276	7951

TABLE 8.4

PROPOSED ANNUAL RECURRING COST FOR PROJECT

					In thousand Taka
Pump :					
DTW	: 285 X 14000	= 3990			
STW	: 145 X 8680	= 1254			
LLP	: 142 X 8000	= 1136			
HP	: 350 X 305	= 105	.....		6485
Irrigation and Draining Channel		@ 5%			317
Godowns		2%			9
Fish-ponds		5%			40
Live-stock & poultry		10%			120
Management & Establishment		1.5			125
Training					730
Workshop and Equipment		10%			50
Miscellaneous		1.5			10
Total					8376

In 1981 annual expenses will be 7186
In 1982 and onward 8376

9 FINANCIAL ANALYSIS

Financial analysis of the costs and benefits is required in order to find out the viability of a project. Estimated cost and benefits of the present project have been processed in earlier chapters. Attempts will be made in this chapter to work out and show the results of the financial analysis of the proposed investment and benefits thus accruing.

9.1 NET PRESENT VALUE (NPV) OF THE PROJECT

Present worth of the total cost stream of the project over its life at 15% rate of interest (which is considered as the present opportunity cost of capital in the country) has come to Taka 587 million as shown in Table 9.2

Present worth of the benefit stream of the project at the same rate of interest, on the other hand, been taka 711 million as shown in the same Table 9.2

Net present value of the project in 1979 has therefore been Taka 123.51 million.

9.2 BENEFIT/COST RATIO

At the prescribed opportunity cost of capital (15%) in this country at present, benefit/cost ratio of the project is found to be 1.21 as shown in Table 9.2

9.3 INTERNAL RATE OF RETURN

Investment in the project will result in an internal rate of return of 43.2%

This rate of return is determined with the help of interpolation rule, as shown in Table 9.5. Interpolation is made in this case between 40% and 45% rate of discount as the NPV is positive at the lower rate (40%) and negative at the higher rate of discount (45%)NPV of the project at 45% discount rate is shown in Table 9.4

Thus the IRR worked out for this project is very high. The project represents a change of and expansion in the existing activity and does not represent introduction of any new activity. The introduction of this project enhances the benefit to large extent and the magnitude of benefits in the initial years are very high. As a result this excellent IRR has been achieved. Experience of such high IRR has been observed in other similar projects. Reference can be made of a project of Rice production in Ghana where IRR was more than 40 which Stern describes as an excellent rate of return.[1]

The economic analysis of the project has not been done considering the nature of the project. The project being a self-help project and government contribution coming as grant it is not considered for economic analysis. The conversion of output prices and input costs from market to economic values, allowing for subsidies provided for pumps and fertilizer, foreign exchange costs, taxes and unskilled labour cost seems difficult for this type of project. Any way if the economic analysis is made the IRR would have been much less than the rate at financial consideration.

Tables 9.1 to 9.5 contain the financial appraisal of the project. We have already explained that the project is a change of and

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1. Joseph J. Stern and Michael Roemer, The Appraisal of Development projects, A Practical Guide to Project Analysis with case studies and Solutions, Agriculture : Co-operative Rice Project (case -2), Praeger Publisher, Newyork,1978, page 138

expansion is an existing activity and as such we are practically dealing with the additional costs incurred when the project is implemented and the additional benefits thus accruing. In this process it is essential to identify the additional costs and additional benefits seperately.

In order to identify the additional cost and benefit, it is required to determine the stream of benefits and costs of cultivation without project and with project. This is done in the Tables 9.1 to 9.5. Item A in Table 9.1 shows the total acreage planted for each year, broken down into acreage under cultivation without project, acreage brought under project and acreage by way of intensive cultivation. Item B represents the production starting with present production in 1979 then showing the expected production with project which increases with introduction of the project in 1981 and then in 1982 and onward production with project are recorded. The total production is shown in thousand maunds which is average of all crops. For details please see table 6.6 in chapter 6. Column B-4 shows the total production and B-5 increased production due to project. Item C shows the total revenue with and without project. Column C-2 shown the value of production without project and C-3 value with project. C-5 is the increased revenue due to project. Revenue is determined by multiplying the total production with average value of crop per maund and it is estimated that value of crop with project is Tk.100/= while it is Tk. 80.2 before the project is implemented.

Item D shows the capital expenses detail of which can be seen in Table 8.2 and 8.3 in chapter 8. In this project, it is necessary to provide for replacement after five years for pumps installed before the project is implemented and workshop equipments. On the other hand pumps installed with the implementation of the project are needed to be replaced after 10 years. So the investment cost is repeated beginning in the year 1986 and in 1991 and 1992 following the initial sequence. Item E shows the annual costs of

the project. E-1 is the annual cost without project (Table 5.10). E-2 represents the cost of production with project (Table 6.6). E-3 recurring cost due to project (Table 6.4). E-4, E-5 and E-6 are provision for capital replacement. Line E-7 is the total annual cost while E-8 represents increased annual recurring cost due to project. So the marginal cost E-8 and marginal benefit C-5 are derived and in Table 9.2 it has been discounted at 15% interest and in Tables 9.3 and 9.4 are repeated at 40% and 45% discount respectively. Thus IRR is derived and formula for computation of IRR is shown in Table 9.5.

The major problem faced in making the financial analysis of the project was the determination of life of the project. The ongoing nature of the investment activity in the project presents a problem in determining the life of the project. In fact, the project has an infinite life and to obtain a good approximation of Net Present value we have arbitrarily determined the life of the project as 15 years keeping provision for replacement of pumps after 10 years. In the process of replacement salvage value has not been considered for simplification in calculation. The commission of salvage value has reduced the NPV to a little extent. On the other hand the growth rate of agricultural production has been kept static though the country as a whole is experiencing a modest growth of 1 to 2 percent over the previous years. This has been done in view of crop failure which may occur due to some adverse circumstances in some years.

9.4 CONCLUSION

Bangladesh is a developing country with tremendous pressure of population. The country is facing food shortage and a heavy drainage of her hard earned foreign exchange for importing food grain is constantly hindering her other development activities.

Though the potential for self-sufficiency in food is very high, the country is yet to make any major break through in this respect. From analysis of soil and water availability it can be easily said that the country can be made self-sufficient in food in near future. This requires proper programming of the agricultural activities. This will also ensure employment to the population, 80% of which is dependant on this sector for a livelihood to be earned.

In our present study we have seen that by proper programming of agricultural activities, a deficit area can be turned to not only self-sufficient, but also surplus with an investment which provide a benefit/cost ratio of 1.21% at 10% rate of interest which is the present opportunity cost of capital in our country. At present a positive benefit/cost ratio at 10% rate of interest is considered as viable for an investment project in the country and our present study of the agricultural development of the UJ area providing a benefit/cost ratio of 1.21% which by all standard justifies the taking up of such projects throughout the country.

We have already observed that the country has a deficit in food supply and due to shortage of fund and heavy import of food grain other development activities practically could not be under taken at a speed and pace to meet the requirement of a developing country. In this state of affairs projects of UJ size & kind through out the country may help in achieving the national goal of food self-sufficiency. On the other hand the project of UJ type will not only achieve food self-sufficiency but check the alarming population growth rate and illiteracy.

The co-operation that is to develop among the people will minimise the costs of a project to a great extent making possible of taking up of such a project. People will together

fight a problem and a sense of co-operation and fellow feeling in all matters will bring success in the field of Production and peace among the people. This will make the country developed and people will really live in peace and affluence. As such UJ project may be replicated throughout the country.

TABLE 9.1

A ACREAGE (TOTAL ACRES) ULASHI- JAMUNATHPUR

A ACREAGE (TOTAL ACRES)	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1.WITHOUT PROJECT	52474	52474	37474	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.WITH PROJECT	-	-	15000	52474	52474	52474	52474	52474	52474	52474	52474	52474	52474	52474	52474	52474	52474
3.ADDITION DUE TO CROPPING INTENSITY	-	-	-	-	20626	20626	20626	20626	20626	20626	20626	20626	20626	20626	20626	20626	20626
4.NET CROPPED AREA	52474	52474	52474	52474	73100	73100	73100	73100	73100	73100	73100	73100	73100	73100	73100	73100	73100

B. PRODUCTION, MT (AVERAGE OF ALL CROPS : FIGURES IN THOUSAND MAUNDS)

B. 1 YEARS	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
2.WITHOUT PROJECT	1010.6	1010.6	722	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.WITH PROJECT			525	1837	2558	2558	2558	2558	2558	2558	2558	2558	2558	2558	2558	2558	2558
4.TOTAL PRODUCTION	1010.6	1010.6	1247	1837	2558	2558	2558	2558	2558	2558	2558	2558	2558	2558	2558	2558	2558
5.INCREASED PRODUCTION	-	-	237	827	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546

Average Production without project 19.28 Maunds

Average Production with project 35 maunds. (Figure Rounded)

C. REVENUES TO FARMERS (IN THOUSAND TAKA)

C.1 YEARS	1979	1980	1981	1982	1983	19	985	1986	1987	1988	1989 *	1991	1992	1993	1994	1995
2. WITHOUT PROJECT	87173	87173	72200	-	-		-	-	-	-	-	-	-	-	-	-
3. WITH PROJECT	-	-	52500	183700	255800	255	5800	255800	25800	255800	255800	255800	255800	25800	255800	255800
4. TOTAL REVENUE	87173	87173	124700	183700	255800	255	5800	255800	255800	255800	255800	255800	255800	255800	255800	255800
5. INCREASED REVENUE DUE TO PROJECT	-	-	37527	96527	168627	168	8627	168627	168627	168627	168627	168627	168627	168627	168627	168627

Per maund average value of crop without project Tk.86.2

Pound average value of crop on the opening year of project Tk.00 (figure rounded)

* The figures for 1990 are same as 1989.

D. INVESTMENT SCHEDULE OF TWO Y DEVELOPMENT PLAN FOR AGRICULTURE IN UJ (FIGURES IN THOUSAND TAKA)

D.1 YEARS	1979	1980	1981	1982	1983	198	985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1. PUMPS	-	10700	2500	-	-	-	-	7490	-	-	-	-	10700	2500	-	-	-
2. IRRIGATION CHANNEL	-	12266	4088	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. LAND	-	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. GODOWN	-	450	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5. PISCICULTURE	-	425	375	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6. CREDIT	-	2800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7. LIVE STOCK & POULTRY	-	500	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8. TRAINING	-	030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9. WORKSHOP & EQUIP.	-	500	-	-	-	-	-	500	-	-	-	-	-	500	-	-	-
10. MANAGEMENT & OVERHEAD	-	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11. CONTINGENCY	-	-	138	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12. MISCELLANEOUS	-	50	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13. TOTAL	-	28221	7951	-	-	-	-	7990	-	-	-	-	10700	3000	-	-	-

E. ANNUAL COSTS FOR AGRICULTURE IN ULASHI-JADUNATHPUR, FIGURES IN THOUSAND TAKA .

E. YEARS	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1.COST OF CULTIVATION WITHOUT PROJ.	41030	41039	77006	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.COST OF CULTIVATION WITH PROJECT	-	-	30885	107891	150513	150513	150513	150513	150513	150513	150513	150513	150513	150513	150513	150513	150513
3.RECURRING COST DUE TO PROJECT	-	-	7186	8376	@ 8376	8376	8376	8376	8376	8376	8376	8376	8376	8376	8376	8375	8376
4.REPLACEMENT RESERVE(a)	-	-	1598	1598	1598	1598	1598	-	799	799	799	799	799	799	799	799	799
5.REPLACEMENT RESERVE(b)	-	-	1070	1070	1070	1070	1070	1070	1070	1070	1070	1070	-	1070	1070	1070	1070
6.REPLACEMENT RESERVE(c)	-	-	-	250	250	250	250	250	250	250	250	250	250	-	250	250	250
7.TOTAL ANNUAL COST	41039	41039	117745	119185	161807	161807	161807	160209	161008	161008	161008	161008	159938	160758	161008	161008	161008
8.INCREASED ANNUAL COST DUE TO PROJ.	-	-	76706	78146	120768	120768	120768	119170	119969	119969	119969	119969	118899	119719	119969	119969	11969

Average per acre cost of production without project Tk. 783.2

Average per acre cost of production in the opening year of th project Tk. 2050.00

a) Replacement reserve for pumps installed before the project was taken. It also include replacement reserve for workshop equipments.

b) Replacement reserve for Pumps installed in 1980
c) Replacement reserve for Pumps installed in 1981
* No interest has been charged.

F. CASH FLOW FROM AGRICULTURE IN ULASHI-JADUNATHPUR.

F. YEARS	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1.ADDITIONAL REVE C-5	-	-	+37527	+96527	+168627	+168627	+168627	+168627	+168627	+168627	+168627	+168627	+168627	+168627	+168627	+168527	+168627
2.SUBTRACT INVE-D-13	-	- 29221	- 7951	-	-	-	-	- 7990	-	-	-	-	- 10700	- 3000	-	-	-
3.SUBTRACT ADD. RECURRING COST E-8	-	-	-76706	-78146	-120768	-120768	-120768	-119170	-119969	-119969	-119969	-119969	- 118699	-119719	-119969	-119969	-119969
4.TOTAL OF ITEM 2 & 3	-	- 29221	-84657	-78146	-120768	-120768	-120768	-127160	-119969	-119969	-119969	-119969	- 129599	-122719	-119969	-119969	-119969
5.TOTAL CASH FLOW	-	- 29221	-47130	+18381	+47859	+ 47859	+ 47859	+ 41467	+ 48658	+ 48658	+ 48658	+ 48658	+ 39028	+ 45906	+ 48658	+ 48658	+ 48658

TABLE 9.2

PRESENT WORTH OF COSTS AND BENEFITS AT 15% RATE OF INTEREST (AT 1979 FINANCIAL COST) ULASHI-JADUNATHPUR.

(in thousand Taka)

Year	Total Additional Cost F-4	Total Additional Benefit C-3	Discount Factor	Discounted Cost	Discounted Benefit
1979			1.000		
1980	30221		.870	25422	
1981	84607	37527	.756	64001	28370
1982	78148	96527	.658	51420	63515
1983	120768	166527	.572	69079	96455
1984	120768	166527	.497	60022	83808
1985	120768	166527	.432	52172	72847
1986	127160	166527	.376	47812	63404
1987	119969	166527	.327	39230	55141
1988	119969	166527	.284	34071	47590
1989	119969	166527	.247	29632	41651
1990	119969	166527	.215	25793	36255
1991	129599	166527	.187	24235	31533
1992	122719	166527	.163	20003	27480
1993	119969	166527	.141	16916	23776
1994	119969	166527	.123	14758	20741
1995	119969	166527	.107	12837	18043
				587401	710915

Net present value at 15% rate of interest Taka 123.4 million
Benefit/cost ratio at 15% rate of interest is 1.21%

TABLE 8.3

PRESENT WORTH OF COSTS AND BENEFITS AT 40% RATE OF INTEREST (AT 1979 FINANCIAL COST) ULASHI-JAGANNATHPUR.

(in thousand Taka)

Years	Total Additional Cost F-4	Total Additional Benefit C-3	Discount Factor	Discounted Cost	Discounted Benefit
1979			1.000		
1980	29221		.714	20864	
1981	84657	37537	.510	43175	19139
1982	78146	96627	.364	28446	35136
1983	120768	168627	.260	31400	43843
1984	120769	168627	.186	22463	31365
1985	120769	168627	.133	16063	22927
1986	127160	168627	.095	12080	16020
1987	119969	168627	.068	8158	11467
1988	119969	168627	.048	5760	8094
1989	119969	168627	.035	4199	5902
1990	119969	168627	.025	2999	4216
1991	129509	168627	.018	2333	3035
1992	122710	168627	.013	1595	2192
1993	119969	168627	.009	1080	1518
1994	119969	168627	.006	720	1012
1995	119969	168627	.005	600	843
				201032	266200

Net present value at 40% rate of interest Taka 5 million
Benefit/Cost ratio at 40% rate of interest is 1.021%

TABLE 9.4

PRESENT WORTH OF COSTS AND BENEFITS AT 40% RATE OF INTEREST (AT 1979 FINANCIAL COST) ULASHI-JADUNATHPUR.

(in thousand Taka)

Years	Total Additional Cost F-4	Total Additional Benefit C-B	Discount Factor	Discounted Cost	Discounted Benefit
1979			1.000		
1980	20321		.690	20163	
1981	84657	37527	.476	40297	17863
1982	76146	66527	.328	25632	31661
1983	120768	166627	.226	27294	38110
1984	120768	166627	.156	18840	26306
1985	120768	166627	.108	13043	18213
1986	127160	166627	.074	9410	12478
1987	119969	166627	.051	6118	8500
1988	119969	166627	.035	4199	5902
1989	119969	166627	.024	2879	4047
1990	119969	166627	.017	2039	2867
1991	129399	166627	.012	1555	2024
1992	122719	166627	.008	982	1349
1993	119969	166627	.006	720	1012
1994	119969	166627	.004	480	675
1995	119969	166627	.003	360	506
				174010	171612

Net Present value at 45% rate of interest Taka 2.3 million
Benefit/Cost ration at 45% rate of interest 0.986%.Internal Rate of Return (IRR) = 43.2%

TABLE 8.8

FORMULA FOR COMPUTING INTERNAL RATE OF RETURN : (IRR)

$$IRR\ (\%) = r_1 + \left(\frac{a}{a+b}\right)(r_2 - r_1)$$

$$= 40 + \frac{4277}{4277 + 2598} \times 5$$

$$= 40 + \frac{4277}{6875} \times 5$$

$$= 40 + 3.20$$

$$= 43.2\%$$

Where : r_1 = Lower rate of discount at which NPV is positive

r_2 = Higher rate of discount at which NPV is negative

a = NPV at lower rate of discount

b = NPV at higher rate of discount

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APPENDIX A

QUESTIONNAIRE

Union | Serial No.

Village | Name of interviewer

Name of head of the family

Type of Family | Religion

1. Description of family

Name Relation with head age male female Education of the family

2. Occupation (agricultural occupation)

Active member | Works in own land Months 3 6 9 12 | Works in others land Months 3 6 9 12

Causes of not working for rest of the period

Can maintain from family from farm | Income from bamboo bush | Income from date garden | Income from pond | Other income | Monthly income

3. Other occupation.

Family member Occupation Time 3 6 9 12 Cause of not working in rest of the period

No work Natural calamities sick old age student minor housewife monthly income.

4. Farm size and ownership.

Size Own land Cultivates own land only | Land cultivating as share-cropper | Do not cultivate own land

Permanently fallow Total land cultivated by him

5. Irrigation.

Area under irrigation (last year)

Season Deep Tube Well Shallow Tube Well Low Lift Pump Handpump Indigenous method Rainfed Total

6. Fertilizer use.

Quantity used (last year)

Season Urea TSP Potash Cowdung Ashes Quantity Price.

7. Crop Production/Distribution/Surplus/Deficit/ in maunds (last year)

Season Crop Own Production Share of the land owner Wages paid to labour Waste & other loss

Share received from share cro duction Total Pro Preserved for seed Sold for payment of debt Sold for cash

To meet household need Deficit Surplus

8. Crop loss (last year) in acres.

Crop Causes of crop loss
Flood Drought Pest Shortage of fertiliser lack of Irrigation
Expected Production Actual Production Difference.

9. Do you use equipments for cultivation.

10. Do you have following equipments
Bull Plough Pump Spray machine Planner Yoke Spade Tractor Other

11. In case you don't have, where do you get : From neighbour Hire

12. What are the equipments you hire/borrow :
Bull Plough Planner Spade Yoke Tractor Spray machine Pump Other.

13. Ploughing cost of one acre of land (tillage charge) :

14. Cost of transplantation of one acre of land

15. Condition of share cropping

16. Do you have to hire labour for cultivation

17. Daily wages

18. Supply of labour :
Available Not available Plenty available Shortage during season

19. From where do you get fertiliser:
KSS TCCA BADC Local Market Own.

20. Problems in getting Fertiliser/Pesticide :
Irregular supply Short supply Transportation problem High price
No problem Shortage of Cash money.

21. Do you get required quantity of irrigation water.

22. Problems of irrigation:

Shortage of fuel No irrigation water Shortage of Pump
Mechanical trouble Costly No servicing avaulable No problem.

23. Per acre cost of irrigation

24. Do you cultivate high yielding variety

25. Intensity of cultivation: Single Double Tripple.

26. Live-stock and poultry.

Animal	Number	Where do you get feed	Problems	Production	Monthly income from live-stock and poultry

27. Fishery 28. Do you have fish pond

29. Area of your pond 30. Do you cultivate fish

31. What are the species 32. Where do you get fish fry

33. Where do you fish
Reel Canal Pond River 34. What do you do with your catch
Consume Part sell Full sell

35. Income from fish 37. Fishing equipments that you have

38. Problems of fishing and marketing : No Net No boat No credit
Marketing problem.

39. Is there any fishery co-operative in your area

40. Are you a member 41. If not, do you like to be

42. Rural Credit (last year)

Source	Interest rate	Period	Security	Repayment of loan

43. Do you require credit 44. Do you get credit

45. Is there any problem in getting loan

46. Marketing/Storage/Transportation of Crop.

47. Where do you store your grain

48. Problems of storage

49. Where do you sell your grain

50. Whom do you sell : Local consumer Middleman Local Market
Wholesaler Government Procurement Centre No Buyer.

51. Vehicle use for transportation of grain.

52. Do you have any co-operative society in your village

53. Are you a member

54. Do you attend meeting of co-operative

55. Services that you get from co-operative societies.

56. Do you like to join, if you are not a member

57. Extension Programme :

58. Do you have an extension worker

59. Has he ever met you or people of your locality

60. What are the things you learn from him.

61. Have you ever discussed any thing about your land with him

62. Has he ever visited your land.

APPENDIX B-1

Cost of Fertilizer

Crop	Urea	Tk. 90/=	T S P	Tk. 60/=	MP	Tk. 55/=	Total
		Tk.		Tk.		Tk.	Tk.
Aus	2-0	180	1-20	90	0-33	46	316
T.Aman HYV	2-0	180	1-20	90	0-33	46	316
Boro HYV	3-25	236	2-0	120	1-10	68	424
WheatHYV	2-5	192	1-30	105	0.33	46	343
Jute	1-5	102	0-11	17	0-16	23	142
G.Nut	0-33	75	1-30	105	0-37	52	232
Kharif	0-20	45	1-0	60	0-20	28	133
Potato	3-0	270	2-0	120	3-0	165	555
Mustard	0-33	75	1-30	105	0-25	35	210
Sugarcane	2-20	135	1-20	90	1-10	69	294
Vegetable	1-0	90	1-20	90	0-20	28	208
Cotton	1-20	135	1-20	90	1-20	53	308
Others	1-0	90	0-35	52	0-20	28	170

APPENDIX B-2

COST OF LABOUR, TILLAGE, SEED AND PESTICIDE

Crop	Labour No.	Tk: 20/=	Tillage Charge	Seed (asar) qty.	Taka	Pesticide in lb. qty.	Taka
Aus	55	1100	150	40	120	3-0	150
T.Aman	70	1380	175	9	35	3-9	175
Boro	75	1500	200	9	25	3-9	175
Wheat	55	1100	175	60	135	1-0	50
Jute	85	1700	150		75	1-8	75
G.Nut	50	1000	100	40	80	1-12	87
Nusari	40	800	100		40	0-8	25
Potato	100	2000	150	600	000	3-0	150
Mustard	40	800	100	4	20	0-12	38
Sugarcane	120	2400	150		100	4-0	200
Vegtable	65	1300	150		50	1-8	75
Cotton	70	1400	200	10	35	6-0	300
Others	45	900	100		50	1-8	75

T.Aman, Boro and Wheat are HYV

APPENDIX B-3

OPERATION COST OF (ANNUAL) LLP, DTW, STW AND HANDPUMP.

LOW LIFT PUMP :

Cost of operation in case of a 15 h.p. diesel engine

1. Fuel hourly consumption.75 gallon .75 X 800 X Taka 15/=	.....	Taka 9000.00
2. Lubricen Lump sum	.....	Taka 1500.00
3. Yearly maintenance	.....	Taka 1200.00
4. Operator Tk.250/= X 12	.....	Taka 3000.00
5. Miscellaneous	.....	Taka 500.00
		Taka 15100.00

(Assuming 800 hours as annual operation time)

In case of a 15 h.p. electric motor

1. Energy Cost Rate of electricity .40 per unit Per h.p. energy consumption .746 unit .40 X 15 X .746 X 800	.....	Taka 3580.00
2. Repairing and maintenance	.....	Taka 500.00
3. Operator 250 X 12	.....	Taka 3000.00
4. Yearly rent	.....	Taka 900.00
		Taka 7980.00

SHALLOW TUBE WELL

1. Fuel oil .25 gallon per hour = 300 gallons operation time 1200 hour Rate of diesel Tk 15/= per gallon 15 X .25 X 1200	.....	Taka 4500.00
2. Lubricant lump some	.....	Taka 1500.00
3. Maintenance	.....	Taka 2000.00
4. Operator Tk. 200/= X 12 months	.....	Taka 2400.00
5. Miscellaneous	.....	Taka 250.00
		Taka 8650.00

HANDPUMP

only maintenance cost (annual)	.....	Taka 350.00

DEEP TUBE WELL

Cost of operation in case of a 25 h.p. diesel engine

1. Fuel 1 gallon per hour 1 X 1200 = 1200 gallons 1200 X Taka 15/=	.....	Taka	18000.00
2. Lubricant	.....	Taka	1700.00
3. Maintenance	.....	Taka	2000.00
4. Operation 250 X 12	.....	Taka	3000.00
5. Miscellaneous	.....	Taka	1000.00
		Taka	25700.00

In case of 25 h.p electric motor

1. Energy .25 X .746 X 1200 X .40	.....	Taka	8952.00
2. Repairing and maintenance	.....	Taka	500.00
3. Operation 250 X 12	.....	Taka	3000. 00
4. Yearly rent	.....	Taka	1200.00
5. Miscellaneous	.....	Taka	350.00
		Taka	14000.00