Socio Economic Impact of Shrimp Culture :
A Case Study on Jabusa and Naihati Village of Rupsha Thana in Khulna District

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Urban and Regional Planning

By

Farzana Rahman

Department of Urban and Regional Planning
Bangladesh University of Engineering and Technology (BUET)

May 2001

SOCIO ECONOMIC IMPACT OF SHRIMP CULTURE :
A Case Study on Jabusa and Naibati Village of Rupsha Thana in Khulna District

FARZANA RAHMAN

DEPARTMENT OF URBAN AND REGIONAL PLANNING
BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET)
MAY 2001

Thesis acceptance form

Department of Urban and Regional Planning
Bangladesh University of Engineering and Technology (BUET)
Dhaka

Socio Economic Impact of Shrimp Culture :
A Case Study on Jabusa and Naihati Village of Rupsha Thana in Khulna District

By
Farzana Rahman

Approved as to style and content by

1. Dr. Golam Rahman (Supervisor)
   Professor,
   Department of Urban and Regional Planning,
   BUET, Dhaka.

   Chairman

2. Dr. Sarwar Jahan
   Professor and Head,
   Department of Urban and Regional Planning
   BUET, Dhaka.

   Member

3. Dr. Roxana Hafiz
   Assistant Professor,
   Department of Urban and Regional Planning,
   BUET, Dhaka.

   Member 10/06/2001

4. Dr Abu Tweb Abu. Ahmed
   Professor,
   Department of Zoology
   University of Dhaka.

   Member (External)

ABSTRACT

Shrimp plays a significant role in the present economy of Bangladesh. In 1997-98, this sector contributed 7.32% of total export earnings of the country and the earnings from this sector is about US$ 155.14 million. For it's immediate return and large amount of foreign exchange earning ability, it became an attractive field of investment. As a result, farmlands in the shrimp growing rural areas of the south-western region are being converted rapidly from crop cultivation to shrimp cultivation. The aim of this research is to assess how far this conversion is beneficial to the rural society.

This research work looks into the social and economic impacts of shrimp culture on rural livelihood. This study focuses on the social and economic life of a locality from the viewpoint of landowners who leased out their land for shrimp cultivation. To identify the impact, two villages of Rupsha thana in Khulna district have been chosen. The first village is mainly a shrimp culture base village, namely Jabusa and the second one is Naihati, which is totally an agricultural village. This study critically analyses the social life and the return from agricultural land of Naihati village and compares those with shrimp cultured Jabusa village.

The study highlights some social impacts of shrimp culture such as, exploitation over the poor land owners, relation between lessee and lessor, change in rural power structure, degradation of social value, impact on education, access to common property resources, insecurity and social tensions, etc.

This study also analyses and compares these two villages from the economic point of view. It shows how the poor landowners are affected economically by the outsiders in the different aspect of their lives. It focuses the change in yield of paddy, reduction of employment opportunities, change in occupation, reduction of crop production, change in domestic animal husbandry and degradation of environmental condition due to the uncontrolled and unplanned shrimp cultivation.

Considering its high return characteristic, this research finally tries to put forward some proposals for engaging the local landowners in the shrimp culture with minimum adverse effects. It gives direction to use shrimp farming as a tool for rural development.

Title of the Thesis :

Socio Economic Impact of Shrimp Culture :
A Case Study on Jabusa and Naihati Village of Rupsha Thana in Khulna District

Thesis Supervisor :
Dr. Golam Rahman
Professor,
Department of Urban and Regional Planning,
Bangladesh University of Engineering and Technology,
Dhaka.

ACKNOWLEDGMENT

At first all gratitude goes to Almighty ALLAH. Without His immeasurable glory any work can not be fulfilled. Next my parents whose cooperation and inspiration always helped me to go forward, are gratefully remembered.

I gratefully acknowledge the valuable advice and comments of my supervisor Professor, Dr. Golam Rahman, Department of Urban and Regional Planning, BUET. His constant guidance, encouragement and advice have been instrumental in conducting this research and I feel his affectionate but disciplined guidance has allowed me to reach my destination. I would like to convey my sincere thanks to Dr. Sarwar Jahan, Professor and Head, Department of Urban and Regional Planning, BUET for his academic, administrative and logistic supports. I am equally indebted to Dr. Roxana Hafiz, Assistant Professor, Department of Urban and Regional Planning, BUET, for her cordial encouragement and valuable suggestions. My gratitude also goes to all other teachers of my discipline for their suggestions and helpful services during this course of my study.

My indebtedness to Dr. A.T.A. Ahmed, Professor, Department of Zoology, University of Dhaka for offering me valuable suggestions. His expertise and intellectual capacity in real sense added positive sprit to my research. This research is partly the product of his meaningful influence but he always considered my independent findings which truly became catalytic in reaching to a conclusive view.

I wish to offer my best gratitude to my husband Md. Akter Mahmud for his guidance, support and constant help in every stage of my performance and I believe and realize that a congenial atmosphere promoted by him has allowed me to materialize my aspirations and this research paper is an outcome of that.

FARZANA RAHMAN

ACRONYMS AND ABBREVIATIONS

ADAB	Association for Development Agencies in Bangladesh
BARD	Bangladesh Academy for Rural Development
BBS	Bangladesh Bureau of Statistics
BSCIC	Bangladesh Small and Cottage Industries Corporation
BUET	Bangladesh University of Engineering and Technology
BURP	Bachelor of Urban and Rural Planning
CDL	Community Development Library
Cm	Centimeter
GDP	Gross Domestic Product
GIS	Geographical Information System
GOB	Government of Bangladesh
HYV	High Yield Variety
In	Inch
KDA	Khulna Development Authority
Km	Kilometre
KMPP	Khulna Master Plan Project
KU	Khulna University
MSL	Mean Sea Level
MURP	Master's of Urban and Regional Planning
NGO	Non Government Organization
Tk.	Taka
WB	World Bank

GLOSSARY

CARITAS	: An NGO.
GDP	: Total monetary measure of all final goods and services for a year within a specified geographic region.
Gher	: Local term that denotes land under shrimp farming
Landuse	: Different types of uses of lands such as, agriculture, industries, settlement, pisciculture, etc.
Mouza	: Smallest revenue unit.
Nijera Kari	: An NGO
Per Capita Income	: The average level of national income for each member of the population.
Polder	: An area of low-lying land reclaimed from the sea through the building of dikes.
Salinity	: The content of salts in sea water, expressed as parts per thousand (or gm per 1 kg of water).
Thana	: Administrative unit above Union and below Zilla. (Synonymous with Upazila, but discontinued in view of GOB decision in July 1992).
Union	: Lowest administrative unit in Bangladesh which comprises of several villages.
Village	: A geo-social entity.
Yield	The part of productivity utilized by human or other animals.

CONTENTS

LIST OF FIGURES

LIST OF MAPS

LIST OF PHOTOGRAPHS

LIST OF TABLES

Chapter One
Introduction

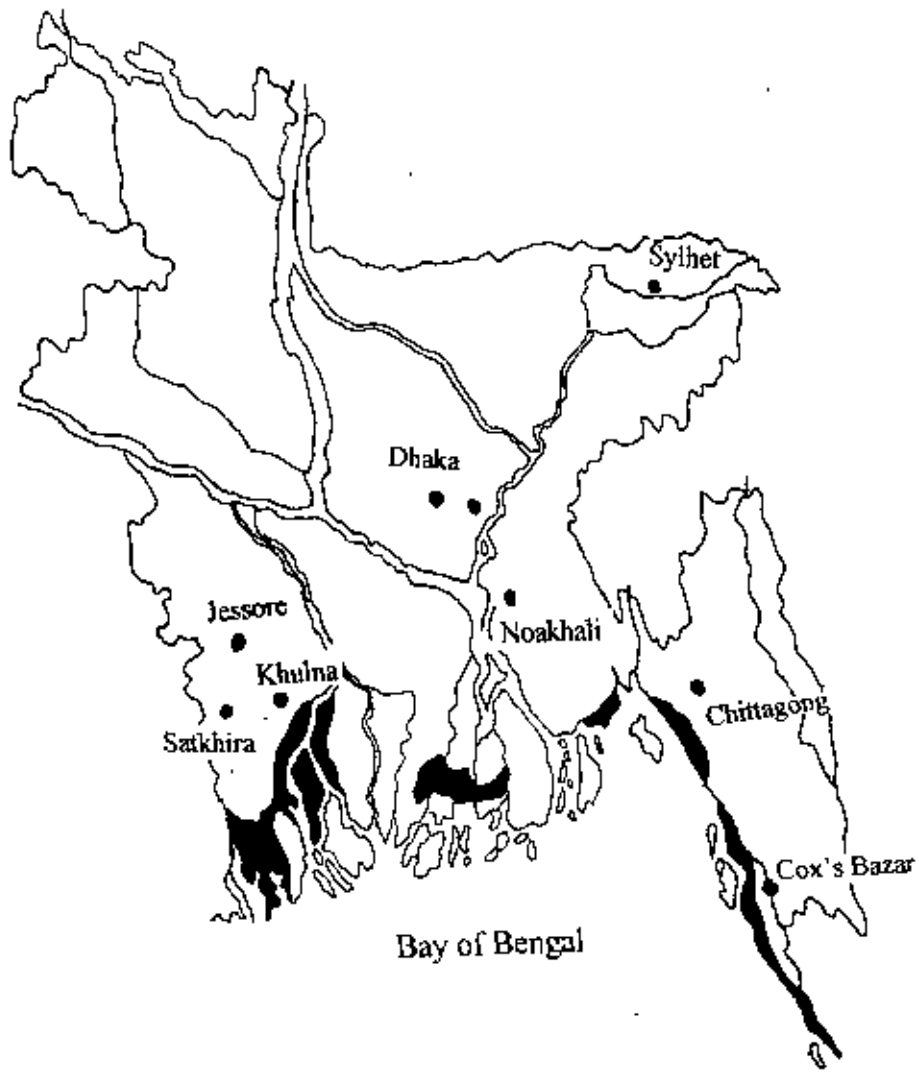
1.1. Background of the Problem

In Bangladesh shrimp is the third largest foreign exchange earning commodity, after garment and jute. In 1992-93, a total of 19,224 metric tons of shrimp valued at Taka 6,040.3 million was exported, of which 31,000 metric tons was contributed by shrimp, cultured in brackish water alone Bangladesh with about 2.5 million hectares of coastal tidal land, has enormous potential for brackishwater aquaculture. It is estimated that about 2,166,870 ha of these tidal lands are suitable for brackishwater shrimp culture. (Hoq, Mazid and Haldar, 1995).

The shrimp culture areas are located in the districts of Satkhira, Khulna, Bagerhat, greater Patuakhali, and greater Barisal in the south-western region, and in the districts of Cox's Bazar, and Chittagong in south-eastern region of Bangladesh (Fig 1.1). Shrimp culture is generally practiced in rotation with rice or salt in a given area and also as a single crop in other areas. Crops of shrimp farming and cropping pattern are different in both the regions, since south-western districts have lower salinity round the year compared to the south-eastern region. In the south-eastern region, single crop of shrimp/fish only or a double crop of shrimp/fish and salt is produced, while in the south-western districts, two major cropping patterns are practiced, e.g shrimp/fish and rice, and shrimp/fish alone. Some of these shrimp farms are very large covering more than 80 hectares and the average being 16 ha. The major species of shrimp that are cultured are the *Penaeus monodon* in south-eastern region and *P. monodon* and *Macrobrachium rosenbergii* in the south-west region.

Considering the importance of foreign exchange earnings in our national economy, the Government of Bangladesh has laid top priority in extending the area of shrimp culture and thus raising production therefrom. At present only 3.9% of the potential area is under shrimp cultivation. In order to harness this potential, it would be necessary to address the

Fig: 1.1 Shrimp cultivation area of Bangladesh



Legend

Location of Shrimp cultivation area

Source. Department of Fisheries

constraints as well as the socio-economic problems faced by the shrimp farming industry and these have so far been identified like shortage of seed stock, land-lease and landuse conflicts, short-term land-leasing, lack of technical support, etc. The expansion of shrimp culture in recent years has been accompanied by growing debate on its compatibility with other landuse patterns. Interactions have, however, been made primarily with paddy cultivation and salt production. An estimated 60,882 ha of land in Khulna areas (south-west region) is currently used for farming of shrimp in rotation with paddy, while some 22,342 ha in Cox's Bazar (south-east region) is used for shrimp farming in rotation with salt production. These production interactions have financial implications for landholders and shrimp farmers, as well as socio-economic and environmental consequences and trade off for the country (Hoq, Mazid and Haldar, 1995).

The slow return from agriculture and high return from shrimp culture is the main issue, depending on which people are interested in converting the agricultural land into shrimp production area. Though it is a lucrative business but it has adverse socio-economic impacts on the rural people of that area where shrimp culture have been concentrated.

Shrimp farming in rotation with salt production in Cox's Bazar area does not raise any technical conflict since shrimps are grown during that part of the year when, because of incessant rains, salt production is not possible. The conflict arises in Khulna area, where a large amount of shrimp farms are concentrated and shrimps are cultivated in rotation with paddy. The proponents of shrimp culture maintain that shrimp culture in empoldered areas, actually does not reduce productivity, rather it is increased owing to extra fertilization and entrapment of a freshwater table below the surface along the presence of saline water dropped by 50 percent after several years of shrimp farming in rotation with paddy. People of these areas are of opinion that apart from reducing paddy production, any expansion in shrimp cultivation will decrease the grazing land, most essential for supporting cattle population. This, in turn, would seriously affect the draft power situation of the area. Moreover, shrimp cultivation expedites the process of social polarization by reinforcing the position of landlords and entrepreneurs on the one hand and by generating labour displacement and increasing the level of poverty for subsistence and small farmers on the other. In practice, whatever the socio-economic consequences may be, the

individual farmers make their decisions for shrimp culture in rotation with paddy on the basis of incremental benefit from shrimp culture compared to reduction in value of paddy as a result of using their land for shrimp culture (Hoq, Mazid and Haldar, 1995).

Tropical shrimp culture has been found to have largely adverse social consequences because its benefits in terms of profits or protein supply do not favour the coastal residents, most of whom are unskilled labour (Bailey, 1988). Socio-economic conflicts are arising from shrimp culture. Shrimp gher (The area enclosed for shrimp farming is called "gher" in Bangladesh) owners take lease of land from local small farmers in return of a nominal lease money and they even force the landowners of adjacent lands to lease their land at lower rent. They flood the land adjacent to their ghers with saline water and thus shrimp culture results in the increase of surface soil salinity leading to the decline of the rice production (Nuruzzaman, 1993). Usually operations are controlled by big landowners or outside commercial interests employing seasonal labour who are mostly outsiders (UNDP, 1995). So the local people have no access to this business. Salt water intrusion and salinity of fresh water aquifers in Taiwan, the Philippines and Thailand have resulted in degradation of profitable and agricultural water supplies which combined with land subsidence, caused significant conflicts between local farmers and residents in the coastal shrimp farming (Primevera, 1989 quoted in Ahmed, 1995). At 22 no. polder of Paikghaca thana of Khulna district, local people had made procession against shrimp cultivation where Ms. Karunamai Sardar (Saha, 1996) was shot down by the gher owners. People around the shrimp culture area of Khulna district reported a decline in the number of livestock due to scarcity of grazing land (Khan and Hossain,1996). Although shrimp culture is designed to strengthen the rural economy but much of the benefit goes to a few city people (Dugan, 1993 quoted in Ahmed, 1995). The mass population of the village where shrimp culture exists does not gain any part of the profit and profit goes to among those people who are not the representative of local areas. So, existing practices of shrimp culture have increased wide disparity among shrimp farmers and general people.

Due to the collection of shrimp fry other species of fishes are destroyed. During tidal water intake, thousands of people engaged for collecting shrimp fry. The collectors trapped not only the shrimp fry but also other species of fishes. They only take the shrimp

fry and other fishes are thrown to the land. For this reason, a large amount of fish-roe and wild fries had been lost which valued minimum Tk. 20 thousands crore. It has been seen that in each year, income from collecting shrimp fry is only Tk. 1.5 crore and the amount of loss of other species is Tk. 5000 crore. People who are collecting shrimp fry and other fishes are also stealing trees and yearly its amount is about Tk. 40 lacks (Banargy, 1998).

The profit that was earned from the commercial culture of shrimp and shrimp was only used for the export. On the other hand, the results of this culture are the destruction of land environmentally and destruction of the rural people socially, financially. It is observed that the amount of profit was not more valuable than the destruction of land and the loss incurred by the rural people (Muniruzzaman, 1995).

Salinity intrusion in surrounding areas of shrimp ghor has been another ecological as well as socio-economic disaster. In the past the coastal people used to earn their livelihood from salt production in the saltplants during dry season. Traditional polyculture of shrimp finfish with or without paddy, used to live in very close harmony with environment. But with the expansion and intensification of shrimp culture from seventies in different habits like mangrove forests, saltplants, paddy fields and other agricultural land, has changed the landuse pattern in the coastal area (Ahmed, 1995). This situation may cause threat to the ecological balance and natural harmony of that area.

Land leasing is another major social problem in shrimp culture. In most cases, land from small farmers are taken on lease for shrimp culture and the leaseholders are not local villagers but mostly from urban areas and absentee landlords. they employ local labour in their farms. Resultantly. the small farmers who leased out their lands live at the mercy of the rich and powerful people with no bargaining power. The owners of the land fell alienated and frustrated for fear of loosing physical possession of their lands, once leased out to the outsiders (Hoq, Mazid and Haldar, 1995).

The aim of present study is to find out the intensity of socio-economic problems that arose from unplanned and uncontrolled shrimp culture. The production area of this culture is based on the rural area. So, the people of rural area are closely associated with

this production. To minimize the adverse effects, the local farmers may turn shrimp culture in an activity being the base for an integrated rural development through shrimp culture.

1.2. Objectives

The objectives of the present study are to ascertain the social and economic condition of the rural people where shrimp culture exists. The specific objectives are stated below :

1. Investigation of the social impacts of shrimp culture.
2. To identify the economic impacts of shrimp culture.
3. Analysis of the factors for which the socio-economic condition of the rural people vary for different landuse pattern (shrimp culture and agriculture).
4. To suggest some recommendations for uplifting of rural society through shrimp culture so that rural economy can be strengthened.

1.3. Scope of the Research

There will be evident from the following that shrimp is an export-earning commodity and it has a great contribution to our GDP. In 1997-98, 7.32% contribution had come from this sector (Table 3.2). But this study investigates the contribution of shrimp culture to our rural society where this culture has been done.

Shrimp culture is a profitable business but initially it needs a large amount of investment. Some rich businessmen use this opportunity and these limited numbers of people achieve the total profit of this culture. Whereas shrimp farming needs vast amount of land so their intention concentrate to the rural areas and they take lease land by any means. Where they become failure to get the land, they use power and forcibly use the land for shrimp farming.

The scenario of these villages where shrimp culture exists has changed due to these circumstances. In this study, these situations are the main scope of research. To evaluate the objectives of the study, two villages were chosen as sample. One is a shrimp cultured

village, namely Jabusa village in Rupsha thana and the economy of other village is based on agriculture, namely Naihati village of same thana. Rupsha thana is located in Khulna district social and economic structure of these two villages has been compared. From these comparisons, the difference between two villages in context of social and economic life will be clear. Then it will also be clear that which one is better for local rural people.

1.4. Review of Literature

Shrimp is a lucrative export-earning product of Bangladesh. But it also has some adverse impact on rural society. Some literatures have been reviewed on this subject matter which are presented below :

In 1995 a study by Bangladesh Institute of Development Studies (BIDS) drew the following observations regarding shrimp culture and environment in the coastal region:

a) Shrimp farming leads to a change in land use pattern and thereby, affects traditional agricultural activities.
b) The socio-economic effects on marginal farmers, land less groups, share croppers and farm workers are definitely adverse in the absence of positive intervention.
c) Shrimp farming, requiring saline water, etc, contributes to a change in ecology.
d) Based on geo-physical findings and social analysis, there exists the definite possibility of saline leaching to deeper soils.

BIDS report also includes a soil testing report conducted by, Dhaka University. As the testing was conducted in December 1992, after the monsoon season, the results would clearly indicate if leaching of saltwater had accumulated in the deeper soils, indicated by increased salinity

In a study by Rahman (1989), a number of negative impacts on the society and economy were identified. These are:

a) It takes resources away from the poor, who are probably using them more effectively and sustainable.
b) It gives more power to the rich, who may exploit the resources for their commercial interests unsustainable.
c) It encroaches upon the rights of the poor to common property resources and thus deny them the benefits of expenditure saving incomes.

A survey report of Fisheries Research Institute, prepared by Hoq, Mazid and Halder (1995), highlighted some important issues. Those are :

a) The shrimp farms (ghor) are scattered every where, even at the homestead areas which cause problems of varied nature to the inhabitants. The farms should therefore be operated in some planned areas in the coastal districts.
b) Apparently, there is no difficulty in the production of rice in the shrimp culture lands, although deterioration in soil quality along with methods of arrangement in landuse between lease holders and land owners often lead to the consequence of late transplantation and reduced productivity of rice. Paddy transplantation is delayed due to late harvest of shrimp crop by the leaseholders for their own interest.
c) Employment of local people in shrimp farms is often limited to low-wage jobs such as labourers, while technical and managerial positions are reserved for the outsiders.
d) Shrimp culture being a capital-intensive activity with a few urban people as the large producers, the local poors' interest is utterly ignored in the large farms. This tendency of the bigger producers lead to long term social and economic problems resulting in landlessness, rural-urban migration and violence.

A study by Khan and Hossain (1996) identified six changes due to the coastal shrimp culture. These are:

a) Deforestation
b) Reduction of fresh water resources and grazing land
c) Sedimentation
d) Changes in water quality
e) Destruction of Plankonic species and
f) Degradation of environment due to processing industries.

A study by Hart and Nandy (1990, quoted in Ahmed) also pointed out with a heart touching description that:

> "Due to intensification of shrimp culture the traditional practice of integrated shrimp cum paddy culture in the western part, which was more environmentally sound is being eliminated creating environmental as well as major socioeconomic problems, the poor farmers are becoming jobless, not getting straw fodder for their cattle. Production in the coastal region has declined. In areas with continued shrimp farming a typical Bangladeshi rural household with a kitchen garden, a pond with freshwater or a reliable tube well, cattle, ducks and chicken has been rare for scarcity of food and shrinkage of grazing field for creating aquaculture ponds."

Professor Kamal (quoted in Rahman, 1999) identified the "most significant" characteristics of shrimp farming as the "oppression and resistance" by the entrepreneurs and common masses of the locality. He says.

> " Usually the owners are related to political parties in power, and with a change in government they tend to move on to the new power-party as soon as they can wrap up with them. On the contrary, the poor peasants also become politically organized as their struggle for existence intensifies. Thus an unequal tug of war turns the social life

abnormal and disturbed. All the apparatus of the state- police, court, civil administration- serve the farm-owners' interest adding that women living in the shrimp-farm areas suffer from acute insecurity. As sexual harassment is frequent. Rape is often sued as a weapon for creating panic and gaining control over protesters. As a result, women become imprisoned within their homestead losing their right of mobility, and often they have to leave home and take refuge elsewhere to avoid molestation."

The Bangladesh Netherlands joint program (BWDB, 1985) gave some remarks on effects of shrimp culture.

Direct effects are .

a) Shrimp culture has direct influences in income generation, income distribution and employment.
b) The reduction in the surface grazing land caused by the flooding of the shrimp fields, and the increase in the salinity of the water in the khals (canals) inside the polder will affect the live stock negatively which implies that more cattle will die, or that more energy will have to be spent by human to keep it alive. This in turn will affect the availability of draught power and the income of people- some of whom are landless or marginal farmers- for whom the cattle is an important means of subsistence.
c) Paucity of safe drinking water inside the polders will also have negative effects, especially for the poor, because more time and energy will have to be spent in carrying water from distant ponds or tubewells to the households affected.
d) Finally, trees and bushes are wealth, privately or collectively owned and enjoyed, and their destruction by the saline water means a loss for those who own them, or for the public at large.

Shrimp is an export based industry. This business fetched about Tk. 16 crore or 86% of the export earnings from the fisheries sector during the first eight months of 1998-99 fiscal year (The Bangladesh Observer, October 29, 1999). Its production area is located almost in the rural areas. So, shrimp culture has a significant effect in the life of rural people.

In Fifth Five Years Plan (1997 – 2002) strategies have been taken for the development of fisheries, those are :

- Adequate credit facilities for the fish farmers will be created and credit guarantee scheme will be introduced for marginal farmers.
- Physical facilities like electricity, roads, transports, fresh water, etc. will be created and made available to develop brackish water fish and shrimp resources.
- Traditional method of shrimp culture will be improved by introducing modern technology for increased production; shrimp culture extension service will be strengthened to take necessary steps for the establishment of shrimp hatchery at private level
- Quality of fish and shrimps will be ensured for the export of fish and shrimps through creation of facilities and modern quality of certification system.

1.5. Organization of the Report

The subject matter of this report has been conveniently divided into eight chapters. Beside background, chapter one contains research objectives, research question, scope of the study, limitation of shrimp culture and its possible negative consequences on the economy and the society along with the review of literature.

Chapter two highlights the methodology of the empirical part of the study. In this chapter, the working procedure of the research has been elaborated.

Chapter three gives an overview of the problems and issues regarding shrimp farming in south-western region, mode of operation of shrimp farms, contribution of shrimp culture in the economy of Bangladesh and historical development of shrimp cultivation

Chapter four describes the study areas. This part includes location, topography, soil, river system, climate, temperature, rainfall, humidity, demography, age structure, educational status, income distribution, occupation and general discussion of two study areas.

Chapter five and six are the main analytical part of the report. These two chapters describe the social and economical conditions of the two villages in context of agriculture and shrimp culture

The final chapter concludes the paper. Before conclusion at first, major findings are summarized. Then, there is a short analysis on which shrimp culture is shown as a tool for rural development. At last, conclusions are drawn up. Besides above seven chapters, two separate sections are included. One contains bibliography and another appendix, which includes questionnaire format and some calculations.

CHAPTER TWO
METHODOLOGY

2.1. General

A proper methodology is always necessary for the successful accomplishment of any research work. It helps to streamline and organize the experiences, observations, examinations, analysis of data and information and their logical interpretation through a systematic process to achieve the ultimate goal and objectives of the research. Data, which are the raw materials of a research work determine to an appropriate extent, the nature, success and limitation of the thesis. The methodologies adopted for the current research work is presented in a sequential manner.

2.2. Literature Review

A comprehensive literature survey relating to the study was carried out. Reference materials include books, journals, reports and newspaper clippings.

2.3. The Hypothesis

The hypothesis is framed to investigate the degradation of the socio-economic condition of the rural people in shrimp cultivated areas by the present process and pattern of shrimp culture. Basing on this hypothesis following stages of research has been presented.

2.4. Stages of the Research

Following stages were followed during the research work :

Stage – 1 : Selection of the study area.

Stage – 2 : Reconnaissance survey.

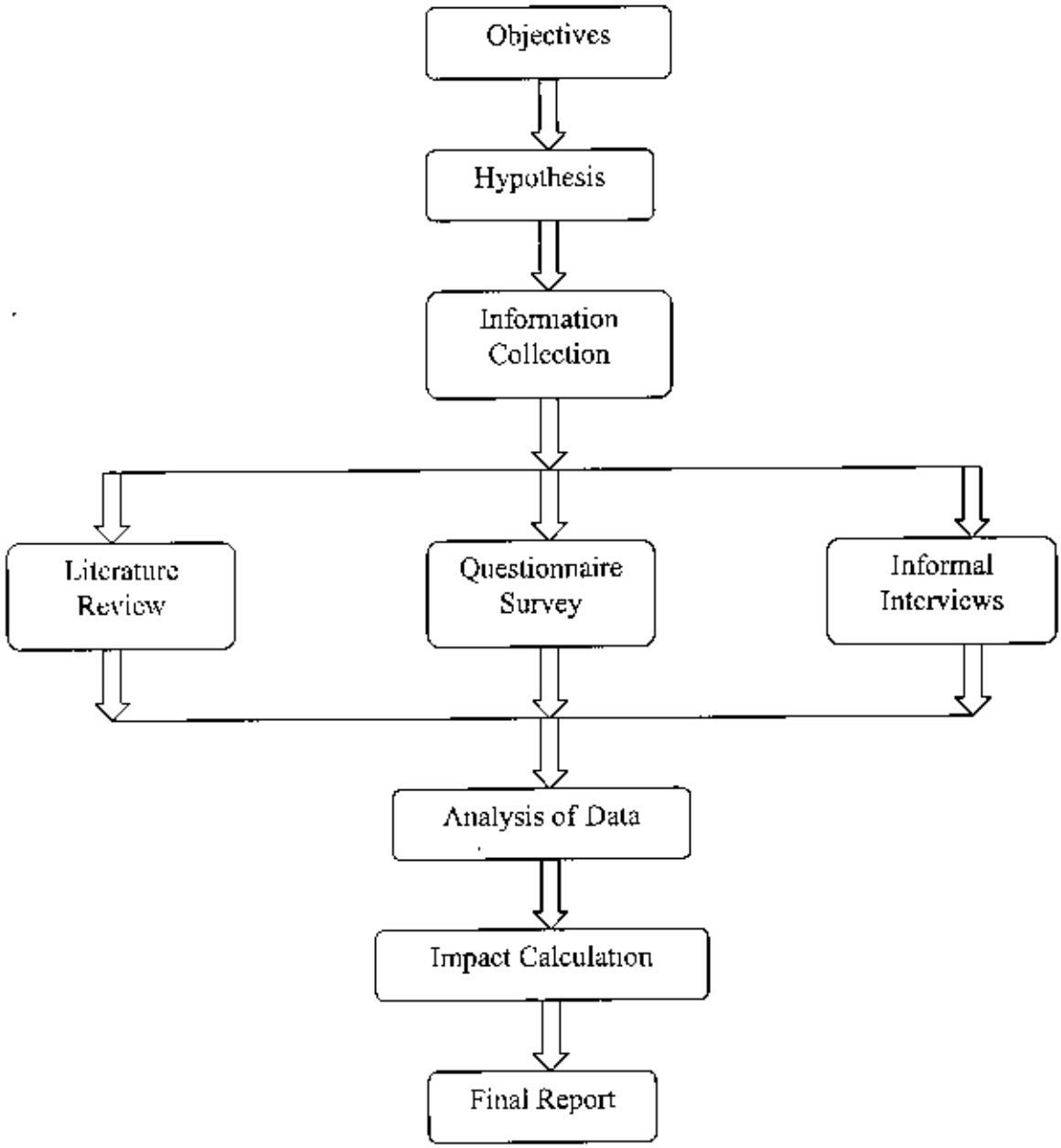
Stage – 3 : Selection of sample.

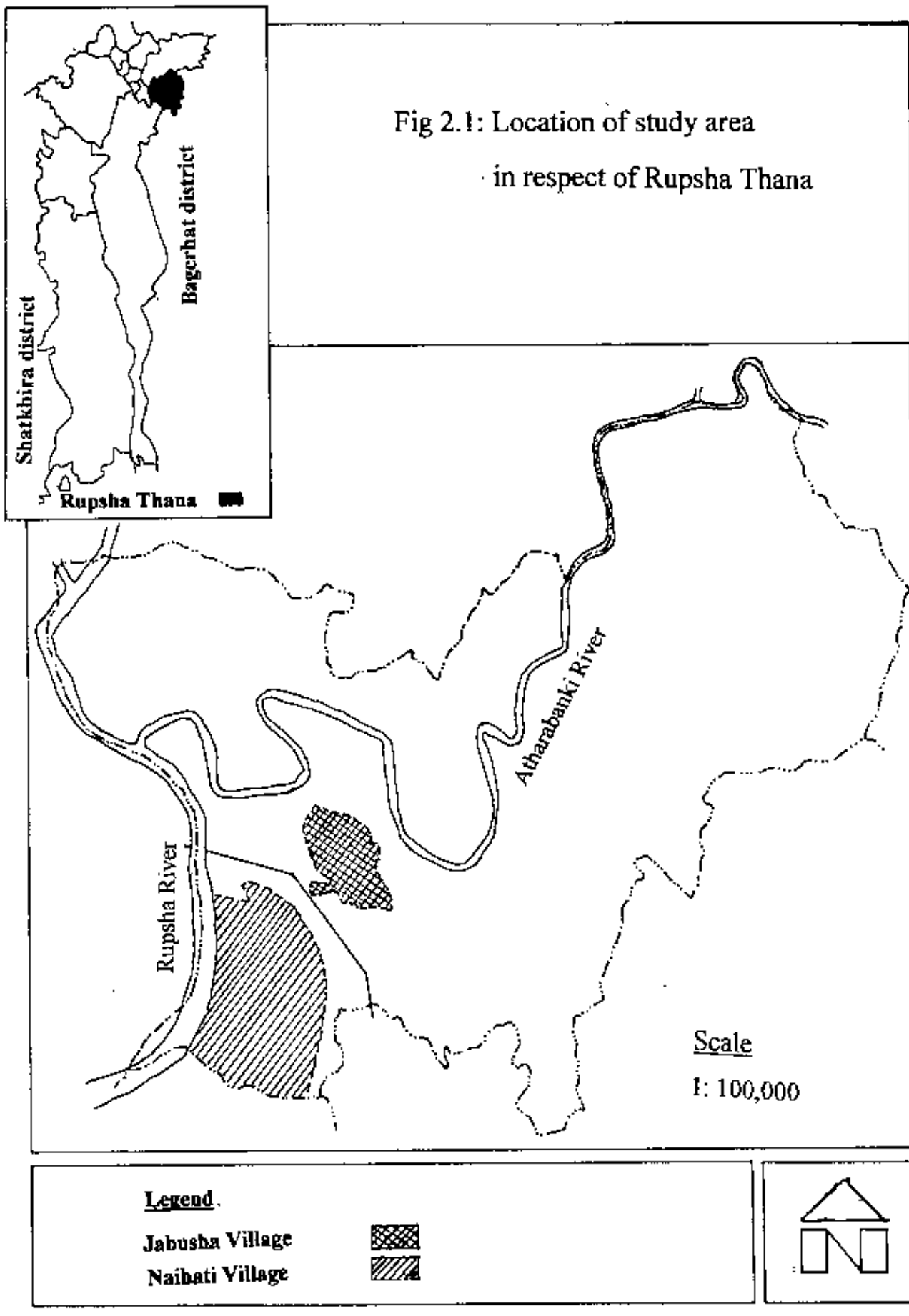
Stage – 4 : Collection of Data.

Stage – 5 : Processing and Analysis of Data.

Stage – 6 : Presentation of the report.

Fig 2.1. Flow chart of methodology




Shatkhira district
Bagerhat district
Rupsha Thana
Fig 2.1: Location of study area
in respect of Rupsha Thana
Atharabanki River
Rupsha River
Scale
1: 100,000
Legend
Jabusha Village
Naibati Village
N

2.4.1. Stage – 1: Selection of the Study Area

Main theme of this research is to evaluate socio-economic feasibility of shrimp culture and identify the changes of shrimp cultured area from an agricultural area. When the social and economical life of a shrimp cultured area is compared with that of a pure agricultural village then the positive and adverse impact of shrimp culture will be clearly evaluated and the wish of the local people will also be reflected.

So, for the research purpose two villages were selected which are situated in the Rupsha thana of Khulna district. The first one is Jabusa where shrimp farm exists. Twenty four shrimp farms exist in Jabusa and land area is about 523 acres, 21.54% of the total landuse. The second one is Naihati village. Economy of this village is mainly based on agriculture.

These two villages are selected because,

1. Homogeneity in climate and
2. Homogeneity in social culture.

2.4.2. Stage – 2: Reconnaissance Survey

During the period of November and December'1999 a reconnaissance survey was carried out on different villages of Khulna and Bagerhat district. After analyzing the primary criteria of the selection, Jabusa and Naihati villages of Rupsha thana of Khulna district were finally selected.

2.4.3. Stage – 3: Selection of Sample

A. Sample size:

Primary level data generated from 100 samples (households). Of them, 50 respondents were from Jabusa village where the economic activity depends on shrimp culture and other 50 were from Naihati which is a totally agricultural village. The data were collected

during December'1999. Both questionnaire survey and participant observation methods were used while collecting information.

Table 2.1. Sample size

Study Areas	Total household	Area in acres	Sample Size	% of sample size
Jabusa village	672	2428	50	7.45% of total population
Naihati village	684	516	50	7.3% of total population

Source: Bangladesh Population Census, Community series: Zila Khulna,1991, BBS.

B. Target group:

In this research, following three groups were surveyed:

- Shrimp farmers of Jabusa village ,
- Non shrimp farming groups of Jabusa who leased out land for shrimp culture.
- General farmers of Naihati village who have not engaged their land in shrimp cultivation.

2.4.4. Stage – 4 : Collection of Data

2.4.4.1. Required information

In order to fulfill the research objectives following information were required.

- **For Social Impact**

Indicators	*Source*
Exploitation of land owner	Interview and literature survey
Changing rural power structure	Interview and literature survey
Degradation of social value	Interview and literature survey
Impact on education	Questionnaire survey and literature survey
Access to common property resources	Interview, literature and questionnaire survey
Insecurity and social tensions	Interview, literature and questionnaire survey

- **For Economic Impact**

Indicators	*Source*
Changing landuse	Questionnaire survey and literature survey
Reasons for conversions from crop to shrimp	Interview, literature and questionnaire survey
Decrease of income	Questionnaire survey
Impact in employment	Literature and questionnaire survey
Impact on livestock	Questionnaire survey
Trend of occupational change	Literature and questionnaire survey
Change in economic status	Interview, Literature and questionnaire survey
Ownership of trees	Interview, literature and observation
Trend on freshwater fishes	Interview and literature survey

2.4.4.2. Questionnaire survey

Information was collected from 100 respondents on which 50 were from Jabusa village and 50 are from Naihati village.

2.4.4.3. Informal interviews

Informal discussions were made with representative samples of the local level influential persons during the survey to understand their opinion, nature and functions regarding this landuse conversion and detail of shrimp farming and its various impacts. Interviewees include:

- Rich farmers, school teachers, imams (muslim priests), physicians, etc.
- Local level N.G.O workers like, Project manager of CARITAS, Project officer of Nijera Kari.

Questions on the changing pattern of livelihoods were also put forward before youths, boatmen, women, day labourers, petty traders, the artisans, the *lathials* (musclemen

working in the *ghers*), etc. The views of local government officials (LGED), BWDB have been shared to understand the changing pattern of social and economic structures.

2.4.4.4: Map collection

Detail landuse maps of Jabusa and Naibati village were collected from Khulna Development Authority.

2.4.5. Stage – 5: Data Processing and Analysis

Data have been edited and tabulated manually using the simple statistical methods. The descriptive and unstructured materials, interview forms, observation, survey documents and other records were summarized and arranged in a sequential order.

2.4.6. Stage – 6: Presentation of the Report

The final report was submitted after editing. Following steps were associated with the presentation of the report.

a) Representation of assembled and analyzed data through tables and charts.
b) Presentation of the draft report.
c) Presentation of the final report.

2.5. Limitation of the Study

Some difficulties arose during the information collection period and those conditions have, inevitably, affected the qualities of the information collected. Of them following are notable :

1. Many shrimp farmers are not interested to give interview.
2. It was too difficult to collect the social impact of shrimp culture from the inhabitants of Jabusa village. They were afraid to say anything against shrimp farmers. So, during the analysis of social condition in many cases the author depended on the information from secondary sources.

3. During field survey, due to the non-cooperation of the gher owners/managers of the study area, it was difficult to collect adequate information from the field on various aspects of production, management and return.
4. There were also some difficulties relating to the information regarding economic impact. In the field, certain types of information were not perfectly accurate, some times respondents gave answers basing on assumption, such as : information of previous years (e.g. yield of paddy, no. of live stock, etc.).
5. General people are afraid of saying anything against the interest of gher lease holders, which creates difficulties in collecting the factual information.
6 This study could not cover the entire population of the study area for questionnaire survey. Rather samples were selected on a random basis and 50 houscholds of Jabusa and 50 houscholds of Naibati village were surveyed. So, the researcher had to depend on the answers given by a small number of respondents.

In spite of these difficulties, large amounts of reliable information were collected. For calculating costs, present rate was taken carefully by verifying different areas. To sum up, it may be said that the information used in this research gives a reasonably complete and reliable image of socio-economic impact of shrimp culture.

CHAPTER THREE
SHRIMP CULTURE IN BANGLADESH

3.1. Perspective

Bangladesh has been gradually emerging as an important producer of cultured shrimp and in this process the fisheries sector has been contributing substantially to GDP. The contribution of this sector to GDP is about 6 percent compared to only 1 percent in India (Aquatics Farm Ltd. 1989). Shrimp accounts for more than 80 percent of sea food exports from Bangladesh. which made a quantum jump from US$19 million in 1977/78 to US$ 140 million in 1987/88 India (Aquatics Farm Ltd, 1989).

Bangladesh has some natural advantages in shrimp cultivation. The large delta created by the merging of the Ganga and Jamuna rivers, encompasses an area of 2.5 million hector of coastal tidal land, much of which is ideal for the culture of tropical shrimp. In addition, there are large areas of coastal land suitable for cultivation in brackish water. The country also possesses one of the world's largest resources of wild *Penaeus monodon* shrimp fry (Aquatics Farm Ltd, 1989). This abundant water, land and fry resources place Bangladesh in a unique position to produce cultured shrimp at production cost, as low as anywhere in the world.

Despite these advantages, the average yield of shrimp has not been improving significantly The yield per hector was 169 kilograms (kg) in 1986-87. It has been emphasized by experts that better techniques for excluding other fishes from pond and proper care of nursing fry have the potential of increasing yields up to 250-300 kg/ha, without major capital improvements or additional feed.

3.2. Shrimp Exports

Presently, 122 fish processing units are operating in Bangladesh. It plays a dominant role in meeting the protein demand, employment opportunity and foreign exchange earnings of the country. Bangladesh fisheries sector contributes about 4.7% to its GDP and about 8% to its GNP. About 1.2 million people directly and 10 million indirectly are connected with this sector for their livelihood. The total catching of shrimps per year (inland) is 4,79,742 metric tons (mt) and shrimps (marine) is 2,45,474 metric tons. The export of shrimps virtually started in 1972-73 with earnings of only US$ 279.22 million or Tk. 15636.32 million (The Independent Yearbook, Bangladesh 1998).

Table 3.1 Year-wise export of shrimp from Bangladesh.

Year	Export Value (million US$)	Quantity (million lb)
1988-89	141.38	45.19
1989-90	138.11	47.88
1990-91	141.80	52.92
1991-92	130.53	44.32
1992-93	165.34	48.35
1993-94	210.52	55.51
1994-95	305.64	78.36
1995-96	313.69	75.07
1996-97(up to April)	279.22	64.43

Source: Export Promotion Bureau, 1997

In 1997-98, 7.32% export came from shrimp and prawn sector which was valued about 155 14 million US$ It was the third largest sector. The first one is ready-made garments and knitwear which contributed 70.79% and the second one is jute and jute goods that contributed 8.38%.

Table 3 2. Sectoral shares (July-Nov, 1997-98).

Sectors	Export Value (million US$)	Percentage
Ready made garments and knitwear	1500.27	70.79
Jute and Jute goods	177.60	8.38
Fish and fish product	178.24	8.41
a shrimp and prawns	155.14	7.32
b. Other items	23.10	1.09
Leather and leather goods	77.35	3.65
Tea	26.70	1.26
All other commodities	159.17	7.51
Total	2119.33	100.00

Source: Export Promotion Bureau, 1998

3.3. Mode of Operation of Shrimp Farms

3.3.1. Traditional practice

Present cultural method is a traditional practice carried out in lands with earthen enclosures locally known as gher. The flow of saline water into the enclosed areas is usually controlled by small wooden sluice box. From February to April sluice gates are opened to allow the entry of saline water carrying juveniles of various varieties of coastal of coastal fin fish and post larvae of shrimps which breed in the sea and the estuarine water get into the enclosures. They are allowed to grow until they attain harvestable size. This type of shrimp cultured is termed "Extensive culture", one in an unmanaged manner in our coastal areas and the yield per annum not exceeding 200-300 kg/ha. Of course higher production is also observed. In Khulna region, the cropping pattern of brackishwater shrimp culture in dry month is followed by the crop of local variety of paddy(Aman) in the wet months from July-December. In Cox's bazar area, more than 35,000 ha of tidal land are utilized for salt and shrimp production on alternative way. (Nuruzzaman, 1993).

3.3.2. Bhery (Shrimp plus Paddy) fisheries

Ghers constitute one of the important fishery resources mainly in the Khulna areas. With a water spread area of over 50,000 ha (Nuruzzaman, 1993) and spawning across the lower, medium and high saline zones, modified with a little scientific practices offer immense scope and potential for augmenting fish and shrimp production through improvement of traditional practice along with paddy production.

3.3.3. Shrimp culture followed by paddy cultivation

In this method, one crop of transplanted rice is grown between July and November following a crop of shrimp. Under this system, the harvesting water of brackishwater shrimp is completed by June or July before the salinity decreases. Thereafter, rain water is allowed to accumulated and is drained out to remove the salinity in the field. After the plantation of *T.Aman*, rain water is allowed to accumulate inside the gher to flood the land to a depth of 60-100 cm. Thus during the monsoon months, paddy-cum-fish culture in the real sense is properly practiced, if the farmers are aware of the simple culture technology through integrated method But this approach has the disadvantages of decreasing paddy yard.

3.3.4. Shrimp culture followed by salt production

About 14,000 ha of salt beds produce an estimated 46,000 mt of salt per hectare in Cox's bazaar region. Salt beds are encircled with low earthen dikes where sea water is brought in, preserved and evaporated during the dry months between November and April. Between May and early December, when salt cannot produce because of rains, some 10,000 ha of salt beds are used for growing a crop of brackish water shrimp and fin fish in Cox's Bazar area (Nuruzzaman, 1993). It also depicts the semi-intensive cropping pattern that can be adopted in future. The production of shrimps from salt beds would be 3-4 times higher than the present level of production.

3.3.5. Advanced cultural system

In this farming method, the improvement over the traditional approach is in the introduction of a systematic pond configuration. Each pond has separate inlet and outlet gates to facilitate water exchange. Pond preparation and harvesting is done scientifically. This method involves higher stocking rates, use of fertilizers and sometimes addition of supplementary feeding along with the regular water management activities. A very few established farms of shrimp culture have adopted the new technology. This method is practised in limited scale in Cox's Bazar area.

CHAPTER FOUR
STUDY AREA AND IT'S PROFILE

4.1. General

Jabusa and Naihati villages are situated in the same union in Rupsha thana of Khulna District. Though the two villages are situated in the same geological and micro climatic condition but there are some physiographic differences between two villages, that is why the village Jabusa is suitable for shrimp culture and Naihati is not.

4.2. Location

Jabusa and Naihati are in Khulna district of Bangladesh. Geographically Jabusa is located between 22°47'45"N - 22°45'30"N latitude and 89°35'E - 89°36'45"E longitude and Naihati is between 22°47'45" - 22°48'30"N latitude and 89°35'E - 89°36'E longitude

Table 4.1. Location of the study Area

Village Name	Mouza	Union	Thana	District
Jabusa	Jabusa	Naihati	Rupsha	Khulna
Naihati	Naihati	Naihati	Rupsha	Khulna

Source : BBS, 1991

These two villages are situated at the eastern side of the Rupsha river. Khulna-Mongla highway divides these two areas. This road passes along the southern part of the Naihati and northern part of the Jabusa villages.

4.3. Landuse

Total area of the Jabusa village is about 2428 acre. On which 1527 acre is agricultural land, 62.89% of total landuse. 523 acre is shrimp farm which is 21.54% of total landuse.

Fig 4.1: Landuse Map of Jabusha Village

However, in this village 13.80% land is occupied by settlement with mixed vegetation. As far the study area is concerned, the dominance of agricultural landuse is prominent. But it is likely that due to the shrimp farming the productivity of agricultural land is found less, compared to the productivity of non-shrimp farming adjacent Naihati village. This estimate is shown in the analytical part of this research (Chapter-six).

Table 4.2. Landuse pattern of Jabusa village

Landuse	Area (in acre)	Percentage
Agriculture	1527	62.89
Shrimp farm	523	21.54
Settlement with vegetation (orchards and fruit trees)	335	13.80
Pond	5.50	0.23
Khal	15.75	0.65
Sea food/ frozen industries	19.25	0.79
Road	2.50	0.10
Total	2428	100

Source : KMPP, 1999

In Naihati village, prominent landuse is settlement with vegetation which is about 67.34%. In this area, green vegetation is found almost in all compounds of the houses. Landuse of pure agriculture is about 25.72%. In this village 3.29% of land are occupied by road and railroad features, because old Bagerhat road and Khulna-Bagerhat rail line pass through the village. Administrative landuse is about 1.21%, in which Ansar Academy exists. Besides, religious and educational landuse are about 0.30%. Landuse of the study area has been calculated by using grid method.

Fig 4.2: Landuse Map of Naihati Village

Legend

Agriculture
Settlement with vegetation
Pond
Katcha Road
Pucca Road
Bazar
Mosque

N

SCALE

1 : 12,500

Table 4.3. Landuse pattern of Naihati village

Landuse	Area (in acre)	Percentage
Agriculture	132.75	25.72
Settlement with vegetation (orchards and fruit trees)	347.50	67.34
Pond	9.50	1.84
Road/Rail road	17.00	3.29
Bazar	1.50	0.30
Administrative	6.25	1.21
Religious/Educational	1.50	0.30
Total	516.00	100

Source : KMPP, 1999

4.4. Demography

Jabusa village is almost 4.7 times bigger than Naihati village. The density of population in Jabusa village is 1.64 per acre where as the density of Naihati is 7.5 per acre. There are very little variations in total household of two villages. Total households of Jabusa are 672 where as in Naihati these are 684.

Table 4.4. Area and total households of the study Area

Village No	Area in Acres	Total Household	Population		
			Male	Female	Total
Jabusa	2428	672	2089	1887	3976
Naihati	516	684	1962	1910	3872

Source : Bangladesh Population Census, Community series: Zila Khulna,1991, BBS.

4.5. Age and Sex Structure of Households

From each village 50 households were selected for sample survey. The data which are used for research purpose are based on these (50+50) = 100 households. In terms of age,

there are no significant variations in age structure of two villages. About 44% people are working group (21 years to 50 years) in Jabusa village whereas in Naihati this ratio is about 55.3%.

Table 4.5. Age and sex structure of households

Age range	Jabusa village				Naihati village			
	Male	Female	Total	%	Male	Female	Total	%
Below 5 Years	6	9	15	8.29	2	8	9	4.79
6-10 Years	18	10	28	15.47	13	18	31	16.49
11 –20 Years	22	13	35	19.34	10	19	29	15.43
21 –30 Years	12	18	30	16 57	15	24	39	20.74
31 – 40 Years	15	16	31	17.13	23	10	33	17.55
41 – 50 Years	12	8	20	11.05	14	18	32	17.02
Above 50 Years	8	14	22	12 15	6	8	15	7.98
Total	93	88	181	100.00	83	105	188	100.00

Source : Field Survey, December'1999

4.6. Educational Status

Educational status of two study areas is described in table 4.6 and table 4.7. In table 4.6 total literacy rate of two villages are shown. Male, female and total literacy rate of Naihati village is shown higher than Jabusa village.

Table 4.6. Literacy rate of two villages in the study area

Village No	Literacy Rate (7+ years)		
	Total	Male	Female
Jabusa	33.8	39.0	27.9
Naihati	48.3	52.9	43.7

Source . Bangladesh Population Census, Community series: Zila Khulna,1991, BBS.

Table 4.7. Educational status of the sample households

Educational status	Jabusa	Naihati
Illiterate	61.14	50.44
Upto class V	12.43	18.77
VI + X	11.43	18.68
S. S C.	10.00	9.11
H S. C. and above	5.00	3.00
Total	100	100

Source : Field Survey, December'1999

The educational status as depicted in table (4.7) explains that 38.86% of the respondents are literate in Jabusa village where as 49.56% in Naihati village. According to BBS 1991, this rate is about 33.8% in Jabusa and 48.3% in Naihati.

4.7. Income Distribution

In Jabusa village, about 21.92% of the respondents have an annual income exceeding Tk. Fifty thousand. Among them 12.66% belong to Tk. 20,000 to 50,000 income groups. While 42.83% belong to Tk. 10,000-20,000 income group. In Jabusa village they are the largest group. About 15.79% of them belong to less than 10,000 income group. While remaining 6.8% of the respondents have an annual income more than Tk. one lac.

Table 4.8. Yearly Income level of the sample households

Yearly Income (Tk)	Jabusa	Naihati
< 10,000	15.79	4.51
10,001 – 20,000	42.83	30.83
20,001 – 50,000	12.66	34.06
50,001 – 1,00,000	21.92	19.92
1,00,001 +	6.80	10.68
Total	100	100

Source : Field Survey. December'1999

4.8. Occupation

Agriculture is the most dominant occupation of majority of the respondents (58.45%) in Naihati village (Table 4.9.). About 7.22% respondents have said that they are engaged in business. 6.13% are day labour. Only 2.04% are service holder. Nobody of this village have chosen shrimp culture as their profession. On the other hand, in Jabusa 15.48% people engaged in shrimp farming and 32.41% people are engaged in Fry collection. So totally 47.89% people have engaged themselves in shrimp culture related activities. In this village 17.65% people are engaged in agriculture.

Table 4.9. Classification of respondents on the basis of Occupation

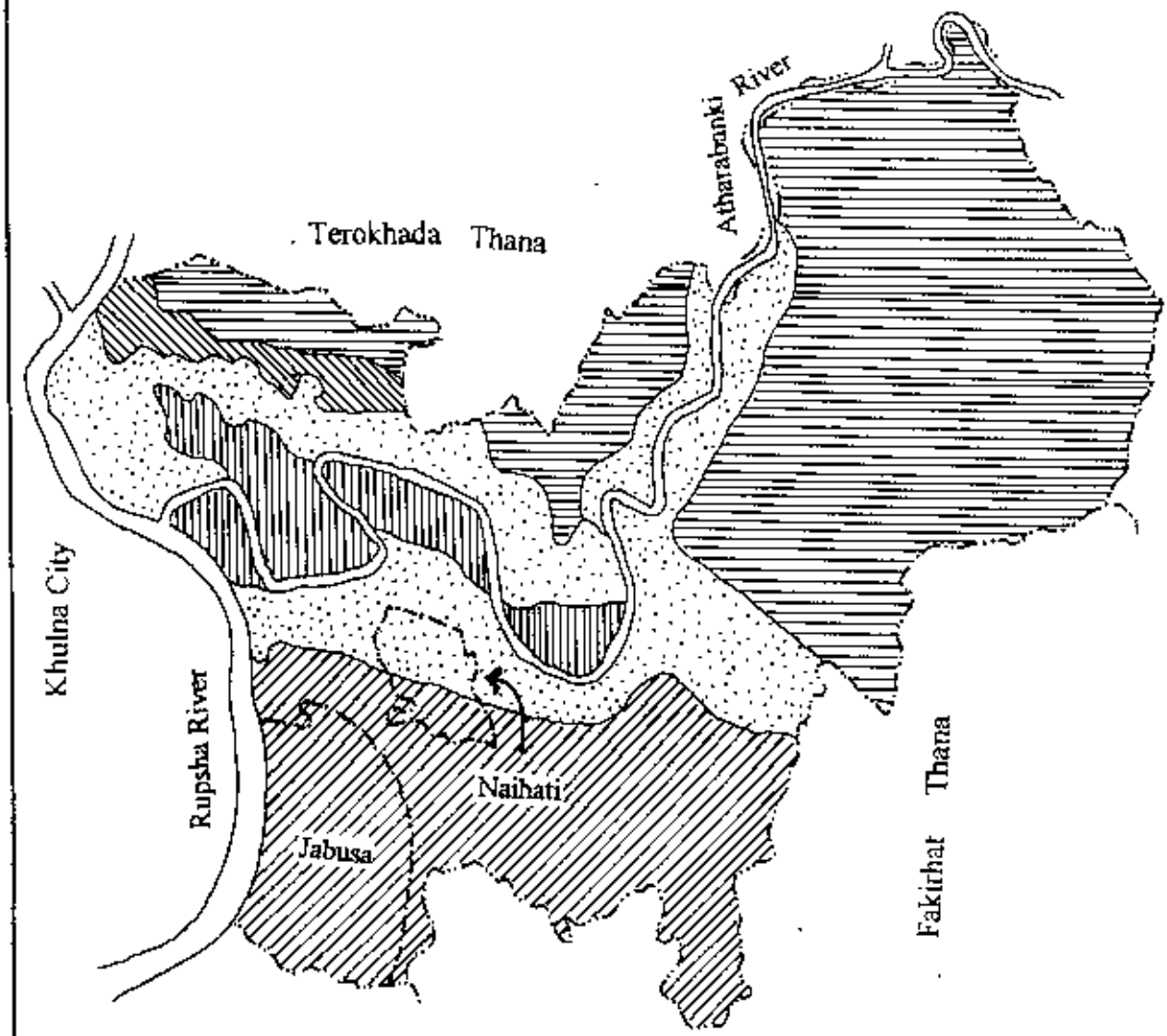
Occupation	Jabusa Village	Naihati Village
Agriculture	17.65	58.45
Day Labour	3.44	6.13
Service	2.44	2.04
Business	8.22	7.22
Shrimp Culture related activities	15.48	0
Fry collection	32.41	2.56
House Wife	8.6	9.44
Unemployed	10.16	13.08
Others	1.6	1.08
Total	100	100

Source: Field Survey, December'1999

4.9. Topography

Some homogeneous characteristics are found in topographical conditions of two villages. Most part of the villages are alluvial plain. Low elevation of the land is another characteristics of these two villages. Naihati is 4m (metre) above and Jabusa is less than 2m from the mean sea level (MSL).

Fig: 4.3 Geological Characteristics and Terrain Elevation



Legend

- Bar (Silty sand, Sandy silt and clayey sand)
- Natural levee (Silty sand, clayey sand and sandy silt)
- Old meander complex (Sand, silty sand, and sandy silt)
- Flood plain (Clayey silt and silty clay)
- Back Swamp (Peaty clay, clay and peat)

Scale

1: 100,000

Source: Geological survey of Bangladesh, 1998

4.10. Soil

The surface of the Khulna is not perfectly plain and can be characterized by six major geomorphic units (Fig.4.3). These are natural levees, floodplains old meander complex, bar, tidal marsh and back swamps

Natural levees are well developed along the Bhairab-Rupsha riverbanks (mostly on the west bank) and is occupied mainly by the present build-up area of the city. This part of the city is 4 metre above the mean sea level (MSL). The flood plains occupied mainly by fringe areas of the city are relatively broad, and extended from the edges of the levees up to the swampy areas. The altitude of this unit is two meter above MSL. Old meander complex with soil characteristics of sand, silt-sand and sandy silt form a vast area to the southeast of the city along the Khulna Mongla road. The tidal marsh region also forms a vast area characterized by silt clay, clayey-silt and peat located in the southwestern part of the periphery of the Khulna city. The low-lying swampy areas currently used as the agricultural lands are poorly drained and has persistent water logging problems compared with other two units. The average altitude of swamp area is less than 2 metre above MSL (KMPP, 1999).

From the above characteristics it can be clearly identified that soil condition of Naihati village mostly in natural levee areas. composed by silt sand, clayey sand and sandy silt. Old meander complex is the Jabusa's soil category that is composed by sand, silt sand and sandy silt (KMPP, 1999). These two types of soil condition are the main reason for the development of two different types of landuse in the same geographical area.

4.11. River System

In the Khulna region there exists a complex river system, which bifurcates and again joins each other forming a net like pattern. The rivers of this reason are tidal in nature and get very little fresh water from upstream, particularly in the winter. The main flows of the fresh water each from the Ganges through the Garai-Madhumati. (KMPP, 1999). The Study areas lay on the Bhairab Rupsha course. Atharabanki river passes along the

northern boundary of Naihati village and Passur river along the southern part of the Jabusa village. There is a regular tidal fluctuation in these three rivers.

4.12. Climate

Typically a monsoon climate prevails all over Bangladesh with little variation. Besides, the climate can also be characterized by distinct seasonal variation of temperature, rainfall and wind direction. Khulna region does not show any remarkable climatic difference compared to that of rest of the country although similar to other coastal districts, some marine influence is observed. The distinct feature of climate at Khulna is the salt laden air throughout the year, especially when it blows from the sea as a result of diurnal changes in the sea and land breezes at regular intervals.

Table 4.10. Three distinct seasons at Khulna and their Characteristics

Seasons	Months	Characteristics
Summer	March to May	Hottest, dry and maximum evaporation rate
Monsoon	June to October	Highest rainfall, wet and high humidity
Winter	November to February	Cool, dry and low wind velocity

Source : KMPP, 1999

4.13. Temperature

April is the hottest month showing a monthly maximum temperature of up to 35^0 C. However, Khulna region shows a mild summer than many of the inland areas, particularly northwestern districts, where summer temperature sometimes exceeds 40^0 C. In June, there is a sharp fall in temperature due to the out break of monsoon. During the monsoon, the monthly maximum temperature is about 30^0 C. The cool dry winter season begins is November, and January is the coldest month with a minimum monthly temperature of about 10^0 C. However, due to locational advantage, i.e. nearness to the sea coast, winter is also mild in Khulna than many of the inland districts. For example, the winter temperature of Rangpur sometimes drops down to 4^0 C (KMPP, 1999).

4.14. Rainfall and Humidity

Khulna receives an average annual rainfall of about 1800 mm. The main source of rainfall is the southwestern monsoon. Nearly 81 percent of the total rainfall occurs during June – October. During March – May some rainfall also occur due to Nor'wester effect. Winter is the dry period with little or nearly no rainfall., However, during the months of December and January , little rainfall has been recorded (KMPP, 1999).

4.15. Shrimp Culture in Jabusa Village

Shrimp culture introduced in Jabusa village in 1986. Shrimp culture needed a level of salinity which the soil of Jabusa permitted. At that time land value of the area was low which was 10 thousand / bigha (1 bigha = 0.33 acres), at present it is Tk. 50 thousand / bigha. For that reason the outsiders were interested to invest in the village Jabusa. The local landowners were paid nominal lease money by the outsider shrimp farmers for the land forcefully taken away from them. Then the lease money was Tk. 800 – Tk. 1200 / bigha / year. This practice of shrimp farming was totally unplanned. The areas for Shrimp Culture needed water logged for six months with saline water. Due to the salinity of water at that time no paddy culture and sweet water fish was allowed inside the ghor area.

There has been a major social and economical imbalance in Jabusa village due to Shrimp Culture. The leaseholders are the source of this imbalance. The poor farmers cannot engage themselves in Shrimp Culture due to the lack of large amount of capital. So they lease out their land. And after a time they lose their control over their lands and thus conflict arises. There were some common properties (khas land) in the village. These are grazing land, common water bodies, play fields, forest, etc. But after starting Shrimp Culture access to common property resources was totally prohibited.

In Khulna, primarily land is used for paddy cultivation. Beside these, vegetation is also a common feature in every household and people earned from this household vegetation, such as – coconut tree, betel leaf and nut, mango tree, banana tree and other green crops. But at present, these are gradually disappearing.

CHAPTER FIVE
SOCIAL IMPACT

5.1. General

Social impact of an intervention is the change in livelihood, life style, sense of security, norms and values, morality etc. of a community. In relation to the social impact, in this research, social life of the general people of the locality (Jabusa village) are evaluated. In accordance to the hypothesis who are the main affected people in the current trend of shrimp culture. A number of negative impacts hamper the rural community where shrimp culture exists. To measure the social impact of shrimp culture in Jabusa village indicators like; exploitation of land ownership, rural power structure, social values, educational status, access to common properties and social security are evaluated.

5.2. Exploitation over the Poor Land Owners

From the field survey, it has been found that local rural people have interest on shrimp business but due to the lack of capital the poor farmers can not engage all of their land to shrimp culture. So, they lease out their lands for more income earnings. Those who are not interested leasing out their land are forced to rent out their pieces of land to large farmers. It is a common practice in the study area, to take over land for shrimp culture by using force. From table 5.1 it has been observed that among the 88% respondents claim that the reason for conflict is late harvesting of shrimp.7% answered for personal security and rest 5% told various reasons, such as low rate of lease money, breach of contract, etc. Therefore, aggression of the conflicts highlights the flame of social degradation.

Table 5.1. Reasons for conflict (Village : Jabusa)

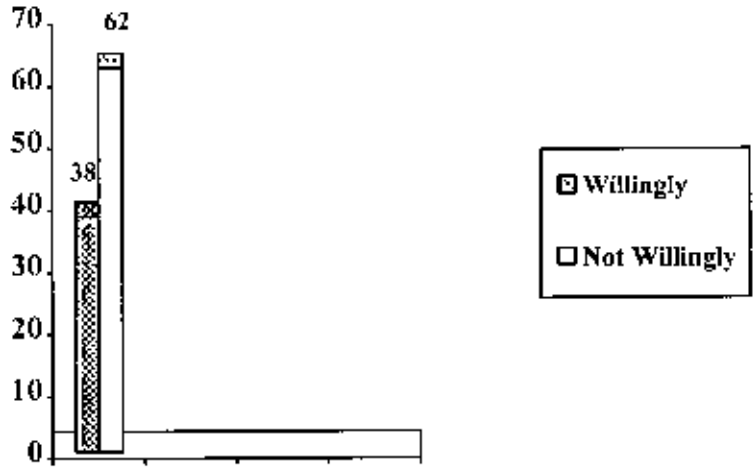
Reasons for conflict	%
Late harvesting of shrimp	88%
Security	7%
Others	5%
Total	100%

Source : Field Survey, December'1999

From the personal interview with farmers it has been found that due to forcible take over of land conflict occur between land owner and lease holder which some times turn into bloody clashes. Besides, after the expiry of lease period the leaseholders do not want to give back the land to the land owners. The demand of the land owners is timely release of their land so that they can engage other activities such as – paddy cultivation or salt production (in the coastal areas). But in most cases, the shrimp farmers, either outsiders or powerful local elites. have not responded positively to meting this demand. The result has been quite chaotic. The indiscriminate intrusion of saline water into others' paddy fields and the exclusion of local shrimp farmers from the production processes have serious implication on the local ecology. Excessive salinity has not only led to shrinkage of common grazing ground for the livestock and poultry but many sensitive trees have died also. This leads to further confrontation. In this manner the small and marginal landowners have become the victims of exploitation under current shrimp farming practice. The landowners of the locality have virtually lost their rights on land and they have no power to fight against these unlawful activities, which have made them helpless and hopeless. The leaseholders take resources away from the poor and utilize it to make profit. It may encroach upon the rights of the poor to common property resources and thus deny them the benefits of expenditure saving incomes (Rahman 1989).

From the field survey it has been observed that only 38% landowner leased out their land willingly and rest 62% leased out forcefully (Fig 5.1).

Fig 5.1. Percentage of people who leased out their land willingly



Source : Field Survey, December'1999

Table 5.2 relation between lessor and lessee (Village : Jabusa)

Relation	Percentage
Good	2%
Moderate	13%
Bad	85%

Source : Field Survey, December'1999

About 85% respondents told that their relation with lessee is not satisfactory. They do not care landowners. About 13% respondents told about their moderate relation. They told that they had no conflicts but they didn't gain any profit from that business. About 2% told that their relation was good and the shrimp businessmen respect them as landowner.

5.3. Changing Rural Power Structure

During the interview the poor farmers opined that gher owners are rich businessmen and the villagers are poor. So, normally the poor villagers go to them as they have need of money. They borrow during their need. Gher owners take this advantage and try to

exploit these people in advantage of their own interests. This process has a significant influence in changing the rural power structure. According to the villagers' opinion, generally leasing time is one year often it extends to five years in the negotiation with the landowner. Sometimes force is applied when they fail to negotiate with the landowners. The leaseholders appear with more power in terms of money and land. And for that cause, a gherowner posses more power than the general people. The gherowners exploit the resources for their commercial interests which are unsustainable. The local leaders and elite who used to give leadership and guidance to common rural people are being gradually undermined by the new wealthy outside elite in the area. This often creates social conflicts between gher owners and local leaders. In such situation landowners support the local leaders because they do not get any kind of beneficial return from the gher owners. The gher owners only reap the profits from land but hardly pay anything in return to the local community.

5.4. Degradation of Social Value

The social environment is vitiating and moral degradation has been becoming a reality as the direct by-products of the shrimp culture. From field survey, it has been found that the young generation of this area has become more commercial in their attitude and values. They go for easy money earning rather than devoting into studies. They spent most of their time for catching shrimp fry and harvesting shrimps. They are also involved in petty thieving and in local violence. The gher owners employ young men as guards for their ghers who are also often used as musclemen during clashes. Use of illegal arms is rampant. Such activities are degrading peaceful social environment of the community.

5.5. Impact on Education

From the field survey it has been found that school going children are more interested in catching shrimp fry than going to school. Their poor parents are less interested to send them to the school because children can earn money by collecting shrimp fry. The shrimp farmers do not care for the interests of local people, they do not take any step to improve the educational condition.

Table 5.3 Rate of school going children

Age range	Jabusa village			Naihati village		
	Total	% of School going	% of Not going	Total	% of School going	% of Not going
Below 5 Years	15	6.67	93.33	9	2.22	77.78
6 –10 Years	28	14.29	85.71	31	74.19	25.81
11 –20 Years	35	31.43	68.57	29	65.52	34.48

Source : Field Survey, December'1999

From the field survey it has been observed that in different age, percentage of school going children is higher in Naihati than Jabusa village (table 5.3). In Jabusa village, children of six to ten years are twenty eight in numbers, in which school going children is only 14.29%. Where as in Naihati village this percentage is about 74.19%. Incase if eleven to twenty years, 31.43% children are going to school in Jabusa and in Naihati this figure is again higher which is about 65.52 %. Here poverty is a major factor in affections attendance in school and shrimp culture has intensified it. In Jabusa village shrimp culture has an affect to increase poverty which is explained economic impact parts of the study.

5.6. Access to Common Property Resources

Besides loss of their private resources, local people have suffered a loss regarding common property resources like common grazing ground, common water bodies, common forests, etc. They have lost their control over these resources. The loss of access to such common property means net loss for local users. The loss may take the form of:

- Loss of livestock when a common grazing land is turned into private property.
- Loss of time and energy which in turn is a loss of cash when nearby water resources are contaminated with salinity, hence longer travel time is needed to fetch household and drinking water.
- Loss in cash due to shortage of firewood when a common forest becomes inaccessible. (Rahman,1989).

5.7. Access to Water Bodies

Since the introduction of shrimp culture, catching of fish other than shrimp has become difficult. Most of these fishes are considered as predators by shrimp farmers. Farmers screen out the predators while stocking shrimp fries. A huge number of fries (other than shrimp) get killed prematurely while collecting shrimp fries from open water bodies. Apart from that, a number of canals earlier available for fishing, by the poor, have now been turned into shrimp ponds and people are not allowed to fish in them. Fishing by night has virtually been eliminated in the coastal belt. In short, there has been a negative impact on the production of other fishes due to shrimp cultivation and those dependent on fishing for subsistence have been forced into deprivation (Rahman,1989).

5.8. Insecurity and Social Tensions

Shrimp culture has also intensified social contradictions in an otherwise tranquil village community. A large portion of peasants have been forced out of their traditional sources of income, while most of shrimp farmers do not always employ local landless persons on their farms. They do not relay on them and bring in their own loyal workers from outside of the village. As a result the poverty situation has worsened among the local people. Personal security of these local landless people is always in risk. Local people cannot even walk over the *bundh* (dykes) raised by shrimp producers. If they try to walk over the dykes, they are often assaulted physically. The security of women is under greater threat. Their honour and self-respect are often dashed to ground by the musclemen of the power elites. No organized protest is tolerated. Local police and administration in most cases, side with the emerging power holders for reasons known to all (Rahman,1989). This type of picture also found in Jabusa. Children are often physically assaulted because the security guard treated then as thieves.

CHAPTER SIX
ECONOMIC IMPACT

6.1. General

Shrimp culture plays a vital role in the economy of the nation due to its large contribution in foreign exchange earning. But its national importance has always undermined the adverse affect being created among various economic groups in the local area, particularly small landowners.

6.2. Changing Landuse

Changes in landuse are the most common and primary effect of shrimp culture. Large scale conversion of cropland into shrimp farms started since the introduction of shrimp culture in the area and the process still going on.

Table 6.1. Structure of Shrimp land in Bangladesh.

Name of District	No. of shrimp farm	Ave. area of Farm (ha)	Total area of land		Ave. Production Per ha (kg)	Total Production (metric ton)
			ha	%		
Khulna	813	29.22	23759	21. 94	160	3801. 880
Shatkhira	1123	18.88	21207	19. 58	206	4368. 642
Bagerhat	2648	13.40	35483	32. 76	170	6032. 110
Cox's bazar	1879	14.49	27069	24. 99	150	4060. 350
Chattagram	44	8.70	383	0 35	132	50 556
Noakhali	14	4.36	61	-	62	3. 782
Vola	1	12.00	12	-	72	0. 864
Potuakhali	18	18.11	326	0. 30	65	21. 190
Total	6540	16.56	108300	100.00	169.33	18338. 564

Source : Department of Fisheries (DOF), January, 1992.

The land owners has given their land leased to the lessee at a nominal lease money. These lease money varies from Tk. 3000 /bigha/year to Tk.5000 /bigha/year. The lands which produce two crops a year (paddy and shrimp) require the amount of lease money Tk.6000 /bigha/year to Tk.8000/bigha/year. These types of lands are very few in number.

Table No 6.2. Rate of Landuse Conversion from Crop to Shrimp (Village : Jabusa)

Year	Acres	Percentage (%)
1980 – 1985	18	3.39
1986 – 1990	248	47.51
1991 – 1995	144	27.55
1996 - 1999	113	21.55
Total	523	100

Source : Field Survey. December'1999

- Total area of Jabusa village is about 2428 acre.

From the survey, it has been observed that the landuse conversion is taking place at a very rapid rate. In 1980-85, 3.39% land had been converted, in 1986-90 the rate of this conversion became very high and it was 47.51%, in 1991-95, 27.55% land and in 1996-99 this amount stood at 21.55% (Table 6.2). In 1986-90 the rate of conversion was the highest and the rate was about 47.51%.

6.3. Reason For Conversion from Agriculture to Shrimp Culture

People of the locality have admitted that at first they agreed to lease out for shrimp farming because of low rate of production in crop farming. For long they experienced a low rate of return from crops and when the shrimp growers offered them a reasonable amount of lease money they agreed to lease out their lands. But day by day the power of leaseholders has increased, they employed muscleman for the protection of gher but these muscleman had become a subject of panic to the villagers.

Table 6.3. Reasons for Conversion (Village : Jabusa)

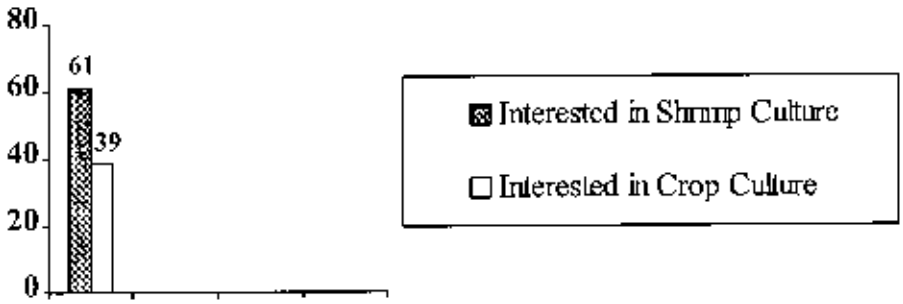
Reasons for conversion	No of respondent	%
Observing adjacent area	8	17%
From various lucrative offer	4	7%
For profitable income	5	10%
Loss in crop sector	2	3%
Pressure from powerful groups	23	47%
Others	8	17%
Total	50	100%

Source Field Survey, December'1999

If the gher owners fail to get land for expanding their gher mutually, acquire the adjacent land by force. Some farmers were brought under control by offering them share of profit from the gher but this approach was not persuasive enough to all farmers. The people who leased out their land once, never got their land back. This created a sense of distrust among the landowners. From the field survey in Jabusa village it has been observed that 47% respondent are forced to lease their land due to pressure from powerful groups and they are the largest group About 10% of the respondents have said that they are engaged because of profitable income but they also told that they did not gain what they expected. 17% were engaged observing adjacent areas. About 7% engaged themselves from various advertisements. Only one respondent (3%) said that lose of crop sector is the cause for their engaging in shrimp culture. About 17% (Others) have said that they have no alternate way. Because the amount of their land is small and their adjacent areas were already used by shrimp culture. So, their small pieces of land became a pocket land regarding those shrimp farms. So, they had to lease those small pieces to the adjacent gher owner.

At present, people are not interested to lease out their land to others. Instead, they want to get back their own land and, most of them wish to cultivate shrimp themselves in small scale They prefer shrimp rather than paddy (fig 6.1), because of it's higher rate of profitability.

Fig 6.1 Peoples Opinion about shrimp culture



Source : Field Survey, December'1999

6.4. Change in Yield of Paddy

Shrimp culture is more profitable than paddy or crop cultivation. So, local people became interested to use their land for shrimp cultivation, instead of crop. They converted their land from paddy to shrimp cultivation. But they did not know how long that profit would be effective. After passing some time they observed the actual result.

The poor people of the locality could not put their own land for shrimp culture due to lack of capital. They are forced to lease out their small pieces of land to large shrimp farmers who are mostly out-siders of the village and almost all the profit coming from shrimp go to lessee. It is observed that due to increased shrimp farming the rate of reduction in crop field increases. Some leaseholders cultivate paddy in their lands but the production of paddy is not satisfactory because the harvesting of shrimp is often delayed by the gher owners and again the lands are submerged with saline water. The delayed harvest of shrimp causes late transplantation of *Aman* seedling. If the transplantation is done later than mid-August, the paddy yield reduces. The local farmers who are even now cultivating their small amount of land (which they did not lease for shrimp), the return of crop production in their land is not satisfactory and that return often can not be even equal to the production cost. So, they become hopeless about crop cultivation.

The farmers of village Jabusa told that the shrimp farmers do not consider the interests of local paddy farmers.

Table 6.4 Change in yield of paddy (Jabusa Village)

No of respondent	Quantity of Land (Bigha)	Rice Production (Maund/Bigha)			
		Before 1985	1986-90	1991-95	1996-99
20	Upto 5.00	20	15	7	3
12	5.00 – 10.00	25	20	10	8
15	10.00 – 15 .00	22	20	12	8
3	15.00 and above	21	24	19	7
Total 50		Av. 22	Av. 19.75	Av. 12	Av. 6.5

Source : Field survey, December'1999

Table (6.4) shows the production of paddy of Jabusa village in different years. From the table (6.4) it can be seen that, where the average paddy production was 22 maund/bigha before 1985, it was reduced to 19.75 maund/bigha in 1986-90. The declined rate of production was 10%. The production became 12 maund/bigha in 1991-95 and the declined rate from 1986-90 was 39.24%. The production became 6.5 maund/bigha in 1996-99 and the declined rate from 1991-95 was 45.83%. So, the decline rate of paddy production from 1985 to 1999 is 70%. The data clearly indicates that paddy production in shrimp fields is continuously falling and this decline started immediately after initiation of shrimp farming in those lands. The rate of decrease of crop land is quite alarming. Beside this, before shrimp culture green crops and vegetables were grown together with paddy in the same land. But they are not grown now together with paddy in the same land. Thus total crop and vegetable production in the area is on decrease, which directly affects the income of the farmers who are depending solely on land for their livelihood.

Table 6.5. Change in yield of paddy (Naihati Village)

No of respondent	Quantity of Land (Bigha)	Rice Production (Maund/Bigha)			
		Before 1985	1986-90	1991-95	1996-99
22	Upto 5.00	20	22	25	30
13	5.00 – 10.00	18	20	30	45
10	10.00 – 15 .00	20	20	22	25
5	15.00 and above	25	28	30	35
Total 50		Av. 20.75	Av. 22.50	Av. 26.75	Av. 33.75

Source . Field survey, December'1999

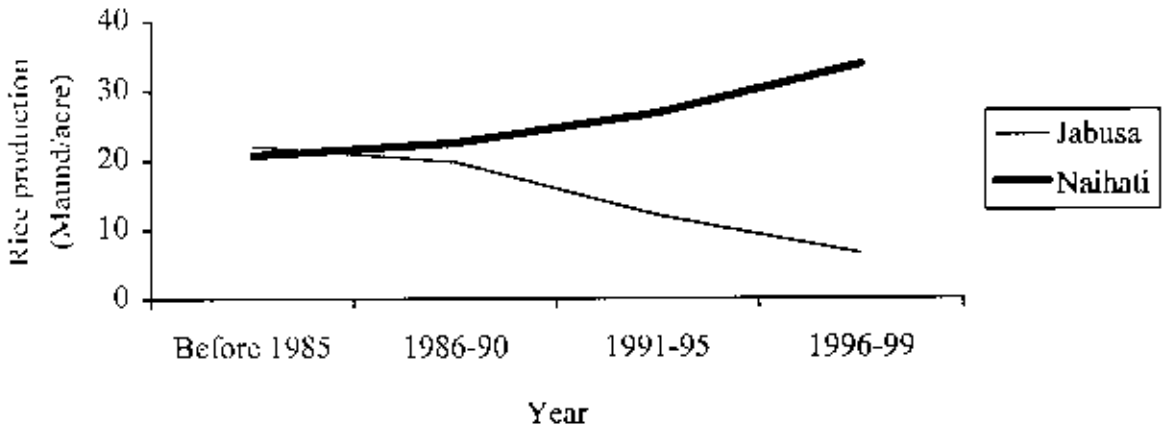
On the other hand, totally different situation exists in Naihati village (Table 6.5). The yield of paddy increases here day by day. Before 1985 the average production was 20.75 maund/bigha where in 1999 it is 33 75 maund/bigha. 63% is the increasing rate of paddy production. Causes of these changes in yield of Paddy are use of fertilizer, irrigation, and cultivation of different types of high yield variety (HYV) of rice.

Table 6.6. Change in yield of paddy (Maund/Bigha)

Village	Before 1985	1986 - 90	% of Change	1991 - 95	% of Change	1996 - 99	% of Change
Jabusa	Av. 22	Av. 19.75	- 10.22	Av. 12	- 45.45	Av. 6.5	- 70.45
Naihati	Av. 20.75	Av. 22.50	+ 8 43	Av. 26.75	+ 28.91	Av. 33.75	+ 48.35

Source : Field Survey, December'1999

Fig 6.2 Change in yield of paddy in two study areas



Source : Field Survey, December'1999

6.5. Impact on Employment

In the Jabusa village, before shrimp culture, land was primarily used for paddy cultivation. So, most people of that area including women were involved in crop cultivation to earn their livelihood. Crop production involves more manpower than shrimp farming. With the decrease in crop cultivation job market has been reduced. From field survey it has been observed that in Jabusa village, 47.89% people are engaged in fishing related activities In which 32.41% people are engaged in fry collection and 15.48% in others activities (Chapter four, table 4.8). Other activities include work in shrimp farm (though it is rare), and work in shrimp depots (In depot, shrimps are graded, beheaded and washed by the hired labours). Shrimp farms need small number of workers, so there are not many jobs in the area now. In this way conversion of cropland into shrimp farming is increasing the rate of unemployment and consequently promoting poverty and social unrest. The people who find jobs in the shrimp ghers do not earn sufficient income. Beside this, the outsiders have also imported labours from their own localities But this has laid off local labours. The people who are engaged in gher of the locality, their jobs are not permanent. They are engaged as day laborers. The leaseholders usually do not trust the local labourers and they hire labourer from outside, especially for

the security guard of the ghers. In Naihati village percentage of fry collectors are only 2.56% of the total occupation.

It has been observed from various features and news items that shrimp culture creates employment opportunity for the women. But findings from the field survey, shows a different picture. Before starting shrimp culture, scope of work was vast for the women. Most of them were engaged in activities related to crop production, like, harvesting and husking. They also maintained livestock and poultry. They could grow vegetables in their homestead areas. But after spreading of shrimp cultivation the picture turned different. Their scope of work has become limited. At present they can not work in their own crop field because these are under lease. And the small amount of land which the land owners occupy even now produce so insufficient crop that the women have little work to do in the field. Vegetables do not grow because of salinity. Women can not maintain livestock because of shortage of grazing field. They have limited work in shrimp processing factories and some of them collect shrimp fry. The amount of these works is limited in comparison to what they had before. Table (6.7) shows the economic activities before and after shrimp cultivation.

Table : 6.7. Economic activities of women

Previous Activities (Before Shrimp Culture)	Present activities (After Shrimp Culture)
• Agriculture (Crop) related works in own and others' land.	• Agriculture related activities have become reduced, shrimp is replacing crops in the field. The local women are not actively related with shrimp farming.
• They used to sell paddy seeds.	• Land have been often flooded during the time of sowing of seed. So, the women can not be engaged with this activity.
• They used to sell milk and cowdung.	• The number of domestic animals has decreased due to the lack of grazing fields, shortage of poultry and dairy feed and illness due to saline water.

Continued .....

• They used to sell vegetables.	• Vegetables can not grow due to saline water, so women can not contribute their labour in vegetable farming.
• They had sold own hand making mats.	• The mat tree can not grow due to saline water so women can't do mat making.
• They had sold eggs of hens and ducks.	• Gher owners prevent to maintain duck, so women can't raise ducks.
• They had done the work of constructing embankment.	• They are doing it even now.
• They had collected shrimp fry.	• They use to do it even now.
• They had worked in Food for Works Program	• They can do it even now.
• They had caught fishes from sweet water and sold it.	• Now a days, lake, beel, pond etc are flooded with saline water, so that fishes of sweet water are not available and women miss this activity.
• Before shrimp cultivation women did not work in any shrimp processing depo.	• Now, they have to take jobs in the shrimp processing depo.

Source : Field survey, December'1999

Fry collection became an occupation for large number of people only when Bagda shrimp culture was proved profitable for exporting. Fry catching is primarily linked with the monthly lunar cycle when the high and low tides occur. After shorting, fry collectors transfer their catches to earthenware bowls which are then carried back to the villages, from where these are passed through a chain of middleman before reaching the ghers (Hoq, mazid and haldar, 1995).

In Jabusa village, mostly the ages of the fry collectors are between 16 – 40 (74.1%). About 29.7% of the fry collectors are female. From this activity villagers can earn little

income. Table (6.8) shows the earning and employment rate of the study area. More or less, members of almost every family have joined in this activity.

The participation of women in fry collection is determined by the following factors :

- The necessity of women's earning for the family.
- The availability of other family members for household works.
- General economic condition governing women's work outside home.
- The place and time of catching fry.

In southern region, fry catching season starts in mid November and lasts till mid July. Generally the catchers go out haunting twice a day, usually at 5 – 9 am 3 – 5 pm. But during the season, collectors have to spend night keeping the net out in the river. Collection of shrimp fry is done using either fixed bag net or triangular (or less frequently rectangular) nets Push nets are widely used by the collectors, while some use set bag net and a very few use them both. Besides the fry of other shrimp species and fish, a number of other species are also caught with Bagda, *P. momdon*, discarding the other species caught in the rate. This rate of wastage is very high compared to the Bagda fry collected. From the ecological point of view, this may have adverse effect on fish population and habitat. (Hoq, Mazid and Haldar, 1995).

Table 6.8. Income and employment from fry collection

Fry Collector		People Engaged (%)
		Jabusa village
Age (in %)	1 – 15	25.6
	16 – 40	74.1
Gender (in %)	Male	70.3
	Female	29.7
Member per family (Ave.)		2
Daily income (in Tk.)		20
Monthly income of family (in Tk.)		1200

Source: Field survey, December'1999

In Khulna region, fry collection is a seasonal profession. However, income from this sector is not enough for the villagers to make their life easier specially during rest of the year. So, they are searching for jobs during off-season. The off-season occupation include:

a) Day labour
b) Fishing (Other than shrimp)
c) Ferry
d) Agriculture (Harvesting, straw cutting, labour, etc)
e) Wood Cutting
f) Removing Bagda heads (Female & children only), etc.
g) Rickshaw/Van puller

6.6. Impact on Livestock

Livestock, specially cows and goats are important income earning sources of the local people. Field observation shows that in Jabusa village rapid growth of shrimp culture is causing gradual reduction of grazing fields for cow and other domestic animals which resulted in deterioration in health of the animals. Obviously, the yield of milk has also been declined. Domestic animals are becoming ill due to saline water. Duck is strictly prohibited in shrimp culture area. Because duck catches fish from the farms. The mortality rate of poultry has also become high in areas due to the saline water. So, the people are deprived of income from poultry.

6.6.1. Ownership of Poultry

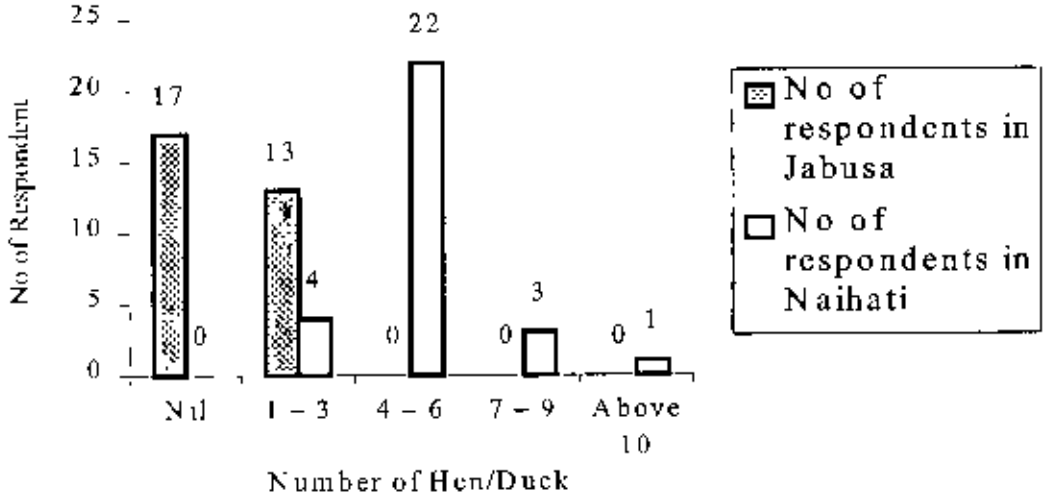
Ownership of poultry birds is very important for the poorer households as it can provide a small but regular income for them. For the poor, it is not only immediate source of income, but also the security throughout the year which is more crucial.

Table 6.9. Ownership of Poultry

Number of Hen/ Duck	No of respondents in Jabusa	No of respondents in Naihati
Nil	28	0
1 – 3	22	7
4 – 6	0	37
7 – 9	0	5
Above 10	0	1

Source: Field Survey, December'1999

Fig. 6.3 Ownership of Hen/Duck



Source: Field Survey, December'1999

Seventeen households found in Jabusa village have no poultry. Only thirteen have poultry birds but its number were not exceeding three. In Naihati village, every sample households have some poultry birds.

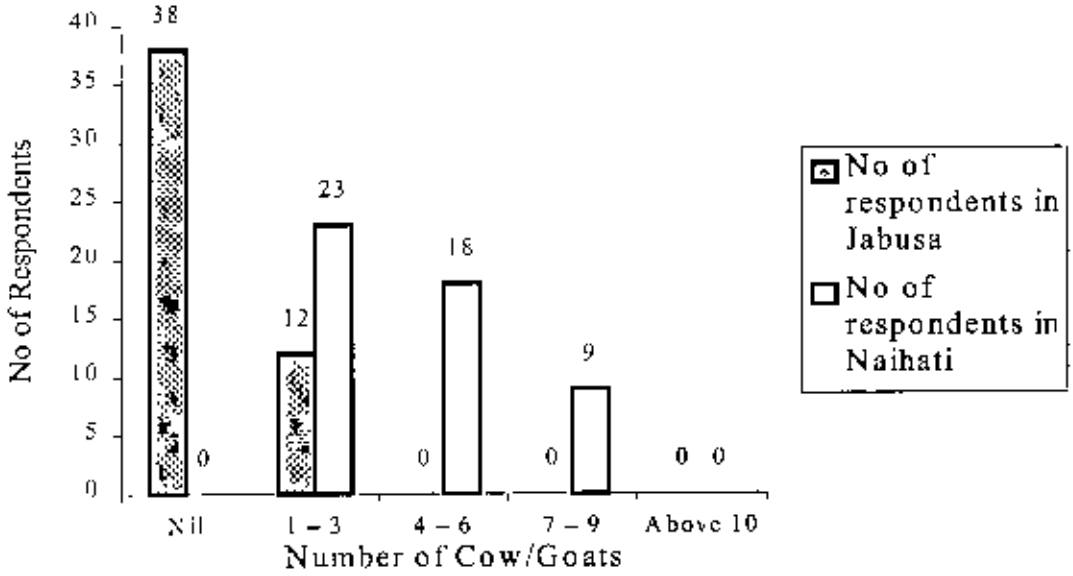
6.6.2. Fodder Crisis

Most of the farmers could not feed their farm animals properly, as price of all kinds of fodder have shot up in local markets and most of the grazing fields of the areas have been turned into shrimp farms in Jabusa village. One maund straw is being sold at Tk. 150 to Tk. 175, farmers said. Loss of common grazing gronnds has led to scarcity of fodder and grass for animals which has resulted in deterioration in health of the animals. Obviously, the yield of milk has also declined

6.6.3. Bullock Shortage

Cultivation of aman and boro paddy fields in Jabusa village is being hampered due to an acute shortage of farm animals. During the peak-time of boro season, there are many farmers who have no animals to plough their lands.

Fig 6.4 Ownership of Cow/Goats



Source: Field Survey, December'1999

Table 6.10. Ownership of dairy

Number of Cow/ Goat	No of respondents in Jabusa	No of respondents in Naihati
Nil	38	0
1 – 3	12	23
4 – 6	0	18
7 – 9	0	9
Above 10	0	0

Source: Field Survey, December'1999

In Jabusa village 38 households were found who have no cow and goat. Only 12 households have but not more than three. But in Naihati village every houscholds have some cow/goats. Nine households are found who have more than six cows (But less than ten). Most of them claimed that they had sufficient cattle breeds including milk cows. But now they have not enough and most of existing are very weak. The milk cows are still there in the village Jabusa. But they do not yield much milk. Just five to six years

back, their cow gave plenty of milk.. The people of shrimp cultured areas complains that their goats are loosing hair and are in trouble too because of skin diseases.

6.6.4. Loss of Income

Cow dung and milk are the source of earning in our village area. The people of Jabusa village are looser from that income.

Table 6.11. Yield of livestock product in study areas.

Village	Product (Average)					
	Milk (Kg/day)		Cow dung (Kg/day)		Egg/day	
	1999	Before 1990	1999	Before 1990	1999	Before 1990
Jabusa(Sample 50)	2-5	10-15	5-8	15-20	2	8
Naihati (Sample 50)	10-15	8-10	15-20	14-15	10	8-10

Source : Field Survey, December'1999

Table 6.12. Income from livestock.

Village	Average present family income (Tk./month)		
	Milk	Egg	Total
Jabusa (Sample 50)	2400	150	2550
Naihati (Sample 50)	7800	750	8550

Source : Field Survey, December'1999

- **Milk Production**

Average earning from milk in Jabusa village is Tk. 2400/family/month where in Naihati village this amount is Tk. 7800. In Jabusa village 2 to 5 kg is the average production of milk per day per family where 17 family has no cow/goat totally. But in Naihati, average production per day per family is about 10-15 kg. In the previous section, it was found that due to the shortage of grazing field most of the people of Jabusa village give up raising

cows, goats, etc. it resulted reduction of milk production in the shrimp farming dominated Jabusa village. It has brought another significant change in the fuel consumption.

- **Cow Dung**

In village areas cow dung are used instead of wood or kerosene for cooking. In Jabusa, fuel consumption pattern is quite different than any other villages of Bangladesh. Less number of domestic animals resulted less amount of cow dung. So, people are using wood because of shortage of cow dung.

- **Egg**

In Jabusa village average earning from egg is Tk. 150/family/month whereas in Naihati village this figure is Tk. 750 which amount is five times larger.

6.7. Trend on Occupational Change

People are changing their occupations due to changing circumstances and necessity. Before shrimp cultivation most lands were used as paddy fields and major part of the people of the locality were engaged in this sector. But now a days, when paddy fields have been converted into shrimp ghers, local peasants are compelled to change their traditional occupation. Because the gher owners do not allow them in their gher and the land which is previously cultivated by the whole family is reduced because of lease and that small amount of land can be cultivated by one or maximum two persons. Some have become shrimp fry collectors. Some are day labourers, some have taken jobs outside the village while others are totally unemployed

From the Table (6.13) it has been observed that previously about 66% male and 36% female were involved with crop culture whereas in 1999 only 35% male but no women are found in this sector. According to the field survey, the rate of unemployment (Male) has increased. Earlier no male was unemployed but about 3% unemployed male has been found at present. They told that previously they were engaged in their own agri-field but at present they are jobless. From the interview, it has been seen that some local people remain totally unemployed during the winter season. Sometimes they find some temporary job but it can not ascertain their regular income. During summer they get work in gher as day labourers and fry collectors. Prior to shrimp culture, housewives were also

engaged with crop culture but today they have lost their jobs. Before shrimp culture 19% male and 15% female were involved with fishing. They used to catch fish from canals and rivers and earned their living. But now a days, they have become fry collectors and day labourers of the ghers. Presently 32% male and 38% female are engaged in fishing related activities. It is true that shrimp culture creates employment for women and children, because their wage rate is lower than man. Daily rate for male is Tk.50 per day where as for women and children this rate is about Tk. 30. So, these groups are always preferred by shrimp businessmen. Women and children work in the factories and their main job is to separate head from the body of the shrimp. These groups are known as "Headless". But this job is also a seasonal job.

Table 6.13. Trend of occupational change (Village: Jabusa)

Occupation	Previous (Before shrimp culture)		Present (After shrimp culture)	
	Male (%)	Female (%)	Male (%)	Female (%)
Agri-farmer	66	36	35	0
Day Labour	4	0	17	8
Service	3	0	2	0
Business	4	0	5	3
Fishing related activities	19	15	32	38
Others	4	3	6	10
Unemployed/House wife	0	46	3	41
Total	100	100	100	100

Source : Field Survey, December'1999

6.8. Change in Economic Status of the Local People

Bangladesh earns a considerable amount of foreign exchange by exporting fisheries products, lion's share of which comes from frozen shrimps. These earnings help to increase the rate of GDP, and the profit of shrimp farmers. But it does not improve the fate of the small and marginal land owners leasing out land for shrimp farming. Field survey has been carried out 50 families from Jabusa village and 50 from Naihati.

Table 6.14. Income from shrimp farm and agri-land (Village: Jabusa)

Landuse	Area (in acre)	Income (Tk.)				
		Investment per acre	Production Per Acre	Income per acre	Profit per acre	Total Profit (in TK)
A	B	C	D	E	F = E - C	G = F X B
Shrimp	523	90,000	350 Kg	1,40,000	50,000*	2,61,50,000
Paddy	1527	6,000	30 mound	9,000	3,000**	45,81,000
Other Landuse	378	--				
Total	2428	--				

Source: Field Survey, December'1999

*1 kg Shrimp cost = 400 Tk

**1 Mound Paddy cost = 300 Tk

From the above table it is found that 1527 acres of land produce only about forty-five lac eighty one thousand taka on the other hand 523 acres of land, one third of agricultural land, can able to produce about two crore sixty one lac and Taka. Per acre profit from shrimp culture is 50,000 Taka and only 3,000 Taka from that of same quantity of land used for crop cultivation. The profit earned from shrimp culture is more than sixteen times than that is earned from agricultural land.

Table 6.15. Income from Agri-land (Village: Naihati)

Landuse	Area (in acre)	Income (Tk.)				
		Investment per acre	Production Per acre	Income per acre	Profit per acre	Total Profit (in TK)
A	B	C	D	E	F = E - C	G = F X B
Paddy	130	6,000	42 mound	12,600	6,600*	8,58,000
Other Landuse	378	--				
Total	2428	--				

Source. Field Survey, December'1999

*1 Mound Paddy cost = 300 Tk

In Naihati village paddy production per acre is substantially higher than that of Jabusa village In Naihati village paddy production per acre is 42 mounds and on the other hand it is 30 mounds in the Jabusa village. Because of salinity this production rate is quite less.

From the table 6.14 it has been observed that in a shrimp farm income per acre is Tk. 1,40,000. So, income per bigha is about Tk. 46,000 (approximately). From this in income the share of landowner is only 6.52% or Tk.3000/bigha/year which he has received as rent of the land.

Table 6.16 Distribution of income of a shrimp farm

Share holders	Share of Income	Percentage
Shrimp farmer	Tk. 43,000	93.48%
Land Owner	Tk. 3.000	6.52%
Total income	Tk. 46,000	100%

6.9. Ownership of Trees

Trees can contribute significantly in ensuring livelihood security to the poor. They provide assets in addition to biomass. Trees provide with subsistence and income in many ways. Non- timber forests and tree products include edible fruits, nuts, roots and condiments. Trees also provide fodder and firewood. Thus trees can be a very stable source of income to tide over seasonal hardships, especially during, slack seasons and thus reduce the need to migrate out of their villages. During bad times, tree owners can sell them off. People may also use trees as 'saving banks' and as means to meet contingencies or to settle debts (Chambers *et al. 1989)*. Trees have, thus, a potential capacity to reduce vulnerability and provide with both cash and collateral generating assets for the poor. *(Rahman, 1989)*. Fruit trees were abundant in Jabusa village when the shrimp cultivation was not in practice. Rabi crops were also plenty. But now, both trees and rabi crops have vanished from the landscape.

But in Nalhati village, every house has some fruit trees and other trees. Coconut and betel nut are found almost in every house. Beside this, banana trees, mango trees, jackfruit trees are also available. In this village, coconut and betel nut are the economic commodity also.

6.10. Impact on Fresh Water Fishes

The people of Naihati village even now depend on their ponds for fresh water fishes, such as – Rui, Katla, Magur, Kai, Tengra, Puti, etc. But in Jabusa village, this picture is totally different. The inhabitants told that earlier they could catch big fishes from the family pond, sometimes they could distribute some of them to their kith and kin. But as saline water seeped into the pond, the water got contaminated. And that was the end of it. All fishes got killed. The principal food items like fish are now rare commodities in Jabusa village. In few year back they got fishes from their own pond where as, now if they want to eat, they have to go to bazar with large amount of money. Even the inhabitants of village Jabusa can not catch fish in the government canals near a gher. They are challenged by the security guards of the gher owners.

6.11. Case Studies on some Representative Families

Before shrimp cultivation there were a number of sources of income in village Jabusa but these have declined due to landuse conversion. Here, two case study of two studied village are presented to show the comparison between economic life of two villages.

- **Case Study 1 :**

Name	: Abu Sayeed Sekh
Age	: 57
Village	: Jabusa
Family Member	: 8
Land under agriculture	: 3 Bigha
Land under shrimp cultivation	: 14 Bigha

There has been a significant decline in the economic position of Abu Sayeed's family since 1986. Main change is in agriculture sector. There are some sources such as, coconut, betel nut, fuel, vegetable which has a contribution earlier. But now, they can not sale it commercially, small amount which they produce are used for family consumption. Before 1986 Mr. Sayeed was full-time engaged with paddy production. But now he has a

business also, a glossary shop. This adds some additional income to his family that is no so significant. Two member of his family engaged with shrimp fry collection but it is a seasonal work. The income declination rate of this family is about 67%.

Table 6.17. Changes in the sources of yearly income of Abu Sayeed's Family

Sources of Income	Income (Tk) before Shrimp Culture (Before 1986)	Income (Tk) after Shrimp cultivation (1999)	Change in Income (Tk)
1. Agriculture	1,02,000	6,300	- 95,700
2 Coconut and betel nut	40,000	Nil	- 40,000
3. Lease money	Nil	42,000	+ 42,000
4. Sale of livestock (Excluding consumption)			
a. Cow milk	18,000	4,000	- 14,000
b. Egg	43,200	1,800	- 41,400
c. Cow dung	225	Nil	- 225
5. Vegetable	30,000	Nil	- 30,000
6. Business	Nil	18000	+ 18,000
7. Shrimp fry supply	Nil	4000	+ 4,000
Total	2,33,425	76,100	- 1,57,325

Source : Field survey, December'1999

* All the prices are calculated at the rate of 1999.

* This table is elaborated in Appendix-III

- **Case Study 2 :**

Name : Rahmat Ullah

Age : 62

Village : Naihati

Family Member : 10

Land under agriculture : 22 Bigha

Table 6.18. Changes in the sources of yearly income of Rahmat Ullah's Family

Sources of Income	Income (Tk) (Before 1986)	Income (Tk) (1999)	Change in Income (Tk)
1 Agriculture	79,200	99,000	+ 19,800
2. Coconut and betel nut	40,000	50,000	+ 10,000
3. Mango, Banana, Papaya	5,000	7000	+ 2,000
4 Sale of livestock (Excluding consumption) a. Cow milk b. Egg c. Cow dung	 24,000 36,000 225	 48,000 54,000 450	 + 24,000 + 18,000 + 225
5. Vegetable	30,000	Same as 1986 Tk. 30,000	No change
Total	2,14,425	2,88,450	+ 74,025

Source : Field survey. December'1999

* All the prices are calculated at the rate of 1999.

- This table is elaborated in Appendix-IV

Rahamat Ullah is one of the oldest inhabitants of Naihati village. He has 22 bigha agricultural land. Besides, two bigha attached to his homestead where all kinds of vegetables are grown. There is a pond of 1/4th bigha of land but he does not sale fishes commercially The banks of the pond are full of fruit trees. There are plenty of betel nut as well all around the homestead. Since 1986 income of Ramat Ullah's family increase. The rate is 34%. Mr. Rahamat told that except vegetables income has increased in every source. Because he expand his sources. In case of agricultural sector, high yield variety of paddy helps to increase his income.

CHAPTER SEVEN
RECOMMENDATIONS AND CONCLUSIONS

7.1. Summary of Findings

From the above findings and analysis following issues are highlighted:

1 Poor landowners do not lease their land willingly. Along with the lease money sometimes they are compelled to lease out their land under the pressure of powerful persons. In Jabusa village, it was found about 62% people were forced to lease out their land and this situation had created clashes. Besides, rest 38% who leased out their land willingly has faced other types of problems. After the expiry of lease period the lessee has denied to release their land.

2. Late harvesting of shrimp is the main cause for which conflict arose between lessor and lessee. About 88% respondents have claimed regarding this issue. About 7% answered for personal security and rest 5% told various reasons, such as low rate of lease money, breach of contract, etc.

3. About 85% respondents told that their relation with lessee is not satisfactory. About 13% told that their relation is moderate and only 2% respondents told that their relation is good so far.

4. In different age, percentage of school going children is higher in Naihati than that of Jabusa village. In Jabusa village only 14.29% children of 6-10 years old were attending school where as in Naihati this figure is about 74.19%. In case of 11-20 years age class, 31.43% boys and girls are going to school in Jabusa and Naihati this figure is again quite high with 65 52%.

5. About 61% villagers of Jabusa were found interested in shrimp farming if they got the necessary support. From this findings it is clear that, most of the people of the study area are interested about shrimp farming.

6. In Jabusa village, the decline rate of paddy production from 1985 to 1999 is 70%; whereas in Naihati, the increasing rate of paddy production is about 63%.

7 Average earning from diary and poultry product in Jahusa village is about Tk.2550 (Sample 50); where as in Naihati village it is about Tk. 8550.

8. Only 6.52% income of a gher goes to the local people or landowner. The rest goes to people from outside of their village Therefore shrimp cultivation do not benefit a large number of local villagers.

7.2. Recommendations

From the field survey, one thing is clear that if capital is provided, then poor landowners would be interested in shrimp farming. Because, it is a lucrative business and poor people want to change their fate. But some people who are minority group, not always motivated by profit. They have other considerations such as, social values, tradition, community feeling, etc. keeping in mind these sense and taking lessons from the above discussions, the following policy options can be suggested.

1. Shrimp is an export oriented profitable business item, it can't be suggested to stop it but there should be regulations to promote its development without affecting the rural economic structure of the small and landless farmers. Local people should be involved in the shrimp farming activity. As it was found, lots of problems are infested with the arrival of outsiders of shrimp cultivation in this area. So, outsiders should be discouraged to come for shrimp farming for the socio-economic stability in Jabusa village. For the recovery of the existing condition of shrimp farming following mechanisms are recommended in context of crop production and shrimp production by the local people.
   - If the local people (landowners) want to engage their land for crop production, they have to form a co-operative This co-operative with the help of LGED will bring the fresh water from adjacent Rupsha River through canals, which are now blocked. Fresh water is essential for reducing the salinity. LGED is ready to help in this regard, if the co-operative apply to do so.
   - If the local people want to engage their land in shrimp farming, they will do it in small scale by their own. Financial institutions are disbursing loan in fishery sector. Govt. and non-government organizations have training and managerial programs in this field.

2. At least. 50% of the total land in a village must be reserved for homestead, natural vegetation, ponds, grazing ground, play field and community spaces.
3. People should be encouraged not only to shrimp (Bagdha) but also to prawn (Galda) culture. Because, Galda is cultured in fresh water and it has no adverse impact on the environment. Also IRRI (a variety of rice) can be cultivated with Galda at the same time.
4. If people get interested to shrimp culture then suitable areas for shrimp culture would he selected by the Govt. These areas are declared as shrimp cultured areas. It is needed to identify the potential areas for shrimp culture through scientific surveys.
5. It is very much essential to develop a "Shrimp Research Institute" which will provide with the necessary information as well as technological knowledge about shrimp culture. Research should be undertaken for increasing shrimp yield through improved technology.
6. In shrimp ghers, large scale plantation should be made compulsory. People who will continue shrimp farming should plant trees in the embankment of the ghers to upgrade the environmental situations in this area. Coconut and betel nut trees can be recommended for this purpose because their leaves will not rot the gher water and their canopies are not big enough to affect the growth of shrimps. Besides, it will bring an extra income for the gher owner.
7. Salinity tolerable paddy should be evolved by the BRRI.
8. Co-operatives can be established in rural areas for shrimp farming. Local banks can give credit to small shrimp farmers.
9. Thana Parishad and Union Parishad, two lower hierarchical administration of local Government, should carefully exercise the existing child labour laws in this area. Child labour should be strictly prohibited from joining any shrimp related activities. Food for education program can be arranged to encourage them to go to school.

7.3. Conclusions

Shrimp is a valuable export good which contributes a high economic return to the economy of Bangladesh. But from this research it is clear that this new source of revenue earning is not an unmixed blessing. The aim of the study was to investigate the degradation of the socio-economic condition of the rural people in shrimp cultivated areas by the present

process and pattern of shrimp culture. Here, the assumption has been focussed on the negative impact of shrimp culture. On the basis of sample survey, observation and analysis, the hypothesis of this research has been accepted.

From the research findings, it is reveled that at present shrimp culture is beneficial for a section of people but it would not be a matter of the majority of people. Here, interests of the local people are the main objectives. If they are interested in agriculture they can again start paddy cultivation. If they are more concerned about lucrative profit of shrimp business, they can start it in a small scale but planned and regulated way and without hampering the ecosystem. Shrimp farmers should be encouraged to adopt primarily semi-intensive mode of shrimp farming rather than horizontal expansion as this farming pattern may led to the destruction of agricultural land as well as environment. While shrimp culture is vulnerable to crop production then prawn culture should be encouraged by the government by providing credit and other facilities to the local rural people. Bangladesh government should explicitly address one major guiding principle and development strategy for achieving a balanced and maximum production which will be socially, economically and environmentally sustainable.

BIBLIOGRAPHY

Ahmed, A.T.A. (1995), Impacts of Shrimp Culture on the Coastal Environment of Bangladesh. Paper presented at the Workshop on the Coastal Aquaculture and Environmental Management, Cox's Bazar, Bangladesh, Organized by Institute of Marine Sciences, University of Chittagong and sponsored by UNESCO/ROSTSCA, April 25-28, 1995.

Bailey. C. (1988), The Social Consequences of Tropical Shrimp Mariculture Development, Ocean Shoreline Management 11(1), Cited in Nuruzzaman, (1995).

Banarjee. K., Destruction of Sundarbans : Overview 1, 2. 3, 4 and 5, the Daily Bhorer Kagaj, August, 1998.

Banarjee. K., Open Terrorism at Devhata-Kaliganj, the Daily Bhorer Kagaj, 2nd August, 1998.

BIDS (1995), *Shrimp Culture and Environment in the Coastal region* : Working Paper New Series No. 8, Dhaka

BWDB, (1985), *Shrimp Culture in the semi saline zone of the Delta,* Technical Report no 13, Vol 2, Prepared by Bangladesh-netherlands Joint Program, Arnhem, The Hague, August.

Dugan, P.J. (1993), Wetland Management and International Perspective, In Freshwater wetlands in Bangladesh Issues and Approaches for Management, IUCN, Gland, Switzerland.

Fisheries Research Institute (1995), Socio-Economic Impact and Constraints of Shrimp Culture in Bangladesh : A Survey Report, Mymensingh.

Islam, N. (1996), *Environment and Vegetation of sundarbans mangrove Forest,* Environment and Biodiversity : In the context of South Asia, Kathmandu, Nepal.

Juville, M. and Serene, P. (1990), *Socio-economic Impact of Shrimp Cultivation in Polder 20 and 20/1 : A Case Study,* A Paper Presented for the Workshop on "Environmental and Policy aspects for shrimp cultivation', Dhaka

KDA, (1999). "Preparation of Structure Plan, Master Plan and Detail Area Plan for Khulna City" *Interim Report.* Aqua- Sheltech Consortium.

Khan, U S.A. and Hossain, S (1996). Impact of Shrimp Culture on the Coastal Environment of Bangladesh, *International Journal of Ecology and Environmental Sciences*, International Scientific Publications

Mahmood, N. (1986), Effects of Shrimp Farming and Other Impacts on Mangroves of Banglalesh, Paper presented at the third session of Ind-Pacific Fisheries Council (IPFC) Workshop on Inland Fish/Mangrove. Bangkok, Thailand, 22-25 June, 1986, cited in Khan and Hossain (1996).

Muniruzzaman, The Poison of Shrimp Fever in Bangladesh, The weekly Jaijaidin, 14th Nov, 1995.

Nuruzzaman, A.K.M. (1993), Coastal Environment and Shrimp Cultivation, Bangladesh agriculture Research Council.

Nuruzzaman, A.K.M. (1995), shrimp Culture and Management of Coastal Environment with Emphasis on Cox's Bazar and Satkhira Regions, Bangladesh, Paper presented at the Workshop on the Coastal Aquaculture and Environmental Management, Cox's Bazar, Bangladesh, Organized by Institute of Marine Sciences, University of Chittagong and sponsored by UNESCO/ROSTSCA, April 25-28, 1995.

Planning Commission (1999) Fifth Five Year Plan (1997-2000). Dhaka, Bangladesh.
Primevera, J.H. (1989), The Social, Ecological and Economic Implications of intensive Prawn Farming, Asian Aqualt. II (1).

Rahman, Golam and Awal, Sadiqul (1993). Present Status and Prospects of the shrimp Culture in the Khulna Region, *A paper presented on the seminar on development of coastal resources*, Khulna University, Khulna, July 23-24, 1993.

Rahman, Anur (1989), *The Impact of Shrimp Culture on the Coastal Environment*, Environment and development in Bangladesh.

Rahman, Anisur (1999), Environmental Losses Eclipse Profits from Shrimp Sector, The Daily Observer, October 29, 1999.

Saha, M. Shrimp Culture : Socio-Economic and Environmental Impact and its Consequences, 17th June, 1996, Dainik Sangband, Khulna.

UNDP, (1995), Climate Change in Bangladesh : Report on Human Development in Bangladesh Environment, Dhaka, Bangladesh.

APPENDIX - I

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF URBAN AND REGIONAL PLANNING

RESEARCH TITLE : SOCIO-ECONOMIC IMPACT OF INCREASING SHRIMP CULTURE :
A Case Study on Jabusa and Nathati Village of Rupsha Thana in Khulna District
(ONLY FOR RESEARCH PURPOSE)

Sample No : Date :

Village :

Name of the respondent :

1. Household information :

Serial No	Age	Sex	Education		Occupation		Income/month
	1	2	3		4		5
			Continue	Not	Present	Previous	

Code : 1
1. Below 5 Years
2. 6 Years – Upto 10 Years
3. 11 Years – Upto 20 Years
4. 21 Years – Upto 30 Years
5. 31 Years – Upto 40 Years
6. 41 Years – Upto 50 Years
7. Above 50 Years

Code : 2
1. Male
2. Female

Code : 3
1. Illiterate
2. Below SSC
3. S.S.C.
4. H.S.C.
5. Graduate
6. Masters and above
7. Doctor/Engineer/ Other Professionals

Code : 4
1. Farmer
2. Day labour
3. Service
4. Business
5. House Wife
6. Fishing related activities
7. Unemployed

2. Source of income of the Household

Source	Present Income (After Shrimp Culture)	Previous Income (Before Shrimp Culture)
	Y/M/W/D	Y/M/W/D
1 Salary		
2. Agriculture		
3 Business		
4. Wage		
5 Poultry		
6. Livestock(Cow/Goat)		
7 Vegetables		
8 Lease Money		
9 Income from Shrimp gher		
10. Shrimp fry collection		
11. Salary from shrimp farm		

3. Information about land :

Use of Land		In Acre	In Bigha	In Katha	In Decimal	In sq. ft
Home Stead						
Crop Culture						
Shrimp Culture	Own					
	Lease					
Others						
Total						

4. Change in Yield of Paddy in the Study Area :

Year	Production (Maund/Acre)	Cost (Tk./Maund)
1995-2000		
1991-1994		
1985-1990		
Before 1985		

5 What was the use of land before shrimp farming ?

6 Amount of land converted to shrimp culture from agriculture

Time	Amount of land	
	Agriculture	Shrimp Culture
1st year..19..		
2nd year..19..		

7a. Are you leased out your land willingly ?

Yes ☐
No ☐

7b If yes, then why had you encouraged for this shrimp culture ?

i Observing adjacent area ☐
ii From various lucrative news ☐
iii For profitable income ☐
iv. By force ☐
v. Other ☐

7c. How is your relation with lessee?

Good ☐
Bad ☐
Moderate ☐

7d Is there any conflict between you and your lessee?

7e If yes, then what is the reason of the conflict ?

8 Livestock, especially Cows, Goats and Poultry are facing what kind of problems due to Shrimp Culture ?

i. .....
ii. .....
iii. .....

9. Yield of Livestock's product

Product	Present	Previous
Milk		
Cow dung		
Egg		

10. List of Trees

Present	Previous

11. What type of negative impact had happened?

i. Change in yield of paddy
ii. Changes in water quality
iii. Decreasing land, livestock, trees, etc
iv Shrinking common grazing land, water bodies, forests, etc.
v. Personal security has been under threat.
vi. Others

APPENDIX - II

UNITS AND MEASUREMENTS

1 Hectare	= 2.4711 Acre
1 Acre	= 3.025 Bigha = 100 Decimals = 0.4046856 Hectare
1 Bigha	= 33 Decimals = 0.3305785 Acres = 0.13378038 Hectare
1 Foot	= 0.3048 Metre
1 Sq ft	= 0.0929 Sq.m.
1 Mile	= 1.6093 Km.
1 Sq mile	= 2.590 Sq.km
1 Km	= 0.6214 Mile
1 Ser	= 0.93 Kg
1 Mound	= 37.324172 Kg = 0.037324172 Metric Ton
1 Crore	= 10 Million
1 Lac	= 0.1 Million
US $1	= Tk. 57

APPENDIX - III

Changes in the sources of yearly income of Abu Sayeed's Family

Sources of Income	Income (Tk) before Shrimp Culture (Before 1986)	Income (Tk) after Shrimp cultivation (1999)	Change in Income (Tk)
1 Agriculture	Crop Land = 17 Bigha Production = 20 maund/bigha Rate = 300 Tk/maund Income = 17x 20x300 = Tk. 1,02,000	Crop Land = 3 Bigha Production = 7 maund/bigha Rate = 300 Tk/maund Income = 3x7x300 = Tk 6.300	- 95,700
2. Coconut and betel nut	Tk. 40.000	Nil	- 40,000
3. Lease money	Nil	Tk. 3000/bigha/year Total = 14x3000 = 42,000	+ 42,000
4 Sale of livestock (Excluding consumption)			
c. Cow milk	Per year = 300 Kg Per kg = 10 Tk. No of cow = 6 Income = 300x10x6 = Tk.18.000	Per year = 200 Kg Per kg = 10 Tk. No. of cow = 2 Income = 200x10x2 = Tk.4,000	- 14,000
d. Egg	Egg per hen per day = 2 Ave egg per hen / year = 600 Rate = Tk.3 per egg No of hen and Duck = 12 Income = 2x3x12x600 = Tk. 43,200	Egg per hen per day = 1 Ave.egg per hen / year = 300 Rate = Tk 3 per egg No of hen = 2 Income = 1x3x2x300 = Tk. 1,800	- 41,400
e. Cow dung	Per day = 1 Kg Per year = 300 Kg Per kg = Tk 0.75 Income = 300x0.75 = Tk 225	Nil	- 225
5. Vegetable	Tk. 100 per day Ave. 300 day per year Income 100x300 = Tk 30,000	Nil	- 30.000
6 Business	Nil	Per month profit = Tk. 1500 Income = 12x1500 = 18000	+ 18,000
7 Shrimp fry supply	Nil	Tk. 1000 per month Income 1000x4 = Tk. 4000	+ 4,000
Total	2,33.425	76.100	- 1,57,325

Source : Field survey, December'1999

* All the prices are calculated at the rate of 1999.

APPENDIX - IV

Changes in the sources of yearly income of Rahmat Ullah's Family

Sources of Income	Income (Tk) (Before 1986)	Income (Tk) (1999)	Change in Income (Tk)
1. Agriculture	Crop Land = 22 Bigha Production = 12 maund/bigha Rate = 300 Tk/maund Income = 22x 12x300 = Tk. 79,200	Crop Land = 22 Bigha Production = 15 maund/bigha Rate = 300 Tk/maund Income = 22x15x300 = Tk 99,000	+ 19,800
2 Coconut and betel nut	Tk 40 000	Tk. 50,000	+ 10,000
3 Mango, Banana, Papaya	Tk. 5,000	Tk. 7000	+ 2,000
4 Sale of livestock (Excluding consumption)			
e. Cow milk	Per year = 300 Kg Per kg = 10 Tk. No of cow = 8 Income = 300x10x8 = Tk.24.000	Per year = 400 Kg Per kg = 10 Tk. No. of cow = 12 Income = 400x10x12 = Tk 48,000	+ 24,000
f Egg	Egg per hen per day = 2 Ave.egg per hen / year = 600 Rate = Tk.3 per egg No of hen and Duck = 10 Income = 2x3x10x600 = Tk. 36,000	Egg per hen per day = 2 Ave.egg per hen / year = 600 Rate = Tk.3 per egg No of hen = 15 Income = 2x3x15x600 = Tk. 54,000	+ 18,000
e Cow dung	Per day = 1 Kg Per year = 300 Kg Per kg = Tk 0.75 Income = 300x0.75 = Tk 225	Per day = 2 Kg Per year = 600 Kg Per kg = Tk. 0.75 Income = 600x0.75 = Tk450	+ 225
5. Vegetable	Tk 100 per day Ave. 300 day per year Income 100x300 = Tk. 30,000	Same as 1986 Tk. 30,000	No change
Total	2,14,425	2.88,450	+ 74,025

Source : Field survey, December'1999

* All the prices are calculated at the rate of 1999.

APPENDIX - V

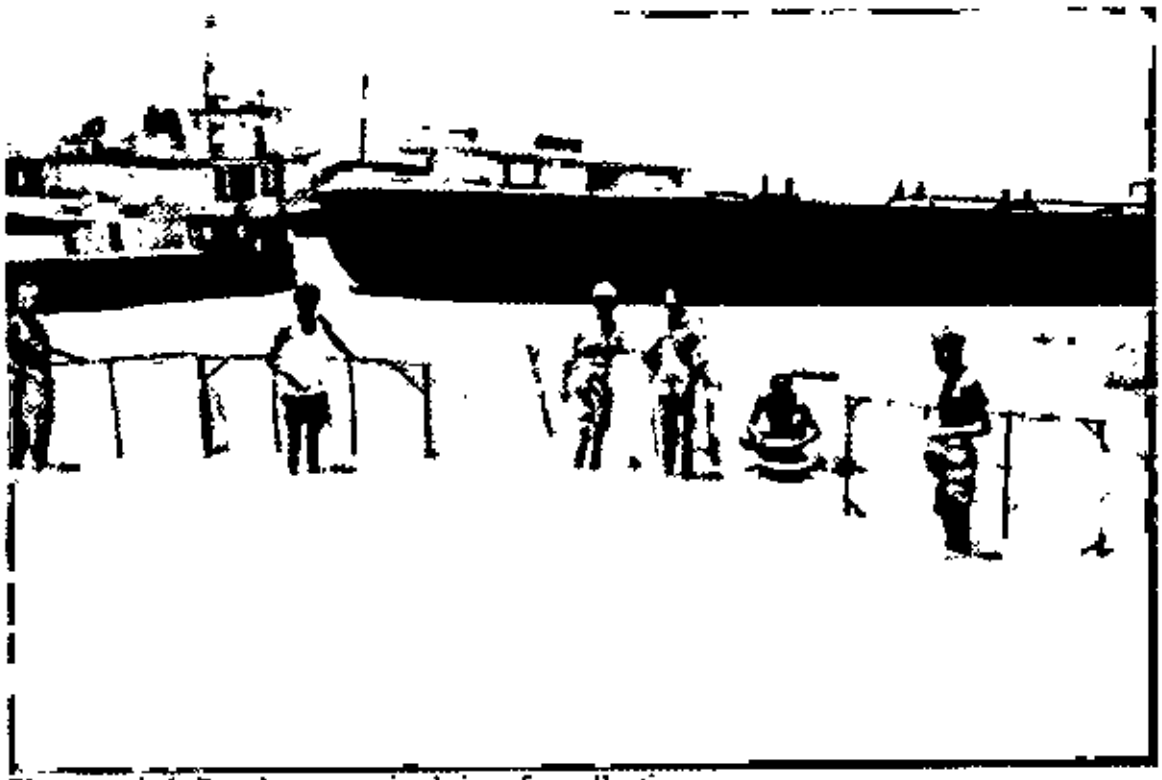
Photograph 1. Landscape of Jabusa village

Photograph 2. Landscape of Naihati village

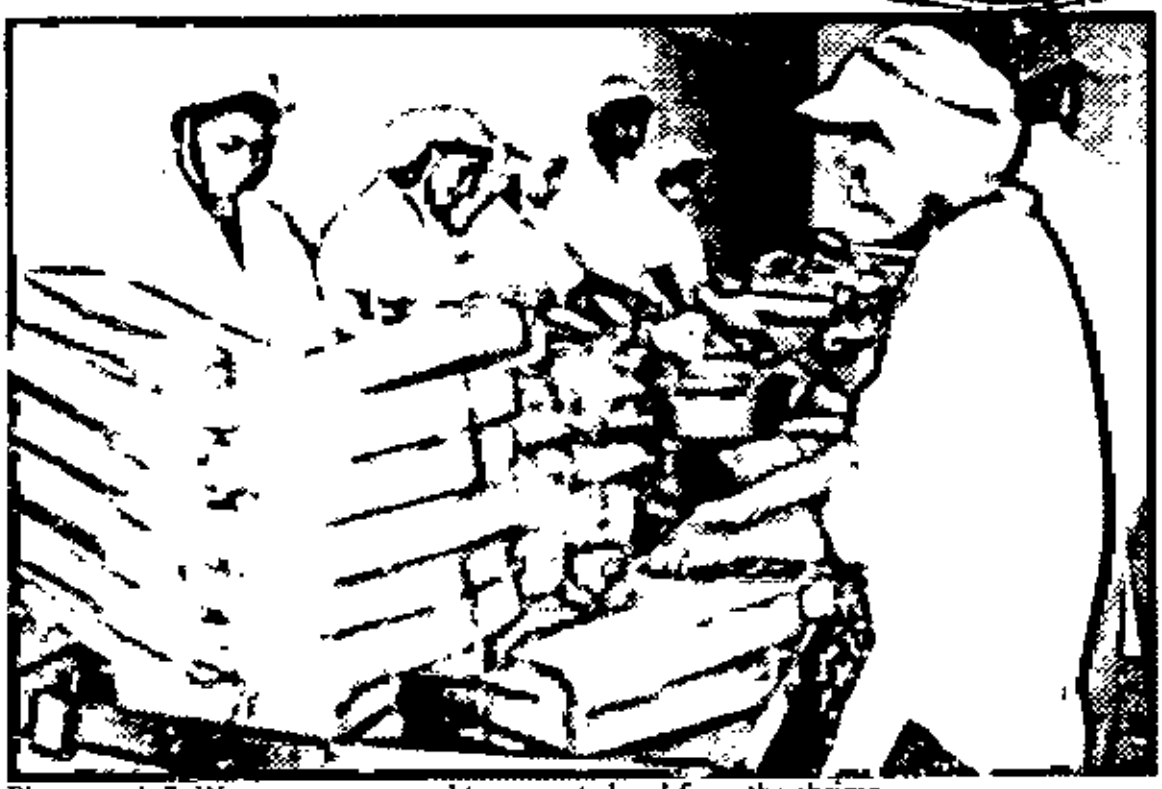
Photograph 3. Absence of grazing resulted the livestock just skin and bone in Jabusa

Photograph 4. Available grazing field in Naihati made the livestock healthy and produce more milk

Photograph 5. Gher area restricted for the frequent movement of local inhabitants (Jabusa village)



Photograph 6. People engage in shrimp fry collection



Photograph 7. Women are engaged to separate head from the shrimp

Photograph 8. Women are engaged in the diversified profession beside their homestead works