Government of the People's Republic of Bangladesh
Bangladesh Water Development Board
Water Resources Planning Organization

FLOOD ACTION PLAN

NORTHEAST REGIONAL WATER MANAGEMENT PROJECT (FAP 6)

KALNI-KUSHIYARA RIVER MANAGEMENT PROJECT FEASIBILITY STUDY

ANNEX D SOCIAL

Final Report
March 1998

SNC ♦ Lavalin International
Northwest Hydraulic Consultants

in association with

Engineering and Planning Consultants Ltd.
Bangladesh Engineering and Technological Services

Canadian International Development Agency

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COVER PHOTO: A typical village in the deeply flooded area of the Northeast Region. The earthen village platform is created to keep the houses above water during the flood season which lasts for five to seven months of the year. The platform is threatened by erosion from wave action; bamboo fencing is used as bank protection but often proves ineffective. The single *hijal* tree in front of the village is all that remains of the past lowland forest. The houses on the platform are squeezed together leaving no space for courtyards, gardens or livestock. Water surrounding the platform is used as a source of drinking water and for waste disposal by the hanging latrines. Life in these crowded villages can become very stressful especially for the women, because of the isolation during the flood season. The only form of transport from the village is by small country boats seen in the picture. The Northeast Regional Water Management Plan aims to improve the quality of life for these people.

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ACRONYMS AND ABBREVIATIONS

BBS	Bangladesh Bureau of Statistics
BIWTA	Bangladesh Inland Water Transport Authority
BRAC	Bangladesh Rural Advancement Committee
BWDB	Bangladesh Water Development Board
CEDAW	UN Convention on the Elimination of all forms of Discrimination Against Women
cft	cubic feet
CIDA	Canadian International Development Agency
cm	centimetre
CO	Community Organizer
DC	Deputy Commissioner (formerly District Commissioner)
DPHE	Department of Public Health Engineering
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FPCO	Flood Plan Coordination Organization
FWC	Family Welfare Centre
FWV	Family Welfare Visitor
GOB	Government of Bangladesh
ha	hectare
HH	Household
hr	hour
HTW	Hand Tube Well
HYV	High Yielding Variety
kg	kilogram
km	kilometre
KK	Kalni-Kushiyara
KKCDMP	Kalni-Kushiyara Community Development and Monitoring Project
KKRMP	Kalni-Kushiyara River Management Project
LCS	Landless Contracting Society
LLP	Low Lift Pump
m	metre
MCH	Mother and Child Health
mm	millimetre
Mm^3	Million cubic metres
MOWR	Ministry of Water Resources
mt	metric tonne
NERP	Northeast Regional Water Management Project
NGO	Non-Governmental Organization
NPWA	National Policy for Women's Advancement
PRA	Participatory Rural Appraisal
SDO	Sub-Divisional Officer
Tk	Taka (Bangladesh currency. $1 CDN=approx. Tk 30)
TNO	Thana Nirbahi Officer
TW	tube well
UNDP	United Nations Development Program
WARPO	Water Resources Planning Organization

GLOSSARY

aar bandh	a traditional method of platform protection using a bamboo frame and vegetative packing
adhibhagi	sharecropper
aman	monsoon rice crop
aus	pre-monsoon rice or rice grown in *kharif* I season.
b. aman	broadcast or deepwater aman rice grown in *Kharif* I and II seasons
bandhak	mortgage
barga	sharecropping practice whereby usually, the operator provides the inputs and the produce is shared by operator and landowner
bari	cluster of houses usually having kinship lineage
bazar	market
beel	floodplain lake that may either hold water perennially or dry up during the winter season
bepari	laborer coming from outside the area
bhita	homestead
bisra	a patch of land, usually located between homestead and crop land
boro	rice grown during the dry, winter season
bou	wife
bundh	earthen dam, closure
chai	bamboo fish trap
chailla	a water-tolerant grass (hemarthria protensa) grown in low-lying floodplains
chanda	contribution
char	newly emerged land, or silted water body
chata	a round shaped fuel block made of cow dung and rice straw
chara bisra	slightly elevated land adjoining the homestead platform
chukti	a type of leasing system for singled-cropped land whereby the operator pays a fixed rent after harvest amount of
chukti kamla	a contracted laborer
class I channel	3.6 metre depth; 50 metre width perennial
class II channel	2.4 metre depth; 50 metre width perennial
class III channel	1.8 metre depth; 37 metre width perennial
class IV channel	1.5 metre depth; 37 metre width seasonal
country boat	wood hull boat of traditional design; capacity usually not more than 500 *maunds* (19 tonnes)
dawa	harvesting
dawal	local harvesting laborer
decimal	a unit of land measure; 0.01 acre; 0.004 ha
demi paddy	submerged rice stalk and head
dhaincha	a leguminous plant (ipomea fistulosa), used for green manure and fuel
dhala	breaches across river banks
dhol kolmi	a water-tolerant shrub, used for traditional platform protection (ipomoea fistulosa)

dry season	5 months: December-April inclusive
ghar	room, small house
ghat	riverine landing or bathing place
girost	farmer
gleaning	the collection of fallen rice kernels, from harvested fields
gopat	pathway
gram	village
haal	a unit of land measurement, equivalent to 12 kare or 1.46 ha
haat	big market
haor	a depression on the floodplain
hara	unit of land measurement, equivalent to 16 katha or 1.28 acre
hati	neighborhood cluster
hizol	a water tolerant tree (barringtonia acutangula), used for traditional platform protection
household	a family unit, who share common resources for cooking and eating
ikor	a water-tolerant grass (sclerostachya fusca)
IWT craft	steel-hull boat 350-500-tonne capacity; single screw
jala	rice seedling
jalakhet	rice seed bed
jalmohal	waterbody used as fishery
kamla	wage laborer
kanda	high land on the *haor*, used for cattle grazing, cropping or paddy threshing
kantha	quilt sewn of old cloth
kare	a unit of land measurement, equivalent to 3.60 acre or 0.11 ha
katha	a unit of land measurement, equivalent to 0.08 acre
khal	channel
khas	government owned land or water bodies
khola	paddy threshing land
kare	a unit of land measurement equivalent to 0.11 ha
koroch	a water-tolerant tree (pongamia pinnata), used for traditional platform protection
kutcha	unfinished surface, thatched
lakh	100,000
logni karbar	usury or money-lending at high interest rates
lungi	cotton woven cloth worn by men
macha	platform made of bamboo or wood
maund	an indigenous unit of weight, equivalent to 40 seers or 37.3 kg
mohajan	money-lender
mora gang	dead river, unused channel
muni	wage laborer
muri	puffed rice used as snack
nal kagra	a water-tolerant shrub (phrangmites kankap), used for traditional platform protection
noya gang	new river course
paddy	unhusked rice
para	a neighborhood cluster (same as *hati*)

parishad	council
poa	indigenous unit of weight equivalent to a quarter of a *seer*
pucca	paved, made of brick, finished surface
purdah	a state of physical or social seclusion for women
rabi	dry season
rangjoma	a type of leasing system whereby the operator pays a fixed rent in cash at the time of contract
roa	rice transplantation
roj kamla	laborer engaged on a daily basis
ruaichha	transplanted *aman*
samity	cooperative society
saree	woven cloth worn by women
seer	an indigenous unit of weight, equivalent to 0.933 kg
t. aman	transplanted *aman* rice grown in *Kharif* II season or monsoon season
taka (Tk)	Bangladesh unit of currency, 1 US $ = 40 taka (approx.)
tarja wall	protection wall made from bamboo mat
thana	geo-administrative unit under a district comprising several unions
union	geo-administrative unit under a thana comprising several villages
union *parishad*	elected local government council at the union level
wet season	7 months: May-November inclusive

CONVERSIONS

Weight

1 *seer* = 0.933 kg
1 *maund* = 40 *seer*, 37.3 kg

Area

1 *kare* = 0.25 acre, 0.11 ha
1 *haal* = 12 *kare*, 3.60 acre, 1.46 ha
1 *acre* = 100 decimals, 0.40 ha
1 *katha* = 0.08 acre or 0.03 ha
1 *hara* = 16 *katha* or 1.28 acre or 0.52 ha

Calendar

Bengali Month	Conversion	
	From the middle of	To the middle of
Baishakh	April	May
Jaishtha	May	June
Ashar	June	July
Sravan	July	August
Bhadra	August	September
Ashwin	September	October
Kartik	October	November
Agrahayan	November	December
Poush	December	January
Magh	January	February
Falgun	February	March
Choitra	March	April

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1. INTRODUCTION

1.1 The Social Context

The Kalni-Kushiyara study area is a part of the Surma-Kushiyara floodplain. Topographic characteristics have made the region relatively secluded. The area is characterized by heavy monsoon rainfall and extensive depressions on the floodplain (*haor*), which remain under water for more than half the year. The relationship of water and land has deeply influenced the settlement patterns, cultural practices and economic activities of the people. Lives and livelihoods are centred around the cultivation of the annual rice crop, grown during the dry winter season. What is reaped from the fields during April and May must sustain the entire populace for the whole year. Any mishap to this harvest jeopardizes the economic and social stability of all communities in the area.

Defined by the context of the water and land, the social environment is inextricably conditioned by a host of natural, social and economic factors. A study of the social environment, encompassing the influences of natural processes, climatic events, historical trends, human perceptions and responses is imperative to understanding the social dynamics of the people. With such knowledge, appropriate social, gender and environmental components can be conceptualized, designed and realistically undertaken in a multi-faceted project.

1.2 Scope

The scope of the social studies has been defined in the context of the overall scope and purpose of the Kalni-Kushiyara River Management Project (KKRMP) feasibility study. This Annex mainly includes information which could not be incorporated, in detail, in the main report. It was felt that a more detailed account would better enable an understanding and appraisal of the project. Therefore, this Annex should be treated as auxiliary to the main report and not an independent study.

1.3 Data Source and Methodology

The study is based on both primary and secondary data. Primary data have been obtained from the field through surveys, interviews and group discussions. Secondary data have been gathered mainly from the Bangladesh Bureau of Statistic (BBS) literature, statistics of selected government agencies and other government publications.

Village Reconnaissance Survey

A village reconnaissance survey was conducted during the period from November 1995 to February 1996. The main purpose of the survey was to get an overview of the area along the flood-way of the Kalni-Kushiyara River and to gain general knowledge about human settlements. A total of 133 riverside villages on both banks of the Kalni-Kushiyara were covered in the survey. Among these are 39 villages in the Sherpur-Markuli reach, 31 villages in the Markuli-Ajmiriganj reach, 26 villages in the Ajmiriganj-Katkhal reach, and 37 villages in the Khatkhal-Shibpur reach (Table D.1).

The Village Reconnaissance Survey covered information on location, number of households, homestead area, erosion, flood history and incidence of water-related problems and issues.

Household Survey

A socio-economic survey of households was carried out between April and June 1996. A simple sampling procedure was followed to select the ultimate survey units. In the first stage, all villages covered by the reconnaissance survey were scrutinised on the basis of available information. Given the time and resources, it was decided to select two villages from each of the following reaches:

- Upper Reach - Sherpur-Ajmiriganj;
- Middle Reach - Ajmiriganj-Khatkhal, and
- Lower Reach - Khatkhal-Shibpur.

Several other criteria were used to optimize the representativeness of the survey villages. These are as follows:

- In each reach, one village on each of the banks;
- In each reach, two villages from two separate *thanas* for geographical diversity;
- Preferably small or medium size villages, in relation to population;
- Villages with households having mixed occupations;
- Villages suffering from water-related problems such as floods, drainage congestion and/or erosion;
- Villages where the people appeared to cooperate in providing reliable information, and
- To avoid atypical villages, i.e. villages with a market, "very rich" villages, "extremely poor" villages, etc.

Based on these criteria, 6 villages were selected in three reaches. In the middle reach, Kakailseo and Gazaria villages were selected. It should be mentioned that upon the completion of a Pilot Dredging Project, village platforms were developed both in Kakailseo and Gazaria (Annex J - Pilot Dredging Project). This intervention is expected to impact on the socio-economic life of the beneficiary households in these 2 villages. A pre-project survey was carried out on households in these villages to obtain baseline data and facilitate comparative studies in the future.

In the second stage, all households were covered in the selected villages, except Kakailseo and Gazaria, as ultimate survey units capturing the entire configuration and dynamics of these villages. This has helped to minimise the sampling error significantly. Kakailseo and Gazaria villages are very big in size. In Kakailseo, parts of four *hati* were developed through the Pilot Dredging Project. These are Kumedpur, Chanpur, Charhati and Gopalpur. Each *hati* is perceived as an independent social unit by its residents and obviously possesses some essential characteristics of a village. Initially all beneficiary households, whose platforms were developed, in these four *hati* were selected for the survey. Secondly, all households in one *hati* were selected for the survey. Chanpur Hati was selected because of its medium size and also because it fulfils other conditions outlined above. In Gazaria, all beneficiary households were covered. This included the entire northern area and a small fraction of the southern area. These two areas had been initially physically separated, forming two separate neighbourhoods but in 1996, they were connected as a result of the Pilot Dredging Project.

In total, 568 households in six villages were covered in the Household Survey (Table D.2 and Figure D.1). A pre-designed questionnaire was used to obtain necessary information on population characteristics, land ownership, tenancy conditions, occupation, income, water and sanitation. All household heads were interviewed. In the absence of the head of household, another adult member of that household was interviewed.

Women's Status Survey
In the dry season of 1996, a women's status survey was conducted by female community organizers (COs) in five villages, representing four *thanas*, located along the river between Ajmiriganj and Madna. Villages were selected to sample women's participation in the pilot communities and to represent villages with a typical range of women's issues related to flood, erosion and homestead agriculture. The senior woman in 408 households was surveyed with a structured questionnaire on household characteristics, marriage, education, literacy, land ownership, homestead production, income, wage and household decision-making.

Participatory Rural Appraisal, PRA
PRA was extensively used to obtain relevant information which could not be collected through a structured questionnaire. Understanding of the issues, problems and processes needed careful examination of concrete experiences and perceptions of the respondents. PRA with informal interviews and focus group discussions was an important method of data collection. It also enabled conceptualisation of pertinent issues and processes for deepening sensitivity and understanding of members of the study team.

The method allowed collection of information on a wide range of issues including land and tenancy relationships, labor and wage contracts, agricultural and land use practices, markets, navigational patterns, and women's rice gleaning practices. Historical accounts and social studies on bank and *haor* erosion, water management practices, *khas* land, channel shifting, river avulsions, spill closures, and disposal sites have been documented.

Government Statistics
Besides published documents, data on relevant subjects were obtained from government sources. Latest data on tube-well was collected from *thana*-level office of the DPHE. Data on health services were obtained from the *thana* health office.

1.4 Analysis

Analysis of data involved three modes of interpretation. Survey data were processed mainly in the form of tables. Main characteristics were largely defined and used in statistical tables in line with the BBS literature to facilitate comparison. It was further useful to address issues, problems and processes within a historical context. Several case studies were completed highlighting some key issues and problems. Pseudonyms for persons have been used in the case studies in compliance with ethical standards of social research.

2. PEOPLE

2.1 Project Population

The social catchment has been defined by the hydrological boundary of the project. This includes part of the Sylhet Basin bounded by the Kalni-Kushiyara River and the Surma-Baulai River. The area covers 2 *thanas* in their entirety and parts of 16 other *thanas* (Table D.3). The estimated population of the study area was 1.77 million according to 1991 Population Census (Table D.4). Based on projections, the population in 1995 was estimated at 1.89 million (Table D.5).

2.2 Population Growth

The area experienced low population growth until the sixties. The population having doubled in the first seventy years, from 1900 to 1970, tripled in the twenty years that followed. Growth rate in successive inter-census periods has been lower than that of the country (Table D.5). This implies that the region experienced net out-migration throughout the period.

2.3 Settlement Pattern

Habiganj is the only major urban centre located in the project area. Habiganj is a municipality with half of its area within the Kalni-Kushiyara region. Although the *thana* headquarters are considered as urban centres, some of these headquarters are found to be outside the project boundary.

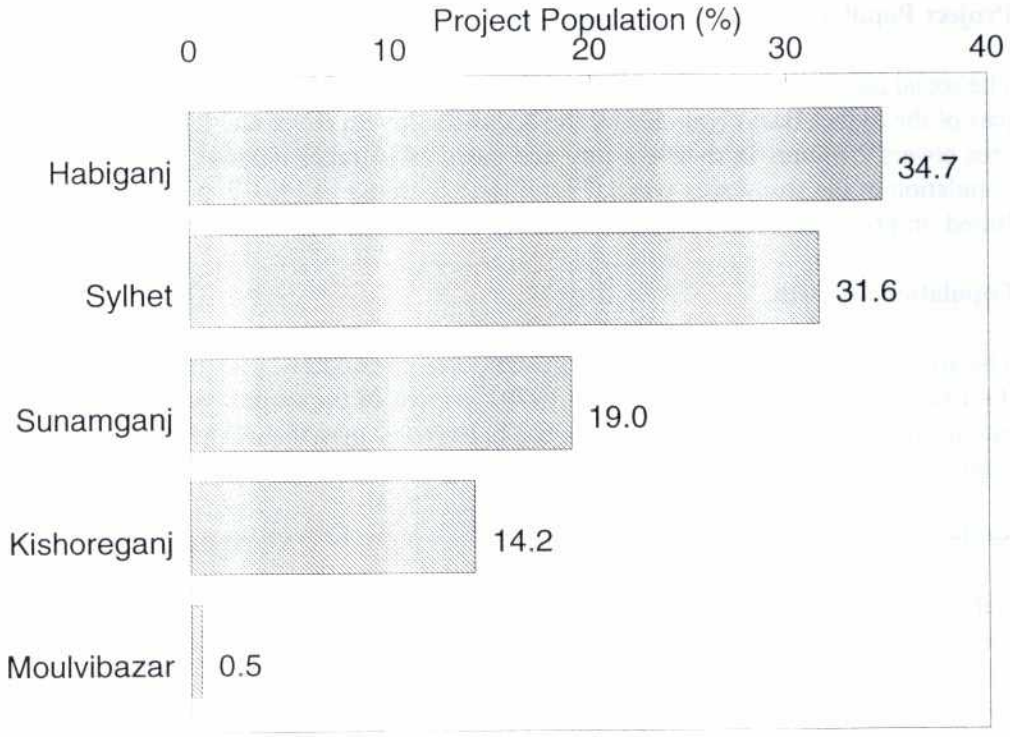
Urban population in the region increased at an annual rate of 5.35% during the inter-census period from 1981 and 1991. The rate of increase in urban population was the highest in Lakhai Thana during this period, with Habiganj, Sylhet Sadar and Sullah Thanas following close behind. The lowest was in Ajmiriganj Thana (Table D.6). These statistics may not necessarily reflect the actual extent of urbanisation, as many of these centres lack the necessary civic amenities.

People mostly live in the villages. While the villages are more contiguous in the eastern part of the region, they are very scattered in the western part (Figure D.2). This pattern has been conditioned by the land elevation and the water regime. The western part includes a network of *haors* which are deeply-flooded. Here it is very difficult and costly to raise platforms for homesteads.

2.4 Geographical Distribution

The project impacted area includes parts of the greater Sylhet and Mymensingh regions. Greater Sylhet accounts for as much as 80% of the total project area and 85% of the project population. Among the present districts, Habiganj has the highest share of project population, followed by Sylhet, Sunamganj and Kishoreganj (Tables D.7 and D.8). The district-wise distribution of population has been shown in Graph D.1.

Graph D.1: Distribution of Population



2.5 Population Density

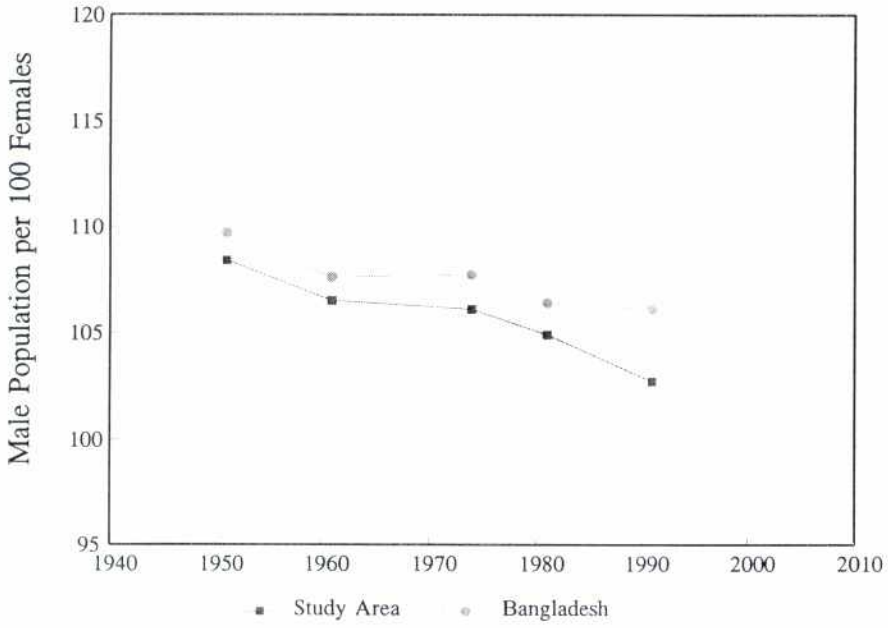
The Kalni-Kushiyara region accounts for 2.27% of the area and 1.58% of the population of Bangladesh. The population density is 526/km^2, which is much lower than that in the NERP area (707/km^2) and in Bangladesh (755/km^2). The density decreases along the east-west direction. This is evident from the clusters of human settlements shown in Figure D.2.

The estimate of population density may give a distorted picture. It appears that the area is thinly populated, compared to many other regions of the country. In fact, large tracts of land are not suitable for dwelling because of very low elevation. The costs of raising homestead platforms are very high and there are difficulties in relation to maintenance. There is severe scarcity of homestead platform space in the area. People are compelled to live on small earthen mounds. In terms of population per unit of homestead area, the region is one of the most densely populated in the country.

2.6 Sex Ratio

The sex ratio is defined as the ratio of male population per 100 females. The sex ratio compares the society's conditions for women in relation to men. A high sex ratio indicates that women are disadvantaged in the society. Historical data since 1951 show that the sex ratio has been declining and that women's condition is gradually improving. In 1991, the sex ratio in the project area was 102.7, slightly lower than the rest of the country (Table D.9, Graph D.2). This lower ratio reflects fewer urban centers in the project area. In urban areas, there is proportionately, a greater population of working males, living away from their families in the villages.

Graph D.2: Sex Ratio



2.7 Age Structure

Population is more concentrated in the lower age groups. This is indicative of a high dependency ratio. Findings of the household survey show a higher proportion of females in middle age groups, and reflects higher out-migration of male population of those age groups. In older age groups, a higher percentage of the female population is evident. This perhaps reflects high male mortality in these groups (Table D.10).

3. STATE OF HUMAN DEVELOPMENT

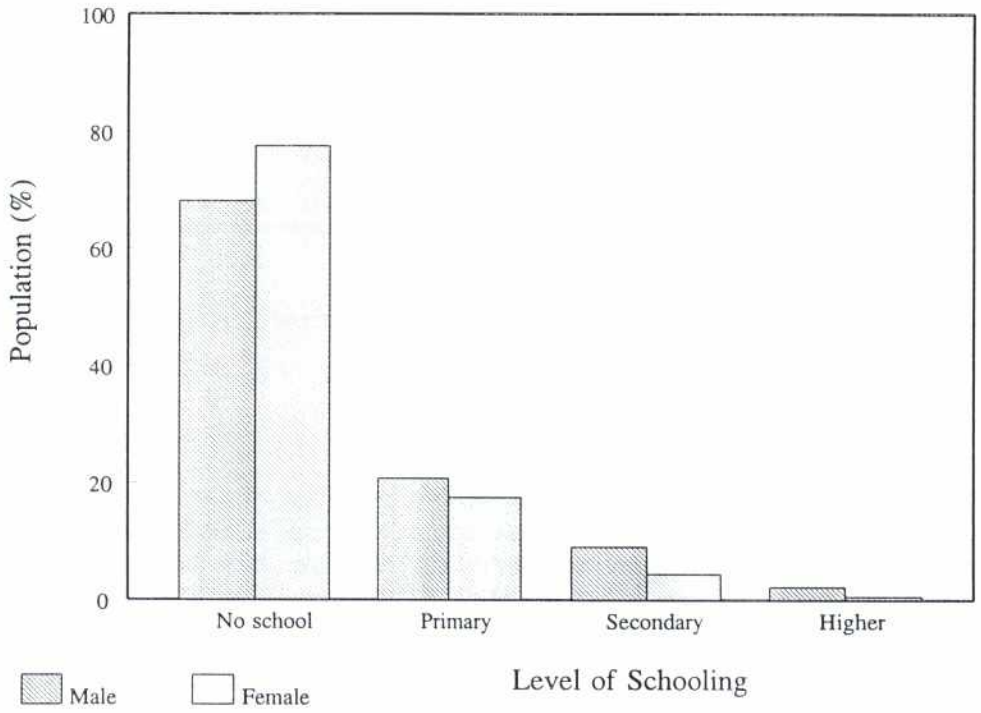
3.1 Human Development Concerns

Human development concerns and priorities include access to health care, basic education, nutrition support and water and sanitation. It is now universally acknowledged that these are indispensable elements of human security. An analysis of the state of human development in terms of these basic needs has been attempted here.

3.2 Education

The region is characterized by low levels of literacy. Data on literacy rate of the population of 7 years of age and above for 1991 are available from the population census. Out of 18 *thanas* covered in the project, 13 *thanas* have lower levels of literacy compared to the national rate. Female literacy rate is lower than that of the male in each *thana*. The literacy rate is higher in areas of relatively higher elevation in Sylhet and Moulvibazar districts and much lower in low-lying areas of Kishoreganj district (Table D.11).

Graph D.3: Level of Education



Survey data show that about three quarters of the population have no schooling at all, while less than one-fifth of the population have attended classes only at the primary level (Graph D.3). At each successive stage of schooling, female participation is lower (Table D.12).

2 a

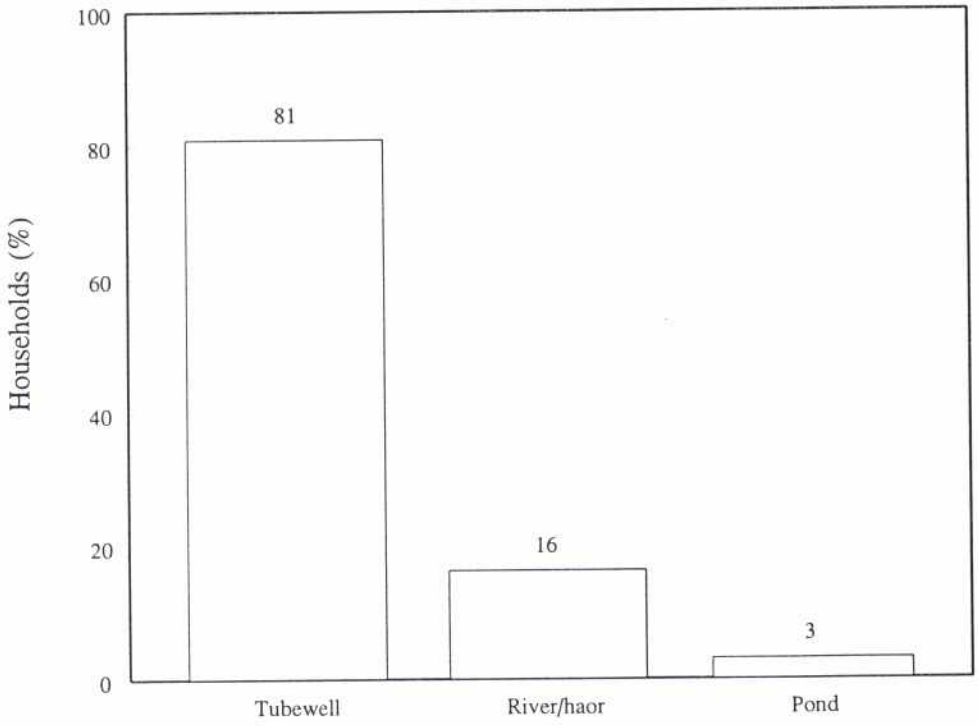
3.3 Potable Water

Hand tubewells (HTWs) are the main source of safe drinking water. Almost all people use tubewell water for drinking purposes. Though some have their own private HTWs, the majority depend on public tubewells, supplied by the DPHE. These are usually on the homesteads of influential people. During floods, HTWs are often submerged, and access to safe water becomes difficult.

About 4% of the HTWs were found to be out of order. On average, there is one operating public HTW for 112 persons (Table D.13). When HTWs break down, they may remain out of order for quite a while. There are several reasons for this. Spare parts are not always available and there is often a dispute over who should pay for the repair.

Tubewells may not be accessible to all people. It has been found that about one-fifth of the households do not get safe water for drinking. Among them, 3% of households drink pond water and another 16% use the water of the river or the *haor* for drinking (Graph D.4). Access to tubewells is directly correlated to land-ownership status. While 98% of the large farmers drink tubewell water, only 74% of the landless do (Table D.14).

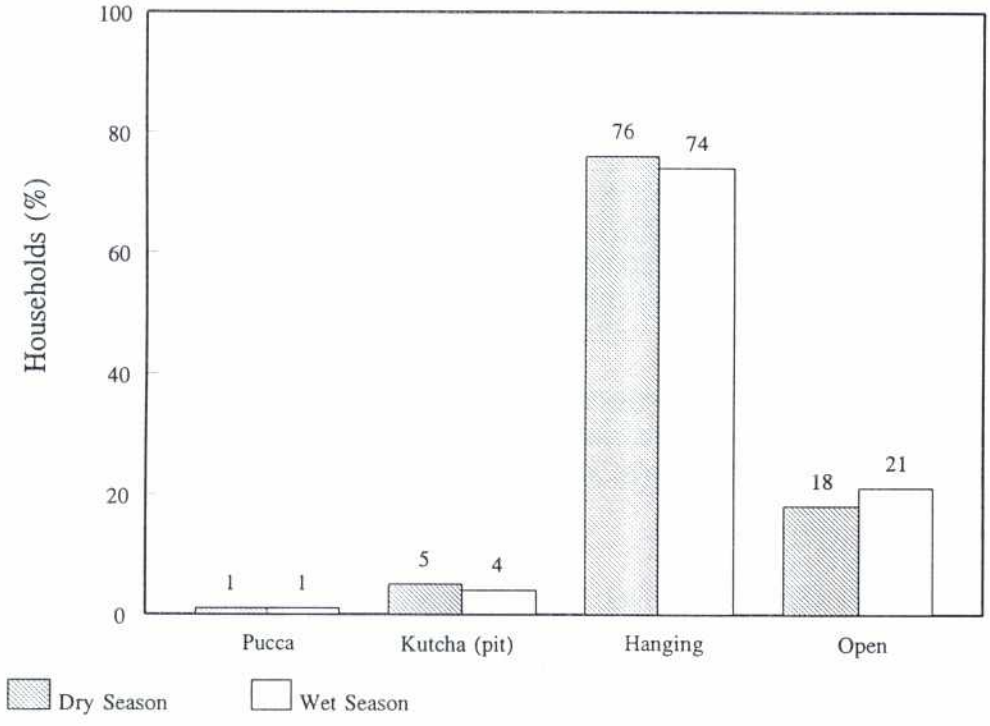
Graph D.4: Source of Drinking Water



3.4 Sanitation

The state of sanitation is very poor. Only 1% of households possess a *pucca* latrine which is considered sanitary under acceptable standards (Graph D.5). The use of *kutcha* latrine (with pit) is also uncommon. Only 5% of household use *kutcha* latrine (with pit) in the dry season and 4% of them in the wet season. Three quarters of the households use a hanging latrine which is considered extremely unhygienic. About one-fifth of households do not possess any latrine at all. They utilize open spaces (Tables D.15 and D.16).

Graph D.5: Type of Latrine Used



3.5 Health

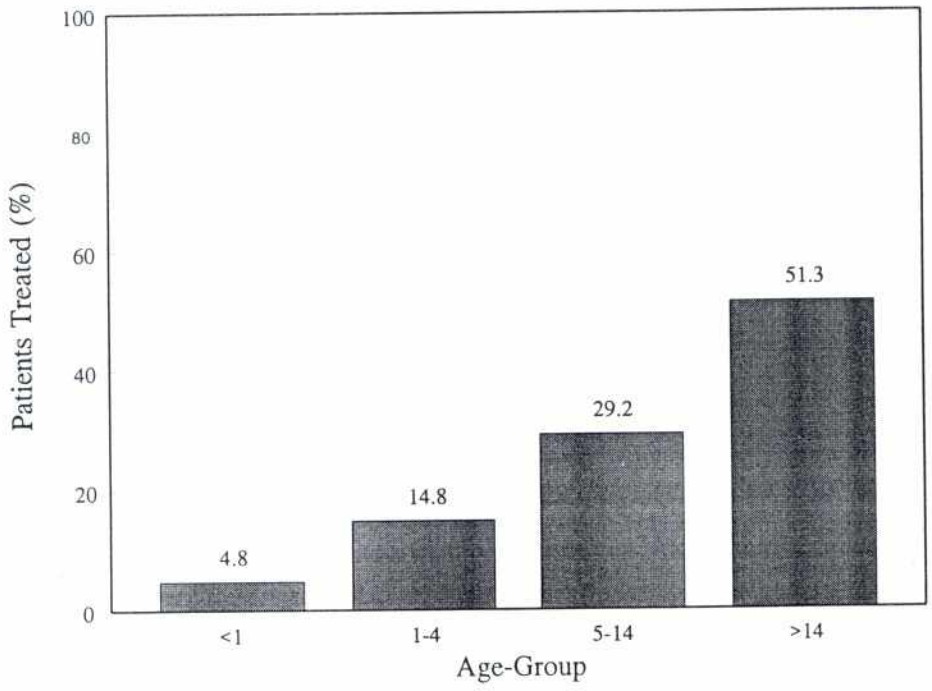
Each *thana* has a hospital run by a team of professionals and para-professionals and equipped with in and out patient facilities. There is also one Family Welfare Centre (FWC) in each union where limited maternal and child health (MCH) services are available. The FWC is presently operated by a Family Welfare Visitor (FWV). She is also responsible for maintaining and updating a list of eligible couples, to whom she supplies contraceptives.

Analysis of data covering one calendar year, obtained from four *thanas* (Jagannathpur, Balaganj, Ajmiriganj and Mitamain) shows that the people visit the government *thana* health centres for treatment of illness. It is likely that the people living in adjoining villages are the main users of the *thana* health centres. Hence the statistics obtained from these health centres may not represent the situation of the whole *thana*. However, a general pattern about the incidence of diseases is evident from the statistics.

The highest proportion of the patients come to the health centres for treatment of diarrhoea. Other prevalent health problems are related to worm infection, peptic ulcer, skin disease, respiratory infection and anemia (Table D.17). The seasonal variation in the occurrence of diarrhoeal diseases is visible from the statistics. It shows that though people suffer from diarrhoea in all seasons, the occurrence is far greater in the post-monsoon period (Table D.18).

It has also been found that patients who are treated in the *thana* health centres belong to a higher age group (Graph D.6). More than half of the patients are 15 years of age and above, while only 5% are below one year of age and another 15% are from one to four years of age (Table D.19). This may be indicative of a lack of facilities for child health care and a low priority on child health in the society.

Graph D.6: Age Distribution of Patients



4. RESOURCE BASE

4.1 Land Ownership

Land is the most critical resource in a rural setting. It is also the most scarce resource. Land is not merely an economic asset, it is also a symbol of security, pride and power. Almost all aspects of life, including, livelihood, rituals, cultural practices, politics, conflicts and social relations centre around land.

The traditional image of a villager is that of a *girost* (farmer). The "man behind the plough" derives great satisfaction from the ownership of a piece of farm land. Once a farmer loses his land, he is virtually dislodged from his economic and social base. It has been observed that more and more people are losing land as a result of the process of pauperization. This process is often accelerated by unfavourable hydro-morphological conditions.

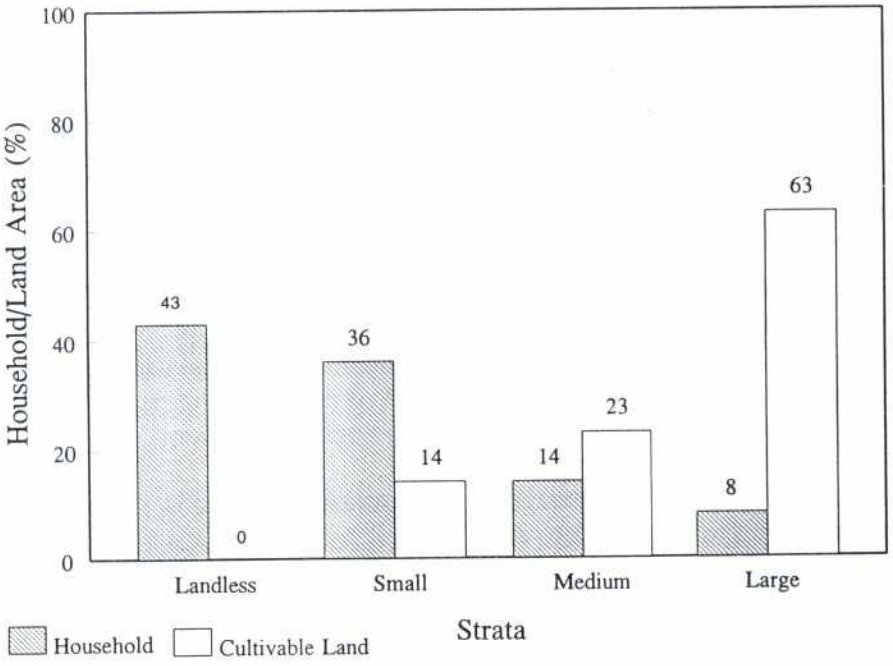
In the study region, the average size of cultivable holding is 1.1 ha (Table D.20). This amount of land seems to be enough to earn a modest living if there is a good harvest. However this does not reflect the real situation. Findings of the household survey conducted in 1996 show that as many as 42% of the households in the region do not own any cultivable land. Others own holdings of varying size.

The pattern of land ownership is indicative of a stratified society. Economic and social relations are hardly independent of this pattern. Land-owning strata have been defined and used in this report in line with the BBS literature. Four major strata have been identified. These are as follows:

- Landless - No land
- Small farmer - Up to 1 ha
- Medium farmer - Up to 3 ha, but more than 1 ha
- Large farmer - More than 3 ha

Small farmers constitute the second major group. They are 36% of the total surveyed households, but they own only 14% of cultivable land. Medium farmers constitute 14% of the households. They own 23% of cultivable land. Only 8% of households are large farmers. They, however, own almost two-thirds of the land. This exhibits the extent of concentration of land in the hands of a few. Though the landless and the small farmers together form 78% of the households, they possess only 14% of cultivable land (Table D.20). The situation is represented in Graph D.7.

Graph D.7: Land Ownership Pattern



4.2 Homesteads

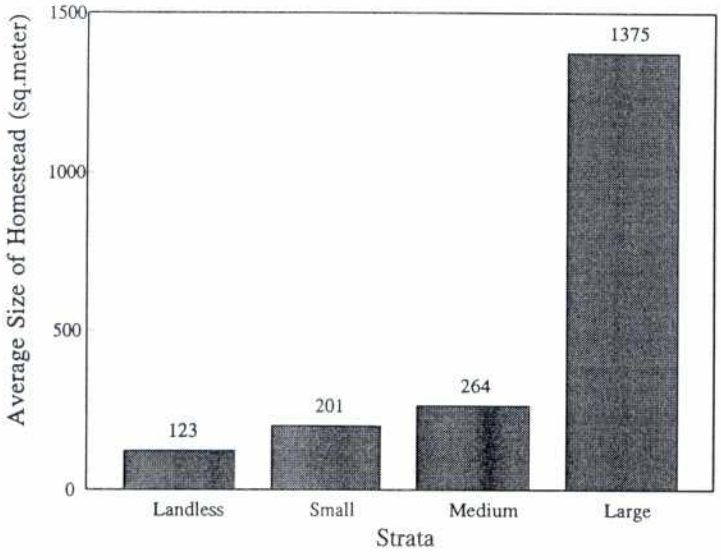
A village is an agglomeration of several *bhita* (homestead). In deeply-flooded areas, a homestead consists of a raised earthen plot. This is considered as the root of a *girost* and is literally the last resort for survival with some sense of dignity. If a household does not possess any cultivable land, its members can still retain some sense of security, if they own a homestead plot and a *ghar* (small house).

The economic potential of a homestead plot is also significant. Home-based economic activities are of great value and contribute to the household income (or cost saving) in various ways. Women grow vegetables and fruits on the homestead. The courtyard is used for threshing, husking and drying of rice. They also keep poultry and cattle and make nets and traps for fishing. Almost every inch of land on the homestead is used for purposes that carry economic value. Observations reveal that small landowners use the homestead more intensively than others.

Findings of the survey show that 18% of the households do not own any homesteads. They live on others' land. Among the 242 landless households (owning no cultivable land), 71 do not own any homestead. They constitute 12.5% of the total households in the region. This group may be bracketed as the destitute, the most vulnerable section of the community. On the other hand, the bulk of the households (71%) possess homesteads up to only 0.05 ha. Only 5% of the households possess homesteads more than 0.1 ha size (Table D.21).

The pattern of homestead ownership is similar to that of cultivable land. The average size of homestead for all households is 268 m^2 (Table D.22). Most of the small homestead-owners either do not possess any cultivable land or own smaller amounts of it, while large farmers own homesteads of much bigger size (Graph D.8).

Graph D.8: Size of Homestead



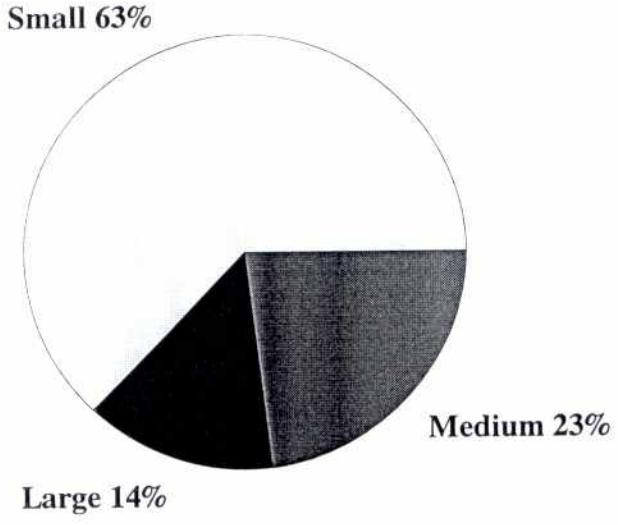
4.3 Farm

Although land ownership is the principal determinant of a farm, farm size does not always coincide with the size of holding owned. Land is cultivated under different tenancy systems. Besides farming their own land, farmers hire land from others for a particular season or a particular year under different conditions of rent. On the other hand, some landowners do not farm their own land. They rent it out, partly or entirely, to others.

The survey data show that among the 242 landless households, 65 (27%) possess operational holdings of different size. One of them even possesses a large farm (more than 3 ha). On the other hand, eight large land-owners, out of 44, rented out their entire land or part of it. They may be termed as absentee farmers, in the sense that they are not involved in the management of their own land. However, the extent of absentee farmers is low. Only 28 households (9%), out of 326 landowning households, do not cultivate their own land.

Findings also show that farms are predominantly small (65%), that is up to 1 ha. About a quarter of the farms are of medium size (up to 3 ha, but more than 1 ha). Only 11% of farms are large, i.e., more than 3 ha each (Graph D.9). The average size for a farm is 1.5 ha (Table D.23).

Graph D.9: Farm Size



4.4 Tenancy Systems

Barga and *rangjoma* are the major tenancy systems in the region which are indicative of the high extent of landlessness and the high concentration of land in the hands of a few.

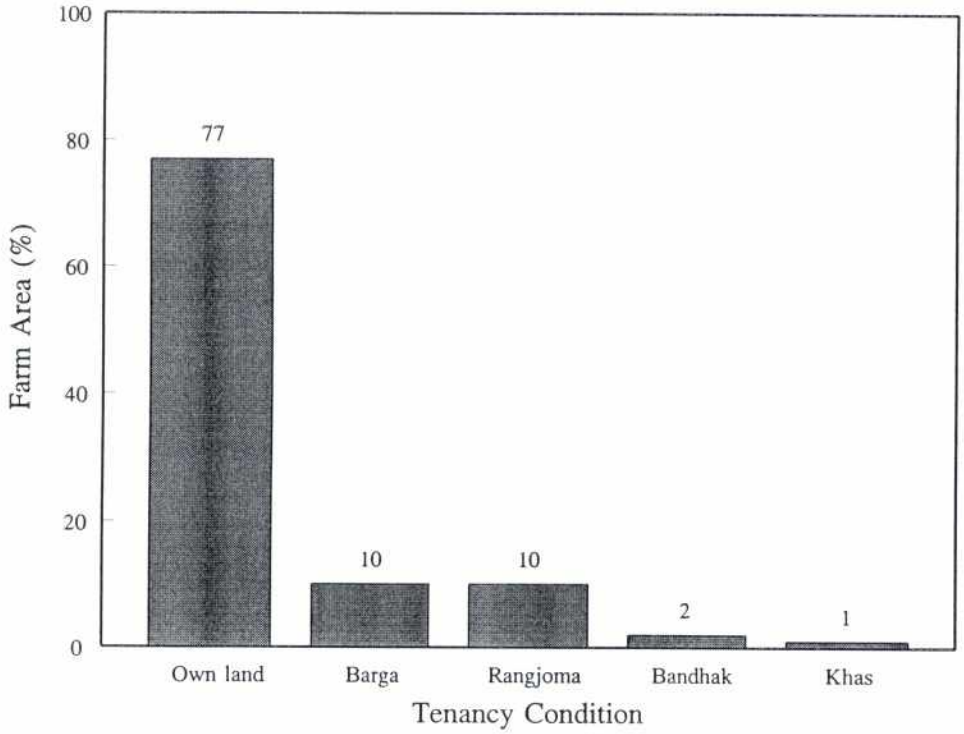
Rangjoma is a leasing system where the cultivator pays a fixed rent in cash at the time of contract. The rent is Tk 1,000 per *kare* for single-cropped land and Tk 1,200 to 1,500 per *kare* for double-cropped land (1996 rate).

Barga is a system of share-cropping where the cultivator and the landowner share the costs of seed, fertilizers and water equally, and divide the profits of production equally among them. Other costs, including labor are borne by the cultivator.

Bandhak is the traditional system of mortgage. If one borrows money, one has to put up a collateral. Land is used as collateral and is mortgaged to the lender. The lender holds the right to cultivate the mortgaged land and receive all benefits from it until the loan is repaid. If one is not able to repay the loan within a stipulated period, the land is forfeited to the lender. *Bandhak* is considered to be an investment by the lender. In the past, only the big landowners and traders used lend money against mortgaged land. Now it is common for all strata of the population.

Findings of the household survey show that large landowners tend to rent out more land under different systems than small landowners, while small landowners rent in more land under these systems (Table D.24). The proportion of *barga* land and land taken under the system of *rangjoma* is almost equal. Owner-operated farming is, however, the predominant practice (Graph D.10).

Graph D.10: Tenurial Distribution of Farm Area



5. LIVELIHOOD

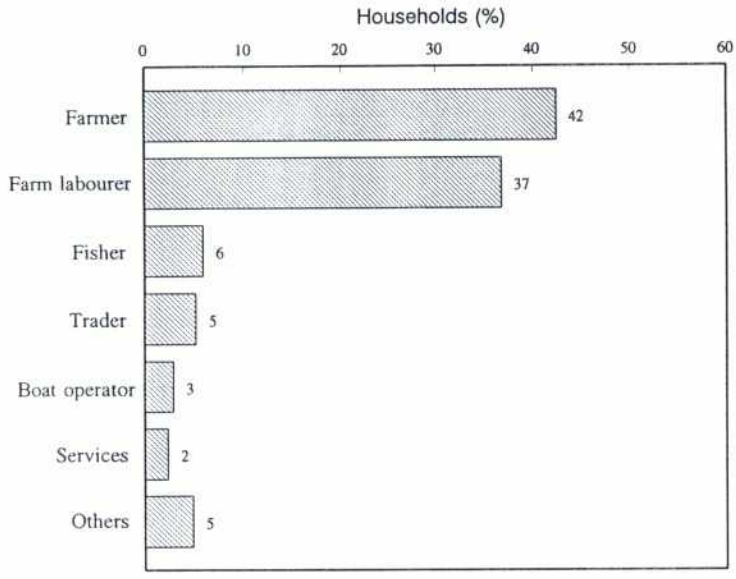
5.1 Occupational Pattern

People earn their living from different sources. Households engaging their household members in a variety of occupations is quite common. Despite limited opportunities, people try to diversify their activities in order to maximize income and to minimise risk.

Although agriculture (cultivation of field crops) is a major occupation, the majority of households depend on other occupations for additional sources of income. Farm labor is the second major occupation in the study region (Graph D.11).

Poor households, that is, the landless and small farmers, are involved in various non-agricultural professions in greater proportions, while the large land-owning households mainly depend on agriculture (Table D.25).

Graph D.11: Main Household Occupation



Findings of the household survey show that, on average, one household has three sources of income. Landless and small landowners capitalize on more sources of income-earning than do the larger landowners.

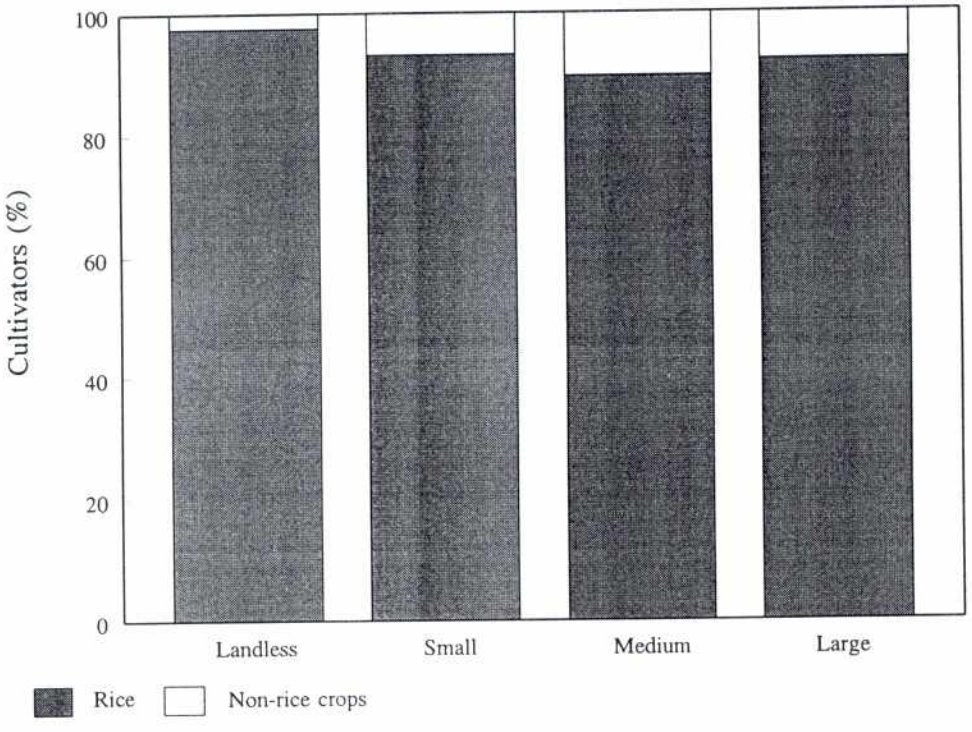
The majority of households earn income from field crops. Even a quarter of landless households are involved in field agriculture under different tenancy arrangements. About half of the total households work as wage laborers on others' farms. As many as 75% of landless households and 47% small farmers work as farm laborers. Furthermore, half of the landless households and one-third of small farmers are engaged in earthwork.

Among the major activities done mainly by women are rice gleaning and rice processing (threshing, parboiling, drying). More than a quarter of landless households are involved in rice gleaning from the *haor* (Table D.26). About 30% of the total households are involved in fishing, while 26% are engaged in trading activities. Boat transportation is also an important means of livelihood, involving about one-fifth of households.

5.2 Farm Practices

The cropping patterns practiced by farmers is indicative of the subsistence nature of agriculture. Land is overwhelmingly used for the cultivation of rice. Some farmers grow potatoes, spices or vegetables as a second crop. Non-rice crops are of minor importance and are cultivated on only 8% of the land, according to farmers' response in selected villages (Table D.27). However, a land use survey covering the total project area and verified with *thana* agricultural statistics indicates that less than 2% of total cropped area is cultivated with non-rice crops (Main Report Table 3.3).

Graph D.12: Cropping Practices



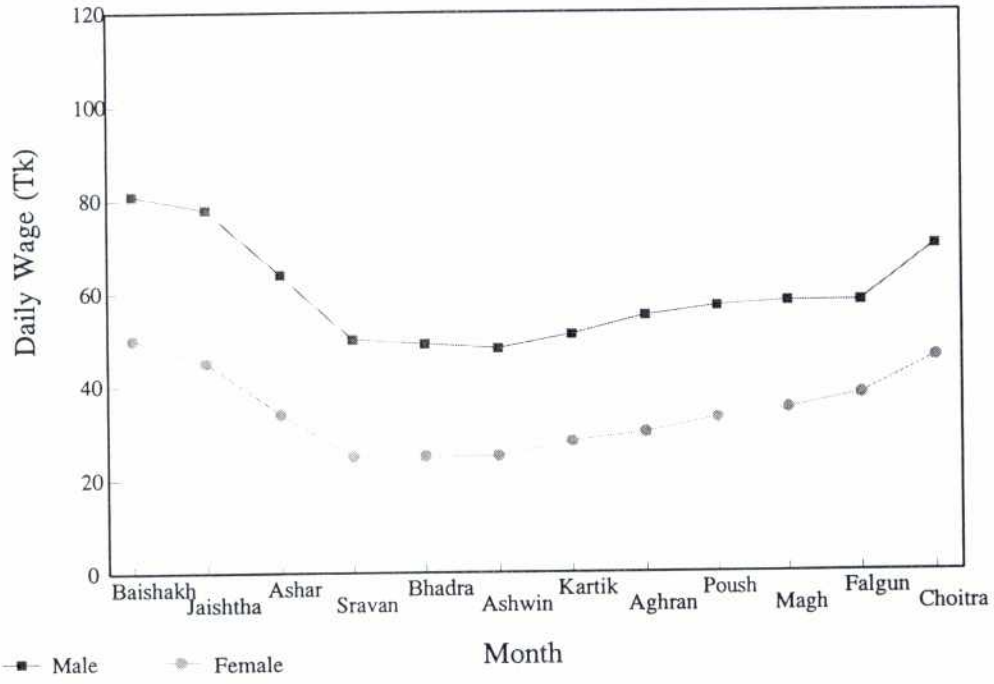
5.3 Wages

The dry winter period (*boro*) is the main agricultural season, characterized by a high demand for labor. A variety of different labor-contracting arrangements are practiced. There is in-migration of labor including *kamla* (seasonal farm laborers) and *bepari (* harvesting laborers) who are engaged from another area. Migrant laborers mostly come from the Greater Mymensingh region. Large farmers do not like to hire *dawal* (local harvesting laborers), as they are considered less efficient than the *bepari*. In the *haor* areas, many farmers engage *bepari* for harvesting and threshing of rice. As there is always the danger of early flood, harvesting has to be completed quickly. The *bepari* (or *dawal*) gets 10% of the harvest, as wage. Large farmers mostly engage laborers on a seasonal or contractual basis for most of the cultivation period. Employment of labor on a daily basis mainly takes place during harvesting.

Tasks in agricultural production are traditionally based on the division of labor between men and women. Field activities, like the preparation of *jalakhet* (seed-bed), *haal* (ploughing), *roa* (transplantation) and *dawa* (harvesting) are men's domain. Women are engaged in seed preparation and post-harvest processing, which take place on the homestead. For women of middle-class farm families, working in the field is still not socially acceptable. As the economic condition of households deteriorate, there are changes in the division of labor. In addition to their previous tasks, poor women are now engaged as field laborers, for transplantation and weeding. Cutting rice and threshing is now done by poor women when these tasks can be carried out in nearby fields or on the homestead's *kanda* (high land used for rice cultivation, processing and cattle grazing).

Daily wages reach their peak in the *boro* harvesting months of *Baishakh* (mid-April to mid-May) and *Jaishtha* (mid-May to Mid-June). Comparison of male and female wage is not practical because men and women do different tasks. Nevertheless, for the amount of time worked, women earn less than men, in all seasons (Chapter 6). Wage data are shown in Graph D.13. To smooth the curves, a three month moving average of wages has been computed (Table D.28).

Graph D.13: Daily Wage Rates in Agriculture

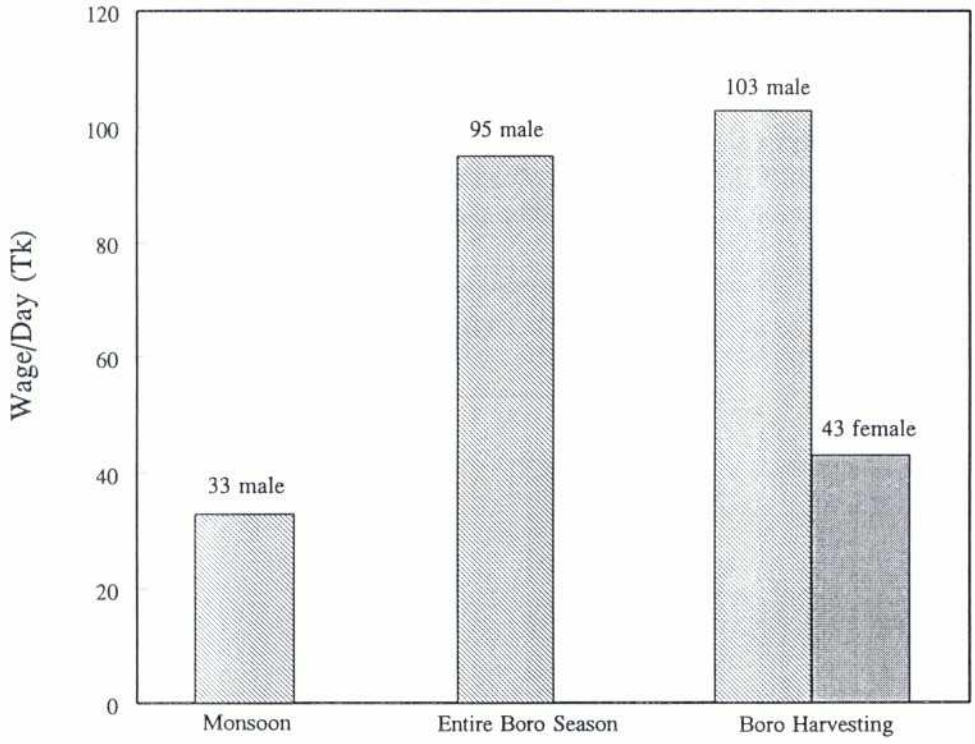


Labor opportunities are limited except in the dry season. The poor depend mainly on wage labor for their survival. A host of labor contracting systems have evolved, with varying wage rates, characterized by a fluctuating demand for labor, at different stages of rice cultivation.

Well-to-do farmers employ one or more *kamla* (labor) on a seasonal or yearly basis. A farmer usually engages one *kamla* per *haal* (about 1.5 ha) of cultivable land. A *chukti kamla* (contractual seasonal laborer) engaged from mid-*Kartik* to mid-*Jaishtha*, covering the entire *boro* season is paid, in addition to 3 meals a day, about 30 *maunds* of rice or Tk 6,000 to 8,000 as wage. One *maund* is equivalent to 37.3 kg. Some are paid in both rice and cash. Often a *kamla* is employed only for harvesting and transplantation of rice for a period of one to two months. In addition to two or three meals a day, a *kamla* gets seven to nine *maunds* of rice for one months work or about 15 *maunds* of rice for two months work. The monthly wage rate for certain agricultural activities such as boat operation and LLP operation is about Tk 800 to 900, plus three meals a day. In the monsoon season, the demand for labor is minimal, causing wage rates to drop.

Women get less wages for contractual work. A female laborer in the harvesting season usually gets 3 to 4 *maunds* of rice, three meals a day and a *saree* (traditional women's clothing) for a month's work. Based on different systems of contractual wage, the average daily rates have been estimated and are shown in Graph D.14.

Graph D.14: Daily Equivalent of Seasonal Wage



5.4 Credit

Logni karbar (usury or money-lending) is a common practice. In the *haor* areas, the demand for capital reaches its peak in the months of *Poush, Magh* and *Falgun* (mid-December to mid-March), when farmers start preparing land for *boro* cultivation, negotiate with labor, transplant rice, buy fertilizers and pay for irrigation. At this stage, most of the poor and medium farmers borrow money from the *mohajan* (money lender) and repay the loan after harvest in *Baishakh-Jaishtha* (mid-April to mid-June). Wages drop in the months of *Bhadra*, *Ashwin* and *Kartik* (mid-August to mid-November). At that time, there is very little demand for farm labor (Graph D.13). In these months, poor people borrow cash or rice for subsistence.

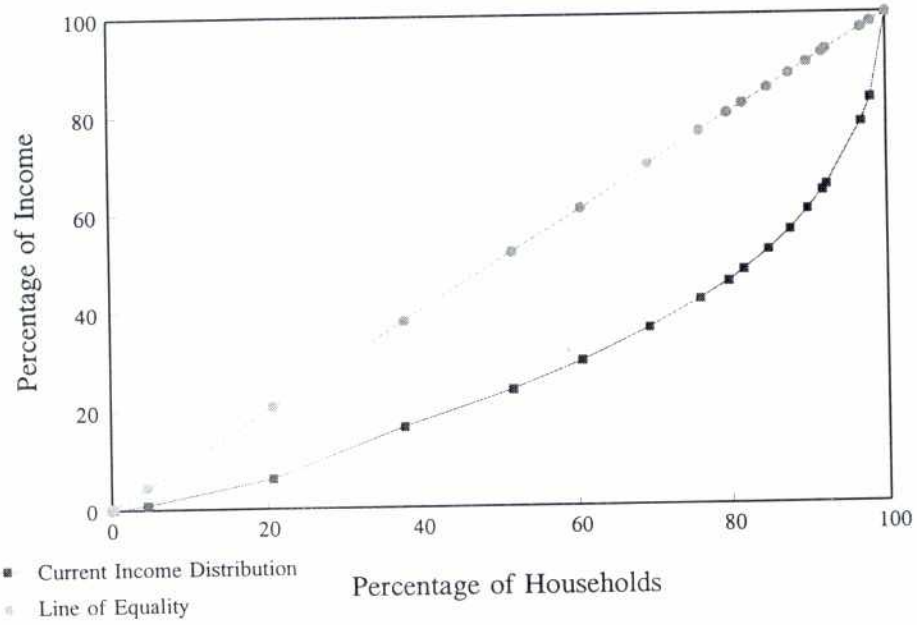
The monopolistic credit market, dominated by a small group of traditional money lenders, does not exist any more. Now there are many lenders. This new group are not so rich but they do have some surplus to invest in usury. The common practice is to pay 8 *maunds* of paddy for borrowing Tk 1,000 for the *boro* season, usually from the month of *Aghrahayan* to *Baishakh*. In case of a crop failure due to early flood, the repayment period is usually extended by another year and interest for the first year is written off. Annual rates of interest on loans have been estimated, based on prevalent systems and arrangements. The rates of interest on loan from private sources are many times higher (over 90%) than the interest rates from institutional sources (15-20%).

5.5 Income

Household net income for one crop year (1995-96) has been calculated based on all known sources. Income distribution is highly skewed in favour of large landowners. (Tables D.29 and D.30).

A detailed analysis shows that the bottom 20% of households have an income share of only 6%, while the top 10% have an income share of 40% (Graph D.15). The degree of inequality of income distribution is much higher than that of the country.

Graph D.15: Income Distribution



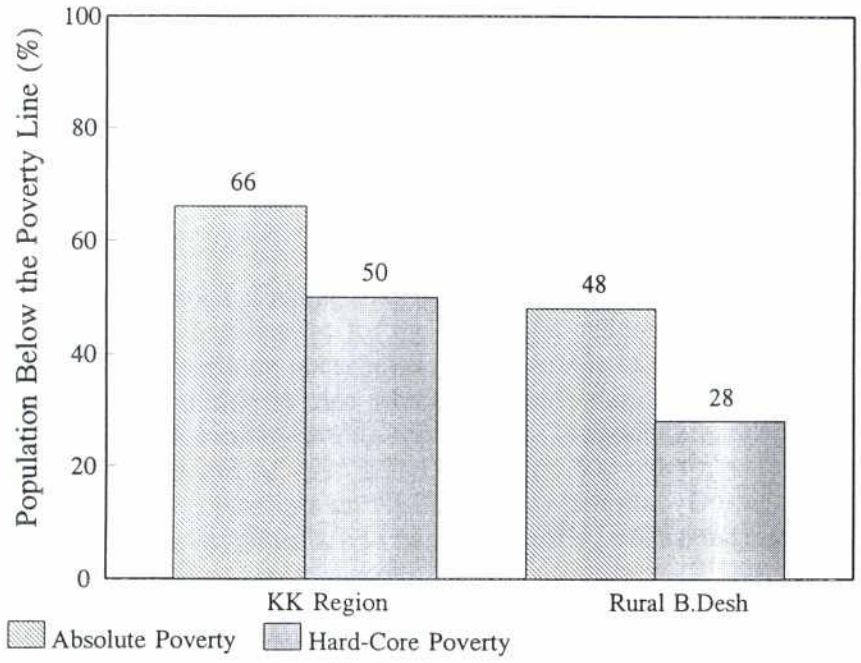
The Gini coefficient of income distribution has been estimated to be 0.45 compared to 0.39 in Bangladesh and 0.37 in rural Bangladesh (1991-92 data). The Gini co-efficient is a measure of the degree of inequality. The value of the co-efficient ranges from zero to one. If the value of the co-efficient is zero, income is equally distributed. A value of one indicates perfect inequality.

5.6 Poverty

The per capita average monthly income is Tk 622 (Table D.30). Household income is not sufficient to maintain a decent life for most of the households. Absolute poverty expenditure per capita per month for 1991-92 was estimated at Tk 428 for rural Bangladesh. The amount is Tk 314 for the hard-core poverty level. For simplicity of analysis, this has been assumed as the poverty level expenditure for the study region for the corresponding year. These values have been brought to the 1995-96 prices, using rates of inflation for successive years. Thus the absolute poverty expenditure for 1995-96 stands at Tk 488, and that of the hard-core poverty level at Tk 358 (BBS Household Expenditure Survey, 1991-92, published 1995).

Estimated by WHO/UNICEF for Bangladesh, the absolute poverty line is the required level of calorie intake of 2,122 calories per capita per day . The hard-core poverty level is 85% of the required level, that is, 1,805 calories per capita per day.

Graph D.16: Extent of Poverty



It is assumed that the poverty level income and expenditure is the same. This reflects a situation of no savings and no debt. This may not be true for all households, but may be used for a simple poverty analysis.

Based on these assumptions, as much as 66% of the households are absolute poor, while half of the population are hard-core poor (Graph D.16). These rates are much higher than that of the country.

Rice gleaning is a significant source of income-earning for poor women in the *haor* area. Women of destitute families earn over one third of their annual income through gleaning rice in harvested fields. Of women who glean, 65% are female heads of household. Based on national data, 90% of women-headed households are considered absolute poor. Thirty three percent are part of the hard-core poor population and are vulnerable to chronic food shortage (UNDP, Human Development in Bangladesh, Empowerment of Women, 1994). Although poor women face food insecurity and low social status, female heads of households rank high in decision making for their family.

6. WOMEN IN THE PROJECT AREA

6.1 Introduction

In the Kalni-Kushiyara area, as in other parts of Bangladesh, women's social and economic roles are located within the family and the household. Women traditionally assume the class position of the male family head and are expected to confine their activities to the household compound.

The socio-cultural norms of *purdah*, restricting women's access to employment and educational opportunities are rigorously applied in the project area. In keeping with the norms of *purdah*, women cannot meaningfully participate in community organizations. Lack of communication and the relative isolation of the area appears to have reinforced traditional conservative attitudes towards women.

River siltation, pre-monsoon flooding and frequent failure of the annual crop has resulted in deteriorating economic circumstances for the wives and children of small and middle farmers. Women of landless and destitute households are vulnerable to diminishing food security when they lose labor opportunities in rice processing and gleaning, as a result of crop loss. Increasingly, women seek income-earning opportunities in agriculture, rice processing and paddy gleaning. In the dry seasons of 1996 and 1997, some 400 women were eagerly available as laborer and construction contractors on NERP's pilot platforms. During the monsoon season, when almost no labor opportunities are to be found locally, women migrate to distant centres to work in road construction and rock quarries.

River bank erosion and loss of homestead land has created great hardship for those families who live in a state of perpetual migration, searching for flood-secure homesteads.

Unlike other areas of rural Bangladesh, where government and NGO development programs have been successfully targeted to women, gender-specific development efforts in education, credit and income generation are notably absent in the remote area of the project.

6.2 Knowledge Base for Gender Assessment

Women in the Pilot Dredging Project
Over the past one and half years, material on gender issues has been collected from women of 200 beneficiary households and some 400 women laborers, involved in the Pilot Dredging Project. Qualitative gender and class-specific material has been documented on flood, erosion, traditional platform protection, homestead production, seasonal labor activities, wage rates, construction labor and gleaning. The Participatory Rural Appraisal (PRA) method was used to gather qualitative material on women's views of selected issues and problems.

Women's Status Survey
In April 1996, a women's status survey was conducted by NERP female staff in five villages, representing four *thanas*, located along the river between Ajmiriganj and Madna. Gazaria North, Gazaria South and Kakailseo were selected on the basis of NERP's work with women during the Pilot Dredging Project. Katkhal and Aynarkandi were selected to represent villages of average size, with moderate attitudes towards women's activities and a typical range of women's issues related to flood and erosion.

The senior woman in each household (chosen by other household women) was interviewed with a structured questionnaire. In five villages, women in 408 households were surveyed. In Gazaria North, Gazaria South and Kakailseo, all households owning land on the new homestead platforms were sampled, while in Katkhal and Aynarkandi, data was collected from one in five households. A successive sampling method was used.

The sample groups at Kakailseo and Gazaria consisted of households owning land on the new platforms, and households of the same socio-economic class, living in the same *paras*, but not owning land on the new platform. These sample groups will be used in the future for an impact assessment of settlement patterns on the new pilot platforms. As a consequence of this rationale, poor and destitute women were not sampled because they did not own homestead land at Kakailseo and Gazaria South. The skewed survey sample has resulted in failure to reflect the full dimensions of labor and living conditions for destitute women.

From 408 households, gender specific baseline data was collected on household composition, marriage, education, literacy, land ownership, homestead production, wage labor and household decision-making.

6.3 Household Characteristics

Household Composition

Although household characteristics are dependant on its economic status, the following is a description of a household owning an average amount of homestead and agricultural land. The majority of women interviewed (77%) were between the ages of 21 and 49 years (Table D.31). The senior woman in the house is the wife (*bou*) of the household's head, in either a nuclear or an extended family. Other women in the house may include unmarried daughters and daughters-in-law. In cases where the household's mother has been widowed, the eldest son's wife will assume the position of senior woman.

Marriage Patterns

In Bangladesh, women's marriage is a universal norm. A woman's status in the society is ascribed through her husband, as male head of household. In the survey of 408 women, none were categorised as "never married". The great majority of senior household women (97%) were currently married; 2% were widowed and 1% was divorced or abandoned. The majority of women (97%) had married only once. (Tables D.32 and D.33)

Women's early marriage is a second universal norm in Bangladesh. The national mean age of women's marriage is 18 years. This is as per the BBS, Health and Demographic Survey of 1994. The survey data indicates that the majority of women in the project area marry between the ages of 12 and 16 years (76%), while 20% are married below the age of 12 years (Table D.34). In the project area, very early marriage is related to traditional socio-cultural practices which have not been influenced by education or gender-specific development programs (Table D.35). Ninety two percent of women in the project area are non-literate. In other parts of Bangladesh, girls schooling over an extended period, along with targeted development for adult women, provide significant alternatives to women's early marriage and extended child-bearing years.

Women's Land Ownership Patterns

In the project area, land is the most important productive resource owned by households. Women seldom own land. Although in Islamic Law women have the right to inherit land, in

actual practice women forego their inheritance to brothers. According to Islamic Law, a woman has the right to inherit half of her brother's share of the father's property and one-eighth of her husband's property, if there are children. By retaining the favour of her brother, a woman hopes to secure future economic support, should her marriage fail.

In the survey data, only 3% of women own homestead land, while agricultural land is owned by 5% of women. Seventy four percent of women owning land have received it as a gift from the husband, rather than as inheritance from her father. (Tables D.36, D.37 and D.38).

6.4 Women's Work

The Homestead

The ownership of homestead land (*bhita*) is an indicator of the household's wealth. Of the total 408 households surveyed, 21% do not possess homestead land. The accuracy of this data compares well with that of NERP's Household Survey, where it was found that 18% of households do not own homesteads. The difference is caused by sampling from Katkhal, where homestead erosion is exceptionally great, and from Kakailseo and Gazaria South where the sample was skewed to only those households owning homesteads. Those without homesteads live on others' land and are classified as the poorest of households. A few wealthy households (4%) own large homesteads up to 0.1 ha (25 decimals). The majority of households (75%) own a small piece of homestead land up to 0.05 ha or 12 decimals (Table D.39).

Women's Homestead Activities

In the project area, an average homestead is a raised earthen platform with a house (*bari*), several outbuildings, a courtyard and a hanging latrine. Average households will have access to a tubewell, at a distance of 50 metres. All households, particularly those owning small homesteads, try to maximize the use of land and space. Most of the work on the homestead and all of the work in the house is done by women of the family.

Before harvest, women prepare a paddy threshing floor (*khola*), by applying a layer of glazed mud to space on the homestead platform or the nearby lowland (*chara bisra*). Rushing to complete before the impending monsoon, women will be intensively engaged in drying, winnowing, husking and storing the household's most valuable commodity. Women of poor households will process paddy gleaned from the *haor*. At this time, women also preserve the seed for next year's plantation. Puffed rice (*muri*) is prepared as a dry food, particularly for the monsoon period. Women grow vegetables, mainly during the dry season on small patches of ground and on rooftops. Depending on its flood security, women may grow papaya and fruit trees on the platform. They feed and tend livestock and poultry. During the dry season, cattle and goats graze on *haor* land and are sheltered at night on the homestead. During the monsoon, when no grazing land is accessible, livestock must be kept on the homestead. The herding of ducks, goats and cattle to graze is usually family labor, done by children. In wealthy households, labor is often hired for grazing. Women of artisan families make fish nets and bamboo traps (*chai*). All women collect cow dung and prepare the fuel blocks (*chata*) required to cook during the long monsoon. To protect against wave erosion, women pack earth and vegetative matter (*chailla* bundles) against the platform's outer slope. Following the monsoon, they repair platform damage with earth from the *chara bisra*. Within the house, women's domestic work consists of child care, fetching water, cooking, washing, cleaning, glazing mud floors and sewing the family's bedding (quilts known as *kantha*).

8a

However, as a family member, a woman's work on the homestead and in the house is unpaid. All of women's work in the household can be valued as indirect income through labor wage saved to the household. Women's labor in the household is not valued in classical farm statistics. Thus in national production figures, women's labor remains hidden and without value.

The Women's Survey attempted to bring out the value of women's labor in activities both within and outside the household. The survey method is a somewhat crude instrument to collect data on household labor throughout the year. The more reliable method is the time-use study in various seasons. Recognising the limitation, it is estimated that the survey data is 80% accurate in valuing women's labor in the household.

The Range of Women's Income Activities

The range of economic activities undertaken by women is provided in Table D.40. Data from the survey indicates that women are most active in livestock and poultry rearing. Out of 408 women interviewed, 70% produced for family consumption, while 43% sold surplus livestock and poultry for cash income.

Despite their activity in livestock and poultry rearing, women earned more from paddy production, including cultivation, harvesting and processing. Of the 408 households interviewed, 63% of women were involved in paddy production, representing a saving in labor expenditure for the household. Ten percent of women earned a labor wage through paddy processing in others' houses.

Thirty four percent of women interviewed were active in sweet potato, ground nut and chili cultivation. Of these women, 24% earned a labor wage by cultivating these crops on others' land.

Although 79% of households own homesteads, only 50% of women cultivated vegetables. Of these women, 10% sold surplus vegetables for cash income.

Working with their husbands, 11% of women were making bamboo fish traps. Of the bamboo producers, 60% sold for cash income.

A few poor women obtained income in a variety of other activities. Five percent of women obtained income as construction laborers on the pilot platforms. During the monsoon period, 3% of women migrated outside the area to work as construction and domestic labor. Two percent of women worked as domestic labor in others houses to process paddy, glaze mud floors and repair platforms. Two percent of women earned income through fishing and fish processing, while only 1% of women earned income through petty trade.

Poor women who work in the public sphere often do not have homestead land. As a result of the skewed sample, the relative number of poor women working outside their homesteads is not reflected in the survey.

The Value of Women's Income Activities

Table D.41 provides data on the value of women's labor in self-employment and wage employment. Employment refers to such activities as rice processing, livestock rearing, vegetable production, bamboo work, agricultural labor, construction labor and paddy gleaning. Multiple responses were recorded. Some activities were done in the household and some in the public

sphere. Some women earned through labor wage saved, some earned through direct wage and some earned in both ways for the same activity.

Of the total income earned by 408 women, 74% of the income was earned from labor wage saved and 26% was earned as direct wage. Based on earnings from both categories of wage, a woman in the survey earned an average of Tk 3,554 per year. Throughout the year, poor and destitute women in the area will have earned more, through rice gleaning. This is not reflected because of the sample, based on homestead ownership.

Purdah

Purdah, literally means curtain and implies the physical concealment of women. In an applied sense, *purdah* refers to the socio-cultural separation of women from men. The norms of *purdah* prescribe the appropriate behaviour for women in the society. The traditional division of labor between women and men reinforces the construct of *purdah*. Ideally, women work in the home; men work in the public sphere. Social status is awarded to those who can follow the ideal of *purdah*. In rural areas, high status accrues to the male head of household who can afford to keep his women in the ideal of *purdah*.

The Gender Impacts of Impoverishment

As the economic condition of households deteriorate, the ideal of *purdah* is less strictly applied and there are changes in the traditional division of labor between men and women. The survival strategy of poor households includes the wage labor of women outside the household. Historically however, women's work was not located in the public sphere. In the transition, the main constraint for poor women is lack of employment opportunities and low productivity of wage in what has been, non-traditional sectors.

A household is defined as a family unit, who share common resources for cooking and eating. As a family becomes impoverished, there will be changes in the social and economic relationships of the household. The extended family tends to break down. Sons and their families begin to cook and eat separately and eventually move to their own house on the family's homestead platform. Married daughters who may have returned to the household after being widowed, divorced or deserted may be provided with living space but required to earn a livelihood for themselves and their children. In a poor household, a widowed mother may also have to scavenge or work for her own food.

Women's Work in the Public Sphere

In the project area, women's work is based on the seasons of the year (Table D.42). Consequently women's earnings are related to availability of labor opportunities in the monsoon and dry season. Labor opportunities are greatest during the six month dry season when the *boro* rice crop is cultivated, harvested and processed.

During the peak harvesting period, wealthy households producing surplus rice often hire female labor for rice processing. On a daily basis, women's wage for processing is Tk 35 plus the value of a meal at Tk 10. On a contractual basis, women are most often engaged for seven weeks and paid Tk 2,700, inclusive of food and clothing.

During this period women are also engaged in the cultivation and harvesting of chili, ground nut and sweet potato. Although contracts are usually negotiated for women to uproot and pluck produce from an entire field, this work is valued at an equivalent wage of Tk 35 per day.

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The agriculture labor done by women and men differs in the nature of work and the conditions of contract. Differential wage rates in agriculture are therefore difficult to assess. In general, in the peak labor period, women earn Tk 45 per day in rice processing, while men engaged in rice cutting earn Tk 75 per day.

In the dry season, women are hired as contractual labor for earth construction and homestead repair. In earth cutting, women earn Tk 400 to 450 per 1,000 cubic feet on union council roads.

In the dry seasons of 1996 and 1997, women near the villages of Gazaria and Kakailseo worked as construction labor on the pilot platforms. As sub-contracted labor, women earned as low as Tk 550 per 1,000 cubic feet and as high as Tk 900 per 1,000 cubic feet, depending on the height and distance of earth carried. Women's daily wage ranged from Tk 40 to 80. For the pilot project construction in 1997, women worked on direct contract. On the average, a woman earned 16% more as a member of an independent labor contracting group, than as sub-contracted labor.

For three months during the monsoon (mid July to mid October) there are almost no income-earning opportunities in the area. Locally, women work as domestic labor and earn a daily wage as low as Tk 10. During the monsoon, poor women of landless or female-headed households migrate to Sylhet and Dhaka to work in stone quarries and as construction and domestic labor.

Paddy Gleaning

A gleaning study was conducted in June 1996 by NERP female field workers. A sample of 20 poor women, engaged in paddy gleaning was selected from Gazaria and Kakailseo.

Paddy gleaning is a typical income-earning activity for poor women in the *haor* region. Gleaning consists of collecting paddy kernels which have fallen to the ground or those which remain on the stalk after harvesting. Gleaning is hard and tedious work, as the kernels are picked from the ground, one by one. Only poor or destitute women glean, sacrificing social status in order to feed their children.

Paddy gleaning is of three types, carried out in different seasons. During the dry season, *aman* paddy is gleaned from highland fields in December. *Boro* paddy is gleaned from the *haor* fields between mid April and mid June. In this pre-monsoon period, harvesters will have quickly cut and bundled the paddy to secure the crop from flooding. The yield of *boro* paddy gleaning is plentiful because many kernels will have been knocked to the ground. *Boro* paddy is the most profitable and therefore the most preferred type of gleaning. *Demi* gleaning is carried out over three weeks, in the early monsoon period between mid June to early July. *Demi* gleaning consists of collecting second-growth paddy kernels, eight weeks after the original cutting. The stalk is regenerated as the monsoon water inundates the *haor* fields, so that those gleaning *demi* paddy must work in chest-deep water.

For reasons of security, all women interviewed travel in groups to glean paddy in distant fields. Only three women gleaned *aman* paddy, travelling to and from a distance of 14 km to glean and carry. All women interviewed glean *boro* paddy, travelling to and from a distance of 8 km. On the average, women work 11 hours per day, including travel and gleaning time. Depending on travel distance and gleaning conditions, they collect on the average 12 kg of paddy per day. The study indicates that women gleaners have an average household size of 4.5 persons, consuming 3 kg of paddy per day. After husking, 40 kg of paddy converts to 28 kg of rice. On the basis of this rate, each household consumes 2 kg of rice per day.

Given the average family size, each individual eats less than 0.5 kg of rice per day. With the paddy gleaned, women are able to feed their families for four months between May to August. In addition to their own consumption, 16% of women gleaners were able to sell surplus paddy to supplement other consumption needs (Table D.43).

Gleaning occurs in the same period as the *boro* harvest. All women interviewed found gleaning at the equivalent value of Tk 70 per day to be preferable to the Tk 35 daily wage earned in rice harvesting and processing. In addition, women found gleaning a more concrete means of securing four months of food, rather than the insecurity of a cash wage to purchase rice at market prices, which increase in the period following harvest.

6.5 Women in Decision Making and Public Participation

Women's role in decision making and public participation has been studied through the Pilot Dredging Project and the Women's Status Survey.

Household decision making is a highly complex subject, with dimensions related to sex and age hierarchies, economic and educational variables, and socio-cultural influences. The material presented in this simplified study can therefore only be used to indicate broad guidelines.

In the project area, women's relatively marginal role in household decision making and public participation is related to the socio-economic conditions prevailing in a remote area, uninfluenced by gender-specific programming.

Social and Economic Decisions

In the project area women's participation in household decision making is more limited than men's. Women's role in decision making is mainly related to the presence of a male household head, the woman's education level and her role in household and market production. Ninety seven percent of surveyed households have a male household head (Table D.32). Eight percent of women have received an exposure to formal education (Table D.35). A woman's average, annual earnings is calculated to be 8% of total income in an average household, over a year (Table D.41). The NERP Household Survey found that the annual, per capita income in the project area is Tk 7,470, with an average household size of 5.7 persons. Total household annual income is calculated at Tk 42,500.

Women's sole-decision making capacity within the household is directly related to the absence of a male household head. The women's survey found female heads of household to be 3%. However of the 20 women interviewed in the gleaning study, 65% were heads of household (Table D.44). Most female headed households live in extreme poverty. Women of these households are active in agricultural, construction labor and gleaning in the public sphere. Although female household heads are vulnerable to food insecurity and are not afforded the social status which comes with *purdah*, they rank high in taking independent decisions for their household.

Women were surveyed on their decision making role related to food preparation and distribution, platform maintenance, contraceptive use and children's education and marriage (Table D.45).

Not surprisingly, women played the greatest role in decision making around food. Eighty four percent of women took decisions around the choice of food to be prepared, although only 44%

of women were the sole-decision maker on food preparation. This reflects women's inactivity in attending the market. Although 97% of women participated in the decisions related to food distribution within the family, 82% of women were solely responsible for food distribution.

In the project area the majority (63%) of decisions concerning the use of family planning methods was taken by women and men jointly, while at the national level, 74% of couples take joint decisions on family planning (BBS, Women and Men in Bangladesh, 1996).

In the project area, 58% of women participate in decisions relating to flood measures and platform maintenance. Such decisions include the shifting of pregnant women, children and elderly people during the peak of flood, distress sale of cattle and grain, household shifting following homestead erosion and the type and financing of repair to eroded homesteads.

In the project area, the majority (55%) of decisions about children's education were taken by men and women, jointly. At a national level, 68% of decisions on children's education were taken jointly (BBS, Women and Men in Bangladesh, 1996).

Women are less active in decisions concerning farm management, including land purchase and sale, cultivation of crops and sale of crops. Of the 408 women interviewed, 1% of women were alone in making decisions concerning farm management, while 30% of women were involved in a joint decision with the male household head on farm management. Comparatively, national data indicates decisions on the sale of rice are taken jointly by 68% of women (BBS, Women and Men in Bangladesh, 1996).

In the project area, women have a relatively small role in making decisions concerning children's marriage. Only 26% participated, while at a national level, 60% of women participated in decisions concerning children's marriage (UNDP, Empowerment of Women, 1994).

Public Participation

In the project area, women's participation in community organizations is minimal, mainly because there are virtually no gender-specific organizations. Of the 408 women surveyed, only one woman is a member of a local cooperative.

In the pilot project communities, women are not included in platform committees, formed of male landowners and village elite. No attempt has been made to encourage women's participation on these committees because even if a woman's husband allowed her to participate, her role would be nominal and her opinion would be unheard by the male committee. For meaningful public participation at the community level, women require gender-specific forums. In the pilot project's extended community management phase, such women's organizations will be developed.

Poor women have a higher rate of public participation than do women of economically secure households. During implementation of the pilot project, poor women were specifically targeted. Utilizing traditional labor groups, over 400 women participated in platform construction. Both as group members and labor leaders, women negotiated wage and contract conditions with all-male construction firms and local committees.

6.6 Women's Empowerment in the Proposed KKRMP

Isolation and lack of communication with the rest of the country appears to have reinforced traditionally conservative attitudes towards women in the project area. The majority of women marry between 12 and 16 years; 92% of women are non-literate. Women do not participate in community organizations in the area. In the pilot project communities, women have no effective membership on the platform committees.

Pre-monsoon floods and subsequent loss of the annual *boro* rice crop has accelerated the process of impoverishment for women of farm families. Women of landless and destitute households are vulnerable to food security when they lose labor opportunities in rice processing and gleaning, as a result of crop loss. Riverbank erosion and subsequent loss of homestead land has resulted in economic hardship for women whose families live in a state of perpetual migration.

As the economic circumstances of households deteriorate, women in the project area increasingly seek opportunities to enhance the family's income. Women from economically secure households work within their courtyard, in spheres where the norms of *purdah* can be respected. They are mainly active in rice processing and in livestock, poultry and vegetable production, for their family and for sale. Women of landless and poor families work as laborers in earth construction and in agriculture on rice, ground nut and sweet potato cultivation, as well as processing rice in others' houses.

Rice gleaning is a significant source of income-earning for poor women in the *haor* area. Women of destitute families earn over one third of their annual income through gleaning rice in harvested fields. Of women who glean, 65% are female heads of household. Women, who are heads of household are the poorest people in the project area. Based on national data, 90% of women-headed households are considered the absolute poor. Thirty three percent are part of the hard-core poor population and are vulnerable to chronic food shortage (UNDP, Human Development in Bangladesh, Empowerment of Women, 1994). Although poor women face food insecurity and low social status because they can not maintain *purdah*, female heads of households rank high in decision making for their family.

Unlike other areas of rural Bangladesh where government and NGO programs have been successfully targeted to women, gender-specific development efforts in education, credit and income generation are notably absent in the remote area of the project. The proposed KKRMP provides an excellent opportunity to introduce targeted programs for women to the project area.

Within the overall framework of the UN Convention on the Elimination of All forms of Discrimination Against Women (CEDAW), and as a follow-up to the United Nations Fourth World Conference on Women, the Bangladesh government has adopted a National Policy for Women's Advancement (NPWA) in 1995 and a National Action Plan (NAP) for implementation of the Beijing Platform in 1996. Among other objectives, the government's plan aims at ensuring women's empowerment through equal access to socio-economic activities, health, nutrition, education and skills training, as well as providing special support to abandoned and deserted women and rehabilitative measures for women affected by natural calamities.

In a government approach known as 'mainstreaming', such gender concerns are to be the responsibility of all ministries and agencies. Accordingly, the KKRMP, under the MOWR, BWDB and WARPO has been designed to enhance women's access to particular project components and to improve their participation in household, local and regional decision-making.

During the construction period, the contractor will be mandated to engage 25% of women for earthwork construction labor, subject to their availability. Monitoring of labor conditions at construction sites will ensure that women's labor groups are provided with safe and healthy work conditions and wage rates equal to those of men. Unlike the pilot project, women's labor groups will be mobilized at an early stage and encouraged to establish a savings component. During the platform finishing period, women's groups will be supported to enhance their earning as labor contracting societies (LCSs). Women of new platform households will be benefitted by enlarged homestead space, providing flood-security, enhanced income through paddy processing, improved vegetable and livestock production, increased family nutrition and improved access to potable water and sanitation. During the three year program following construction, women of new homestead platforms will receive skills training in horticulture, nutrition, platform protection, hygiene and sanitation. On selected homestead platforms, poor women will be provided with schools, micro-credit and technical training in income-generating activities, such as tree nurseries, concrete latrine construction and high-value horticultural production. Through their group activities , improved incomes and ownership of productive resources, it is expected that women's role in household decision-making and community participation will be strengthened.

Implementation of gender-specific project components requires that female community organizers are fielded and supported in the project area.

Through their group activities, improved incomes and ownership of productive resources, it is expected that women's role in household decision-making and community participation will be strengthened.

7. THE WATER REGIME

7.1 Problems

Problems of the people are inextricably linked with the water regime. The river is the lifeline of the people and it is an indispensable condition for their survival. Now it has turned into a nemesis. River erosion is rampant, particularly at sections where it takes a sharp turn. Early floods ruin standing *boro* crops. In the monsoon, the entire region looks like a swelling sea. Wave action of the *haor* causes erosion to village platforms. Rivers are silting up. This has further aggravated the situation. Monsoon floods damage *aman* crops in high land areas and inundate the *bhitas* (homestead platforms). Due to siltation of rivers and outlet channels, post-monsoon drainage from *haors* is belated or impeded. This adversely affects *boro* plantation. The plight of the people is multiplied, as a result of all these phenomena.

PLIGHT OF A FARMER

Mahbub Ali is a medium-sized farmer of Kuloncho. He has suffered crop loss in almost all years since 1988. In 1991 and 1992, he was able to partially harvest his crops with the help of a boat, as his crops had been submerged under flood water. There was no crop damage in 1995. However, he cultivated only 16 *kare* land in that year as he was running short of capital. He rented out 20 *kare* on a share-crop basis.

To survive from the loss of his crops, Mahbub Ali had to sell some land and cattle. After the loss of crop in 1989, he sold 2.5 *kare* of land, for the first time. He had thirteen head of cattle. During the last five years, he sold off five head and three died during the flood of 1994. He also mortgaged out some land and borrowed Tk 4,100 from a *mohajan*. In 1991 Mahbub Ali borrowed Tk 11,000 from a relative living outside the country. Again in 1992, he borrowed Tk 6,000 from the same person, in order to cultivate *boro*. In 1993, he mortgaged eight *kare* of land for Tk 8,000. With this amount he planted *boro* but the crop was completely damaged by early flood. In 1994 Mahbub Ali once again sold off ten *kare* of land and started a business, which never flourished. This time his relatives refused to lend him any money. He borrowed Tk 6,000 from the *mohajan*, against an advance sale of 48 *maunds* of paddy. The loan is still outstanding, as he also lost his crop in that year, due to floods. He then took up a job in a shop in the adjoining village. He had a good harvest in 1995 and has left his job to return to farming.

7.2 Pre-Monsoon Flood

Boro is the principal rice crop of the region. If there is a flood in the growing or maturing stage of the *boro*, its consequence is catastrophic. There is little opportunity for re-plantation of seedlings after February. A flood in March or April is perceived as a vengeance of nature. This is caused by heavy rain and the rush of water from the hills in the upper catchment. The situation has become worse, due to the low drainage capacity of the river. Tables D.46 to D.49 provide the extent of pre-monsoon flooding crop damage between Sherpur and Ajmiriganj from 1985 to 1995. Recurrent pre-monsoon floods have accelerated the process of pauperization among farm families. The situation may be depicted through a case study of Kuloncho village.

The Tale of Kuloncho

Kuloncho is a village under Kuloncho union of Derai Thana. It is situated about 4 km off the right bank of the Kushiyara River. The cultivable land of this village is located in Tanguar Haor. From 1971-72, the *boro* crops of this *haor* were ruined due to early floods. Since 1978, when a closure was constructed across the Kalni River near Markuli, the crops of Tanguar Haor have mostly been saved. However, the problem of pre-monsoon flooding has surfaced again. The water of the Surma and the Kushiyara Rivers have been inundating the *haor* and causing damage to the *boro* crops for the last eight years.

The water of the Kushiyara usually enters Tanguar Haor through spills at Akkilshah Bazar and Uttar Suriarpar. The farmers tried to prevent such an overflow by constructing a dyke at those locations. However, as the riverbank erodes, the water flows towards other low areas. At times, the water enters the *haor* by breaching the dyke. Nowadays, at any point along the right bank of the Kushiyara, water can enter Tanguar Haor and adjoining areas and damage the *boro* crop.

In 1994, the closure across the Ratna Khal near Swadhin Bazar was breached and water from the Kushiyara River entered this area and damaged crops. At the same time, the area was inundated by water from the Surma River.

Kuloncho is vulnerable to early flood, almost every year. In 1991 and 1992, farmers had a partial harvest from under the water, as the land was inundated. It was only in 1995 that there was no flood and they were able to harvest the entire crop. However, in that year, farmers had not cultivated all of their fields because of crop losses in the preceding years. They had insufficient money to sow a full crop. In any case, farmers had become sceptical about the prospect of a safe harvest.

Crop loss in successive years has impoverished the village of Kuloncho. Medium farmers have become small farmers and small farmers have become landless. Many owner-cultivators have become share croppers. They must supplement their income by wage labor, fishing in the *haor* and working in small shops.

Some years ago, there were only a few landless families. Now there are about 80 landless families in Kuloncho. Almost all households, except a few rich ones, have sold their trees, cattle, poultry and even their boat, which is the only means of transport during the monsoon season. For example, there were 1,500 cattle in the village 10 years ago. Now there are only 200 head of cattle. Many cows and bullocks died in the flood of 1994, due to lack of fodder and the resulting disease.

Some 20 households had to sell their house and *bhita* to pay off their debts. They have left Kuloncho. Almost all families are indebted to the *mohajan* or to relatives working outside the country. About 35 families in the village have members living abroad. They lend money to their poor relatives and help them in different ways. Overseas relatives usually do not claim interest on their loans. If the farmer fails to repay the loan in time, he usually settles the liability by selling his land to his relative who has loaned the money.

The overseas relatives no longer want to lend money to the villagers because of their incapacity to pay back. Nor are the overseas relatives interested in claiming cultivable land in lieu of repayment because land in this area is too vulnerable to damage by pre-monsoon floods.

The *mohajan* usually lends money to be repaid in paddy. The farmer has to pay 8 *maunds* of paddy in exchange for a loan of Tk 1,000. The situation of the borrower becomes worse if there is a crop loss due to flood. Then the farmer has to sell his cattle or land to pay off the loan.

Crop Loss in Boailla Beel

The Boailla Beel is situated between the Kushiyara and the Bibiyana Rivers. If there is an early flood, water from both rivers enters the *haor* and causes damage to crops. Damages have been more severe since 1989.

The channel, which used to drain water from Boailla Beel had become silted up. Drainage had become a major problem. The residents solved the problem by organizing voluntary labor. In 1988 farmers cut a new canal, so that they could plant their *boro* rice in time. The new canal is known as Boailla Khal.

QUEST FOR A SHELTER

Rama Namasudra has shifted her house eleven times. Her house was originally located in Alakdi village on the southern side of Jalalpur Khal. Her parents had 7 hectares of land. That land was eroded with the Bibiyana avulsion in 1957-58. Then Rama built her house on a piece of fallow land. After four years that house was also eroded. She built a new house on another piece of land. It was also eroded. This process of erosion and building of new houses continued. When the last house was eroded in 1990-91, she was not able to build a new one. She built a lean-to on the bank of the river, using bamboo poles and plastic sheeting. She lived there for three years, until that shelter collapsed. Now Rama Namasudra has built her eleventh home, a thatched shed, on *khas* land along the riverbank.

The bed of the *beel* has been raised due to siltation, caused when the Kushiyara River surges through, during the pre-monsoon period. The land has remained fallow for the last few growing seasons because there is no water in the *beel* for irrigation of crops.

Most of the Boailla Beel has become totally filled up with silt. In the course of time, people from other parts of the Sylhet region (Bishwanath and Jagannathpur) and from other districts (Comilla and Narsingdi) came to reside on the *beel* land, near the southern bank of the Kushiyara River. The settlers purchased *beel* land at a nominal price. They started growing transplanted *aman* and vegetables before trying to cultivate *boro* rice.

There is approximately 2,430 ha of land in Boailla Beel. About 80% of the area is vulnerable to early floods. The villages affected by this *beel* are Megharkandi, Harinakandi and Rohail of Raniganj union and Daipur, Bhaitgaon, Baushi and Dokkhin Suriyarpar of Kuloncho union.

Over the past few years, 100% of the *boro* rice could be harvested in 1995, and less than 50% was harvested in 1992 and 1994. Crops were almost completely ruined in 1990, 1991 and 1993, although some farmers were able to collect 10% of the harvest from underwater. In these cases, the laborers did the difficult work of cutting the *demi* paddy from under water and with the owner's permission, took the wet grain home with them.

In 1992, to protect the *beel* from the waters of the Bibiyana River, the farmers of Harinakandi, Megharkandi, Bhaitgaon and Daipur built a closure near Inayetganj Bazar. Another group of farmers removed that closure to protect their own land from inundation. As a result, at the end of April 1992, water again entered the *beel* through Barabila Khal. Nevertheless 50% of the crop had been harvested by the time the flood came. A new closure was constructed on the Barabila

Khal, but it breached in April of the following year and the standing crop was completely destroyed.

In 1993, there was no closure on the Bibiyana River and so in that year there was inundation and destruction of the standing crop in that *beel*. A closure on the Bibiyana was constructed in 1994. It was subsequently destroyed by a different group of people. As a result, the *beel* was again flooded and crop was damaged. In the same year the water of the Kushiyara River spilled and entered the *beel* through the sides of Jalalpur, Balisree, Tangrakhali and Dokkhin Suria.

In 1991, the river bank collapsed near Balisree. As a result, water first entered the Chatol Beel and then the Boailla Beel. In 1993, the closure of Tangrakhali breached and water again flooded the Boailla Beel. During the monsoon of 1992, a *dhala* was created in Tangrakhali as the bank of the Kushiyara River had eroded. A large volume of water entered Boailla Beel through the *dhala*. This *dhala* was closed in 1993 by the residents of that area. But it collapsed in the month of *Baishakh* and consequently the *beel* was flooded. In 1994, water overtopped the riverbank near Dokkhin Suria and inundated the *beel*, again with standing crop. In 1995 there was no early flood.

Crop loss in successive years has had a devastating effect on the farmers of Harikandi, Megharkandi, Bhaitgaon and Daipur villages. Many farmers had to sell their assets, such as trees, cattle and eventually land. Many of them borrowed money.

A PEASANT TURNED LABOURER

Riverbank erosion by the Kushiyara has turned Shariyatullah from a peasant to a day labourer. Shariyatullah is now a resident of Golishal. Thirty years ago he lived in Soatior. Many families have migrated to Golishal and Ratanpur from Soatior due to river erosion. Shariyatullah is one of them. His *bhita* has been eroded thrice. In order to erect his new house he had to sell cultivable land, cattle, and eventually his tin-shed dwelling. Once he owned more than three acres of land. As a result of distress sales, Shariyatullah only has less than half an acre remaining.

After the first erosion about 30 years ago, Shariyatullah sold off five *kare* of land for Tk 1,000 only. He built a small house on a small piece of land but after three years, it was again completely eroded by the Kushiyara. Shariyatullah was left with no land on which to build another house. To buy a new homestead, he sold three *kare* of crop land and his tin-shed in which he had lived. He then built a new house, a thatched hut. But the fury of the river continued. His homestead was eroded once again.

After his house had been eroded for the third time, Shariyatullah decided not to live in Soatior any longer . He purchased a *bhita* in Golishal village and decided to start life afresh. However, his small piece of crop land became degraded due to sedimentation on his *haor* fields. To earn a living, he became a share-cropper. Having sold off his cattle which he needed as draught animals, he could not even share-crop for long. He is now living on wage labour.

There had been no landless families in this area. Now there are many. Many farmers now work as wage laborers. Six families of Megharkandi sold their homesteads and left the village. Laborers from other villages used to come to Megharkandi as harvesting labor. Now farmers from this area go to Mokar Haor to harvest rice or work as earthwork labor.

7.3 River Bank Erosion

The erosion of the riverbank has turned many peasant families to day laborers. Erosion is particularly severe where the river takes a sharp bend. There are many examples where people have had to move from one place to another in a village and ultimately have migrated to some other land altogether. Displacement due to erosion has created a large population of internal refugees.

Erosion not only displaces whole households, but each year, partially eroded homesteads bring severe dislocation in day-to-day living. Property loss due to erosion is related to buildings and land used for gardening, rice processing, straw storage and animal sheltering. In market villages, erosion results in loss of shops and storage structures. A study of 16 vulnerable villages and markets along the Kalni-Kushiyara River shows that platforms eroded at an average annual rate of 5.6% (Table D. 50). In theory, one village could be completely eroded in about 15 years. Villages manage to remain, however, because platforms undergo annual maintenance. On the country side of the platform, people often build lateral extensions. Such extensions are possible only in high land areas. In *haor* areas, lateral extensions are nearly impossible because of the very high cost of earth work for raising a flood-secure platform.

7.4 Haor Erosion

During the monsoon, homestead platforms are extensively damaged by waves from the *haor* side. The size of the village platform shrinks every year. Most people live in *katcha* houses, cramped together on the platform. The homestead courtyard is congested with straw piles and animal sheds. Many families possess only one hut, where members of the entire family live, cook, eat and sleep. Cattle and ducks are often sheltered under the same roof.

Wave erosion is so severe that it may threaten the entire village. Before the onset of the monsoon, householders reinforce the slopes of their platform to withstand wave erosion. The people have developed indigenous techniques of platform protection, using vegetative materials found on the *haor*. Most people use bamboo and water-tolerant plants such as *dhol kolmi* and *chailla* grass. Over the past few years, farmers have begun to cultivate rice on the lowest parts of the *haor*, so that now, most households must buy *chailla* grass from the market. Day by day, the costs of materials for platform protection are increasing. When there is crop loss, farmers have no expendable income for platform protection. Only rarely, can a household afford to provide long-term protection, such as brick walling (Table D.51).

7.5 Avulsion

Channel avulsion is another morphological process that has been displacing people in the area for a long period. Shahebnagar village is a striking example of a disaster caused by river avulsion. Shahebnagar is located under Katkhal union of Mitamain *thana* under Kishoreganj district.

The people of Shahebnagar relate their history as synonymous with the devastating impacts of erosion. Of the seven village clusters (*paras* or *hatis*) that were originally settled by migrants from Comilla district some 150 years ago, all but one have been completely eroded over the past forty years.

Shahebnagar is located on the left bank of the Kalni River, and across the river from Katkhal village. In the 1950's, the seven *paras* of Shahebnagar lay contiguously to the south of Katkhal Bazar, connected by road. To the west, flowed the Old Kalni River (locally called the Meghna River) and to the east, the Kalni River. To the south of Shahebnagar lay a large *haor*. At that time there were 600 to 700 families living in Shahebnagar.

The erosion of Shahebnagar has been caused by river bank avulsion and channel shifting. The most significant erosion events occur in March and April when the river is rising from rains in the Indian hills. The erosion of Shahebnagar began from its western flank in 1953 and by 1975 the agricultural land and the homesteads of the first village cluster (Pashimpara) had been consumed by the Old Kalni River. Up until 1965, the Kalni River in the east was known as the *mora gang* (dead river). It then became active and began eroding agricultural land. By 1987 the homesteads of Uttar Hati, Sarkar Hati and Purba Hati were gone. Erosion from the Kalni River was particularly severe between 1987 and 1989. The protection wall of Katkhal Bazar was the first to collapse, causing the high school, the primary school and the playground to disappear into the river, one by one. The central *para* (Maji Hati), along with the village graveyard and the mosque were lost to the Kalni River between 1991 and 1993.

THE RIVER'S CURSE

The cost of relocation has caused economic insecurity for Shahebnagar migrant farmers, such as Rahim Ali. Through channel shifting and bank erosion of the raging Kalni River, Rahim Ali has been forced to shift his household four times, over the past 28 years. His daughter's marriage proposal from a well-to-do Katkhal family was cancelled, when his last homestead was eroded. Rahim Ali' family was though to be both poor and unlucky. The people of Shahebnagar speak of the river as a curse, which "eats their lives". Indeed, at a cost of Tk 230,000 to repeatedly shift, re-settle and re-build, Rahim Ali has become a disheartened man and a life-time debtor to banks and money lenders.

The people of Shahebnagar vividly remember the dramatic event of April 1994 when 200 households became homeless, overnight. A massive avulsion of the Kalni's right bank had eroded the last piece of land separating the Kalni and the Old Kalni Rivers. The two rivers converged to form one rushing waterbody; the contiguous villages of Katkhal and Shahebnagar had been separated. The homesteads of Taragazir Hati were submerged and Shahebnagar, as it was originally settled was gone to the river.

Over the forty year period of river devastation, 95% of Shahenagar's homesteads have been eroded, at one time or the other. In the early years of erosion, when homestead land was still available within Shahebnagar, households shifted between *paras*. Some Hindu families migrated to India. When all of Shahebnagar was threatened by erosion, most people moved to nearby villages which were thought to be safer. However, in Katkhal and in Kaisar on the right bank of the Kalni River, major erosion events in 1959 and again in 1994, resulted in further homestead loss for the Shahebnagar settlers.

In addition to the loss of their homesteads and agricultural land, Shahebnagar farmers report loss of yield and high production costs for *boro* rice, cultivated on silted fields. Over time, the river's shifts and erosion has affected the quality of land on the *haor*. Across the river from Shahebnagar, people recall the massive Kaisar erosion in March 1959, when for two hours, both the river and the sky were brown with the sand of 80 ha of eroded land.

Although the agricultural landless have increased from 15 to 35% of households, only five households are reported to have permanently migrated out of the area. For their very survival, the people of Shahebnagar have developed patterns of seasonal labor migration and temporary homestead shifting. Of the 200 Shahebnagar homesteads eroded in 1994, 100 families also lost their agricultural land. They now work as wage labor, living on others' homesteads in neighboring villages during the dry season, and migrating during the monsoon, to find work in Dhaka and Sylhet.

Since the massive erosion of 1994, 150 households, eroded from the riverside have resettled on their agricultural land in distant *haors*. Eight new *paras* have been formed in Shahebnagar but most families only live there during the dry season. On average, a household must spend Tk 63,000 to build a new homestead of only two decimals (0.008 ha). This includes the costs of land, the earthwork to raise land and the construction of a tin shed house and out-buildings. Although they may own their land on the *haor*, most families do not have the money to raise and construct a flood-secure homestead. Instead, they live on their flat *haor* land during the farming season and shift to seek living space on others' homesteads or the Katkhal school ground during the monsoon.

7.6 Monsoon Flood

During the monsoon the entire region looks like a sea. This is a normal situation when every piece of land goes under water, except the village platforms. In the upper reach however, some fields remain above water and are planted to *aman* rice.

The situation becomes worse when there is a high monsoon. Village platforms are inundated. Homestead courtyards go under one to two feet of water. Water enters many houses. When the conditions deteriorate, people shift to higher places. Many people have no place to go. They take shelter on the *macha* (make-shift bamboo platform inside the house).

People have been living with floods for many years. Historical records show that big floods occurred in the years 1781, 1785, 1850-51, 1893, 1902 and 1929. In the recent past there were big floods in 1966, 1974, 1978, 1988 and 1991. The conditions prevailing in the flood of 1781 narrated by Lindsay and cited in the District Gazetteers, provides an interesting historical perspective on flood in the area (see Box).

7.7 Post-Monsoon Drainage

From October, waters of the *haor* start to recede. The water needs to be drained to facilitate cultivation of the *boro* rice crops. If drainage is delayed or obstructed, farmers cannot transplant *boro* seedlings. Delays in plantation puts the crop at risk for pre-monsoon flood, shortly before it is ready for harvest. The area affected by post-monsoon drainage obstruction in Chatol Beel and Hariar Beel, of the upper reach, between 1988 and 1996 is indicated in Tables D.52 and D.53. Post-monsoon drainage is a critical factor in the agrarian life. Some examples have been cited below to provide an understanding of the drainage problem.

Sreehailer Haor

At present, the water of the Sreehailer Haor drains to the Dhonu River through the Gudi Nadi. As a result of siltation at the confluence of the Gudi Nadi and the Kushiyara River, water nowadays remains in many parts of the Sreehailer Haor, and farmers cannot transplant *boro* in

those areas. There is so much sedimentation in some parts of the *haor*, that the land is elevated and can be cultivated with other crops.

Even if the mouth of the Gudi Nadi was to be excavated, there would still be a drainage problem from the *haor*. In fact, the problem may become worse because water from the Kushiyara River will enter the *haor*. The water level in the Kushiyara River is always higher than that in the *haor*. People report that the excavation of the mouth of the Gudi Nadi would be beneficial only after dredging of the Kushiyara.

Nalua Beel

Nalua Beel is located between the villages of Pituarkandi and Sullah. After the loop cut of 1978, land at the side of the *beel* has been elevated. As a result of drainage congestion, farmers cannot cultivate *boro* rice on about 6 ha of land.

Bara Beel

Bara Beel is located on the left side of the Kushiyara River. The confluence of the *khal* with the Bibiyana channel near the village Megharkandi had been silted up since 1974. This caused drainage congestion and about 14 ha of land had to be left fallow. In 1980, farmers in the area excavated the *khal* to drain water. They must excavate the *khal* every year to maintain it as a drainage outlet.

Boailla Beel

Boailla Beel is located on the left side of the river. Ten years ago, there was a drainage problem on about 50 ha of land. This was

FLOOD OF 1781

The river, from being very low, rose thirty feet perpendicular, overflowing its banks and sweeping everything before it. A more dreadful scene could not be imagined, nor could relief be given to the numerous animals seen perishing in the torrent Cattle and wild animals of every description were observed, indiscriminately floating downstream. The granaries upon the banks, filled with the late super abundant harvest, were all swept into the flood, and thus from a general plenty, in the course of ten days, we were reduced to a state of famine. All was gone except a few partial stores on the high ground.

I must mention here one instance of the people at this juncture. They spent all and brought rice plants from the seed beds on the high ground, but their low lands being under water, they were obliged to plant them in a manner, not altogether new, but seldom practiced, and to which I was an eyewitness. The work is carried on in canoes. In one of the boats were deposited the rice plants, on the other side a heap of well-tempered tenacious clay. The boatman attached two or three rice plants to a lump of clay and dropped them into the water. They became anchored below eighteen inches of water. Many hundred acres of ground were thus cultivated; flourishing in due time as a considerable resource, and thus saving many of the inhabitants from famine. In the situation described, provided the flood during the periodical rains rises gradually, the plants will grow to the height of twelve or fourteen feet, always keeping their heads above water. But if rapidly overflowed and depressed under water, even for one night only, it never recovers.

Upon going to Dhaka few months afterwards, I saw many instances of men and women diving from their canoes to tear up grass and other vegetables as food for their famished cattle. Nor were the sufferings of the unfortunate natives yet ended. When the new crop was nearly ready for use, no persuasion could prevent them from satisfying their hunger, the frequent consequence of which was immediate death or disease. Dropsy and dysentery destroyed many. (Lindsay, cited in the Sylhet District Gazetteers)

caused mainly by the siltation of the *khal* connecting the *beel* with the river. The people, with assistance from the Union Parishad, excavated a *khal* to drain water from the *beel*. This is the Boailla Khal. Each year, the mouth of the *khal* is silted up. This creates a drainage problem at the time of *boro* rice plantation. The people want a lasting solution to this problem.

Hariar Beel

Hariar Beel is located near the village Uttar Suriarpar, about 2 km away from the right bank of the river. Due to drainage congestion, part of the *beel* has remained fallow since 1974. The *khal* connecting the *beel* with the Kushiyara River has gradually silted up. Every year the fallow area is extended by another 20 ha. Over the last 10 years, about 180 ha have become non-cultivable

Drainage in Chatol Haor

The situation of Chatol Haor gives a vivid example of the plight of the people due to drainage problems in the post-monsoon period. The total land area between the Kushiyara and the Bibiyana Rivers is 10,120 ha. More than half of this area lies in the Chatol Haor. For the last 10 years, this area has been suffering from a problem of post-monsoon drainage. As a result *boro* rice plantation has been hampered.

In the past, when the Kushiyara River was deep, water of the *haor* used to drain through Rohail Khal. As the water level of the river was lower than that of the *haor*, water of the *haor* used to recede quickly. Gradually the river has silted up and a *char* (accreted landmass on the bed of a river) has formed at the mouth of the Rohail Khal. Now the water level in the river is higher than that of the *haor*. The situation has now been reversed. Instead of draining water from the *haor*, water of the river now enters the *haor* through the *khal*.

Due to late drainage, plantation of *boro* crops is delayed. Although plantation is supposed to be completed in the month of *Poush* (mid-January), seedlings are planted as late as *Falgun* (mid-March). Late plantation makes the crop vulnerable to early floods.

As the water does not recede in time, many farmers plant rice seedlings when there is still some water in the *haor*. Young rice plants are inundated and ruined when there is early rain. For example, plantation of rice in the 1996 *boro* season ended on 20th *Falgun* (3rd March). There was heavy rain in the region on 27th and 28th of *Falgun* (10th and 11th of March) which drenched and damaged the seedlings. Water of the river entered the *haor* through Rohail Khal. Usually the *khal* remains closed at this time, but in order to drain water from the *haor*, it was kept open. Though the farmers immediately closed the *khal*, much of the crop was already submerged underwater.

When the water level in the river dropped on the 9th of *Choitra* (23rd of March), the *khal* was again opened to drain water from the *haor*. There was heavy rainfall on 15th *Choitra* (29th March). The *khal* was again closed. This process is repeated every year. Consequently, vast areas of land remain uncultivated.

Drainage congestion at the time of *boro* plantation has become a chronic predicament in Chatol Haor and has made the farmers poorer. In the last few years, the distress sales of trees, cattle and cultivable land has increased. Some people have migrated to urban areas in search of work. Many have been indebted to the *mohajan* and to relatives living abroad.

Farmers take loans in the month of *Poush* or *Magh* (December-January), and pay back in *Baishakh* (May). If there is a crop failure, a farmer has to sell the household's assets to repay the loan. Because of poor harvests or keeping land fallow due to drainage problems, no one wants to buy land anymore. Now the price of land is at its lowest.

The land in Chatol Haor belongs to the people of 10 villages of Raniganj and Pilegaon unions. Among these villages are Gotgaon, Khamargaon, Noagaon, Alampur, Rohail, Balisree, Helalpur, Kamrakhai, Joynagar and Kumarai, the latter four being the most affected. The land owned by farmers of these villages is located in a lower stretch.

There are 190 households in Kamrakhai village. Together they possess 450 *haal* of land in the *haor*. One *haal* is equivalent to 12 *kare* of land (3.6 acre or 1.5 ha.). They prepare *jalakhet* (seedbed) for *boro* in late *Kartik* or early *Agrahayan* (November). The *jala* (seedlings) become ready for transplantation in four weeks. However, they often cannot be transplanted until *Falgun* (February-March) because of delayed drainage. Meanwhile, the seedlings become over-mature and do not survive transplantation. Sometimes farmers have to buy seedlings again, from the market.

In the past, all households owned land. Now there are as many as 50 landless families. Medium and small farm households have turned into share croppers. Some are working as day laborers, whilst others live from fishing in the *haor*.

The well-off families no longer cultivate land by themselves. They rent out their land under the arrangement of share-cropping. Sixteen families have left the village. Some have abandoned farming and have started trading activities in the town.

Previously, many farm laborers used to come to this village from other places to transplant and harvest *boro* crops. Now the farmers of this village, themselves go to other places in search of work. Drainage congestion in Chatol Haor has completely changed their livelihood pattern.

7.8 People's Perception

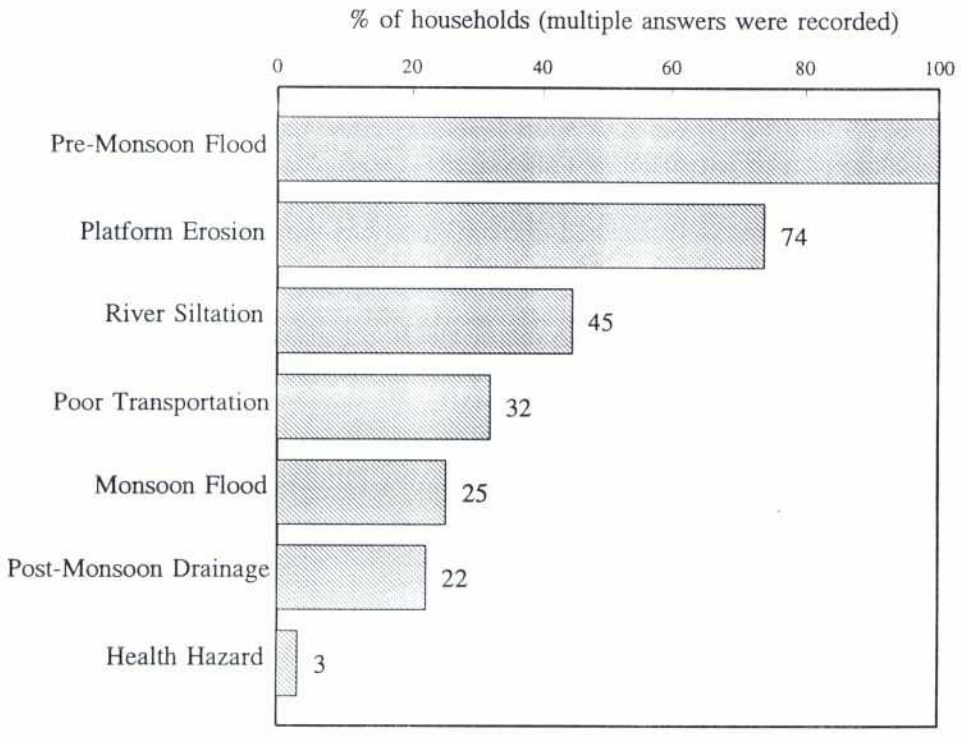
In the Household Survey, respondents were asked to mention problems they face in their day to day life. In most cases, they mentioned more than one problem.

Pre-monsoon flood is the main problem indicated by the people of all areas, irrespective of their occupations and resource base. It is a problem for all households (Graph D17).

Platform erosion (caused either by the river or by the *haor* waves) is the most critical issue next to early floods. More than three quarters of the poorer households have indicated erosion as a problem. However, this problem is not that acute among large farmers. This is because their homesteads are in safer locations or they are able to maintain their platforms. About half of the respondents said that siltation of the river bed is a problem indeed (Table D.54).

When asked to indicate the main problem, two-thirds of the households mentioned that pre-monsoon flood is the most damaging one, followed by platform erosion, and then by post-monsoon drainage (Table D.55). It is interesting to notice that poorer households suffer more from platform erosion than the rich, whilst the rich suffer more from post-monsoon drainage.

Graph D.17: People's Perception of Problems



7.9 Synthesis

Living in a *haor* is hazardous. The situation has become more volatile with changing hydrological regime. Field crops have become more uncertain, due to early floods. Land has been left uncultivated due to drainage congestion. The scale of population displacement has increased due to erosion. All these cumulative impacts have constrained the finances of the household and enhanced the process of impoverishment. Human settlements, particularly in the lower river reaches have become untenable. Poverty, coupled with dehumanised living conditions in eroded villages has diminished the quality of life for people in the project area.

8. WATER MANAGEMENT PRACTICES

8.1 Community Interventions

Next to land, water is the people's most important resource. People in the Kalni-Kushiyara area find the management of their water resources to be increasingly difficult. The prime concern of farmers is the safety of their crops. The people's water management practices are dictated by the scarcity and then the abundance of water. Local variations, related to demand and availability of water, leads to contention and confrontation between different groups of people, trying to manage the same resource.

The most obvious water-related problem is the pre-monsoon flood, which threatens crops and human settlements from February to April. There are other problems too. The people of the region have been living for many years with these hydrological conditions. They have tried to develop some coping mechanisms to deal with the situation. Sometimes these work well, at least in a micro-setting. At other times, people's water management practices causes disaster for other communities in the region.

8.2 Closure

Constructing closures or earthen embankments across a river or a *khal* is a common practice. These are intended to stop inundation of water from the river, in order to save standing crops on the *haor*, from pre-monsoon floods. Several such closures have been built by local communities during the last two decades. An historical account of closures will provide an insight about the problems faced by the people, as well as an understanding of the relationship between the hydrological changes on the river and its impact on the agricultural fields of the *haor*. In most cases of closure construction, there are varying sets of community interests both at a micro level and within the larger region.

Koyer Dhala Closure

About twenty years ago, Koyer Dhala used to be a patch of flat land between Koiya Beel and the Old Kushiyara River. At that time its elevation was slightly lower than at present and there was no *dhala* (channel). The Koiya Beel started silting up after the loop cut of 1978, and was completely filled in by 1985. Siltation along the river bank was as deep as 2.5 m. As the bed of the river in the section from Paharpur to Sullah was elevated, the pre-monsoon spill inundated riverside areas and damaged *boro* crops almost every year. Farmers were eager to protect their crops from the spill of the river. In 1986 and 1987, under a Food for Work Program, a road-cum-dyke was built from Paharpur to the west of Firozpur and Chanderdhala. The Government allocated 3,900 *maunds* (about 145 tonnes) of wheat for the work. This dyke was built across the Koyer Dhala, but it was washed away during the 1988 monsoon flood.

A closure was built on the Koyer Dhala during 1989-91 by mobilising voluntary labor from the people in the adjoining villages (Jalsuka, Badalpur, Ajmiriganj and Baniachang unions). The government also provided some assistance. This work was not successful. The dyke began breaching due to the passage of boats during the monsoon. The breaching was increased by the monsoon waves.

In the month of *Falgun* (February-March) of 1992, there was a sudden rise in the water level of the river and water entered the *haor* through the Koyer Dhala. About 2,000 people worked for 21 days to close the breach. In the meantime, some land went underwater. About Tk 200,000 was spent to protect the closure. A portion of the money was provided by a local elite person and some money was realized by collecting tolls in the impacted villages. In that same year, Tk 237,000 was sanctioned by the government to make a closure on the Koyer Dhala. This money was spent to strengthen the closure and in fact, the closure did not breach between 1992 and 1994. However it collapsed again in July 1995.

In the 1995 post-monsoon season, water entered the *haor* through the Koyer Dhala until well past the post monsoon period (end of December). Vast areas of land in Ajmiriganj, Baniachang and Nabiganj thanas could not be planted. Although some of the land drained through the Jingri River, this drainage was offset by inundation of water through the Koyer Dhala.

In view of this situation, the farmers decided that they had to try to close Koyer Dhala again. In December 1995, they arranged self-help labor. Tolls were collected from the people to buy such necessary materials as bamboo, rope and gunny bags. The earthwork for the closure started in December 1995. Nearly 1,000 men worked everyday. The work was completed by February 1996. Within a fortnight, the water had stopped entering the *haor*. Among those who were present at the work site were local leaders of different political parties. They arranged to allocate 93 tonnes of wheat for the work.

However the farmers have another problem when the Koyer Dhala is closed. As the water level drops on the Old Kushiyara River, there is inadequate water to irrigate in the months of February and March. And yet, if the Koyer Dhala is kept open, water remains in the *haor* up to January and farmers cannot plant their *boro* crops. Farmers say that a sluice gate is required at Koyer Dhala. They claim that a sluice gate would regulate the flow of water from the river to the *haor* and make water available for irrigation. During the pre-monsoon season the sluice gate would be closed to prevent water from inundating the crops.

Markuli Closure

The Old Kalni River flows in from the north to join the Kushiyara River at Markuli. After the 1955 - 1960 period when the Bibiyana River shifted, there were many changes in the Markuli area. The Old Kalni River could no longer influence the flow of the Kushiyara River. Rather the opposite. Because of the deposit of downstream sedimentation as a result of the avulsion, the waters of Kushiyara River often backed up into the Old Kalni River. As the normal flow of the Old Kalni River was inhibited, there was heavy siltation upstream, in the *haors* of Sunamganj district. As well, the Old Kalni was silting up at its mouth, near its confluence with the Kushiyara River, just north of Markuli.

Sedimentation also took place on land along two sides of the Old Kalni River in parts of Derai, Sullah and Jagannathpur *thanas*. By the early 1970's, the land along the Old Kalni River had become so sandy, that instead of cultivating *boro* rice, farmers in Tukchanpur and Narkila began to cultivate ground nut and chilies. By this time, the waters of the Kushiyara River was flowing into the Old Kalni River, almost every year. In 1973, people had closed the Panda Khal to prevent inundation from the Kushiyara River on to their lands in the Dekhar Haor.

The main damage occurred in April 1977, when the waters of the Kushiyara River entered the Old Kalni River and devastated vast acres of *boro* rice crops in the southern part of Sunamganj district.

The most affected crop land was in Baram and Tanguar Hoar in Derai *thana*, Noluar Hoar in Jagannathpur *thana* and Chhutirgaon, Shashkaier, Dhopajura and Chhayar Haors in Sullah *thana*. Apart from this, crops in Khaliajuri Thana of Netrokona district were also damaged. The *boro* crops in all the *haors* of Derai and Sullah, one-third of Jagannathpur Thana and part of Khaliajuri were ruined.

This forced the local people to take action. They felt that a closure on the Old Kalni River would be the best measure to protect their crops from flooding. The first attempt of the Markuli Closure was named the *Kalni Nadi Bundh Prokolpo* (Kalni River Closure Project). When it was first proposed to the Sub-Divisional Officer (SDO) of Sunamganj, the proposal was turned down because it was felt that an active channel could not be closed. Nevertheless, in 1978, the farmers of Tarol union in Derai *thana* and Habibpur and Bahara unions in Sullah *thana* built a closure on the Old Kalni River near its confluence with the Kushiyara River. This closure collapsed during the following monsoon.

A second attempt at the Markuli Closure was made in 1979, in the name of the *Tukchanpur Dhala Bundh Prokolpo*. By this time the SDO of Sunamganj was convinced of the need for a closure at Markuli. He had been in the area in April of the previous year and had seen the closure before it had been washed away by the monsoon. In April, the water level on the Kushiyara river was five feet above that of the Old Kalni River and had there not been a closure on the Old Kalni, the *boro* crops in the southern part of Sunamganj would have again gone under water. The SDO of Sunamganj allocated 250 *maunds* of wheat for constructing the second closure attempt. An additional Tk 5,000 was provided from the Union Parishad to purchase bamboo poles for monsoon wave protection on both sides of the closure. That, however was unsuccessful and the closure collapsed for the second time.

When the then District Commissioner (DC) was approached in 1980 for financing the third closure attempt *(Tekirghonar Bundh Prokolpo),* he initially rejected the scheme, on the basis that no structure should be built to obstruct the natural flow of an international river such as the Old Kalni River. Nevertheless, 500 *maunds* of wheat was allocated for another attempt. The third closure also did not survive the following monsoon.

Again in the dry season of 1981, 600 *maunds* of wheat was provided by the SDO of Sunamganj to re-build a closure on the Old Kalni River and again, the fourth closure collapsed in the following monsoon.

The Markuli Closure was finally built on the Old Kalni River in 1982. Great efforts were made to obtain sufficient resources to construct a durable closure. Popular support was obtained through the national newspapers: "Crops of approximately 80,000 acres of land are damaged as the spill of the Bibiyana (Kushiyara) from Tekirghona to Jalkhali inundates the *haor*" (The *Ittefaq*, 1982). The Ministry of Relief and Rehabilitation provided 2,500 *maunds* of wheat for construction of the Markuli Closure and an embankment along the right bank of the Bibiyana (Kushiyara) River. To date the Markuli Closure still stands.

As a result of the Markuli Closure, the Old Kalni River has nearly dried up. The large *haors* of the southern Sunamganj district must now drain through the Surma River system. Once an international navigation route, the Old Kalni River can barely handle small boats in the dry season. There is not enough water for irrigation of the *boro* rice. Farmers in the area believe that dredging of the river is needed to obtain irrigation water. In addition, dredging would allow passage for boats between Derai and Tukchanpur, thereby enhancing the viability of the Derai Bazar.

Bheramohona Closure

The Bheramohona Beel is a large fishing ground. Fish from this *beel* were transported to Ajmiriganj on the Kushiyara River, via the Dhonu River and the Gudi Nadi. By 1986, the Kushiyara route could no longer be used because the *khal* originating from the Bheramohona, as well as the Gudi Nadi were silted in.

In 1987, in an attempt to improve the navigational link between Bheramohona Beel and Ajmiriganj, fish traders in Ajmiriganj constructed a small canal. This became known as the Bheramohona Dhala. The canal became a wider *dhala* due to plying of boats. During the flood of 1988, the *dhala* was widened even further. Extensive silt was carried from the river to the *beel*. Almost half of the *beel* was silted up. Fishermen and fish traders in Ajmiriganj were suffering. Between 1990 and 1992 *boro* crops in the Bheramohona Haor were extensively damaged by the spill coming through the Bheramohona Dhala.

In 1989 and 1990, attempts were made to close the *dhala* in order to prevent any further siltation from the river. Eventually in the dry seasons of 1992 and 1993, the Bheramohona Dhala was closed. The labor was done under a Food for Work Program.

Now there are new settlers, about 30 families from Sreehail, Durlabhpur and Sahadevpasha living on the high land of this closure. They report that the high land of the closure provides them with better protection against monsoon waves than they had on their eroded village platforms. The settlement, though not yet named, has already assumed the form of a village.

8.3 Loop Cuts

First Loop Cut in the Kushiyara River

The first loop cut in the Kushiyara River was made 6 km downstream of Sherpur, in 1955. Although younger people cannot recall the exact year of its construction, elderly people remember that it was the year following the 1954 general election, when the United Front took a landslide victory over the ruling Muslim League.

At that time, the river flowed from Ahmadpur, 6 km to the west, between Galispur and Shurikona. After passing six villages, the river cut back to the northwest, returning to Galispur. About 4,000 acres of land in the six villages (Galispur, Shurikona, Madhabpur, Chhoidagh, Aatghar and Kalnirchar) was being eroded by the meandering river. Travel time by boat and motor launch was thought to be lengthy. The loop cut was made to prevent erosion and shorten the travel time. At that time, no one considered the negative effects of a loop cut.

People remember that the loop cut was 800 m long and 200 m wide. About 700 laborers were engaged in earth work. They worked with spade and basket. People report that some earth cutting was done with a "ship". This was probably the dredger from the BIWTA.

Over a period of four years, the loop cut had become the main river course and the original course was gradually silted up. Part of the old channel had become a *jalmohal* (fishery). Erosion of agricultural land in the six villages had stopped. Travel time by launch had been reduced significantly.

However there were severe erosion problems for some villages. Ahmadpur was almost entirely eroded. When the loop cut was made, these farmers had not raised any objections. The site of the loop cut was about 1 km away from their village and they thought that it would not affect them. As the river was straightened, the waves became stronger. The new river channel breached on its western side. Over a five year period, 100 families lost their homesteads. Some of them shifted their house two or three times within the village but ultimately Ahmadpur was abandoned. Most of the Hindu families migrated to India after 1960. About 30 families shifted to other villages in the area (Kamarkanda, Durgapur, Galispur and Surikona).

Second Loop Cut and the Bibiyana Channel

People recall that both the first and the second loop cuts on the Kushiyara were proposed to the government and that the government agreed to carry out the work. The second loop cut was also constructed in 1955. It was made at Kasba, near the present site of Lepai Bazar, some 10 km downstream of Sherpur.

The second loop cut was done to save Kasba, which was being eroded on three sides by the Bibiyana River. The second loop cut was about 500 m long and 250 m wide. The loop cut forced the river course to straighten at Jalalpur village.

Long before the second loop cut was made, there was a narrow *khal* passing through Jalalpur, a village adjacent to Kasba. This *khal* was so narrow that people crossed it by jumping over. Aside from this *khal*, there was another channel which emerged from the northeast corner of Jalalpur and then joined the *haor* and made its way towards Markuli. There was no connection between the *khal* and the channel.

When the second loop cut was made, the increased water velocity forced the small *khal* to become wider and deeper. Eventually the land between the *khal* and the channel was eroded and these two water bodies joined. Since the elevation of the *khal* and the channel was much lower that the Bibiyana River, the river took this course. Within five years, a huge area had been eroded and took the form of a wide river. Thus a new course (*noya gang*) of the Kushiyara River, from Kasba to Markuli via Raniganj Bazar had been created.

When the loop cut was being constructed, people in Jagannathpur *thana* understood that their low-lying villages would be flooded by the new course of the Kushiyara. Some two thousand people marched to protest the construction of the second loop cut. Although work at the site was temporarily stopped, it continued when the protesters returned home.

According to people's understanding, the present course of the Kushiyara is a result of the second loop cut at Kasba. Along the passage of the new channel, the villages of Jalalpur, Modipur and Alkodi were completely eroded by the Kushiyara River. In addition, the cultivable land of Pilegaon, Raniganj and half of Nagargram was also eroded by the river's new course.

The loop cut, however, also delivered some benefits. Agricultural productivity was low in some *haors* because of their former depth. Only some jute and *boro* rice could be grown. After the

loop cut these *haors* have silted up. Nowadays, farmers are able to grow *aus, aman, boro* and vegetables.

People report that the second loop cut is not only responsible for the new course of the Kushiyara River, but also for the silting up of the Bibiyana River. Now the Bibiyana River is known as a *mora gang* (dead river). About four-fifths of the Bibiyana has now been converted into cultivable low land. The remaining one-fifth includes small *khals*.

Some thirty five years ago, the Kushiyara River used to pass from Kasba to Markuli via Enayetganj and Kazi Bazar. At that time, the reach between Kasba and Markuli was known as the Bibiyana River. Before the partition of India in 1947 and up until 1960, big steamer ships plied the Bibiyana River to load and unload merchandise at the market of Inayetganj. Boat transportation through the Bibiyana has stopped. Business at Inayetganj has dwindled. Nowadays, the only navigation on the Bibiyana are a few small engine boats, carrying passengers from some villages to Inayetganj Bazar during the monsoon months.

The closing of the Bibiyana River has also produced some benefits. It has protected the area from flooding and erosion. Nowadays, more *boro* rice is cultivated. Cultivation of *aman* rice and vegetables has also increased. Occurrence of flood has been rare after construction of an all-season road from Inayetganj to Markuli along the left bank of the Bibiyana River. Although some floods do occur along the right bank of the Bibiyana, they cause very little damage.

Loop Cut in the Upstream of Sherpur

A loop cut was made in 1977 and 1978 at a site 2 km upstream of Sherpur, in Alipur village of Balaganj thana. This loop cut was constructed by the BWDB. The excavation work was initially done manually and completed by dredge. People reported this loop cut to be 500 m long and 300 m wide. BWDB acquired land and compensated the landowners. People cooperated in the project.

The loop cut succeeded to:

- protect the Dhaka-Sylhet road;
- protect vulnerable villages (Hamorkona, Daudpur, Bakhongram and Afrozganj) from river erosion;
- protect part of Moulvibazar Thana and the entire Nabiganj Thana from flooding.

Loop Cuts in the Markuli-Ajmiriganj Reach

Along the Kalni River between Ajmiriganj and Markuli, three loop cuts were made in the dry season of 1978. During this period, the government of President Zia had launched a "canal digging program", intended to boost up dry-season rice production through irrigation. President Zia was particularly enthusiastic about this program and often visited such project initiatives.

In December 1977, a meeting was convened by the then District Commissioner (DC) of Greater Sylhet. The meeting was held at the BRAC office in Markuli and attended by the SDO of Sunamganj, Circle Officers, Project Implementation Officers and UP Chairmen. The meeting proposed the construction of three loop cuts to straighten the Kalni River. The purpose of the loop cuts, as expressed by the participants, were as follows:

- to make the river more navigable, as increased velocity of water would keep the river bed free of siltation;
- to save transportation time;
- to use the old course of the river as fishery.

The DC of Greater Sylhet and the Commissioner of Chittagong Division conducted two more meetings to discuss the loop cut construction. It was decided by the DC of Greater Sylhet that the work would be done through voluntary labor. The SDO of Sunamganj was given the responsibility to execute the work in the field. He engaged three Magistrates of Sunamganj sub-division to supervise the earth work at three locations. Each UP Chairman was allocated a section of the proposed canals, each about 300 yards long. The UP Chairman of each area was given the responsibility to mobilize funds and hire laborers for that section. In accordance with this plan, each concerned UP Chairman made a "wage fund" by collecting *chanda* (contributions) from the local elite.

The actual earth work continued for three weeks. The loop cut, adjacent to Markuli was supervised by a very enthusiastic magistrate. After completion of the work, he awarded prizes to the three chairmen who had done the best job. One of the three was a women, who was Vice-Chairman of a union in Derai *thana*. At that time, she was in charge of the union, as the Chairman was away from the country.

After the completion of the work, President Zia came to see the loop cuts. A public meeting was arranged in the playground, located between the Kalni River and the BRAC office. The meeting was addressed by the President, the accompanying Minister and the DC of Greater Sylhet.

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9. SOCIAL ASSESSMENT IN COMMUNITIES IMPACTED BY THE PROJECT

9.1 Introduction

This chapter provides an overview of the community impacts anticipated in villages downstream of Ajmiriganj, as a result of the loop cuts, channel dredging and platform constructions proposed in the Kalni Kushiyara River Management Project (Figure D.3). Compensation, mitigation and enhancement measures have been outlined and institutional support at the appropriate levels has been suggested. Figures D.4 through to D.10 show the project intervention associated with the tentative locations of homestead platforms.

The social impact assessment in this chapter is based on community-based documentation, gathered during the feasibility study, including the experience of the pilot project. The material will be presented in the context of the planned engineering intervention, from the lower to the upper reaches.

9.2 The Methodology

Over the past one and half years, male and female Community Organizers (COs), living in Madna, Ajmiriganj and Kakailseo have been collecting people's perceptions on selected socio-economic issues in communities between Ajmiriganj and Ikardia. Reflected in the social analysis used throughout the feasibility study, the COs' sketch maps and documentation have provided material on flood occurrence, disposal site ownership, village configurations, land prices, women's homestead practices, paddy gleaning, erosion history, traditional platform protection, gender-specific agricultural practices, fishing practices, *khas* land use, village institutional structures and social relationships, markets, navigation patterns, labor and wage and the case studies for Shahebnagar, Anandapur and the Cherapur Khal.

Material for the community impact analysis has been obtained through the PRA method, strengthened with the lessons learned through the pilot project. Having male and female COs living in the village over an extended period has served to provide them with the acceptability needed to gain depth on village social relationships, as well as adding a seasonal and gender dimension to the material.

Discussions have been held with a great variety of people including district, *thana* and union administrations, community leaders, homestead dwellers, women, farmers, *khas* land owners and occupiers, fishermen, boat operators, traders, market committees and laborers in over 50 river and *haor* communities. Project experience gained in the construction and development of pilot platforms at Kakailseo and Gazaria has been used to strengthen the community impact assessment and analyze the compensation, mitigation and enhancement requirements for the platform construction, maintenance and development.

9.3 The Issapur Loop Cut

The Engineering Intervention
A loop cut of approximately 2.75 km will be constructed off the Kalni River, west of Issapur, passing south through agricultural land to re-join the Dhaleswari River west of Kalma. The eastern flow of the Kalni River (the Dhaleshwari River) will be closed at Issapur. The western flow of the Kalni River (the Baida Channel) will not be changed.

Two hundred and sixteen hectares of high agriculture land will be acquired from individual landowners to construct the loop cut and its embankments and two large platforms on either side. An estimated 12,000 laborers will be required for the construction of embankments cum confinement dykes and the closure dam. Some 1.0 million m^3 will be excavated manually for embankment construction while 3.1 million m^3 will be excavated by suction cutter dredgers. One camp or more will be required for laborers, and the Environmental Management Plan (EMP, Annex I—EIA) address the security issues related to these camps. There are no villages in the path of the loop cut and no homestead land will be effected. Spoil from the loop cut itself will be used to build the embankments, closures and confinement dykes. Hard protection will be provided. No homestead platforms are to be built and no land dedication is required. The land will be reused for various purposes.

Impacts on Chowdanta and Bhatura
The villages of Chowdanta and Bhatura will be seriously impacted because farmers in these two communities own 90% of the land to be acquired. They strongly oppose construction of the loop cut because loss of this agricultural land will mean loss of their primary source of livelihood.

Both Chowdanta and Bhatura are homogenous Hindu minority communities. Chowdanta is composed of 225 households, of which 105 own land in the loop cut. Bhatura is composed of 95 households, of which 55 own land in the loop cut. In addition to the 50% of landowners who will be negatively impacted, landless households in Chowdanta and Bhatura oppose the loop cut because they will lose agricultural labor opportunities. It is anticipated that for a few years, laborers will gain employment on construction sites in the area.

The 216 ha of land to be acquired is high land, cultivated with HYV *boro* rice. Reportedly, this land is particularly valuable because it is not subject to pre-monsoon flooding.

Scarcity of high land in the area will make it difficult for Chowdanta and Bhatura farmers to replace their high quality agricultural land, even if they are well compensated. These farmers report that to farm efficiently, any replacement land must be located within 3 km of their homesteads. There is no *khas* land within this range. Shifting away from their traditional location is not viewed as a viable option by these minority communities.

Construction of the Issapur loop cut will effectively place Chowdanta and Bhatura on opposite sides of the channel. On right bank, Chowdanta people will be disadvantaged by having to cross the channel to avail of market facilities at Adampur Bazar. On the left bank, Bhatura people will have to cross the channel to reach their high school and administrative linkages in Astagram *thana*. From both communities, some farmers will have to cross the channel with draught animals and implements to farm land on the other side.

Approximately 5,000 households earn part of their annual income from fishing in the seven *beels* found in the area. Fishermen report increasing siltation and loss of fishing income from these *beels* over the past few years. People are of the opinion that construction of the loop cut will not increase siltation in the *beels*. On the contrary, they anticipate that when the new water body is created, river fishing will enhance their income earned from *beel* fishing.

Impacts on Kalma and Issapur

Issapur and Kalma are located respectively, on the north and south ends of the Issapur loop cut. Farmers in these two communities own about 10% of the agriculture land to be acquired for the loop cut. They are willing to sell at market prices. People in Issapur and Kalma anticipate economic growth as they become important transit centres along the new waterway and navigation route. Issapur on the left bank and Kalma on the right bank will retain their existing linkages for schools, markets and administrative needs.

Impacts on People in the Baida Channel Area (Boithakhali - Maska River)

The Kalni River becomes the Baida Channel when it loops south-west from Issapur. The villages of Chandipur, Shantipur, Kakoria and Sapanto are located along the Baida Channel, which people refer to as the Boithakhali or the Maska River. Farmers in this area are not opposed to the Issapur loop cut because they will not lose land for its construction. On the contrary, farmers favour the loop cut because their *boro* crop will be secure from pre-monsoon flood. The loop cut will provide people in this area with a direct north-south navigation route. However, fisher households are concerned that the Issapur loop cut may inhibit the flow in the Baida Channel, thereby reducing water in the large *beels* of the area. This has been calculated not to be the case because backwater effect from the Meghna River will continue to maintain the levels of water bodies in the area.

Compensation (Land Acquisition) for Chowdanta, Bhatura, Issapur and Kalma

Land purchase is required for 216 ha owned by approximately 160 landowners in the villages of Chowdanta, Bhatura, Issapur and Kalma. The average price for high quality land in this area is Tk 180,000 per ha. (Table D.56). Land purchase and payment to the respective landowners should be made before construction begins.

The compensation costs that are usually paid for construction disturbances over homestead and agricultural land will not need to be provided in Chowdanta, Bhatura, Issapur and Kalma because the land to be used for construction access will have been acquired for the project.

Mitigation for Chowdanta, Bhatura, Issapur and Kalma

To mitigate the loss of land as a primary source of income, landowners in Chowdanta, Bhatura, Issapur and Kalma will be paid a cash grant of 20% of the value of land to be replaced. It is anticipated that landowners will either purchase other agricultural land or convert to another income earning opportunity, such as trading and small business.

As a further mitigation for the effects of land loss as a primary source of income, approximately 106 ha of high land on both sides of the loop cut will be proportionately returned back to landowners in Chowdanta, Bhatura, Issapur and Kalma for their re-use in intensive agriculture. This amount of 106 ha is derived from 161 ha from the two platforms minus 45 ha from the setback distances (Figure D.4, Sites 1 and 2).

Landless households in Chowdanta, Bhatura, Issapur and Kalma will lose a portion of their annual income through loss of agricultural labor opportunities. They will be mitigated by the provision of labor opportunities in earth construction. Where possible female and male labor contracting societies (LCSs) should be contracted directly rather than engaged as sub-contracted labor. The experience in the pilot project indicates that LCSs earn approximately 16% more than they can earn as sub-contracted labor.

To mitigate Chowdanta's loss of market access and to provide an opportunity for the development of trade and small business in the area, a market should be developed on the right bank platform. The market area should be raised and provided with drainage, water and sanitation facilities. Shopkeepers will be expected to develop their own structures.

To mitigate Bhatura's loss of access to a high school and administrative facility, two river *ghats* (landings) should be provided at Chowdanta and at place mid-way between Bhatura and Issapur.

Enhancement for Chowdanta and Bhatura

The enhancement package for Chowdanta and Bhatura will include tree and shrub plantation and bamboo fencing along the freehold lengths of the platforms on both sides of the channel. Landless women's groups should be assisted to develop tree nurseries for extensive plantation in the area.

Institutional Aspects of Land Preparation for the Issapur Loop Cut

During the project preparation period, it is proposed that national and local elected representatives be invited to participate in a series of workshops, outlining the scope of the project including its preparation, construction and maintenance phases. The respective Member of Parliament and local politicians will be briefed and requested to discuss the project and its compensation, mitigation and enhancement packages with the people of Chowdanta, Bhatura, Issapur and Kalma. The Ministry of Land Administration under the District Commissioner (DC) of Kishoreganj with the concerned government departments at Astagram *thana* will be requested to execute the land acquisition through purchase from individual landowners. These offices should carry out a detailed survey of landowners, following the engineering survey to mark the required land within the loop cut. The Land and Water Use Directorate of the BWDB will be requested to appoint staff to work with field teams in land documentation, survey, community briefing and preparation.

9.4 The Dhaleshwari Channel

The Engineering Intervention

When the Issapur Loop Cut is constructed, the Dhaleshwari River will be closed at its northern end, near Issapur village. Dredging will be carried out and with the dredged spoil, two homestead platforms will be constructed at Shibpur. A channel within the Dhaleshwari River will be filled and used as raised agricultural land by farmers in Noorpur and Baluchar. During the O&M period of Dhaleshwari River dredging, many more platforms will be constructed in this area.

A Typical Homestead Platform - Shibpur

Two homestead platforms will be constructed in the village of Shibpur on the Dhaleswari River (Figure D.4, Sites 3 and 4). The Shibpur platforms typify the characteristics of the some 31 homestead platforms to be constructed on dedicated land. The social characteristics of homestead platforms, including village configuration, land value, ownership, uses, benefit distribution and the community's organization around the platform are presented below.

No land will be acquired for the deposit of dredged river spoil. Landowners are eager to dedicate their privately-owned land for use as a disposal site and construction of a homestead platform. A landowner's low lying "pocket" of land will have gained ten times in value when it is returned to them as a flood secure homestead. Landowners will use their raised platform space for improved horticulture, cattle rearing, post-harvest rice processing and sanitation.

Not everyone in the village benefits directly from homestead platform development. Village residents not owning homestead land or those owning homestead land outside the proposed disposal site will be unable to dedicate land. Within the village, the percentage of households directly benefitting from new platform land will vary according to the configuration of homesteads and low land. The village configuration is in turn, a product of historical patterns of settlement, land exchanges and platform erosion. However, most people in a village will receive indirect benefits from a raised platform in the form of security for people and livestock during a high monsoon flood, raised playing fields, high passageways for movement during the monsoon flood and increased commerce in expanded markets.

A platform committee, representing both land dedicators and non-dedicators will be informally constituted at the village level. Committee members will be trained on land-use planning, soft platform protection methods, civic responsibilities and community financing. The level of effective committee functioning will be highly dependant on sets of power relationships existing in the village. At the time that owners dedicate land for the disposal site, they will be asked to contribute to soft protection costs, with the expectation that landowners will fully assume these costs when the project is withdrawn after three years. Landowners' economic capacity to finance soft platform protection will, in part, be dependant on their annual harvest.

The compensation, mitigation and enhancement plans have been developed on the pilot project experience. The homestead platform soil will be enriched with straw and green manuring, using *dhaincha*. Soft dyke protection using the traditional *(aar bandh)* method will be provided by the project for the first year following construction and the subsequent three year period. Depending on the severity of wave erosion (Annex C - Engineering) hard protection using concrete blocks may be partially provided. Farmers will be supported to produce *chailla* for the traditional platform protection (*aar bandh*). The soft platform protection will be supplemented with flood-tolerant trees, shrubs and grasses on the slopes and toe of the dyke. Village-based tree nurseries will be supported. On a cost-sharing basis, improved water and sanitation facilities will be provided.

The Dhaleswari Channel Fill

A large sandbar (*char*) of 55 ha has emerged in the middle of the Dhaleswari River, in front of Noorpur and Baluchar (right bank) and Madna (left bank). The *char* has caused river channels to flow on either side of it. The right bank (western channel) will be filled with spoil from river dredging (Figure D.4, Site 5). The filled channel will be closed at both the upstream and downstream ends. No disposal chamber will be constructed and no platform will be built. It is

anticipated that farmers will cultivate this newly filled land, as they have been cultivating the *char* in the middle of the river.

The central *char* began emerging in the river in 1952. Officially, it is government-owned *khas* land, administered by the Ministry of Land Administration at Lakhai Thana, Habiganj district for the left bank and Astagram Thana, Kishoreganj district for the right bank.

At the village and *thana* levels, agreement on customary land use of this *char* has been mediated over the years. None of the cultivators have land title, although many are trying to obtain deeds through the court. Four hundred and fifty cultivators and four mosque committees in Noorpur and Baluchar farm paddy, chili, jute, *chailla* and sesame (*kaun*) on the land.

Since 1990, the flow of water in the dry season has become so low that approximately 30% of land in the west channel is also now being cultivated. The west channel is cultivated by the same group of 450 farmers and 4 mosque committees in Noorpur and Baluchar.

Deposit of river spoil in the Dhaleswari west channel will not require land acquisition because the land is river *khas* and the present farmers have no titles. No compensation, mitigation or enhancement measures are required for the Dhaleswari site. No long-term economic loss will be suffered by cultivators. No social disruption is expected over use of the new *khas* land. As in the past, disputes arising over land use rights will be locally mediated, on the basis of customary land use in the Dhaleswari *char*.

Filling of the west Dhaleswari Channel (Figure D.4, Site 5) is supported by cultivators because more farm land will become available. Farmers expect to use the new land in only three to four years after sandy spoil deposit. Seeds and green manuring practices for the use of African *dhaincha* as soil enrichment will be made available to farmers.

Adampur Bazar and Madna Impacts

Farmers in Madna report that over the years there has been increased siltation in the Dhaleswari River, resulting in reduced post-monsoon drainage capacity and a delay in plantation of the *boro* rice crop. Farmers insist that construction of the Issapur loop cut must be accompanied by annual dredging of the Dhaleswari River. A deepened channel will improve post-monsoon drainage, enabling farmers to plant their *boro* crop on time and eliminate greater risk of crop loss from pre-monsoon floods.

Shopkeepers and traders in Adampur Bazar report that decreased flow and limited navigability in the dry season has seriously affected their business. Since 1992, passenger launches have been unable to navigate this portion of the river during the dry season. Between January and March, when larger boats are unable to pass in the Dhaleswari River, trading goods are off-loaded at Kalma and Issapur and transported on lighterage craft to Adampur Bazar and Madna. Business people are of the opinion that the increased costs for transporting goods during the dry season is threatening the viability of their markets in Adampur Bazar and Madna.

Traders and market owners in Madna and Adampur Bazar are opposed to the Issapur loop cut as a single initiative. They are of the opinion that the loop cut would result in even further siltation of the Dhaleswari River. If the Issapur loop cut is to be constructed, business people are adamant that dredging is essential to maintain navigability and retain the commercial viability of their markets.

At this stage, it is difficult to estimate the new, dry season navigation patterns and trading costs which will evolve after construction of the Issapur loop cut. With the closure at Issapur, the use of lighterage craft from Issapur will not be possible. As in present-day dry season, light trading goods may continue to be off-loaded at Issapur and transported by head load, overland to the market at Adampur Bazar. In which case, the costs of transporting these goods would not be changed. Alternatively, goods from both the north and south may be transported on the new Issapur loop cut, only via Kalma. Without dredging of the Dhaleswari River, these dry season costs may not be changed. With dredging of the Dhaleswari River, larger craft may be able to navigate directly to the markets, eliminating the costs of off-loading and lighterage craft from Kalma. In this case, the costs of transporting dry season goods may be decreased.

In any case, it is likely that the presence of the Issapur loop cut will precipitate changes in transportation flows and marketing patterns in the area. As Kalma and Issapur become important transportation junctions, Adampur Bazar and Madna may loose trading patterns from the west. However transportation linkages with Lakhai under Habiganj district will continue to provide Adampur Bazar and Madna with extensive trading networks to the east.

No land acquisition, compensation, mitigation or enhancement programs are required for farmers or traders of Adampur Bazar and Madna, as a result of Dhaleswari River dredging.

Long Term Maintenance Dredging - Additional Homestead Platforms

Long term maintenance dredging is planned for the Dhaleswari River. Eleven platform sites have been identified at Noorpur (5), Baluchar (2), Adampur (1), Aynarkandi (1), Korail (1) and Islampur (1) for future construction. Landowners in these villages are willing to dedicate land and have indicated their preferences for the location and size of the platforms.

The compensation, mitigation and enhancement measures required for the 11 additional Dhaleswari platforms will follow the same rationale and unit costs as for the 31 platforms on dedicated land.

9.5. The Abdullahpur Dokkhin Char Platforms

The Engineering Intervention

Extensive river dredging will be conducted downstream of Abdullahpur village at a location known as Abdullahpur Dokkhin Char. There are no villages on either the left or right banks of this reach. Dredged river spoil will be used to construct 12 new homestead platforms (Figure D.4, Sites 6 to 17). The platforms will be constructed separately to allow drainage from the *haor*. They will cover a stretch of approximately 10 km along the left bank and will consist of a total area of approximately 44 ha.

These platforms will be exposed to wave erosion from the *haor* and the river. Hard dyke protection will be provided, following a period of platform settling. For the first year monsoon, immediately following construction, soft platform protection will be provided, including the plantation of trees, grasses and shrubs.

Twelve Khas Land Platforms at Abdullahpur Dokkhin Char

There are no nearby villages. The platforms will be constructed mostly on *khas* land, which is presently being cultivated by approximately 800 households from Abdullahpur village. A preliminary field survey indicates that none of the land users have title. The extent of court claims on this *khas* land is unknown at this time.

The 12 platforms constructed on the *khas* land of Abdullahpur Dokkhin Char will be developed for the settlement of poor households from near-by villages which have been eroded (Anowarpur, Abdullahpur, Kalimpur). Those owning neither homestead nor agricultural land will be given priority. A precedent for settlement has been established through a project known as '*Operation Thikana*' carried out by the Ministry of Land Administration in different areas of Bangladesh in the 1970's and 1980's. The criteria used for homestead land allocation in this project will be utilized.

On the 12 platforms, approximately 1,000 households will each be settled on 10 decimals of land. An allocation of 10 decimals of homestead land is based on data from the feasibility study areas and the new Gazaria platform, where the average household owns 7 decimals of homestead land. Families will be expected to provide their own houses. On the total 44 ha of platform land, space will be allocated for public facilities such as schools, playing fields, mosques and graveyards, to be shared by homesteads of the 12 platforms. As part of the project's EMP, the platforms will be enhanced with tree plantation, soil enrichment, latrines and tubewells.

A Possible NGO Program for Landless Households Re-Settled on Abdullahpur Dokkhin Char (and Anandapur) Platforms

The settlement of landless households on new platforms provides an excellent opportunity for long-term development initiatives in the area. It is expected that during the construction period, a national NGO will be attracted to take up such a program targeted to landless households, newly settled on Abdullahpur Dokkhin Char and Anandapur platforms (Section 9.8). Alternatives to livelihoods based on income from agricultural labor can be developed for women and men of landless households. Vocational skills and the provision of credit for income-generation in construction, high-productivity horticulture, trade and boat and engine proprietorship can be provided. Education for women and children and the formation of women's production groups can be established. The proposed poverty alleviation program is not budgeted in the EMP. It is expected that such an initiative may be undertaken by an NGO and funded separately.

Institutional Aspects of Abdullahpur Dokkhin Char Platforms

The respective Member of Parliament and local politicians will be briefed on the planned engineering intervention and its accompanying land and social development requirements.

The Ministry of Land Administration under the Kishoreganj DC, with the concerned government departments at Astagram Thana, will be requested to take possession of 44 ha of *khas* land for the construction of 12 platforms at Abdullahpur Dokkhin Char. When the detailed engineering survey has been completed, these offices should carry out a detailed survey of farmers using the *khas* land. Any land disputes or court cases in regards to this *khas* land should be settled. Elected representatives should be involved in dealing with occupants who are to be displaced from the *khas* land they have been farming. The Land and Water Use Directorate of the BWDB will be requested to field staff to work with the documentation and survey teams. It is anticipated that 2 years will be required to execute these land arrangements.

Platform land distribution and re-settlement of the Abdullahpur Dokkhin Char homestead should be conducted by a committee under the DC of Kishoreganj, through the Ministry of Land, with the assistance of project personnel. Development of a poverty alleviation program for destitute and landless households could be implemented through the same government bodies with donor support for program funding and technical assistance.

9.6 Abdullahpur to Kalimpur and the Kadamchal Channel Dredging

The Engineering Intervention
Downstream of the Katkhal loop cut, the channel will be dredged at Abdullahpur and Kalimpur. The Kalni River will be re-aligned on its right bank, across from Kadamchal. Dredged river spoil will be used for the construction of 10 homestead platforms in villages on the left bank. (Figures D.5 and D.6, Sites 18 to 26 and 28).

The Abdullahpur, Kalimpur, Samarchar and Hemantaganj Homestead Platforms
Ten homestead platforms are to be constructed in the villages of Abdullahpur (4), Kalimpur (2), Samarchar (2), Hemantaganj (1) and Bishorikona (1). All land for platform construction will be dedicated by platform beneficiaries. The type of platforms and the compensation, mitigation and enhancement programs to be provided are typical for the 31 platforms on dedicated land, as detailed for the Shibpur platforms.

9.7 The Katkhal Loop Cut

The Engineering Intervention
A loop cut of approximately 5.5 km will be constructed between Shantipur to Bishorikona, passing through Katkhal and Shahebnagar on its left bank. To accommodate the width of the loop cut, its set-back areas and large platforms on either side, 195 ha of land will be purchased from individual landowners. The Old Kalni River will be closed at Shantipur and Shahebnagar. River training works will be constructed at strategic locations. It is anticipated that up to 12,000 manual laborers will be used in the construction. Spoil from the loop cut will be used to construct 11 homestead platforms in the area. The homesteads of 20 households, displaced from Nayapara (Shahebnagar) will be re-located to a newly constructed platform. In total, 10 homestead platforms will be constructed (Figures D.7 and D.8, Sites 27 and 29 to 37).

People's Views of the Katkhal Loop Cut
Farmers, homestead dwellers and business people in all villages in the vicinity of the Katkhal loop cut are overwhelmingly in favour of its construction.

In Shantipur and Katkhal villages, many households have lost homestead land and buildings from river erosion each year. They feel that without measures to straighten the river, it will continue to erode on the north-west side of Shantipur and will eventually make its own random loop cuts. In early April, 1996 landowners from Katkhal and Shantipur, farming in Borobaira Beel and Bander Beel lost 1,200 acres of standing *boro* crop in a pre-monsoon flood.

In Shahebnagar village, people have become impoverished as a result of continuing river avulsion and bank erosion. The 1994 erosion at Shahebnagar resulted in the loss of 200 homesteads. Over the years, some households have shifted as often as four times to raise new homesteads. Siltation of their *haor* agricultural land has resulted in increased production costs for their *boro* rice cultivation (Main Report, Chapter 5).

Landowners in Katkhal and Shahebnagar anticipate that unless a loop cut is constructed within two years, the river itself will cut south through Doia Beel. People fear that river avulsion and loss of crop in the Mora Gang Beel may occur in the near future.

Landowners are in favour of the Katkhal loop cut because even though they will loose some land to its construction, their remaining land will be less vulnerable to pre-monsoon flood. For the same reason, farmers have given permission for loop cut spoils to be deposited on their low land, should sufficient excavated material be available. Farmers in the area expect to grow *boro* paddy after 1 or 2 years, on the land raised with good quality soil from the loop cut.

Households in Nayapara (Shahebnagar) Displaced by the Katkhal Loop Cut
The homestead land of 20 households of Nayapara (Shahebnagar) must be used for the construction of the Katkhal loop cut. In lieu of this land, displaced households will be relocated to a new platform to be constructed on the left bank, east of the closure of the Old Kalni River. Living on small eroded homesteads, these households are vulnerable to further river bank erosion in either the pre-monsoon or monsoon seasons. They will gladly accept re-location to flood-secure land, as a highly desirable alternative to their present-day precarious location (Figure D.7, Site 31).

Each household will be provided with 20 decimals of land and their costs of moving. As per other homestead platforms, this platform will be provided with soil enrichment, soft protection, tree plantation and improved water and sanitation facilities.

Agricultural Landowners in the Katkhal Loop Cut
An amount of 195 ha of agricultural land is to be acquired. Most of the landowners are found in the villages of Shantipur, Katkhal, Shahebnagar, Kaisar, Nayakorakandi and Bishorikona. The pattern of land distribution and *khas* land is as follows:

- Shantipur to Katkhal - 60% of the agricultural land in this section is owned by Shantipur households; 40% is owned by Katkhal households. A small portion of the former *khas* land of Bander Beel has been awarded to a large landowner in Katkhal. Therefore, there is no *khas* land remaining in this section.

- Kaisar - all agricultural land in this section is owned by Kaisar households in the *paras* of Purbo Hati, Dokkhin Hati and Uttor Hati. The required land along the riverbank is *khas* and is being used by Kaisar households without title.

- Shahebnagar - all agricultural land in this area is owned by Shahebnagar households. There is no *khas* land in this section.

The Ten Homestead Platforms in the Katkhal Loop Cut
Ten homestead platforms are to be constructed at Nayakurakandi (1), Shahebnagar (3), Kaisar (1), Katkhal (4) and Shantipur (1). Landowners in these villages are willing to dedicate land and have indicated their preferences for the location of the platforms.

There are many households from these communities who are without homesteads. However they cannot be provided with homestead land on the new platforms unless they own and can dedicate land within the selected disposal sites. If these households are to be re-settled, they must be provided with homestead space on the new, *khas* land platforms at either Abdullahpur Dokkhin Char or Anandapur.

Compensation (Land Acquisition) for Katkhal Loop Cut Landowners
One hundred and ninety five hectares of land will be purchased from landowners, mainly in Shantipur, Katkhal, Shahebnagar, Bishorikona and Nayakurakandi. This includes the homestead land of 20 households displaced from Nayapara (Shahebnagar). The market price of medium-quality land in this area is approximately Tk 125,000 per ha. (Table D.56). Payment to the landowners is to be made before construction begins.

The compensation costs that are usually paid for construction disturbances over homestead and agricultural land will not be required for Shantipur, Katkhal, Shahebnagar, Bishorikona and Nayakurakandi because the land to be used for construction access will have been acquired for the project.

Mitigation for Katkhal Loop Cut Landowners
To mitigate the loss of land as a primary source of income, landowners in the Katkhal loop cut will be paid a cash grant of 20% of the value of land to be replaced. It is anticipated that landowners will either purchase other agricultural land or convert to another income-earning opportunity, such as trading and small business.

As a further mitigation for the effects of land loss as a primary source of income, approximately 54 ha of loop cut land will be proportionately distributed back to landowners in the Katkhal loop cut for their re-use in intensive agriculture.

Landless households in the Katkhal loop cut area will lose a portion of their annual income through loss of agricultural labor opportunities during the first few years of construction. Female and male laborers will be provided construction work opportunities on the loop cut and the eleven homestead platforms.

Compensation, Mitigation and Enhancement for the Katkhal Homestead Platforms
All land for platform construction will be dedicated by platform beneficiaries. Most of the platforms will be used for homesteads, as detailed for the Shibpur platforms. Katkhal landowners will be particularly benefitted by an expanded market. All residents of Katkhal will be benefitted by an expanded high school and improved linkages for low lying *paras* during the monsoon. As on other homestead platforms, the compensation, mitigation and enhancement programs will include soil enrichment, soft protection, tree plantation and improved water and sanitation facilities. On the new Nayapara (Shahebnagar) platform, a central nursery will be set up as an income-earning activity for poor women who have been re-settled.

Institutional Aspects of Land Preparation for the Katkhal Loop Cut
During the project preparation period, it is proposed that national and local elected representatives will be invited to participate in a series of workshops, outlining the scope of the project including its preparation, construction and maintenance phases. The respective Members of Parliament and local elected representatives will be briefed and requested to discuss the project and its

compensation, mitigation and enhancement packages with the people of Shantipur, Katkhal, Shahebnagar, Bishorikona and Nayakurakandi.

The Ministry of Land Administration, under the DC of Kishoreganj (District Council), with the concerned government departments at Mitamain Thana, will be requested to execute the land acquisition through purchase from individual landowners or re-allocation of *khas* land. Following the engineering survey to mark the required land within the loop cut, these offices should carry out a detailed survey of landowners and *khas* land users. The Land and Water Use Directorate of the BWDB will be requested to work with field teams in land documentation, survey and community briefing.

9.8 The Anandapur Site

The Engineering Intervention

River dredging will be conducted downstream of Kakailseo. Dredged river spoil will be used to construct a homestead platform of 13 ha on the left bank, near Anandapur village (Figure D.9, Site 39).

All sides of the Anandapur platform will be exposed to wave erosion from the *haor*. Hard dyke protection will be provided, following a period of platform settling. For the first monsoon, immediately following construction, soft platform protection will be provided, including the plantation of trees, grasses and shrubs.

Loss of the Anandapur Site in the Pilot Project - Lessons Learned

The Anandapur *khas* land problem is centred around 31 acres (equivalent to 13 ha) of *khas* land which has been awarded in 1989 by the government to 31 landless households, but which has always been forcefully occupied by elite landlords, mainly from neighboring Kakailseo village.

In the selection of pilot sites, Anandapur was considered an excellent choice because it would provide benefits to poor people and it was located on the left bank near a river site which required dredging.

During discussion, preceding site selection, the landless group were unwilling to dedicate their legally owned land for platform construction because they were of the opinion that once the platform was developed, they would never succeed to claim their land from those who were forcefully occupying it. As a result, the Anandapur site could not be included in the final selection for the pilot project.

The Anandapur Khas Land Dispute

In October 1989, 31 landless households from Anandapur were each awarded 100 decimals of *khas* land by the Ministry of Land Administration through the DC of Habiganj. However, as a result of the power structures prevailing in project area communities, the "landless of Anandapur" have never enjoyed the benefits of the land they have been legally awarded.

After completion of official formalities, including the payment of land tax by the "Anandapur landless", the survey stakes were set out in April 1991. During the night, the official survey pegs were removed, allegedly by wealthy landowners from Kakailseo and Anandapur.

Since 1992, these 18 wealthy landowners have been farming the land by forcible occupation. The Anandapur landless have appealed the loss of their awarded land through two court cases and have lost on both occasions. Although site inspections were conducted by the local police, the Anandapur landless were unable to prove that the wealthy landowners were occupying their land.

In 1994 the wealthy landowners were able to divide the loyalties of the Anandapur landless group. One man from the group was encouraged to bring a civil case against the government. He claims that the present *khas* land, originally owned by his forefathers was eroded but as the river shifted to the west, new *khas* land has re-merged on the left bank. Therefore, it is this man's contention that the government has no right to declare his inherited land as *khas* for allocation to the "Anandapur landless" group. This case has been resting with the civil court since 1994. Meanwhile, the 18 wealthy landowners of Kakailseo and Anandapur continue to cultivate and enjoy the profits of the land awarded to the "Anandapur landless" group.

An Institutional Strategy to Obtain the Anandapur Site

The project proposes to dredge the Kalni River and use the spoil to construct a new platform known as the Anandapur site. This platform will be used to settle destitute and landless households, including the "Anandapur landless".

To achieve this, the Ministry of Land Administration would be requested to purchase the 13 ha of *khas* land from the 31 "Anandapur landless" who technically own the land but are not able to occupy it and are therefore unwilling to dedicate it. When government re-acquires the land, the 18 elite landowners will lose any claims they may have for occupancy.

In an undeveloped state, the 13 ha of former *khas* land is very low, unsuitable for habitation. During the monsoon, this land is under 2 to 3 m of water. If they ever were to gain occupancy, the "Anandapur landless" can only use their land for cultivation of vegetables and some local variety rice during the dry season. If the "Anandapur landless" are to re-settle on a flood-secure platform, an allocation of 100 decimals of homestead land per household is difficult to justify.

The Ministry of Land Administration will be requested to allocate 10 decimals of newly developed homestead land to approximately 250 destitute and landless households, including the original 31 "Anandapur landless" households. The criteria for land allocation can follow the precedent set for landless resettlement in other government projects. Destitute families, eroded from Shahebnagar may be candidates for re-settlement on the Anandapur platform.

The project will require extensive support from the DC of Habiganj and the Ministry of Land Administration. They will be provided with institutional support to assist them in re-acquiring 13 ha of previously allocated *khas* land at Anandapur. It is anticipated that up to two years may be required for these arrangements.

To achieve the settlement of landless households on *khas* land, the project will require the support of political parties at national, regional and local levels. The respective Member of Parliament and local politicians will be briefed on the planned engineering intervention and the project's requirements for the *khas* land at Anandapur. They will be requested to mediate with the landed groups at Kakailseo to withdraw the civil case and with the landless group at Anandapur to agree to exchange 100 decimals of insecure, low land for 10 decimals of secure high land.

Compensation, Mitigation and Enhancement for the Anandapur Platform
The 31 "Anandapur landless" households should be compensated for the *khas* land which has been formally awarded to them. The market price for low, newly emerged *char* land in the area is Tk 35,000 per acre or Tk 87,000 per ha.

Unlike the cases of land purchase for the Issapur and Katkhal Loop cuts, the "Anandapur landless" are not enjoying the benefits of their land and are not dependant on it for their livelihood or residence. Therefore they are not entitled to a 20% cash compensation for land replacement or vocational diversification.

On the total 13 ha of platform space, an amount of 2 ha will be allocated for such public facilities as roads, drainage, school, playing field, mosque, graveyard, to be shared by all homesteads on the platform.

On the remaining 11 ha of land, approximately 250 households, including the 31 "Anandapur landless" households, will each be settled on 10 decimals of land. Families will be expected to provide their own houses. The platforms will be enhanced with tree plantation, soil enrichment, latrines and tubewells.

A Possible NGO Program for Landless Households Re-Settled on Anandapur (and Abdullahpur Dokkhin Char) Platforms
The settlement of 250 landless households provides a good opportunity for a long-term development program, such as that detailed for Abdullahpur Dokkhin Char. It is expected that such a program will be initiated by a national NGO and funded separately.

The Kamalpur Site as an Alternative to Anandapur
The Kamalpur site is located on the right bank of the Kalni River, near the sandbar to be dredged. It consists of *khas* land which is cultivated by 185 households from Kamalpur village, under Wara union. It is low land, suitable for *boro* rice cultivation and vulnerable to pre-monsoon flood. A preliminary field survey indicates that none of the land users have titles. The extent of court claims on *khas* land in the area is unknown at this time.

If the Ministry of Land Administration is unable to obtain land for the Anandapur site, proceedings to obtain alternative *khas* land at the Kamalpur site can be undertaken. The platform size and the allocation of land to poor households would be similar to the Anandapur site.

9.9 The Homestead Platforms in the Rahela to Ajmiriganj Reach

The Engineering Intervention
River dredging will be carried out in several locations from Rahela to Ajmiriganj. Dredged river spoil will be used to construct nine homestead platforms, excluding the Anandapur site (Figures D.9 and D.10, Sites 38 and 40 to 47).

Homestead Platforms between Rahela and Ajmiriganj
Nine homestead platforms will be constructed at Rahela (1), Mahmoodpur (1), Shahnagar (1), Nazrakanda (1), Solori (1), Kalnipara (1), Rania (1), Ajmiriganj - Samipur (1) and Ajmiriganj Bazar - Ganjerhati and Pukurpar (1).

All landowners at these sites are willing to dedicate land for platform development. The type of platform use and the compensation, mitigation and enhancement programs to be provided are typical for the 31 platforms on dedicated land, as detailed for the Shibpur platforms. The platform at Mahmoodpur will provide a linkage and possible expansion of the Kakailseo market. The platform at Shahnagar will improve the school facility. The two platforms near Ajmiriganj will mainly be utilized for commercial purposes. The compensation, mitigation and enhancement required for these platforms will follow the same pattern as for other homestead platforms.

9.10 The Navigation Platforms in the Upper Reach

In river reaches up of Markuli, five platforms will be constructed for the purposes of depositing river spoil related to dredging for navigation purposes. Four of these platforms will be constructed on sites owned by BIWTA and on one site land will be required from private owners. No homestead development or household settlement is planned for the navigation platforms. It is anticipated that by rotating the disposal pattern and enriching the soil, farmers may use these sites after several years for sandy crops such as ground nuts and sweet potato.

9.11 Summary of Village Platforms

Table D.57 provides details on the household beneficiary and land ownership of village platforms to be constructed. The table summarizes data on the proposed platforms, including the site number, the platform name by location, the number of platform beneficiaries and the type of land arrangements which will be required.

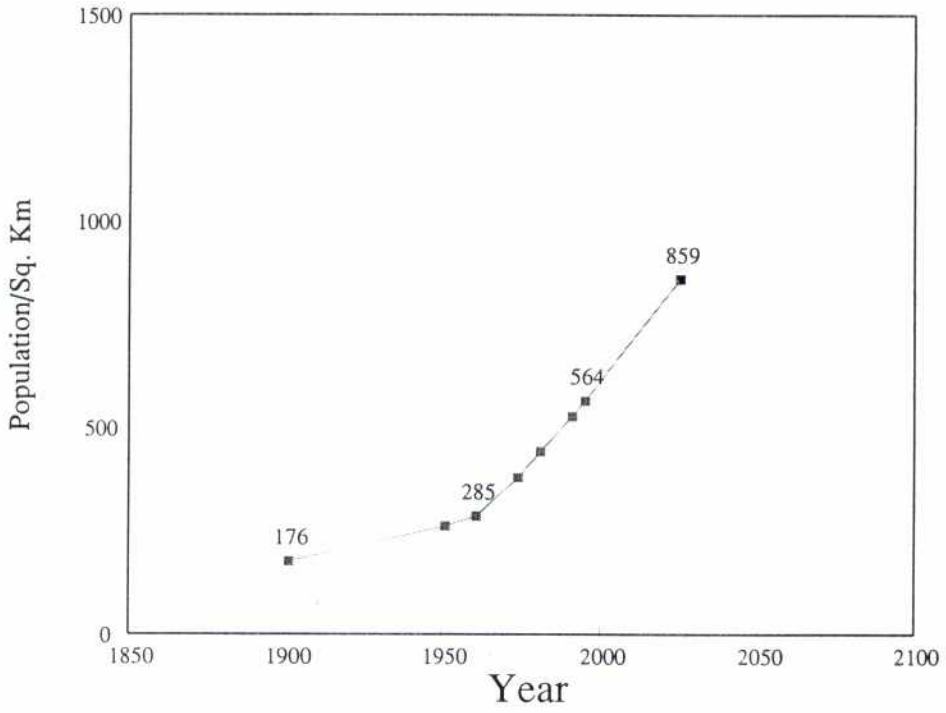
In total, 31 platforms will be constructed on dedicated, privately-owned land as extensions to existing village platforms; 13 platforms will be newly built on acquired *khas* land for the settlement of destitute and landless families; 2 platforms will be built along the Issapur loop cut for re-use as agricultural land and 5 navigation platforms will be built as disposal sites only. A summary of land arrangements and households which will be accommodated is provided in Table D.58.

10. CONCLUSION

The people have been living in an environment characterised by a limited resource base and poor infrastructure. Survival options are few. The people are susceptible to a chain of hydrological and morphological conditions that often threaten their options. All these correspond to a situation where a substantial segment of the population are caught in a process of marginalization. This has been clearly evident in the case studies mentioned in Chapter 7.

From an initial population of 176 people per km^2 there was a significant rise. The density of population per km^2 increased to 564 in 1995 and is likely to reach an figure of 859 per km^2 in the year 2025 (see Graph D.18). This means that more people will compete for scarce land and water resources.

Graph D.18: Population Boom



The situation is more disadvantageous for women. Traditional attitudes towards women have been reinforced by isolation and lack of communication. River de-stabilization, loss of the annual *boro* crops and homestead erosion have accelerated the process of impoverishment for women. Unlike other areas of rural Bangladesh, there are no gender-specific development programs for women in the area.

Given the state of technology the productivity is likely to reach a stage of stagnation within a short period. This is indicative of a syndrome that makes the condition extremely uncertain and volatile. The situation seems inevitable unless interventions are made in the required direction. This calls for concerted efforts beyond physical interventions on the river.

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TABLES

Table D.1: Villages Covered in the Reconnaissance Survey
Flood and Erosion History by Village
SHERPUR- MARKULI REACH

Thana	Union	Village	River Bank	Distance from Bank (m)	Number of Households	Village Platform Area (ha)	Major Flood Year of Occurrence	Water Level Inside House (m)	Erosion by
Balaganj	Sadipur	Tajpur	Right	50	320	30.0	1993	0.3-1.0	Haor
		Sarikona	Right	500	48	10.1	1993	---	---
Nabiganj	Auskandi	Paharpur	Left	100	80	4.9	1993	0.3	River
		Bongaon	Left	1000	185	8.0	1993	0.3-0.5	---
	Bakoir	Chhoto Baushi	Left	500	141	2.4	1974	0.3-0.6	---
	Digholbagk	Durgapur	Right	600	125	7.3	1993	0.5-0.6	---
		Galimpur	Right	1000	125	13.0	1993	0.6	---
		Digholbak	Left	20	425	2.8	1988	0.3-0.6	River
		Kasba	Left	500	655	37.7	1988	0.3-0.5	---
		Kamarkhada	Left	750	58	4.9	1993	0.3	---
		Fadulla	Left	10	285	10.9	1993	0.5-0.6	River
		Ahmadpur*	---	---	5	---	---	---	River
Jagannathpur	Asharkandi	Aatghar	Right	30	114	15.4	1974	---	River
		Fechi	Right	300	139	5.1	1988	---	---
	Pilegaon	Jalalpur	Both	0	310	23.5	1988	0.3-0.6	River
		Khanpur	Left	500	122	7.7	1988	0.3-0.5	---
		Kadamtala	Left	20	46	2.0	1974	0.2-0.3	---
		Erailla	Left	100	176	4.3	1988	0.3-0.6	---
		Pilegaon	Right	0	475	28.4	1974	0.3-0.6	---
		Nagargaon	Left	0	9	0.4	---	---	River

Thana	Union	Village	River Bank	Distance from Bank (m)	Number of Households	Village Platform Area (ha)	Major Flood Year of Occurrence	Water Level Inside House (m)	Erosion by
		Sonatala	Left	100	125	6.1	1988	0.2-0.3	---
		Alakdi	Left	0	26	---	---	---	River
		Harogram	Right	200	200	6.1	1988	0.2-0.3	---
	Raniganj	Alampur	Left	0	100		1988	0.3-0.5	River
		Rohail	Left	300	445	9.7	1974	1.0-1.2	---
		Balisree	Left	0	120	6.5	1988	0.3-0.6	River
		Bagmoyna	Right	0	318	31.0	1974	0.5-0.6	River
		Noagaon	Left	100	435	19.4	---	---	River, Haor
	Haldipur	Khagaura	Right	300	140	6.1	1988	0.6	---
		Mohishakona	Right	300	120	3.6	1988	0.6	---
		Kasiarkona	Right	300	30	5.7	1988	0.6	---
Derai	Kulanj	Tetoiya	Right	200	148	2.3	1988	0.3	---
		Soatior	Left	20	60	2.4	1988		Haor
		Bara Baushi	Left	500	93	6.7	1988	0.3-0.6	---
		Dakshin Suriarpar	Left	100	170	8.1	1974	0.3	---
		Uttar Suriarpar	Right	150	370	10.5	1994	---	---
		Mostafapur	Left	100	37	2.0	1988	0.2-0.3	---
		Golishan	Left	100	104	6.9	1988	0.3-0.5	---
Baniachang	Daulatpur	Noagaon	Left	50	175	5.1	1988	**0.2-0.3**	---
Total					**7,059**	**357.0**			---

Source: NERP Reconnaissance Survey, 1996

MARKULI - AJMIRIGANJ REACH

Thana	Union	Village	River Bank	Distance from Bank (m)	Number of Households	Village Platform Area (ha)	Major Flood Year of Occurrence	Water Level Inside House (mt)	Erosion by
Ajmiriganj	Ajmiriganj	Nayanagar	Left	600	120	1.0	1988	---	---
		Nabinagar	Left	600	110	1.75	1988	0.5-1.0	---
	Badalpur	Ferozpur	Left	0	185	11.3	1988	0.5-1.0	River
		Nadipur	Left	0	75	1.13	1988	0.5-1.0	River
		Haripur	Left	400	85	2.1	1988	0.3-0.6	---
		Badalpur	Left	500	102	1.7	1988	---	---
		Katakhali	Left	1,500	237	1.49	1988	---	---
		Koiya	Left	1,000	42	0.2	1988	0.5-1.0	---
		Ghopi	Left	1,000	60	0.3	1988	0.5-1.0	---
		Matiakara	Left	500	97	1.2	1988	0.5-1.0	---
		Paharpur	Left	500	524	6.9	1988	0.3-0.6	---
		Mahmudpur	Left	500	70	1.0	1988	0.3-0.6	---
		Purbo Kalni	Left	1,000	300	3.5	1988	---	---
		Pituarkandi	Right	700	355	2.50	1988	0.5-1.0	Haor
		Tukerhati	Right	0	70	1.05	1988	0.3-0.6	River
Sullah	Habibpur	Saudhersree	Left	1,000	370	4.9	1988	0.3-0.6	---
		Dharmanagar	Left	500	26	2.5	1991	---	---
		Bishnupur	Right	0	135	2.4	1988	1.0-1.3	River, Haor
		Anandanagar	Right	200	35	0.3	1988	1.0-1.3	Haor

Thana	Union	Village	River Bank	Distance from Bank (m)	Number of Households	Village Platform Area (ha)	Major Flood Year of Occurrence	Water Level Inside House (mt)	Erosion by
		Faizullahpur	Right	0	311	3.6	1988	---	---
		Markuli	Right	1,000	311	7.2	1974	---	---
		Tukchanpur	Right	200	135	1.2	1974	0.6-1.0	---
	Sullah	Bheramohona Bundh	Right	0	30	n/a	---	---	---
		Durlovpur	Right	400	50	1.3	1988	3	Haor
		Sullah	Right	500	423	4.8	---	---	---
	Bahara	Bherardahar	Right	0	283	3.1	1988	0.6-1.0	River
		Protappur	Right	500	465	7.5	1988	---	---
Baniachang	Daulatpur	Helalnagar	Left	0	138	3.4	1974	0.3-0.6	River
		Muradpur	Left	700	60	1.0	1988	1	---
		Markuli Bazar	Left	0	100	---	1988	1	River
		Amarpur	Left	0	150	2.4	1988	1	River
Total					**5,454**	**82.0**			---

Source: NERP Reconnaissance Survey, 1996

AJMIRIGANJ-KATKHAL REACH

Thana	Union	Village	River Bank	Distance from Bank (m)	Number of Households	Village Platform Area (ha)	Major Flood Year of Occurrence	Water Level Inside House (m)	Erosion by
Mitamain	Katkhal	Shantipur	Right	50	85	2.5	1988	0.5	River
Ajmiriganj	Kakailseo	Rahala	Left	50	200	3.8	1988	0.5	River
		Matabpur	Left	200	200	2.4	1988	0.5	Haor
		Anandapur	Left	1000	500	4.9	1988	0.5	Haor
		Kakailseo	Left	200	850	12.2	1988	0.5	Haor
		Mahmoodpur	Left	200	65	1.6	1988	0.5	River
		Shahnagar	Left	200	50	2.0	1988	0.5	River
		Nazrakanda	Left	400	150	1.6	1988	0.5	River
		Solori	Left	400	300	1.2	1988	0.5	River
		Kalnipara	Left	300	100	1.6	1988	0.5	River
		Roina	Left	200	60	2.0	1988	0.5	River
		Gordairgram	Left	1000	550	4.0	1988	0.5	River
		Badarpur	Left	800	150	1.6	1988	0.3	River
		Kadirpur	Left	300	35	0.4	1988	0.3	River
		Samipur	Left	350	120	4.0	1988	0.3	River
		Ganjerhati	Left	400	195	3.8	1988	0.3	River
		Pukurpar	Left	400	80	2.0	1988	0.3	River

Thana	Union	Village	River Bank	Distance from Bank (Meter)	Number of House holds	Village Platform Area (ha)	Major Flood Year of Occurrence	Water Level Inside Household (feet)	Erosion by
Itna	Mriga	Parjakanda	Right	800	350	10.1	1988	0.3	Haor
		Andair	Right	700	50	1.2	1988	0.3	Haor
		Shantipur	Right	500	97	1.2	1988	0.3	Haor
		Barobari	Right	500	125	4.0	1988	0.3	Haor
		Gazaria	Right	400	360	6.0	1988	0.3	Haor
		Modhupur	Right	600	20	0.6	1988	0.3	Haor
		Kaitarkanda	Right	700	250	3.6	1988	0.3	Haor
	Joyshiddhi	Wara	Right	1000	900	10.1	1988	0.3	Haor
		Kamalpur	Right	600	650	8.0	1988	0.3	Haor
Total					**6042**	**96.4**			

Source: NERP Reconnaissance Survey,1996

KATKHAL-SHIBPUR REACH

Thana	Union	Village	River Bank	Distance from Bank (m)	Number of Households	Village Platform Area (ha)	Major Flood Year of Occurrence	Water Level Inside House (m)	Erosion by
Astagram	Adampur	Adampur	Right	360	279	16.3	1974	1.20	River
		Echapur	Right	380	145	9.3	1974	1.0	River
		Islampur	Right	450	145	5.0	1974	0.3	Haor
		Lawra	Right	25	120	20.4	1988	1.0	River
		Kairail	Right	25	270	13.5	1974	0.3	River
		Bhatura	Right	720	95	10.0	1974	0.3	Haor
		Baluchar	Right	450	255	21.5	1988	1.0	Haor
		Shitarampur	Right	1,000	32	2.5	1974	0.3	Haor
		Chowdanta	Right	1,000	255	12.0	1988	0.3	Haor
		Gobindapur	Right	1,000	40	1.3	1988	0.3	Haor
		Aynarkandi	Right	180	130	5.0	1974	0.3	Haor
		Nayahati	Right	455	180	7.5	1974	0.3	Haor
		Boiragirkandi	Right	455	647	50.0	1988	0.3	Haor
		Noorpur	Right	250	587	26.0	1988	0.3	Haor
	Astagram	Islampur	Right	50	200	5.0	1988	0.3	Haor
	Kalma	Kalma	Right	1,000	70	3.0	1974	0.3	Haor
		Halalpur	Right	1,250	?	?	1988		Haor
		Dhalakandi	Left	750	220	2.5	1974		Haor
	Abdullahpur-Khayerpur	Baligaon	Left	100	195	8.5	1974	0.5	Haor
	Adampur/Kalma	Shantipur	Left	120	91	4.25	1988	0.3	Haor

Thana	Union	Village	River Bank	Distance from Bank (m)	Number of Households	Village Platform Area (ha)	Major Flood Year of Occurrence	Water Level Inside House (m)	Erosion by
	Abdullahpur-Khayerpur	Abdullahpur	Left	25	1,786	36.0	1974	1.2	Haor
	Abdullahpur-Khayerpur	Shamarchar	Right	500	300	13.0	1988	0.3	Haor
	Abdullahpur-Khayerpur	Kalimpur	Left	80	592	35.0	1987		Haor
	Abdullahpur-Khayerpur	Anowarpur	Left	40	46	0.5	1988	0.3	River
	Abdullahpur-Khayerpur	Khayerpur	Left	18	1,580	114.5	1988	0.3	River
	Abdullahpur-Khayerpur	Kadamchal	Left	10	700	49.0	1974	2.0	River
Lakhai	Lakhai	Shibpur	Left	185	1,800	17.5	1988	0.3	Haor
	Bulla	Moksedpur	Left	1,000	87	4.8	1974	0.8	Haor
		Beguanai	Left	1,000	199	9.2	1974	0.6	Haor
		Mirpur	Left	1,000	30	4.0	1988	0.3	Haor
		Madna	Left	90	108	9.8	1974		Haor
Mitamain	Katkhal	Katkhal	Right	10	300	29.0	1974	1.2	River
		Bishorikona	Left	180	130	2.5	1974	0.5	River
		Char Katkhal	Left	0	145	5.0	1988	0.3	River
	Kewarjore	Hemantaganj	Right	145	250	15.0	1974	1.2	Haor
		Kanchanpur	Right	15	342	16.3	1974	---	Haor
		Kazirkhola	Right	25	250	6.5	1974	1.0	Haor
Total					**12731**	**594.8**			

Source: NERP Reconnaissance Survey,1996

Table D.2: Villages Covered in the Household Survey

Village	Union	*Thana*	District	Reach	HHs Surveyed
Golishal	Kulanj	Derai	Sunamganj	Upper	118
Durlovpur	Sullah	Sullah	Sunamganj	Upper	41
Kakailseo	Kakailseo	Ajmiriganj	Habiganj	Middle	58
Gazaria	Mrigha	Itna	Kishoreganj	Middle	143
Kalma	Kalma	Astagram	Kishoreganj	Lower	81
Bishorikona	Katkhal	Mitamain	Kishoreganj	Lower	127
Total					**568**

Source: NERP Household Survey, 1996

Table D.3: *Thanas* Located in Project Area

Thana	Area ('000 ha)		% Area within Project
	Total	Within Project	
Ajmiriganj	22,398	22,398	100
Baniachang	48,225	48,225	100
Nabiganj	43,960	35,138	80
Habiganj	25,374	4,027	16
Lakhai	19,656	10,180	52
Derai	42,093	24,849	59
Jagannathpur	36,827	30,318	82
Sullah	26,074	18,369	70
Fenchuganj	11,448	5,766	50
Balaganj	38,951	38,300	98
Bishwanath	21,450	4,941	23
Golabganj	27,834	8,955	32
Sylhet Sadar	51,743	16,602	32
Moulvibazar	34,434	1,293	04
Itna	40,194	15,450	38
Mitamain	22,292	17,570	79
Astagram	35,553	29,830	84
Nikli	21,440	740	03
Total	**420,703**	**335,600**	

Source: BBS, Bangladesh Population Census, 1991

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Table D.4: Project Area Population, 1991

Thana	Village	HHs	Population		
			Total	Male	Female
Ajmiriganj	79	14,713	86,810	44,368	42,442
Baniachang	337	39,816	235,855	119,909	115,946
Nabiganj	287	33,058	197,378	99,228	98,150
Habiganj	41	6,186	35,783	18,519	31,547
Lakhai	33	10,081	57,135	28,133	29,002
Derai	144	18,882	116,126	59,727	56,400
Jagannathpur	272	23,501	154,886	79,199	75,688
Sullah	80	9,779	63,363	32,367	30,996
Fenchuganj	44	6,733	41,102	20,991	20,111
Balaganj	459	36,302	227,006	115,025	111,982
Bishwanath	100	6,069	39,097	19,937	19,160
Golabganj	82	11,232	73,700	37,066	36,633
Sylhet Sadar	227	27,617	177,886	93,414	84,472
Moulvibazar	16	1,524	8,989	4,634	4,353
Itna	45	9,203	51,103	26,644	24,460
Mitamain	102	13,543	85,284	44,172	41,111
Astagram	61	17,684	111,006	57,068	53,938
Nikli	4	760	3,828	1,920	1,908
Total	**2,412**	**286,683**	**1,766,33**	**902,323**	**878,298**

Source: BBS, Bangladesh Population Census, 1991

Table D.5: Population Growth

Year	Population		Annual Growth Rate (%)	
	Project Area	Bangladesh	Project Area	Bangladesh
1901	590,156	28,927,786		
1911	659,245	31,555,056	1.11	0.94
1921	683,814	33,254,096	0.37	0.60
1931	731,373	35,064,170	0.67	0.74
1941	845,171	41,997,297	1.46	1.70
1951	875,919	44,165,740	0.36	0.50
1961	957,398	55,222,663	0.89	2.26
1974	1,269,144	76,398,000	2.19	2.48
1981	1,480,842	89,912,000	2.23	2.35
1991	1,766,338	111,455,185	1.78	2.17
1995	1,893,890	121,110,000	1.76	2.10

Source: BBS, Statistical Pocket Book, Bangladesh, 1996 and NERP

Table D.6: Urban Population

Thana	Urban Population		
	1981	1991	Annual Growth (%)
Ajmiriganj	12,175	13,829	1.28
Baniachang	15,960	21,111	2.84
Nabiganj	4,471	7,387	5.15
Habiganj	11,839	24,814	7.68
Lakhai	4,501	12,222	10.51
Derai	12,351	18,777	4.28
Jagannathpur	1,250	1,436	1.40
Sullah	1,371	2,569	6.48
Fenchuganj	0	0	0
Balaganj	3,618	4,919	3.12
Bishwanath	4,563	6,392	3.43
Golabganj	0	0	0
Sylhet Sadar	21,772	44,629	7.44
Moulvibazar	0	0	0
Itna	0	0	0
Mitamain	0	0	0
Astagram	0	0	0
Nikli	0	0	0
Total	**93,871**	**158,085**	**5.35**

Source: BBS, Bangladesh Population Census,1991

Table D.7: Distribution of Project Area

District	Area (km^2)		Project Area as % of District Area	District's Share in the Project Area (%)
	Within Project	District Total		
Habiganj	1,200	2,637	45.5	35.7
Sunamganj	735	3,670	20.0	21.9
Sylhet Sadar	746	3,490	21.4	22.2
Moulvibazar	13	2,799	0.5	0.4
Greater Sylhet	**2,696**	**12,596**	---	**80.2**
Kishoreganj	636	2,689	23.6	18.9
Netrokona	26	2,810	0.9	0.8
Greater Mymensingh	**762**	---	---	**19.8**
Total	**3,356**			**100.0**

Source: Bangladesh Population Census, 1991, and NERP

Table D.8: Distribution of Project Population

Sub-Division	District	1991 Population		Project Population as % of District Population	District's Share in Total Project Population
		Project	District		
Sylhet	Habiganj	612,961	1,611,334	38.0	34.7
	Sunamganj	334,375	1,802,135	18.2	19.0
	Sylhet Sadar	558,791	2,281,903	24.5	31.6
	Moulvibazar	8,989	1,376,566	0.7	0.5
	Sub-total	1,515,116	---	---	85.8
Mymensingh	Kishoreganj	251,222	2,388,348	10.5	14.2
Total		**1,766,338**			**100.0**

Source: Bangladesh Population Census, 1991, and NERP

Table D.9: Sex Ratio

Census Year	Project Area	Bangladesh	
		Total	Rural
1951	108.4	109.7	108.5
1961	106.5	107.6	106.0
1974	106.1	107.7	105.9
1981	104.9	106.4	103.3
1991	102.7	106.1	103.4

Source: BBS, Bangladesh Population Census, 1974, 1981 and 1991

Table D.10: Age Structure

Age group (year)	Number			Percentage			Sex Ratio
	Male	Female	Total	Male	Female	Total	
0-4	201	233	434	12.1	14.9	13.4	86
5-9	284	263	547	17.0	16.8	16.9	108
10-14	230	187	417	13.8	11.9	12.9	123
15-19	140	130	270	8.4	8.3	8.3	108
20-24	133	145	278	8.0	9.2	8.6	92
25-29	157	141	298	9.4	9.0	9.2	111
30-34	101	115	216	6.1	7.3	6.7	88
35-39	103	96	199	6.2	6.1	6.2	107
40-44	70	68	138	4.2	4.3	4.3	103
45-49	72	59	131	4.3	3.8	4.0	122
50-54	59	54	113	3.5	3.4	3.5	109
55-59	32	25	57	1.9	1.6	1.8	128
60-64	36	30	66	2.2	1.9	2.0	120
65-69	21	10	31	1.3	0.7	1.0	210
70+	28	12	40	1.7	0.8	1.2	233
Total	**1,667**	**1,568**	**3,235**	**100.0**	**100.0**	**100.0**	**106**

Source: NERP Household Survey, 1996

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Table D.11: Literacy of Population, 7 Years and Above

Thana	Literacy Rate, 1991 (%)		
	Both Sex	**Male**	**Female**
Ajmiriganj	22.4	28.2	16.2
Baniachang	20.8	25.5	15.9
Nabiganj	26.4	30.3	22.5
Habiganj	30.6	36.9	23.7
Lakhai	21.6	27.8	15.6
Derai	25.3	30.1	20.2
Jagannathpur	27.9	31.7	23.8
Sullah	21.8	26.8	16.5
Fenchuganj	39.0	44.1	33.6
Balaganj	31.4	35.9	26.7
Bishwanath	33.6	38.9	28.1
Golabganj	38.7	44.2	33.2
Sylhet Sadar	44.1	50.0	37.6
Moulvibazar	36.1	41.2	30.5
Itna	16.0	20.7	10.7
Mitamain	15.6	20.7	10.2
Astagram	38.2	45.0	30.9
Nikli	12.6	17.6	7.4
Bangladesh	**32.4**	**38.9**	**25.5**

Source: BBS, Bangladesh Population Census, 1991

Table D.12: Level of Schooling

Schooling	Population (%)		
	Both Sex	Male	Female
No schooling	72.3	67.4	77.5
Primary	19.4	21.3	17.5
Secondary	6.9	9.1	4.5
Above secondary	1.4	2.2	0.5
Total	**100.0**	**100.0**	**100.0**

Source: NERP Household Survey, 1996

Table D.13: Statistics on Hand Tubewell, 1996

Thana	Population (1996)	Number of Tubewells			Population per Tubewell	
		Total	Running	Running (%)	Total	Running
Ajmiriganj	94,583	1,105	1,075	97.3	86	88
Balaganj	251,538	2,456	2,395	97.5	102	105
Mitamain	117,893	1,067	980	91.8	110	120
Jagannathpur	204,986	1,559	1,508	96.7	131	136
Total	**669,000**	**6,187**	**5,958**	**96.3**	**108**	**112**

Source: Thana Department of Public Health Engineering (interview), 1996

Table D.14: Source of Drinking Water

Source	Percentage of Households				
	Landless	Small	Medium	Large	Average
Tubewell	74	81	91	98	81
Pond	3	4	0	0	3
River/haor	23	15	9	2	16
Total	**100**	**100**	**100**	**100**	**100**

Source: NERP Household Survey, 1996

Table D.15: Type of Latrine Used in the Dry Season

Type of Latrine	% of Household				
	Landless	Small	Medium	Large	Total
Pucca	0	0	1	14	**1**
Kutcha (with pit)	1	3	9	30	**5**
Kutcha (hanging)	72	84	79	56	**76**
Open	27	13	11	0	**18**
Total	**100**	**100**	**100**	**100**	**100**

Source: NERP Household Survey, 1996

Table D.16: Type of Latrine Used in the Wet Season

Type of Latrine	% of Household				
	Landless	Small	Medium	Large	Total
Pucca	0	0	1	14	**1**
Kutcha (with pit)	1	0	9	25	**4**
Kutcha (hanging)	70	87	61	61	**74**
Open	29	13	29	0	**21**
Total	**100**	**100**	**100**	**100**	**100**

Source: NERP Household Survey, 1996

Table D.17: Patients Treated in Selected *Thana* Hospitals, 1995

Disease	Number of Persons Treated													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
Diarrhoea	2,951	2,111	2,619	3980	2,060	3,067	3729	3843	4,022	4,922	5,957	3,669	**42,930**	17.4
Malaria	84	62	51	54	34	49	70	297	64	90	91	160	**1,106**	0.4
Int. Worm Infection	1,318	1,380	1,685	2,409	1,642	1,679	2224	1768	1,641	2,587	2,569	1,620	**22,522**	9.1
Peptic Ulcer	1,556	1,056	1,489	2,169	1,497	1,796	1780	1514	1,809	2,326	1,815	1,853	**20,660**	8.4
T. B.	18	10	18	11	11	117	9	9	5	8	14	68	**298**	0.1
Respiratory Infection	1,131	1,135	1,506	2,088	1,252	829	1001	1020	1,116	1,602	1,773	1,495	**15,948**	6.5
Skin Disease	1,824	1,383	1,878	2,024	1,187	1,292	1508	1372	1,703	2,009	1,948	1,567	**19,695**	8.0
Hepatitis	3		10	63	3	3	16	19	22	13	16	18	**186**	0.1
Night Blindness	96	108	129	93	206	68	50	382	69	75	78	53	**1,407**	0.6
Deficiency	1,387	693	795	1,435	1,085	991	953	854	1,311	1,235	1,289	1,208	**13,236**	5.4
Anaemia	1,591	767	1,324	1,822	858	1,206	1051	940	989	1,662	1,811	1,915	**15,936**	6.5
Asthma	206	188	205	394	148	218	304	160	300	358	351	443	**3,275**	1.3
Whooping Cough	0	0	8	7	0	9	10	0	0	5	4	0	**43**	0
Measles	5	8	13	31	10	16	16	5	0	53	32	14	**203**	0.1
Chicken Pox	30	13	33	98	39	14	24	30	25	12	0	0	**318**	0.1
Diabetes	11	2	7	10	3	1	13	4	6	12	15	7	**91**	0
Eye Disease	1,026	530	640	1,007	653	738	521	781	920	911	729	1,044	**9,500**	3.9
Ear Disease	1,017	819	702	1,046	643	605	664	689	643	849	831	663	**9,171**	3.7
Dental	526	426	447	608	576	508	610	419	421	590	476	691	**6,298**	2.6
Hyper Tension	59	37	64	65	52	32	62	70	218	97	149	46	**951**	0.4
Poisoning	45	0	3	0	0	1	4	0	1	0	2	0	**56**	0
Injuries	840	452	699	633	473	440	529	432	330	682	687	844	**7,041**	2.9
Obst. & Gynee	586	179	231	533	192	47	164	107	99	253	351	521	**3,263**	1.3
Filariasis	0	0	0	0	0	0	0	0	0	0	4	0	**4**	0
Mental	1	2	0	2	0	1	0	0	2	0	0	0	**8**	0
P. U. O.	962	784	1,267	1,683	852	1,073	1065	1500	1,653	1,116	1,582	1,257	**14,794**	6.0
Others	2,576	1,819	3,629	4,590	2,710	3,015	3357	2702	2,678	3,423	3,859	3,028	**37,386**	15.2
Total	**19,849**	**13,964**	**19,452**	**26,855**	**16,186**	**17,815**	**19,734**	**18,917**	**20,047**	**24,890**	**26,433**	**22,184**	**246,326**	**100**

Source: Thana Health Centre Statistics (interview), 1996.

Table D.18: Seasonal Variation of Diarrhoeal Disease Treated, 1995

Month	Patients Treated (%)
January	6.8
February	6.0
March	6.8
April	6.7
May	7.1
June	6.9
July	8.3
August	9.0
September	9.9
October	11.5
November	11.2
December	9.8
Total	**100.0**

Note: Percentages are based on 3-months moving average
Source:Thana Health Centre Statistics (interview), 1996

Table D.19: Age Distribution of Patients Treated, 1995

Age Group	Balaganj	Jagannathpur	Ajmiriganj	Mitamain	Total	%
<1	5,559	3,788	875	1,504	**11,726**	4.8
1-4	12,392	10,516	8,045	5,420	**36,373**	14.8
5-14	21,188	20,366	20,297	9,985	**71,836**	29.2
15+	30,364	37,811	37,689	20,527	**126,391**	51.2
Total	**69,503**	**72,481**	**66,906**	**37,436**	**246,326**	**100.0**

Source: Thana Health Centre Statistics (interview), 1996

Table D.20: Ownership Pattern of Cultivable Land

Strata	HH	Area (ha)	Percentage		Cumulative %		Average Land/HH (ha)
			HH	Area	HH	Area	
Landless	242	0	42	0	42	0	0
Small	203	88	36	14	78	14	0.4
Medium	79	142	14	23	92	37	1.8
Large	44	387	8	63	100	100	8.8
Total	**568**	**617**	**100**	**100**	**100**	**100**	**1.1**

Source: NERP Household Survey, 1996

Table D.21: Ownership Pattern of Homestead

Homestead Size (ha)	Number of Households					
	Landless	Small	Medium	Large	Total	%
0	71	29	5	0	**105**	18
0.01-0.05	159	158	68	19	**404**	71
0.06-0.10	9	12	3	9	**33**	6
>0.10	3	4	3	16	**26**	5
Total	**242**	**203**	**79**	**44**	**568**	**100**

Source: NERP Household Survey, 1996

Table D.22: Average Size of Homestead

Strata	HH	Area (ha)	Average per HH	
			(ha)	(m^2)
Landless	242	3.0	0.012	123
Small	203	4.1	0.020	201
Medium	79	2.1	0.026	264
Large	44	6.1	0.138	1,375
Total	**568**	**15.3**	**0.027**	**268**

Source: NERP Household Survey, 1996

Table D.23: Farm Size

Strata	Households Possessing Farm (%)					Farm Area (ha)	
	No Farm	Small Farm	Medium Farm	Large Farm	Total	Total	Average per Farm HH
Landless	177	56	8	1	**242**	43	0.7
Small	16	171	14	2	**203**	124	0.7
Medium	8	7	63	1	**79**	129	1.8
Large	4	2	2	36	**44**	240	6.0
Total	**205**	**236**	**87**	**40**	**568**	**536**	
% (HH)	36	42	15	7	**100**		
% (farm)		65	24	11	**100**		1.5

Source: NERP Household Survey, 1996

Table D.24: Tenancy Practices

Tenancy System	Landless		Small		Medium		Large		Total		% of Farm Area	% of Land Owned
	HH	Area (ha)	HH	Area (ha)	HH	Area (ha)	HH	Area (ha)	HH	Area (ha)		
Own land	--	--	184	76	71	111	40	227	295	414	77	67
Barga taken	22	22	36	23	4	4	5	6	67	56	10	--
Rangjoma taken	39	16	40	19	18	11	6	5	103	52	10	--
Bandhak taken	8	2	11	4	5	3	3	2	27	11	2	--
Khas land	5	2	3	1	--	--	--	--	8	3	1	--
Total farm	**--**	**43**	**--**	**124**	**--**	**129**	**--**	**240**	**--**	**535**	**100**	**--**
Barga given	--	--	11	5	5	10	5	63	21	78	--	13
Rangjoma given	--	--	12	5	14	11	12	50	38	66	--	11
Bandhak given	--	--	6	1	5	2	5	13	16	16	--	3
Fallow	--	--	--	1	--	8	--	34	--	43	--	7
Total owned	**--**	**--**	**--**	**88**	**--**	**142**	**--**	**387**	**--**	**617**	**--**	**100**

Source: NERP Household Survey, 1996

Table D.25: Distribution of Households by Main Occupation

Main Household Occupation	Number of Households					
	Landless	Small	Medium	Large	Total	%
Agriculture	15	115	69	42	**241**	42
Farm labour	165	44	--	--	**209**	37
Fishing	21	12	--	--	**33**	6
Trading	13	12	4	--	**29**	5
Boat operating	10	6	--	--	**16**	3
Services	6	6	1	--	**13**	2
Others	12	8	5	2	**27**	5
Total	**242**	**203**	**79**	**44**	**568**	**100**

Source: NERP Household Survey, 1996

Table D.26: Distribution of Households by Source of Income

Source of Income	Landless		Small		Medium		Large		Total	
	HH	%	HH	%	HH	%	HH	%	HH	%
Field crop	62	25.6	188	92.6	76	96.2	42	95.5	**368**	**64.8**
Farm labour	181	74.8	95	46.8	4	5.1			**280**	**49.3**
Earthwork	120	49.6	67	33.0	4	5.1			**191**	**33.6**
Fishing	87	36.0	63	31.0	10	12.7	9	20.5	**169**	**29.8**
Trading	71	29.3	48	23.6	17	21.5	11	25.0	**147**	**25.9**
Boat riding	63	26.0	32	15.8	5	6.3	8	18.2	**108**	**19.0**
Rice gleaning	63	26.0	22	10.8	2	2.5	1	2.3	**88**	**15.5**
Rice processing	55	22.7	32	15.8	1	1.3			**88**	**15.5**
Non-farm labour	43	17.8	28	13.8	2	2.5			**73**	**12.9**
Home garden	6	2.5	18	8.9	3	3.8	2	4.5	**29**	**5.1**
Remittance	7	2.9	9	4.4	6	7.6			**22**	**3.9**
Poultry	7	2.9	14	6.9	1	1.3			**22**	**3.9**
Teaching	9	3.7	2	1.0	1	1.3			**12**	**2.1**
Non-govt. job	3	1.2	7	3.4	1	1.3			**11**	**1.9**
Housemaid	8	3.3	2	1.0					**10**	**1.8**
Food processing	8	3.3	1	0.5			1	2.3	**10**	**1.8**
Dairy	2	0.8	4	2.0			3	6.8	**9**	**1.6**
Govt. job	3	1.2	2	1.0	2	2.5	1	2.3	**8**	**1.4**
Traditional healer	4	1.7	2	1.0			1	2.3	**7**	**1.2**
Imam	5	2.1	1	0.5			1	2.3	**7**	**1.2**
Kantha making	3	1.2	1	0.5			2	4.5	**6**	**1.1**
Tailoring	3	1.2	2	1.0					**5**	**0.9**
Goldsmith	4	1.7	1	0.5					**5**	**0.9**
Begging	4	1.7							**4**	**0.7**
Total HHs	**242**		**203**			**79**	**44**		**568**	
Total response	**821**		**641**		**135**		**82**		**1,679**	
Average/hh	**3.4**		**3.2**		**1.7**		**1.9**		**3.0**	

Source: NERP Household Survey, 1996

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Table D.27: Cropping Practices under Various Tenancy Arrangements

Crop	% Farm Area				
	Landless	Small	Medium	Large	Total
Rice	97.5	93.1	89.5	92.1	**92.1**
Potato	0.2	4.5	6.6	4.1	**4.5**
Oilseeds	1.4	1.3	2.9	1.9	**2.0**
Spices	0.7	0.8	0.6	0.7	**0.7**
Vegetables	0.2	0.2	0.5	1	**0.7**
Total	**100**	**100**	**100**	**100**	**100**
Rice	**97.5**	**93.1**	**89.5**	**92.1**	--
Non-rice	**2.5**	**6.9**	**10.5**	**7.9**	--

Source: NERP Household Survey, 1996

Table D.28: Daily Wage Rates

Month	Wage Rate (Tk)		Three Months' Moving Average (Tk)	
	Male	Female	Male	Female
Baishakh	95	58	81	50
Jaishtha	88	53	78	45
Ashar	50	25	64	34
Sravan	53	25	50	25
Bhadra	47	25	49	25
Ashwin	47	25	48	25
Kartik	50	25	51	28
Aghran	55	33	55	30
Poush	60	33	57	33
Magh	56	34	58	35
Falgun	56	40	58	38
Choitra	60	40	70	46

Source: NERP Household Survey, 1996

Table D.29: Annual Household Income in Taka

Income Range (Tk)	Landless		Small		Medium		Large		Total		%	
	HH	Total	HH	Income	HH	Income	HH	Income	HH	Income	HH	Income
5,000	1	4,750	-	--	-	--	-	--	1	4,750	0.18	0.02
5,001-10,000	15	123,620	9	76,000	-	--	1	7,740	25	207,360	4.40	0.86
10,001-15,000	63	888,492	27	356,575	1	13,000	1	12,500	92	1,270,567	16.20	5.25
15,001-20,000	69	1,199,155	26	1,229,900	2	36,500	-	--	97	2,465,555	17.08	10.20
20,001-25,000	39	870,476	37	838,651	3	70,375	-	--	79	1,779,502	13.91	7.36
25,001-30,000	17	464,697	28	787,680	5	142,100	-	--	50	1,394,477	8.80	5.77
30,001-35,000	12	387,250	29	906,272	9	296,780	-	--	50	1,590,302	8.80	6.58
35,001-40,000	12	418,590	19	703,503	7	268,000	-	--	38	1,390,093	6.69	5.75
40,001-45,000	3	125,400	11	432,300	6	255,250	1	43,200	21	856,150	3.70	3.54
45,001-50,000	1	41,600	3	189,250	6	286,500	1	50,000	11	567,350	1.94	2.35
50,001-60,000	2	106,750	2	104,850	14	763,450	-	--	18	975,050	3.17	4.03
60,001-70,000	1	65,000	3	197,500	10	584,900	2	134,000	16	981,400	2.82	4.06
70,001-80,000	2	153,450	5	383,000	5	380,200	1	70,500	13	987,150	2.29	4.08
80,001-90,000	2	165,000	1	82,000	5	430,900	3	249,200	11	927,100	1.94	3.83
90,001-100,000	-	--	-	--	1	92,600	2	192,000	3	284,600	0.53	1.18
100,001-150,000	3	399,500	3	400,000	4	519,800	15	1,771,250	25	3,090,550	4.40	12.78
150,001-200,000	-	--		--	-	--	7	1,199,000	7	1,199,000	1.23	4.96
>200,000	-	--	-	--	1	243,400	10	3,969,600	11	4,213,000	1.94	17.42
Total	**242**	**5,413,730**	**203**	**6,687,481**	**79**	**4,383,755**	**44**	**7,698,990**	**568**	**24,183,956**	**100.00**	**100.00**

Source: NERP Household Survey, 1996

Table D.30: Per Capita Income

Strata	HH	Annual Income (Tk)	%		Average HH Income (Tk)	Average per Capita Income	
			HH	Income		Annual (Tk)	Monthly (Tk)
Landless	242	5,413,730	42	22	22,371	3,925	327
Small	203	6,687,481	36	28	32,943	5,780	482
Medium	79	4,383,755	14	18	55,491	9,735	811
Large	44	7,698,990	8	32	174,977	30,698	2,558
Total	**568**	**24,183,956**	**100**	**100**	**42,577**	**7,470**	**622**

Source: NERP Household Survey, 1996

Table D.31: Women's Age Distribution

Village	Age Group (Years)				Total
	15-20	21-35	36-49	49 & above	
Aynarkandi	8	30	19	12	69
Gazaria North	10	37	29	5	81
Gazaria South	5	20	12	9	46
Kathkhal	14	47	28	10	99
Kakailseo	11	51	43	8	113
Total	**48**	**185**	**131**	**44**	**408**
%	**11.8**	**45.3**	**32.1**	**10.8**	**100**

Source: NERP Women's Status Survey, 1996

Table D.32: Women's Marital Status

Village	Marital Status					Total
	Currently Married	Widow	Divorced	Abandoned	Never Married	
Aynarkandi	63	3	2	1	-	69
Gazaria North	80	1	-	-	-	81
Gazaria South	44	2	-	-	-	46
Kathkhal	98	1	-	-	-	99
Kakailseo	109	2	1	1	-	113
Total	**394**	**9**	**3**	**2**	**-**	**408**
%	**96.5**	**2.2**	**0.7**	**0.5**		**100**

Source: NERP Women's Status Survey, 1996

Table D.33: Number of Times Married in Life

Village	Number of Times Married				Total
	Once	Twice	Thrice	Never Married	
Aynarkandi	66	2	1	-	69
Gazaria North	80	1	-	-	81
Gazaria South	43	3	-	-	46
Kathkhal	96	3	-	-	99
Kakailseo	112	1	-	-	113
Total	**397**	**10**	**1**	**-**	**408**
%	**97.3**	**2.5**	**0.3**		**100**

Source: NERP Women's Status Survey, 1996

Table D.34: Women's Age at Marriage

Village	Total Respondents	Age Group (Years)				Total
		Below 12	12-16	16-20	20 & Above	
Aynarkandi	69	16	50	3	-	69
Gazaria North	81	10	67	4	-	81
Gazaria South	46	10	28	7	1	46
Kathkhal	99	23	76	-	-	99
Kakailseo	113	21	91	1	-	113
Total	**408**	**80**	**312**	**15**	**1**	**408**
%		**19.6**	**76.5**	**3.7**	**0.2**	

Source: NERP Women's Status Survey, 1996

Table D.35: Women's Level of Education

Village	Education Level				Total
	Non Literate	Primary	Secondary	Higher	
Aynarkandi	67	2	-	-	69
Gazaria North	79	2	-	-	81
Gazaria South	45	1	-	-	46
Kathkhal	94	2	3	-	99
Kakailseo	91	18	3	1	113
Total	**376**	**25**	**6**	**1**	**408**
%	**92.2**	**6.1**	**1.5**	**0.3**	**100**

Source: NERP Women's Status Survey, 1996

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Table D.36: Homestead Land Owned by Women

Village	No. of HHs	Homestead Land Size (decimal)				
		No Homestead Land	<1	2-5	6-12	13-25
Aynarkandi	69	69	-	-	-	-
Gazaria North	81	80	-	-	1	-
Gazaria South	46	41	-	2	2	1
Kathkhal	99	98	-	-	1	-
Kakailseo	113	109	-	-	1	3
Total	**408**	**397**	**-**	**2**	**5**	**4**
%	**100**	**97.3**		**0.5**	**1.2**	**1.0**

Source: NERP Women's Status Survey, 1996

Table D.37: Agricultural Land Owned by Women

Village	No.of HHs	No Agricultural Land	Agricultural Land Size (decimal)			
			<50	51-250	251-500	501-750
Aynarkandi	69	64	5	-	-	-
Gazaria North	81	76	4	1	-	-
Gazaria South	46	44	1	1	-	-
Kathkhal	99	96	1	1	1	-
Kakailseo	113	109	4	-	-	-
Total	**408**	**389**	**15**	**3**	**1**	**-**
%	**100**	**95.3**	**3.7**	**0.7**	**0.3**	
			small holding <250		**medium holding 251-750**	

Source: NERP Women's Status Survey, 1996

Table D.38: Source of Women's Titled Land

Village	No. of Women Owning Titled Land	Source of Women's Titled Land	
		Husband	Father
Aynarkandi	5	3	2
Gazaria North	5	4	1
Gazaria South	2	1	1
Kathkhal	3	3	-
Kakailseo	4	3	1
Total	**19**	**14**	**5**
% Total Women (408)	**4.6**	**73.7**	**26.3**
% Source		**73.7**	**26.3**

Source: NERP Women's Status Survey, 1996

Table D.39: Homestead Land Owned by Household

Village	No.of HHs	No Homestead Land	Homestead Land Size (decimals)			
			<1.0	2.0-5.0	6.0-12.0	13.0-25.0
Aynarkandi	69	15	7	28	16	3
Gazaria North	81	15	4	28	32	2
Gazaria South	46	9	2	27	5	3
Kathkhal	99	20	7	47	24	1
Kakailseo	133	27	6	45	29	6
Total	**408**	**86**	**26**	**175**	**106**	**15**
%	**100**	**21.0**	**6.4**	**42.9**	**26.0**	**3.7**

Source: NERP Women's Status Survey, 1996

Table D.40: Income Activities by Self and Wage[1]

Source of Income	Aynarkandi		Gazaria North		Gazaria South		Kathkhal		Kakailseo	
	Self	Wage	Self	Wage	Self	Wage	Self	Wage	Self	Wage
Paddy cultivation	53	11	57	10	28	12	70	-	50	6
Sweet potato/ground nut production	24	1	-	-	-	-	10	4	26	8
Chili production	25	3	6	-	5	2	18	7	30	9
Paddy gleaning	5	-	12	-	13	-	-	-	4	-
Vegetable production	39	3	44	6	6	3	35	8	78	12
Casual household work	-	-	-	-	-	2	-	-	-	3
Seasonal household work	-	2	-	-	-	-	-	-	-	-
Livestock	51	22	46	13	14	10	99	51	74	25
Muri/chira making	38	2	49	-	11	-	45	-	73	-
Earth work (UP)	-	-	-	-	-	1	-	-	-	-
NERP earth work	-	-	-	10	-	5	-	-	-	3
Money lending	-	1	-	-	-	-	-	-	-	1
Fuel collection	26	-	56	-	28	-	32	-	14	-
Bamboo fish trap	7	26	7	-	1	1	3	-	-	-
Birth Attendant	-	2	-	-	-	-	-	1	-	-
Kantha making	39	1	46	-	21	1	85	-	83	2
Petty trading	-	1	-	-	-	-	-	1	-	2
Fishing	-	-	2	2	3	-	2	-	-	-
Floor glazing	69	-	81	-	46	-	99	-	113	-
Total Responses	**69**	**69**	**81**	**81**	**46**	**46**	**99**	**99**	**113**	**113**

Source: NERP Women's Status Survey, 1996
Note: 1. Numbers may not add to totals due to multiple responses.

Table D.41: Annual Value of Women's Income Activities by Self and Wage

Village	Value of Self Labour (Tk)	Value of Wage Labour (Tk)	Value of Total Labour (Tk)	Annual Average Wage per Woman (Tk)
Aynarkandi	147,964	96,035	243,999	3,536
Gazaria North	279,288	65,125	344,413	4,252
Gazaria South	111,899	51,194	163,093	3,545
Katkhal	360,013	99,159	459,172	4,638
Kakailseo	169,056	70,380	239,436	2,119
Total	**1,068,220**	**381,893**	**1,450,113**	**3,554**
%	74	26	100	

Source: NERP Women's Status Survey, 1996

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Table D.42: Women's Work by Season

Month	Activities
BAISHAKH 15th April - 15th May	· Post harvest processing · *Boro* paddy gleaning · Fuel collection · Prepare fish trap · Prepare *chira* and *muri*
JAISHTHA 15th May - 15th June	· Post harvest processing · *Boro* paddy gleaning · Harvesting of chili, sweet potato, ground nut · Fuel collection · Prepare fish trap · Prepare *chira* and *muri*
ASHAR 15th June - 15th July	· Fishing · Fuel collection · *Kantha* making · *Demi* paddy gleaning · Monsoon vegetable cultivation
SRAVAN 15th July - 15th August	· Fishing · Fuel collection · *Kantha* sewing
BHADRA 15th August - 15th September	· Fishing · Fuel collection · *Kantha* sewing
ASHWIN 15th September - 15th October	· Fishing · Fuel collection · *Kantha* sewing
KARTIK 15th October - 15th November	· Dry season vegetable cultivation · Fuel collection · Prepare *chira* and *muri* · House repair
AGRAHAYAN 15th November - 15th December	· Dry season vegetable cultivation . *Aman* paddy gleaning · Fuel collection · Prepare *chira* and *muri* · House repair
POUSH 15th December - 15th January	· Paddy sowing . *Aman* paddy gleaning · Fuel collection · Prepare *chira* and *muri*
MAGH 15th January - 15th February	· Paddy weeding · Cultivation of chili, sweet potato, ground nut · Fuel collection · Prepare *chira* and *muri*
FALGUN 15th February - 15th March	· Fuel collection · Earth work
CHOITRA 15th March - 15th April	· Fuel collection · Earth work

Source: NERP Women's Status Survey, 1996

Table D.43: Impact of Paddy Gleaning on Family Economy

Number of Women	Range of distance travelled (km/person)	Time used for gleaning daily (hr/person)	Paddy collection daily (kg/person)	Av. family size	Av. daily consumption (kg/family)	No. of Consumption days by Gleaned Paddy
20	8-14	11	12	4.5	3	120

Source: NERP Gleaning Study, 1996

Table D.44: Marital Status of the Paddy Gleaners

Number of Women	Widow	Divorced/ Seperated	Husband (Day Labour)	Husband Disabled
20	9 (45%)	3 (15%)	7 (35%)	1 (5%)

Source: NERP Gleaning Study, 1996

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Table D.45: Women in Decision Making[1]

Areas of Decision Making	Type of Decision and Decision Maker[2]			
	A	B	C[3]	D[3]
Male children's education	9	29	222	13
Female children's education	8	18	178	14
Male and female children's marriage agreement	4	22	95	10
Land purchase and sale	12	48	125	5
Rice crop cultivation	23	66	129	6
Rice crop sale	22	62	110	6
Other agri-crop cultivation	16	43	127	6
Sharing of ideas with husband or male HH member on social issue	5	42	268	17
Short term flood actions	7	45	232	12
Long term flood actions	7	45	224	10
Participation in platform maintenance	5	49	218	15
Food preparation choice	-	46	194	150
Food distribution choice in family	-	2	70	327
Family Planning	-	74	182	25
Involvement in local self government	-	-	1	-
	97	541	2375	616

Source: NERP Women's Status Survey, 1996

Notes: 1. Numbers may not add to totals due to multiple responses.

2. A) Not discussed, decision by male, not informed to female;
B) Discussed, decision by male, informed to female;
C) Discussed, joint decision by male and female;
D) Discussed, decision only by female.

3. To show the involvement of woman in the decision making process the responses in colums 3 and 4 only have been considered in this report.

Table D.46: Pre-monsoon Spill and Breach (Last 10 Years)
SHERPUR-MARKULI REACH, RIGHT BANK

Year	Month	Location of Breach & Spill	Affected Union	% Area Affected	Crop	% Damage
1985	April	North Suriarpar and Akkilshah Bazar	Kulonch	100	*Boro*	100
			Tarol	60	*Boro*	100
			Holdipur	80	*Boro*	80
			Jogdol	60	*Boro*	60
			Rajanagar	50	*Boro*	60
			Pilegaon	40	*Boro*	50
			Raniganj	40	*Boro*	50
1989	April	North Suriarpar and Akkilshah Bazar	Kulonch	90	*Boro*	100
			Tarol	50	*Boro*	80
			Holdipur	50	*Boro*	80
			Jogdol	40	*Boro*	50
			Rajanagar	40	*Boro*	50
			Pilegaon	40	*Boro*	50
			Raniganj	40	*Boro*	50
1991	April	North Suriarpar & Akkilshah Bazar	Kulonch	100	*Boro*	50
			Tarol	60	*Boro*	50
			Holdipur	80	*Boro*	50
			Jogdol	60	*Boro*	50
			Rajanagar	50	*Boro*	50
			Pilegaon	50	*Boro*	50
			Raniganj	50	*Boro*	50
1992	April	North Suriarpar & Akkilshah Bazar	Kulonch	100	*Boro*	50
			Tarol	60	*Boro*	50
			Holdipur	80	*Boro*	50
			Jogdal	60	*Boro*	50
			Rajanagar	50	*Boro*	50
			Pilegaon	50	*Boro*	50
			Raniganj	50	*Boro*	50
		Aatghar Khal & Ratna Khal	Raniganj	50	*Boro*	50
					B.*Aus*	20
					B.*Aman*	25
			Asharkandi	30	*Boro*	50
					B.*Aus*	20
					B.*Aman*	25
			Pilegaon	50	*Boro*	50
					B.*Aus*	20
					B.*Aman*	25

Year	Month	Location of Breach & Spill	Affected Union	% Area Affected	Crop	% Damage
1993	May	Aatghar Khal and Ratna Khal	Raniganj	50	*Boro*	50
					B.*Aus*	20
			Asharkandi	30	B.*Aman*	25
					Boro	50
					B.*Aus*	20
			Pilegaon	50	B.*Aman*	25
					Boro	50
					B.*Aus*	20
					B.*Aman*	25
	March	North Suriarpar and Akkilshah Bazar	Kulonch	100	*Boro*	80
			Tarol	60	*Boro*	80
			Holdipur	80	*Boro*	60
			Jogdol	60	*Boro*	70
			Rajanagar	50	*Boro*	70
			Pilegaon	50	*Boro*	50
			Raniganj	50	*Boro*	50
1994	March	Aatghar Khal & Ratna Khal	Raniganj	100	*Boro*	100
			Asharkandi	80	*Boro*	80
			Pilegaon	80	*Boro*	80
		North Suriarpar & Akkilshah Bazar	Kulonch	100	*Boro*	100
			Tarol	60	*Boro*	100
			Holdipur	80	*Boro*	100
			Jogdol	60	*Boro*	100
			Rajanagar	50	*Boro*	100
			Pilegaon	50	*Boro*	80
			Raniganj	50	*Boro*	80
1995	April	Aatghar Khal & Ratna Khal	Raniganj	40	*Boro*	30
			Asharkandi	40	*Boro*	30
			Pilegaon	30	*Boro*	20

Source: NERP PRA, 1996

Table D.47: Pre-monsoon Spill and Breach (Last 10 Years)
SHERPUR-MARKULI REACH, LEFT BANK

Year	Month	Location of Breach & Spill	Affected Union	% Area Affected	Crop	% Damage
1991	April	Jalalpur	Pilegaon	40	*Boro*	60
					B.*Aus*	40
					B.*Aman*	80
		Khanpur	Raniganj	60	*Boro*	60
					B.*Aus*	40
					B.*Aman*	80
		Balisree	Kulonch	20	*Boro*	60
					B.*Aus*	40
					B.*Aman*	80
1992	April	Jalalpur, Khanpur and Balisree	Pilegaon	40	*Boro*	70
					B.*Aus*	30
					B.*Aman*	30
			Raniganj	60	*Boro*	70
					B.*Aus*	30
					B.*Aman*	30
			Kulonch	20	*Boro*	70
					B.*Aus*	30
					B.*Aman*	30
		Golishal, Bibiyana	Kulonch	20	*Boro*	50
			Daulatpur	80	*Boro*	50
1993	April	Golishal, Bibiyana	Kulonch	20	*Boro*	70
			Daulatpur	80	*Boro*	70
1994	March	Jalalpur, Khanpur, Balisree	Pilegaon	100	*Boro*	100
			Raniganj	100	B.*Aus*	30
					B.*Aman*	30
			Kulonch	100	B.*Aus*	30
					B.*Aman*	30
		Golishal, Bibiyana	Kulonch	20	*Boro*	100
			Daulatpur	100	*Boro*	100

Source: NERP PRA, 1996

Table D.48: Pre-monsoon Spill (Last 10 years)
MARKULI - AJMIRIGANJ REACH, RIGHT BANK

Year	Month	Location	Affected Union	% Affected Area	Crop Damage
1989	April	Tengua	Sullah	60	*Boro*
			Bahara	60	*Boro*
		Armother Dhala	Sullah	40	*Boro*
1990	April	Bheramohona	Sullah	100	*Boro*
			Bahara	80	*Boro*
			Mriga	65	*Boro*
			Krishnapur	50	*Boro*
			Dhanpur	50	*Boro*
		7Chaitra (mid)	Nagar	50	*Boro*
		Tengua	Bahra	50	*Boro*
			Sullah	60	*Boro*
		Armother Dhala	Sullah	40	*Boro*
1991	April	Bheramohona	Sullah	100	*Boro*
			Bahara	80	*Boro*
			Mriga	65	*Boro*
			Krishnapur	50	*Boro*
			Dhanpur	50	*Boro*
			Nagar	50	*Boro*
1992	April	Bheramohna	Sullah	100	*Boro*
			Bahara	80	*Boro*
			Mriga	65	*Boro*
			Krishnapur	50	*Boro*
			Dhanpur	50	*Boro*
			Nagar	50	*Boro*
		Chorer Dhala	Hobibpur	40	*Boro*
1993	April	Borobarir Khal	Mriga	100	*Boro*
			Bahara	90	*Boro*
			Sullah	100	*Boro*
		Chorer Dhala	Hobibpur	40	*Boro*
1994	March	Borobarir Khal	Mriga	100	*Boro*
			Bahara	90	*Boro*
			Sullah	100	*Boro*

Source: NERP PRA, 1996

Table D.49: Pre-monsoon Spill and Breach (Last 10 Years)
MARKULI - AJMIRIGANJ REACH, LEFT BANK

Year	Month	Location	Affected Union	% Affected Area	Crop Damage
1990	Apr	Haripurer Dhala	Badalpur	30	*Boro*
1992	Feb-Mar	Koyer Dhala	Badalpur	60	*Boro*
			Jalsuka	50	*Boro*
			Baniachang	50	*Boro*

Source: NERP PRA, 1996

Table D.50: Extent of Damage by Bank Erosion

Village\ Bazar	Period		Duration (Year)	Platform Area (ha)			Erosion Rate (%)		Value of Eroded Property (Tk)	
	From	To		Present	Original	Eroded	Total	Yearly	Platform	Structure
Dhighalbak Bazar	1980	1985	5	0.61	1.82	1.21	67.0	13.3	280,000	1,595,000
Dhighalbak	1982	1996	14	20.24	31.90	11.66	36.6	2.6	280,000	2,529,500
Alampur Balishree	1956	1961	5	6.68	9.55	2.87	30.1	6.0	90,000	840,000
Alampur Balishree	1980	1996	16	0	9.72	9.72	100.0	6.3	90,000	575,000
Markuli	1985	1996	11	3.64	8.16	4.52	55.4	5.0	100,000	925,000
Nadipur (Badalpur)	1980	1996	16	1.01	1.53	0.52	33.9	2.1	79,000	364,001
Pirojpur	1980	1996	16	9.64	14.98	5.34	35.7	2.2	300,000	360,403
Kadamchal Bazar	1993	1996	3	0.20	0.81	0.61	75.0	25.0	100,000	70,001
Ajimganj Bazar	1993	1996	3	0.40	0.81	0.41	50.0	16.7	100,000	124,000
Rashidganj Bazar	1977	1992	15	0	0.85	0.85	100.0	6.7	100,000	205,000
Anawarpur	1956	1962	6	0	4.05	4.05	100.0	16.7	100,000	170,000
Anawarpur	1963	1977	14	0	3.64	3.64	100.0	7.1	100,000	150,000
Anawarpur	1978	1996	18	0.06	6.13	6.07	99.0	5.5	100,000	253,000
Helalnagar	1980	1995	15	8.5	14.17	5.67	40.0	2.7	110,000	335,000
Raniganj Bazar	1984	1996	12	2.23	8.70	6.48	74.4	6.2	5,000,000	11,725,000
Beradhar	1980	1996	16	20.24	30.36	10.12	33.3	2.1	200,000	525,000
Shantipur	1980	1996	16	4.05	13.77	9.72	70.6	4.4	80,000	343,000
Char Katkhal	1991	1996	5	1.82	3.34	1.52	45.5	9.1	160,000	35,000
Katkhal Bazar	1984	1995	11	1.42	3.40	1.98	58.3	5.3	325,000	1,005,001
Total				**80.75**	**167.70**	**86.96**	**51.9**	**5.6**	**7,694,000**	**22,128,906**

* weighted average
Source: NERP PRA, 1996

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Table D.51: Annual Household Expenditure for Platform Protection, 1995-96

Cash Expenditure (Tk)	Number of Households					
	Landless	Small	Medium	Large	Total	%
0	59	48	11		118	30
1-500	31	27	6		64	16
501-1,000	42	35	7	2	86	22
1001-2,000	14	32	23	4	73	19
> 2000	2	14	16	19	51	13
Total	**148**	**156**	**63**	**25**	**392**	**100**

Source: NERP Household Survey, 1996

Table D.52: Post-monsoon Drainage Problem
SHERPUR - MARKULI REACH, LEFT BANK

Year	Month	Location	Affected Union	Affected Area (ha)
1990	February	Chatol Beel	Pilegaon	100
			Raniganj	400
1991	February	Chatol Beel	Pilegaon	100
			Raniganj	400
1992	February	Chatol Beel	Pilegaon	120
			Raniganj	600
1993	February	Chatol Beel	Pilegaon	160
			Raniganj	800
1994	February	Chatol Beel	Pilegaon	160
			Raniganj	800
1995	February	Chatol Beel	Pilegaon	200
			Raniganj	1000
1996	February	Chatol Beel	Pilegaon	200
			Raniganj	1000

Source: NERP PRA, 1996

Table D.53: Post-monsoon Drainage Problem
SHERPUR - MARKULI REACH, RIGHT BANK

Year	Month	Location	Affected Union	Affected Area (ha)
1988	February	Hariar Beel	Kulonch	40
1989				50
1990				60
1991				70
1992				80
1993				90
1994				120
1995				140
1996				16

Table D.54: People's Perception about Problems

Problem	Number of Households Indicating Problem					
	Landless	Small	Medium	Large	Total	%
Pre-monsoon flood	242	203	79	44	568	100
Platform erosion	184	156	63	17	420	74
River siltation	109	102	30	13	254	45
Poor transportation	66	67	27	21	181	32
Monsoon flood	60	44	29	10	143	25
Post-monsoon drainage	58	29	12	27	126	22
Health hazard	7	8	2		17	3
Total	**242**	**203**	**79**	**44**	**568**	**100**

Note: Multiple answers were recorded
Source: NERP Household Survey, 1996

Table D.55: Distribution of Households by Main Problem Indicated

Main Problem Indicated by the Household	Number of Households					
	Landless	Small	Medium	Large	Total	%
Pre-monsoon flood	136	139	52	30	357	66
Platform erosion	85	55	22	3	165	28
Post-monsoon drainage	21	9	5	11	46	6
Total	**242**	**203**	**79**	**44**	**568**	**100**

Source: Household Survey

Table D.56: Land Price

Class of Land		Present Price (Tk/ha)	
ISSAPUR AREA		**Kalma**	**Chowdanta**
Homestead + low land adjacent (*chara bisra*) to village platform		300,000	370,000
Kanda	*Rabi* Crop	120,000	40,000
	Irrigated Rice	150,000	110,000
Boro	High	200,000	200,000
	Low	150,000	100,000
Average land price			180,000
KATKHAL AREA		**Shantipur**	**Shahebnagar**
Homestead + low land adjacent (*chara bisra*) to village platform		500,000	600,000
Kanda	*Rabi* Crop	100,000	150,000
	Irrigated Rice	120,000	120,000
Boro	High	150,000	170,000
	Low	80,000	80,000
Average land price			125,000
GAZARIA AREA			
Homestead + low land adjacent (*chara bisra*) to village platform			250,000
Kanda	*Rabi* Crop		20,000
	Irrigated Rice		50,000
Boro	High		120,000
	Low		30,000
ABDULLAHPUR AREA			
Boro emerged land (river side)			60,000
Rabi crop land (*haor* side)			25,000

NERP Land Price Survey, 1996

Table D.57: Village Platforms According to Beneficiary Households and Land Arrangements

Site No.	Platform Name	Platform Size (ha)	Beneficiaries (HH)	Type of Land Arrangement
1	Issapur L.C. - right bank (Chowdanta)	32.0	Not Known	No homestead platforms. Purchase of L.C. land from private owners at market price. A portion of L.C. land compensated to owners for their agricultural re-use.
2	Issapur L.C.- left bank (Batura)	29.0	Not Known	No homestead platforms. Purchase of L.C. land from private owners at market price. A portion of land compensated to owners for their agricultural re-use.
3	Shibpur -Paschim & Maj Haties	1.3	300	Private owners dedicate D.C. & plat. returned.
4	Shibpur -Maj Nama & Fakir Haties	6.7	300	Private owners dedicate D.C. & plat. returned.
5	Madna Channel	5.8		*Khas* land. No plat. development.
6	Abdullapur Dokhin Char 1	3.5	An estimated 1,000 HHs without homesteads will each be settled on 10 dec. of land.	12 new platform to be constructed on 44 ha. of *khas* land.
7	Abdullapur Dokhin Char 2	3.5		
8	Abdullapur Dokhin Char 3	3.5		
9	Abdullapur Dokhin Char 4	3.5		
10	Abdullapur Dokhin Char 5	3.5		
11	Abdullapur Dokhin Char 6	3.5		
12	Abdullapur Dokhin Char 7	3.5		
13	Abdullapur Dokhin Char 8	3.5		
14	Abdullapur Dokhin Char 9	4.0		
15	Abdullapur Dokhin Char 10	4.0		
16	Abdullapur Dokhin Char 11	4.0		
17	Abdullapur Dokhin Char 12	4.0		
18	Abdullahpur -Southwest Section	7.5	450	Private owners dedicate D.C. & plat. returned.
19	Abdullahpur -High School Section	9.1	500	Private owners dedicate D.C. & plat. returned.
20	Abdullahpur -Graveyard Section	8.1	300	Private owners dedicate D.C. & plat. returned.
21	Abdullahpur -Badashpara	1.6	225	Private owners dedicate D.C. & plat. returned.

Site No.	Platform Name	Platform Size (ha)	Beneficiaries (HH)	Type of Land Arrangement
22	Kalimpur -Poshchim Para	2.9	190	Private owners dedicate D.C. & plat. returned.
23	Kalimpur -Market Section & -Purbo Para	16.7	370	Private owners dedicate D.C. & plat. returned.
24	Kadamchal-Samarchar -Hazibari & Lombahati	6.9	200	Private owners dedicate D.C. & plat. returned.
25	Kadamchal-Samarchar -Lombahati & Raniganj	2.8	35	Private owners dedicate D.C. & plat. returned.
26	Kadamchal-Hemantaganj	9.5	145	Private owners dedicate D.C. & plat. returned.
27	Bishorikona	15.6	130	Purchase from agricultural land owners at market price. Spoil from loop cut to build homestead platform on dedicated land.
28	Nayakurakandi	7.5	50	
29	Shahebnagar-Purbo Hati	7.4	20	
30	Shahebnagar -Dhoi Beel East	10.7	150	
31	Shahebnagar-Nayapara	2.9	35 (consisting of 20 resettled Nayapara + 15 other HHs)	New platform for settlement of Nayapara HHs on purchased land. Each household will get 20 decimal of land.
32	Kaisar-Dokkhin Hati	9.9	150	Purchase from agricultural land owners at market price. Spoil from loop cut to build homestead platform on dedicated land.
33	Katkhal -East Bazar to Gulhati	3.2	30	
34	Katkhal -West Bazar to Bandarhati	3.3	25	
35	Katkhal -East Borohati & Majhati	3.3	35	
36	Katkhal -West Borohati & Majhati	1.7	35	
37	Shantipur	16.8	60	
38	Rahela	5.8	200	Private owners dedicate D.C. & plat. returned.
39	Anandapur	12.8	An estimated 250 poor HHs including Anandapur will each be settled on 10 dec. of land.	*Khas* land - 1 new platform to be constructed on 13 ha *khas* land. Dredging & construction dependant on *khas* land acquisition procedures which may be lengthy.
40	Mahmoodpur	3	55	Private owners dedicate D.C. & plat. returned.

Site No.	Platform Name	Platform Size (ha)	Beneficiaries (HH)	Type of Land Arrangement
41	Shahnagar	3.4	15	Private owners dedicate D.C. & plat. returned.
42	Nazrakanda	2.5	316	Private owners dedicate D.C. & plat. returned.
43	Solori	7.0	254	Private owners dedicate D.C. & plat. returned.
44	Kalnipara	3.5	90	Private owners dedicate D.C. & plat. returned.
45	Rania	3.8	50	Private owners dedicate D.C. & plat. returned.
46	Ajmiriganj - Samipur	3.0	108	108 member HHs from an agriculture cooperative (membership Ganjerhati, Samipur & Jagatpur villages (pop. of 218 HHs) dedicate land. Homestead plat. returned to owners.
47	Ajmiriganj Bazar - Ganjerhati & Pukurpar	3.0	193	The same cooperative members and an additional 85 HHs from Pukurpar dedicate land. Homestead plat. returned to owners.
Totals		**247 Ha.**	**6250 HHs**	
Sites for Disposal Only - No Homesteads Planned				
48	Nawanagar	3.6	Unidentified	BIWTA land
49	Manumukh	8.0	Unidentified	BIWTA land
50	Galimpur	3.0	Unidentified	Private land
51	Omarpur	7.1	Unidentified	BIWTA land
52	Fenchuganj	4.0	Unidentified	BIWTA land
Alternative Site to Anandapur *Khas* Land				
39A	Kamalpur	-	185	An alternative *khas* land to the Anandapur Site (39).

Source: NERP Proposed Disposal Sites Study, 1996

Table D.58: Summary of Platforms

Description	Unit	Quantity
Private land to be purchased for Issapur Loop Cut	ha	216
Private land to be purchased for Katkhal Loop Cut	ha	195
Land purchase for Anandapur platform	ha	13
Land acquired for Abdullahpur Dokkhin Char	ha	44
Issapur purchased land to be returned back for re-use	ha	106
Katkhal purchased land to be returned back for re-use	ha	54
Land to be acquired for 1 navigation platform	ha	3
BIWTA land to be obtained for 4 navigation platforms	ha	19
Number of platforms on dedicated land	Platform	31
Number of platforms on *khas* land acquired by Govt	Platform	13
Landless households on Abdullahpur Dokkhin Char platforms	HH	1,000
Landless households on Anandapur platform	HH	250
Households on dedicated platforms	HH	5,000

FIGURES

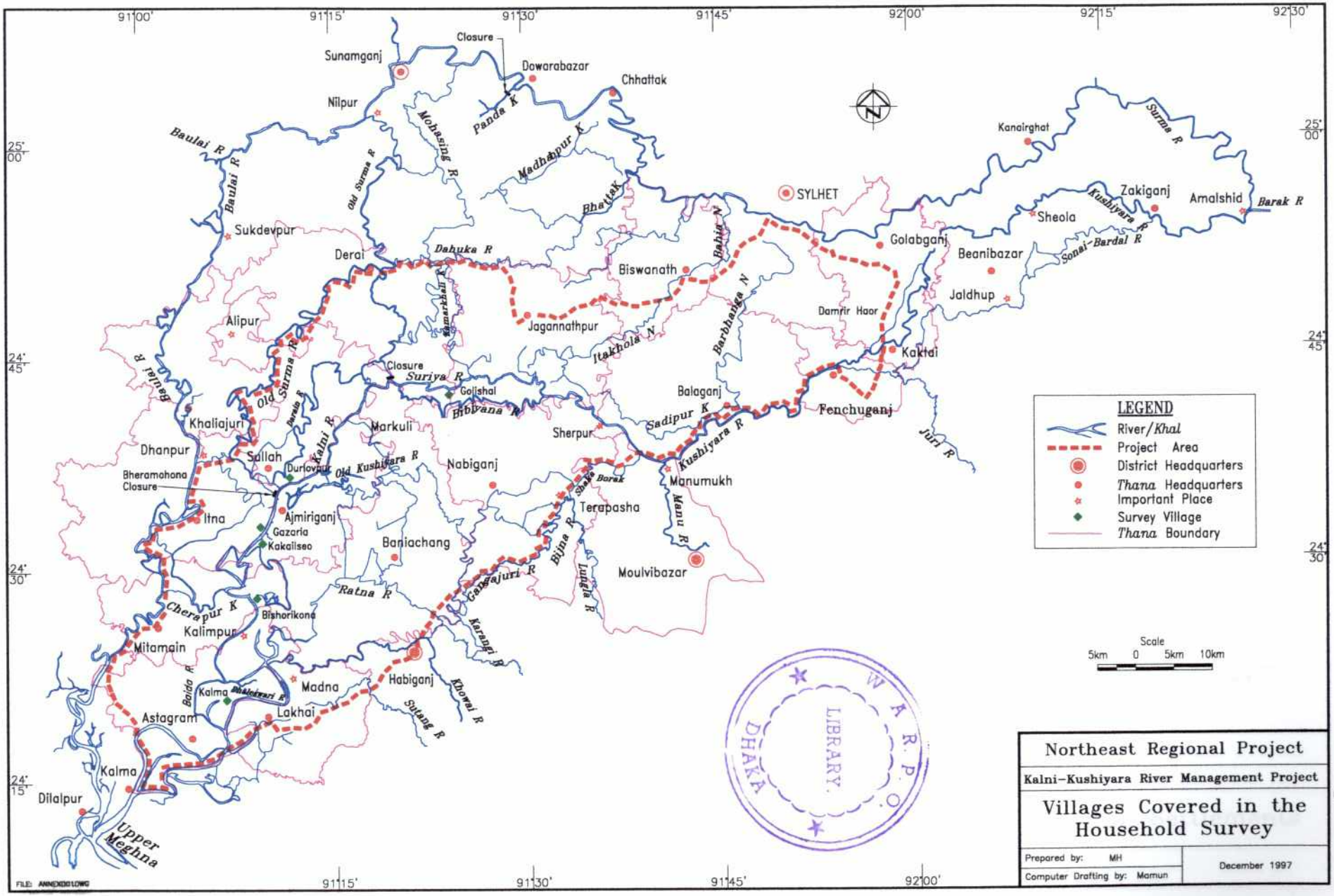
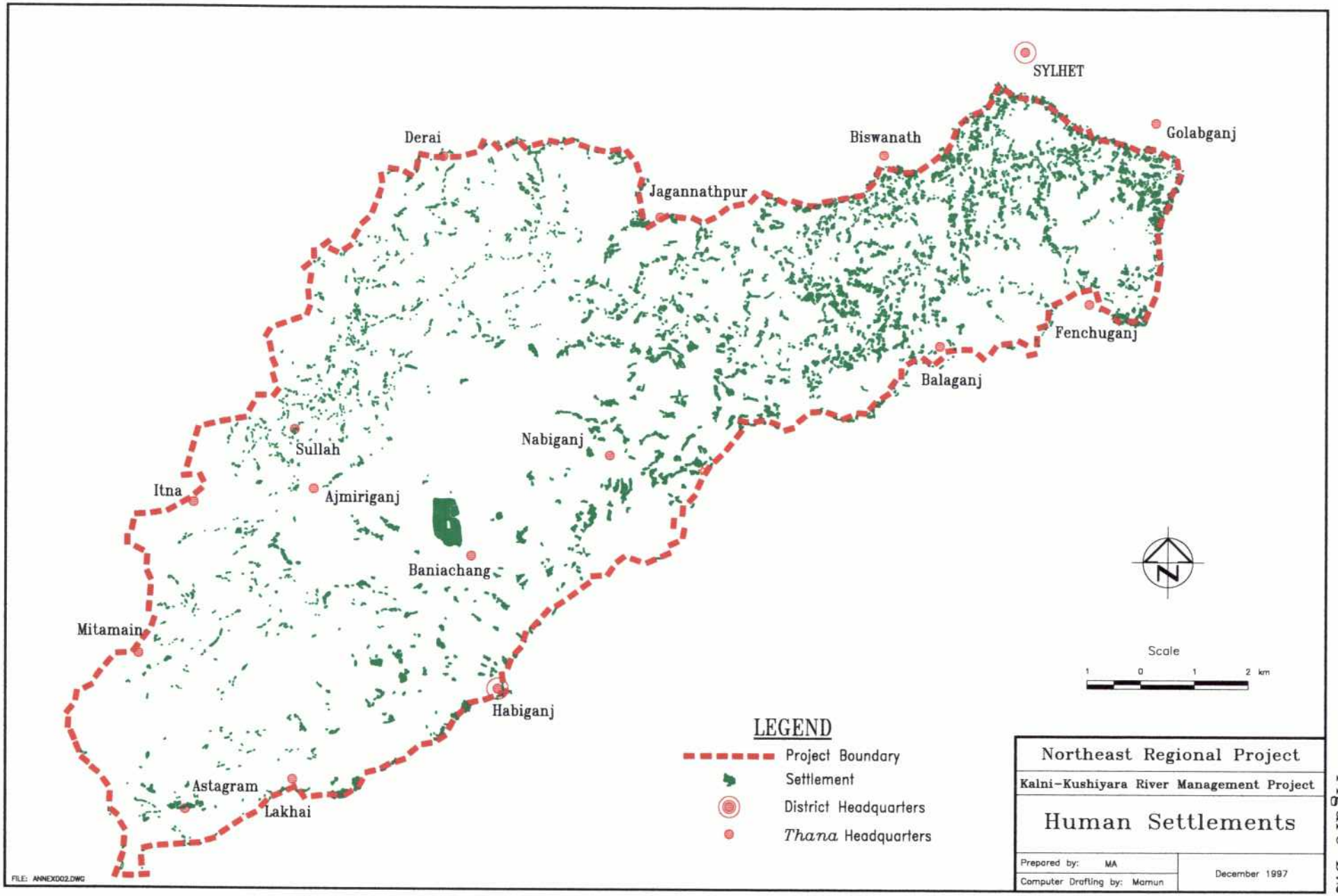


Figure D.1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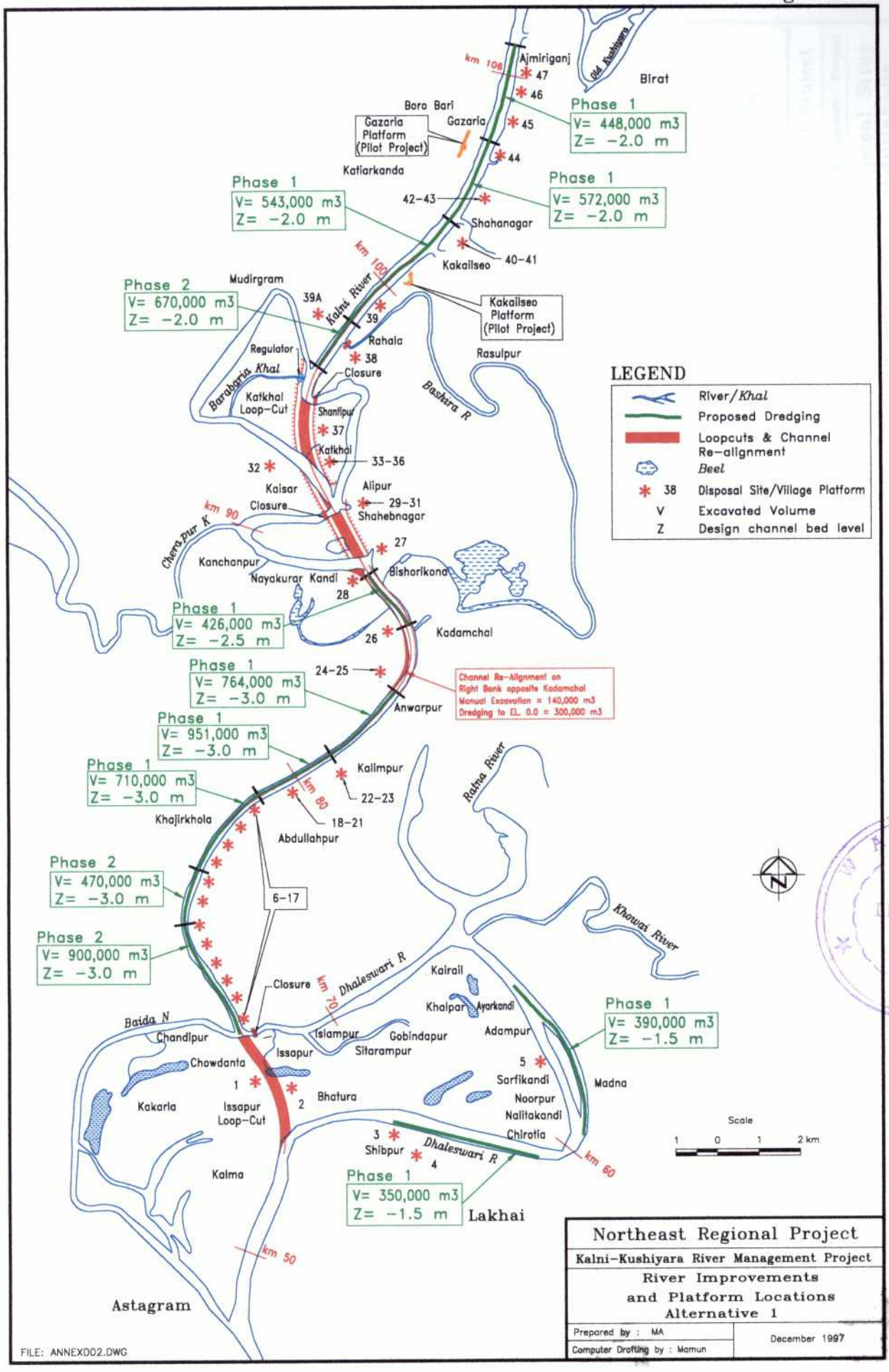
Derai
Biswanath
Golabganj
Jagannathpur
Fenchuganj
Balaganj
Nabiganj
Sullah
Itna
Ajmiriganj
Baniachang
Mitamain
Habiganj
Astagram
Lakhai
N
Scale
1 0 1 2 km
LEGEND
Project Boundary
Settlement
District Headquarters
Thana Headquarters
Northeast Regional Project
Kalni-Kushiyara River Management Project
Human Settlements
Prepared by: MA
Computer Drafting by: Mamun
December 1997
FILE: ANNEX002.DWG

Figure D.2

Figure D.3


Ajmiriganj
Old Kushiyara
Birat
km 106
47
46
Boro Bari
Gazaria
Gazaria Platform (Pilot Project)
45
44
Katiarkanda
Phase 1
V= 448,000 m3
Z= -2.0 m
Phase 1
V= 543,000 m3
Z= -2.0 m
42-43
Shahanagar
Phase 1
V= 572,000 m3
Z= -2.0 m
km 100
Kakailseo
40-41
Kakailseo Platform (Pilot Project)
Mudirgram
Phase 2
V= 670,000 m3
Z= -2.0 m
39A
Kalni River
39
Rahala
38
Regulator
Closure
Barabaria Khal
Katkhal Loop-Cut
Rasulpur
Bashira R
Shantipur
37
Katkhal
33-36
32
Kaisar
Closure
Alipur
29-31
Shahebnagar
km 90
Chera pur K
27
Kanchanpur
Nayakurar Kandi
Bishorikona
28
Phase 1
V= 426,000 m3
Z= -2.5 m
26
Kadamchal
Phase 1
V= 764,000 m3
Z= -3.0 m
24-25
Channel Re-Alignment on Right Bank opposite Kadamchal
Manual Excavation = 140,000 m3
Dredging to EL. 0.0 = 300,000 m3
Anwarpur
Phase 1
V= 951,000 m3
Z= -3.0 m
Phase 1
V= 710,000 m3
Z= -3.0 m
Kalimpur
22-23
km 80
Rahna River
Khajirkhola
18-21
Abdullahpur
Phase 2
V= 470,000 m3
Z= -3.0 m
6-17
Phase 2
V= 900,000 m3
Z= -3.0 m
Closure
km 70
Dhaleswari R
Kairail
Khalpar
Ayarkandi
Khowai River
Baida N
Chandipur
Islampur
Gobindapur
Adampur
Sitarampur
Issapur
Phase 1
V= 390,000 m3
Z= -1.5 m
Chowdanta
5
Sarfikandi
Madna
1
2
Bhatura
Kakaria
Issapur Loop-Cut
Noorpur
Nalitakandi
Chirotia
3
Shibpur
4
Dhaleswari R
km 60
Kalma
Phase 1
V= 350,000 m3
Z= -1.5 m
Lakhai
km 50
Astagram
LEGEND
River/Khal
Proposed Dredging
Loopcuts & Channel Re-alignment
Beel
38 Disposal Site/Village Platform
V Excavated Volume
Z Design channel bed level
Scale
1 0 1 2 km
N
W A R P O
LIBRARY
DHAKA
Northeast Regional Project
Kalni-Kushiyara River Management Project
River Improvements and Platform Locations
Alternative 1
Prepared by : MA
Computer Drafting by : Mamun
December 1997
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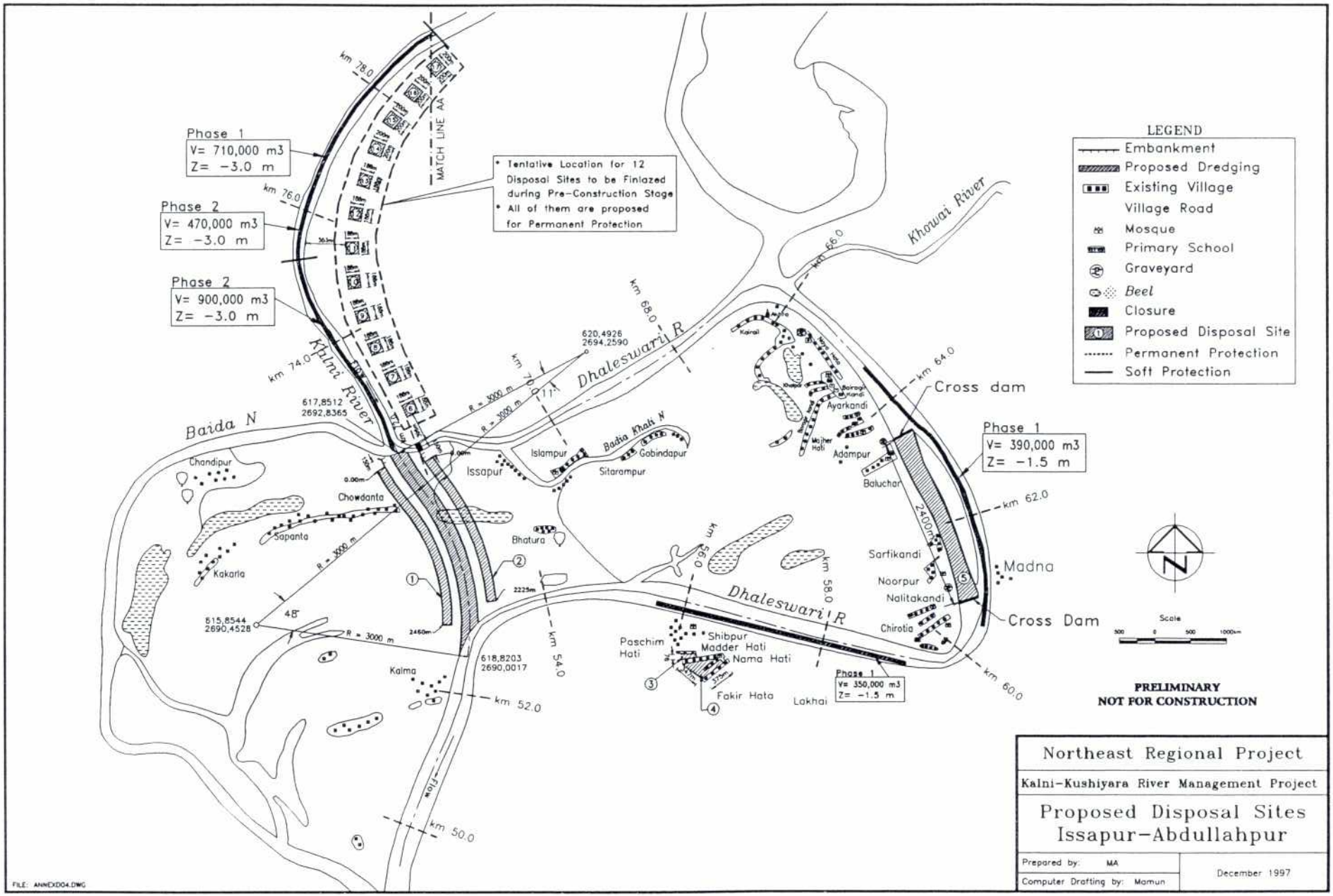


Northeast Regional Project	
Kalni-Kushiyara River Management Project	
Proposed Disposal Sites Issapur-Abdullahpur	
Prepared by: MA	December 1997
Computer Drafting by: Momun	

Figure D.4

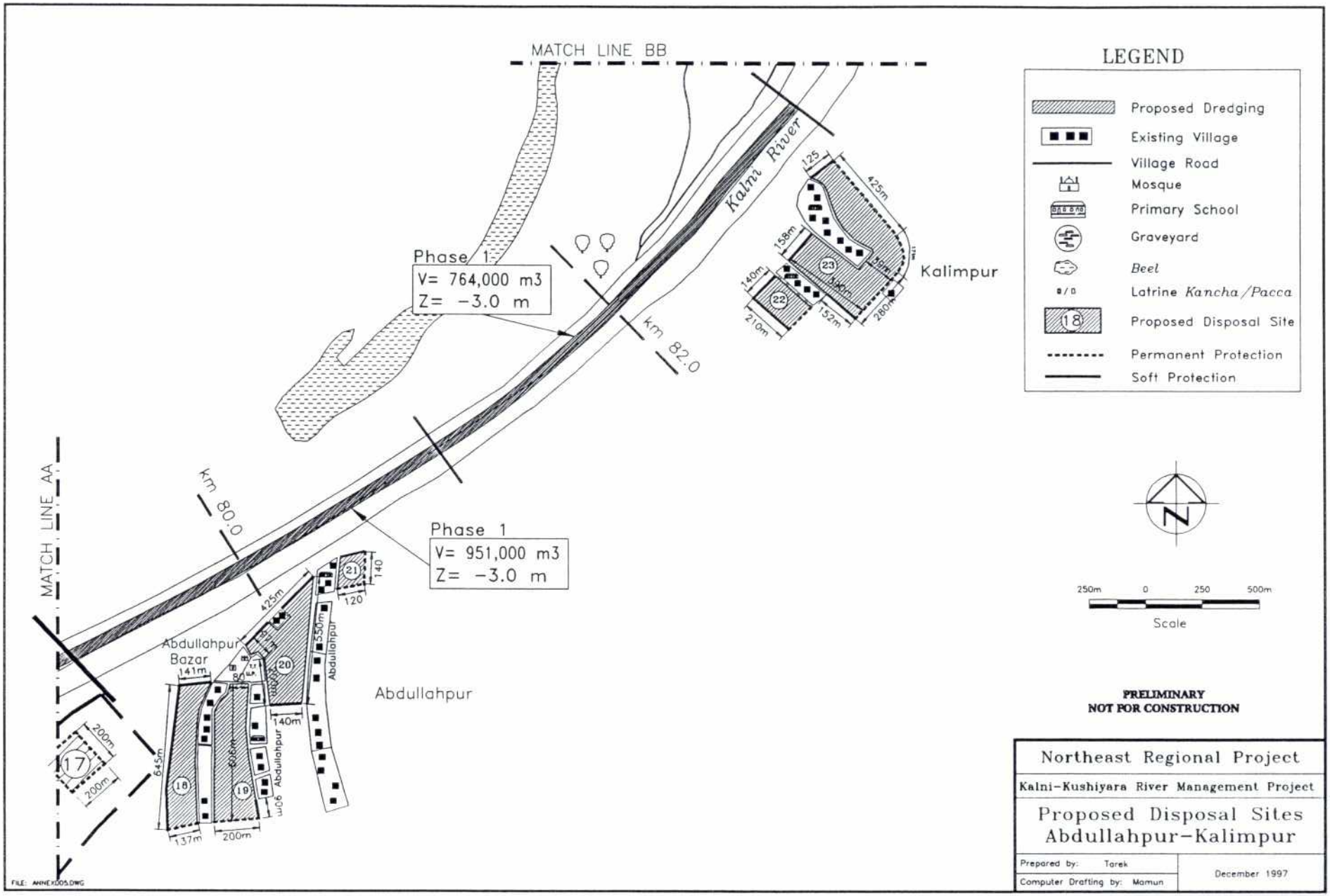

MATCH LINE BB
MATCH LINE AA
Kalni River
Kalimpur
Abdullahpur
Abdullahpur Bazar
Phase 1
V= 764,000 m3
Z= -3.0 m
Phase 1
V= 951,000 m3
Z= -3.0 m
km 80.0
km 82.0
LEGEND
Proposed Dredging
Existing Village
Village Road
Mosque
Primary School
Graveyard
Beel
Latrine Kancha/Pacca
Proposed Disposal Site
Permanent Protection
Soft Protection
N
250m 0 250 500m
Scale
PRELIMINARY
NOT FOR CONSTRUCTION
Northeast Regional Project
Kalni-Kushiyara River Management Project
Proposed Disposal Sites
Abdullahpur-Kalimpur
Prepared by: Tarek
Computer Drafting by: Mamun
December 1997
FILE: ANNEX005.DWG

Figure D.5

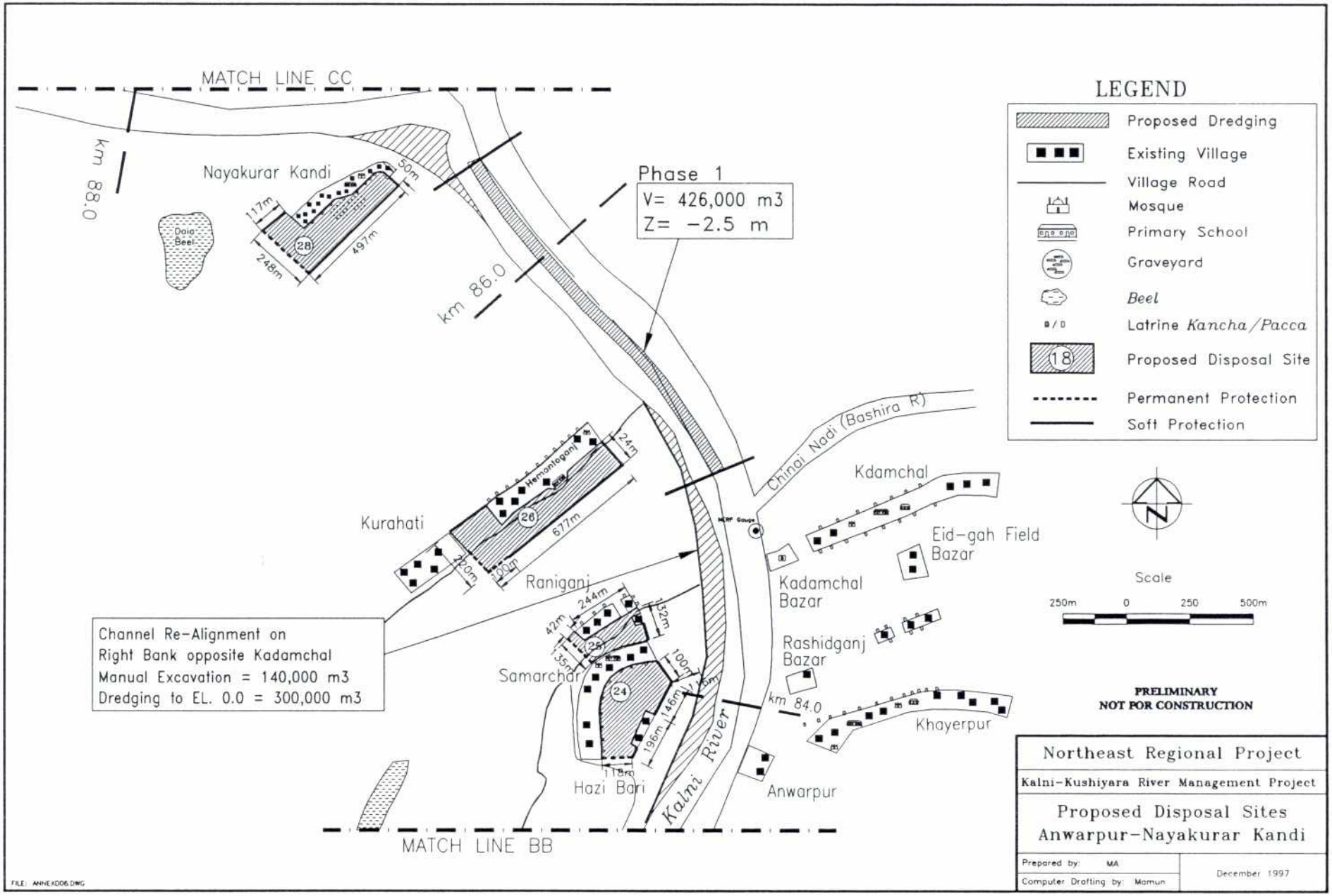
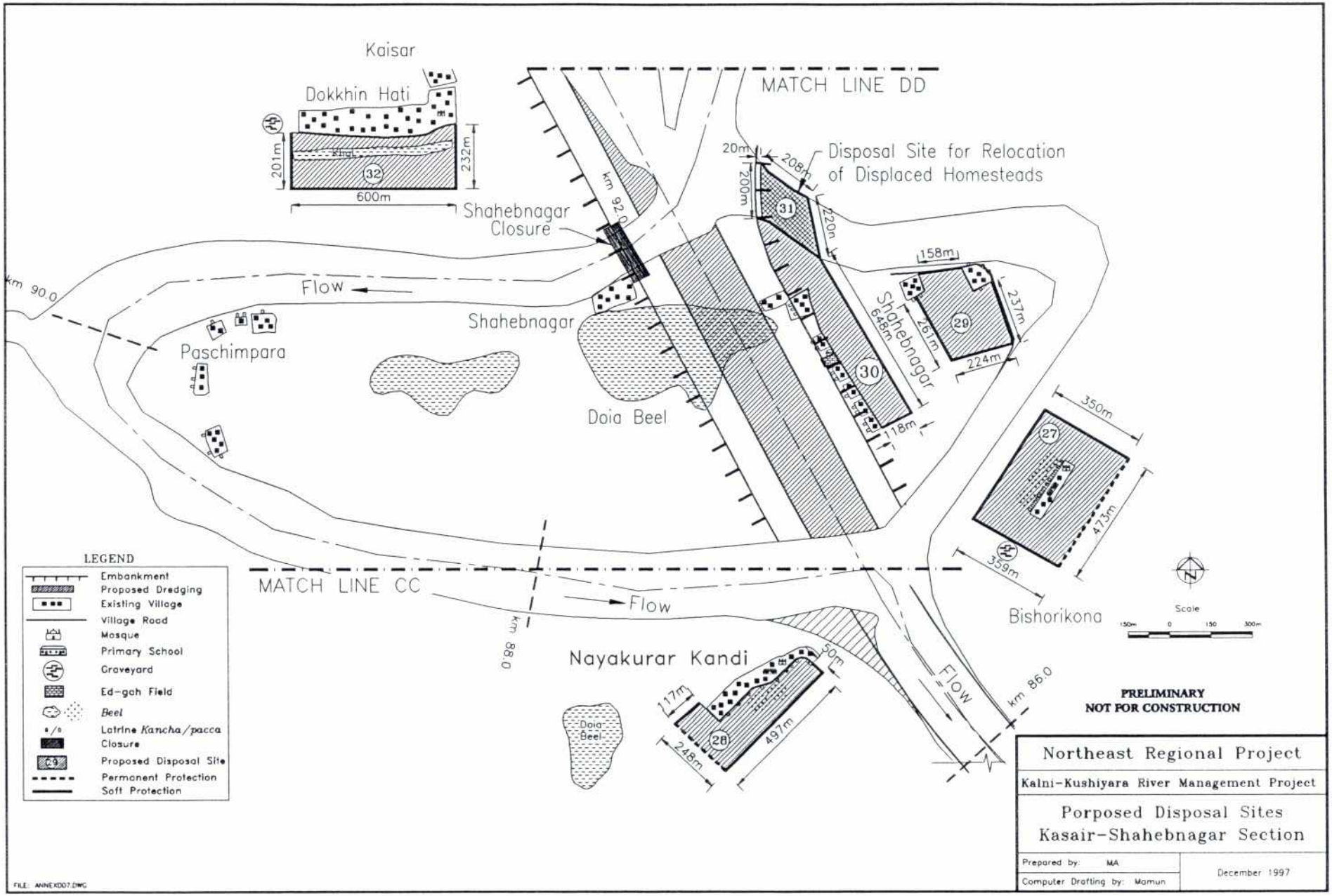
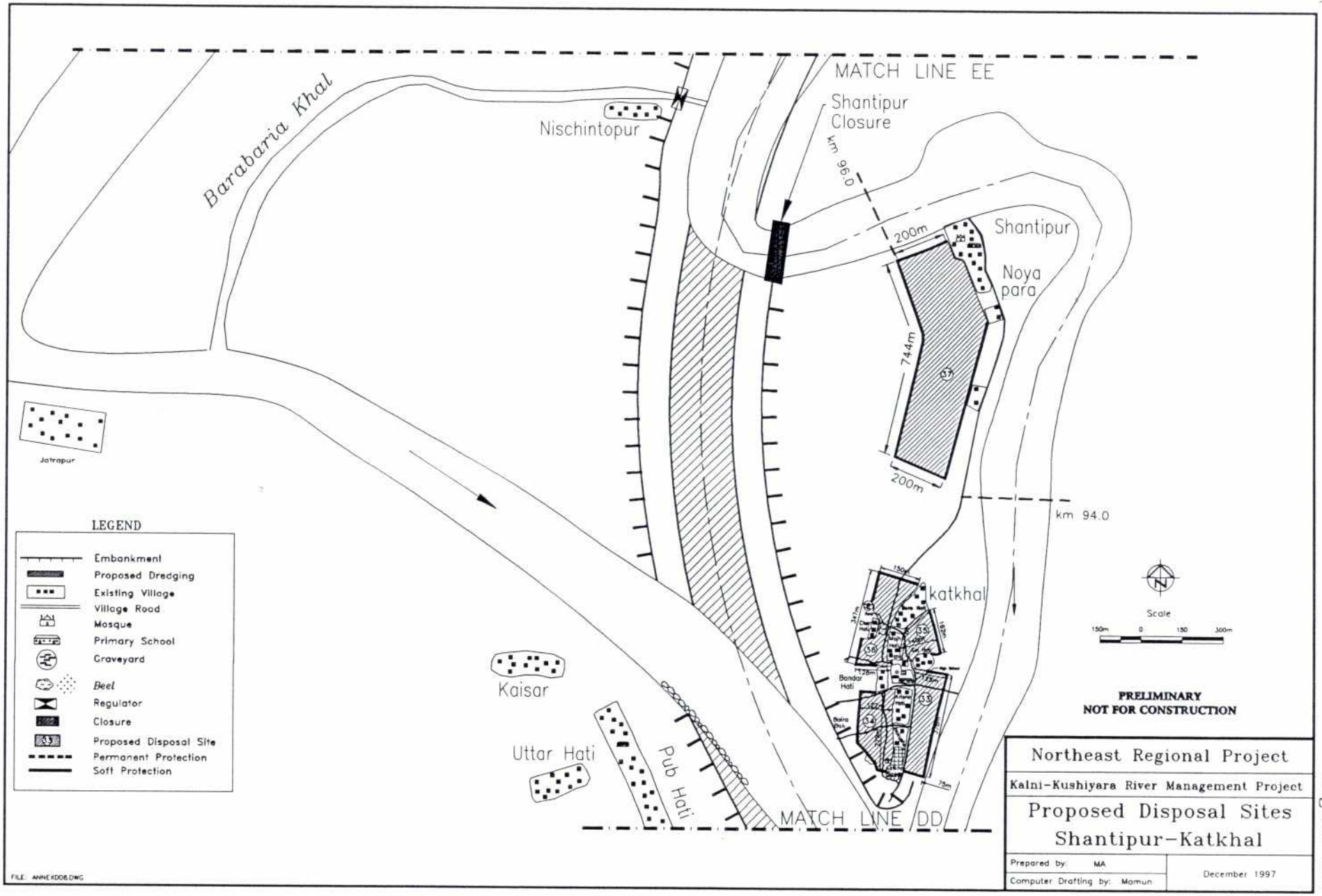

MATCH LINE CC
km 88.0
Nayakurar Kandi
Daia Beel
117m
248m
497m
90m
28
Phase 1
V= 426,000 m3
Z= -2.5 m
km 86.0
Hemantoganj
24m
677m
26
Kurahati
220m
90m
Raniganj
244m
42m
35m
25
132m
100m
Samarchar
24
146m
196m
118m
Hazi Bari
Kalni River
MATCH LINE BB
Channel Re-Alignment on
Right Bank opposite Kadamchal
Manual Excavation = 140,000 m3
Dredging to EL. 0.0 = 300,000 m3
Chinai Nadi (Bashira R.)
MSRP Gauge
Kdamchal
Eid-gah Field
Bazar
Kadamchal
Bazar
Rashidganj
Bazar
km 84.0
Khayerpur
Anwarpur
LEGEND
Proposed Dredging
Existing Village
Village Road
Mosque
Primary School
Graveyard
Beel
Latrine Kancha/Pacca
18
Proposed Disposal Site
Permanent Protection
Soft Protection
N
Scale
250m 0 250 500m
PRELIMINARY
NOT FOR CONSTRUCTION
Northeast Regional Project
Kalni-Kushiyara River Management Project
Proposed Disposal Sites
Anwarpur-Nayakurar Kandi
Prepared by: MA
Computer Drafting by: Mamun
December 1997
FILE: ANNEXD06.DWG

Figure D.6



284

Figure D.7



Northeast Regional Project

Kalni-Kushiyara River Management Project

Proposed Disposal Sites
Shantipur-Katkhal

Prepared by: MA	December 1997
Computer Drafting by: Mamun	

Figure D.8

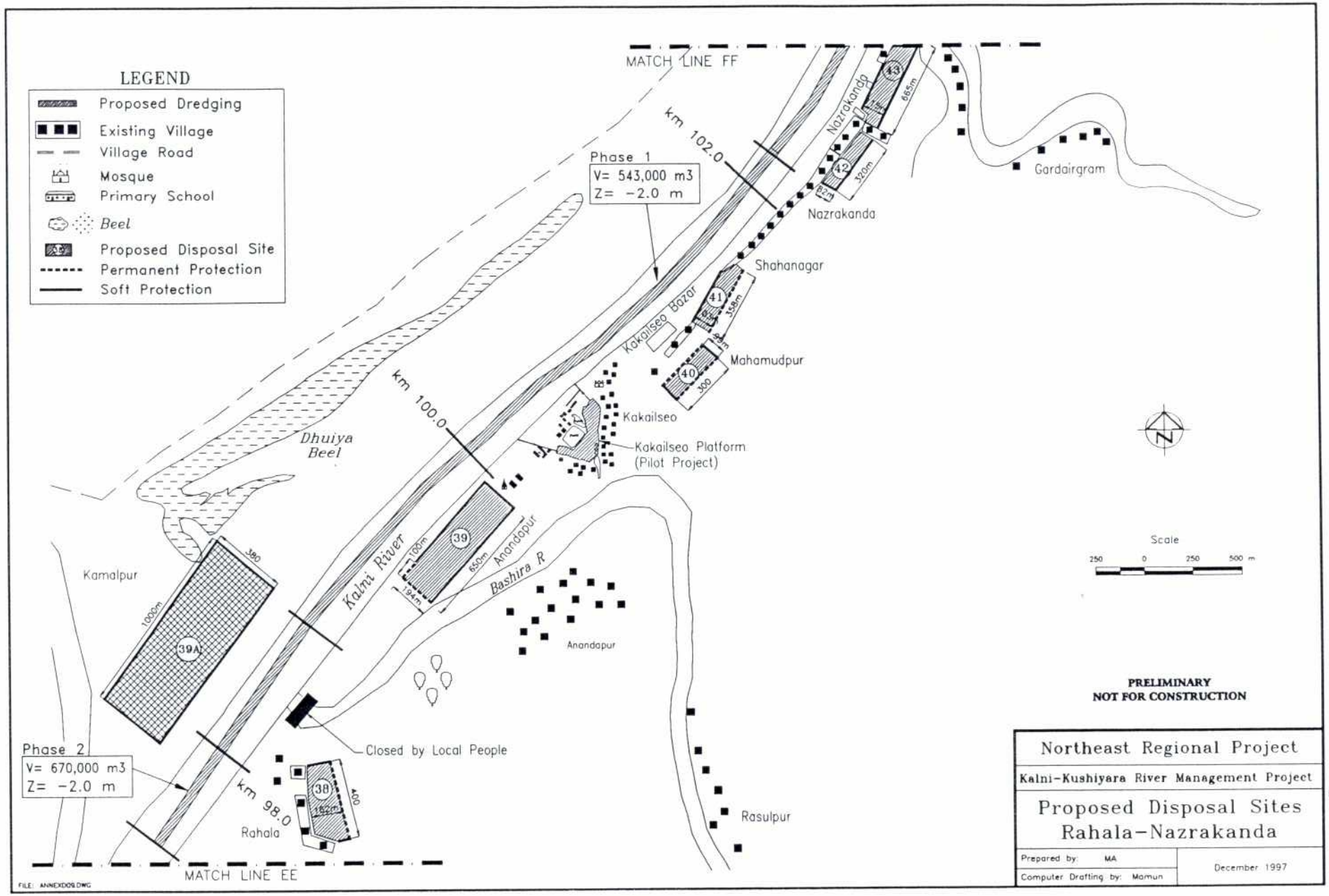

LEGEND
Proposed Dredging
Existing Village
Village Road
Mosque
Primary School
Beel
Proposed Disposal Site
Permanent Protection
Soft Protection
MATCH LINE FF
MATCH LINE EE
km 102.0
km 100.0
km 98.0
Phase 1
V= 543,000 m3
Z= -2.0 m
Phase 2
V= 670,000 m3
Z= -2.0 m
Nazrakanda
Gardairgram
Shahanagar
Kakailseo Bazar
Mahamudpur
Kakailseo
Kakailseo Platform
(Pilot Project)
Dhuiya
Beel
Kalni River
Bashira R
Anandapur
Kamalpur
Rahala
Rasulpur
Closed by Local People
Scale
250 0 250 500 m
PRELIMINARY
NOT FOR CONSTRUCTION
Northeast Regional Project
Kalni-Kushiyara River Management Project
Proposed Disposal Sites
Rahala-Nazrakanda
Prepared by: MA
Computer Drafting by: Mamun
December 1997
FILE: ANNEXDOS.DWG

Figure D.9

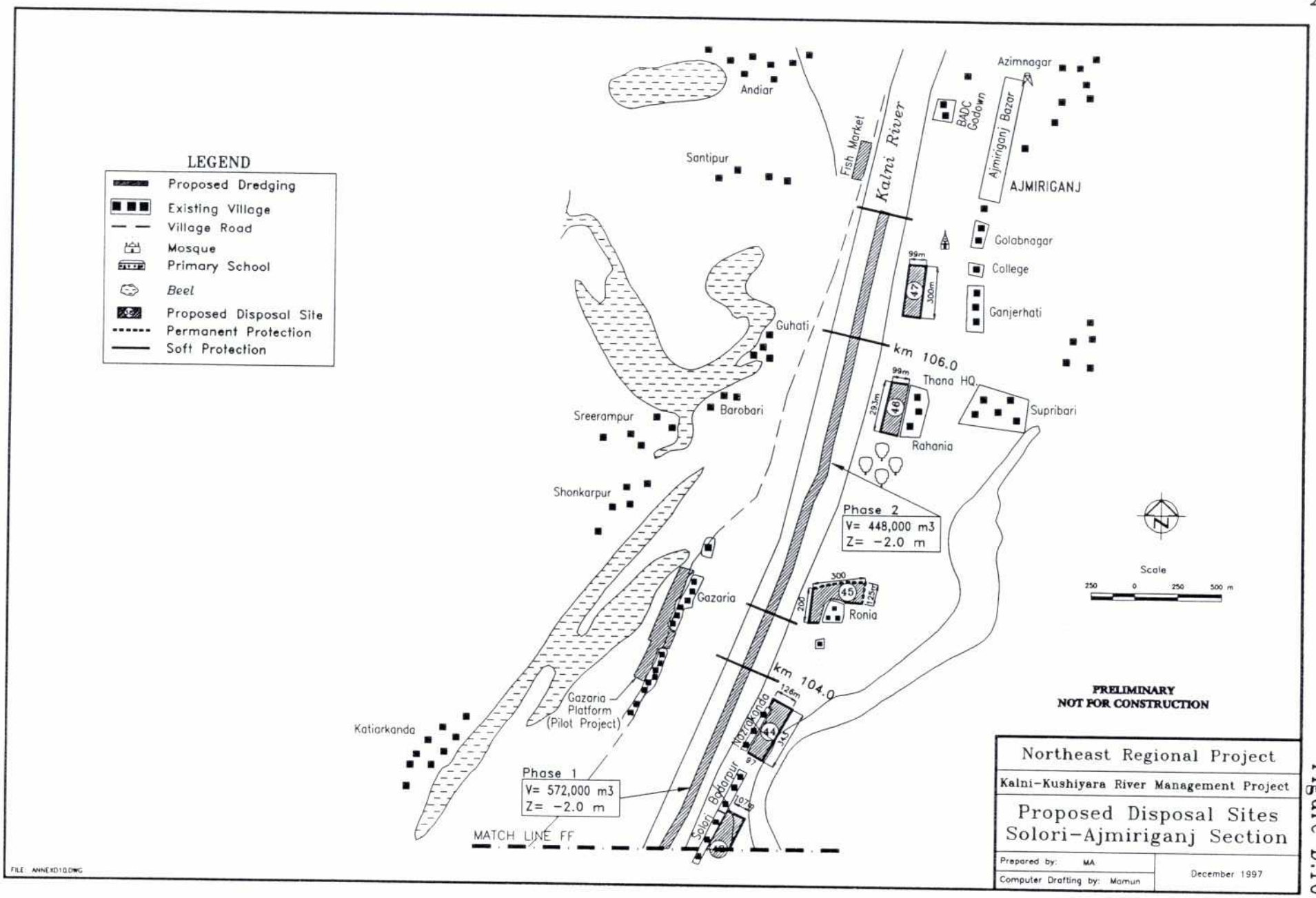

LEGEND
Proposed Dredging
Existing Village
Village Road
Mosque
Primary School
Beel
Proposed Disposal Site
Permanent Protection
Soft Protection
Andiar
Santipur
Fish Market
Kalni River
BADC Godown
Azimnagar
Ajmiriganj Bazar
AJMIRIGANJ
Golabnagar
College
Ganjerhati
Guhati
km 106.0
Thana HQ.
Supribari
Rahania
Barobari
Sreerampur
Shonkarpur
Phase 2
V= 448,000 m3
Z= -2.0 m
Gazaria
Ronia
km 104.0
Gazaria Platform (Pilot Project)
Katiarkanda
Phase 1
V= 572,000 m3
Z= -2.0 m
MATCH LINE FF
Solori Bdarpur
N
Scale
250 0 250 500 m
PRELIMINARY
NOT FOR CONSTRUCTION
Northeast Regional Project
Kalni-Kushiyara River Management Project
Proposed Disposal Sites
Solori-Ajmiriganj Section
Prepared by: MA
Computer Drafting by: Mamun
December 1997
FILE: ANNEXD10.DWG

Figure D.10