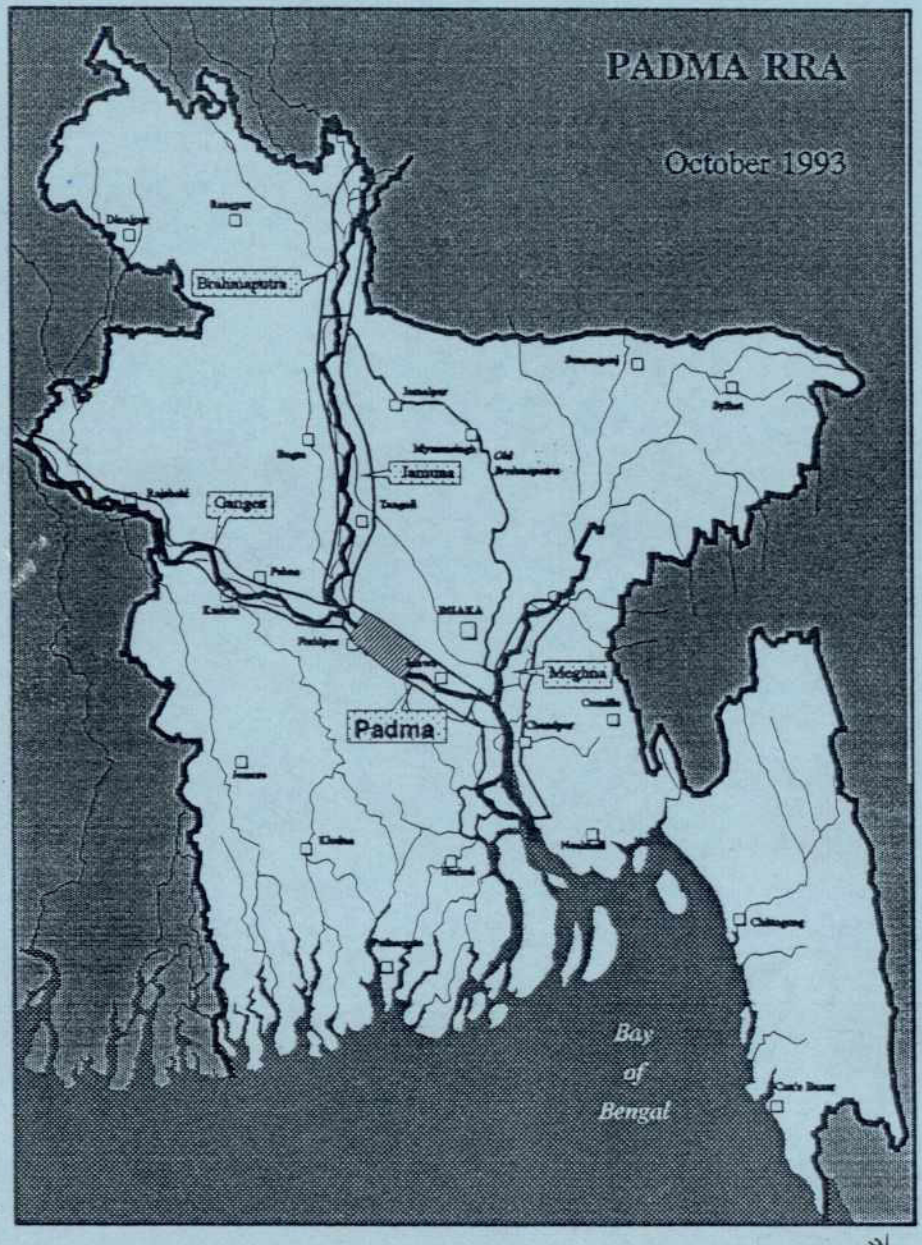
BANGLADESH FLOOD ACTION PLAN

Prepared for
The Flood Plan Coordination Organization (FPCO)
of the
Ministry of Irrigation Water Development and Flood Control

CHARLAND STUDY SUPPORTING REPORT



Environmental Study (FAP 16)
Geographic Information System (FAP 19)

ISPAN
IRRIGATION SUPPORT PROJECT FOR ASIA AND THE NEAR EAST
Sponsored by the U.S. Agency for International Development

BANGLADESH FLOOD ACTION PLAN

CHARLAND STUDY SUPPORTING REPORT: PADMA RRA

ENVIRONMENTAL STUDY (FAP 16)
GEOGRAPHIC INFORMATION SYSTEM (FAP 19)

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October 1993

ISPAN
IRRIGATION SUPPORT PROJECT FOR ASIA AND THE NEAR EAST
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PREFACE

This report is one in a series of reports covering the immediate riverine lands of the major rivers of Bangladesh—the Jamuna, Ganges, Padma, and Meghna. Riverine charlands are defined in this study as areas frequently subject to erosion and accretion within and adjacent to the main rivers of Bangladesh and unprotected by embankments. This report presents the results of a rapid rural appraisal designed to provide social and economic information to support the inventory of population and resources in the charlands of the Padma River. The study was carried out by ISPAN under Flood Action Plan Supporting Studies FAP 16 (Environmental Study) and FAP 19 (Geographic Information System).

The full set of reports is shown in the table below.

Overview Reports	Inventory Reports	Supporting Reports
Summary Report		
Socioeconomic Overview		
	The Dynamic Physical and Human Environment of Riverine Charlands: Brahmaputra-Jamuna	Upper Jamuna (Brahmaputra) RRA Middle Jamuna RRA
	The Dynamic Physical and Human Environment of Riverine Charlands: Meghna	Upper Meghna RRA Meghna Confluence RRA
	The Dynamic Physical and Human Environment of Riverine Charlands: Padma	***Padma RRA***
	The Dynamic Physical and Human Environment of Riverine Charlands: Ganges	Ganges RRA
	Charland Flood Proofing	

ACKNOWLEDGEMENTS

The production of this report, the result of a team effort involving many of the staff of FAP 16, was overseen by Dr. Keith Pitman, Chief of Party, ISPAN.

The study was jointly coordinated by Dr. Mustafa Alam and Dr. Suzanne Hanchett. It involved very intensive fieldwork under rather difficult circumstances, and those who performed this work are gratefully acknowledged. The contents of the report are based primarily on information obtained from people living in the charlands, all of whom were extremely helpful in patiently providing the necessary information. Interviews were also held with government officials and NGO field workers. The cooperation of all these participants is also gratefully acknowledged.

We are grateful to the Flood Plan Coordination Organization and to its Panel of Experts for providing overall direction to this study.

GLOSSARY

acre	-	Acre = 0.4047 ha
aman	-	Late monsoon season paddy planted before or during the monsoon and harvested November-December
amin	-	Land surveyor
arat	-	Wholesale shop
aratdar	-	Wholesale trader with warehouse
aus	-	Early monsoon paddy planted in March-April and harvested in June-July
B. aman	-	Broadcast aman paddy, usually grown in deeper water
bangsha	-	Lineage-mates
BARC	-	Bangladesh Agricultural Research Council
bari	-	A homestead, usually consisting of more than one structure arranged around a central common area
BBS	-	Bangladesh Bureau of Statistics
BDR	-	Bangladesh Rifles
beel	-	An area of open water away from a river
bhatiya	-	People from downstream
BIDS	-	Bangladesh Institute of Development Studies
bigha	-	A local unit of area most commonly equalling 0.33 acre or 0.14 ha
bir	-	Stable
boro	-	Dry season paddy transplanted in December-January and harvested in April-May
BRAC	-	Bangladesh Rural Advancement Committee
BTM	-	Bangladesh Transverse Mercator (map projection)
BUET	-	Bangladesh University of Engineering and Technology
bustee	-	Slum
BWDB	-	Bangladesh Water Development Board
catkin grass	-	*Saccharum* spp. grasses that are prevalent in the charlands
chaura	-	Original settlers in the Ganges char areas
china	-	*Panicum miliaceum*, a variety of millet
chowki	-	Bed/platform
cumecs	-	Cubic meters per second
dacoit	-	Bandit
dal	-	Any of a variety of pulses (lentils); a high-protein food staple usually eaten with rice
decimal	-	Unit of area equal to 0.01 acre
denga	-	Land near a river
desh	-	State
deshi	-	Original settlers in Ganges char area
DEM	-	Digital elevation model
dhaincha	-	*Sesbania aculeata*, a nitrogen-fixing plant used as live fencing, fuel, and building material
diara	-	The low bank of a river
district	-	A large administration unit under the authority of a Deputy Commissioner, now known as a zila
doba	-	Submerged
EIA	-	Environmental Impact Assessment
FAP	-	Flood Action Plan

FCD/I	-	Flood Control and Drainage or Flood Control, Drainage, and Irrigation
fitkiri	-	Alum
FPCO	-	Flood Plan Co-ordination Organization
FWC	-	Family Welfare Centre
GIS	-	Geographic Information System
GPS	-	Global Positioning System
goala	-	Person trading in dairy products
gur	-	Locally produced molasses
gushti	-	Lineage-mates
haor	-	Deeply flooded basin of NE Bangladesh
hat	-	Periodic market
hectare (ha)	-	Hectare = 2.4711 acres
hogla	-	A bulrush (*Typhus angustata*) used for making mats
HSC	-	Higher Secondary Certificate
HTW	-	Hand tubewell
HYV	-	High Yielding Variety
ISPAN	-	Irrigation Support Project for Asia and the Near East
jangal	-	Ground cover shrubs used for fuel and as herbs
jhau	-	Tamarisk bush used as fuel and an herb
jotedar	-	Landlord
JPPS	-	Jamalpur Priority Project Study
kabiraj	-	Traditional healer
kaisha	-	A variety of catkin grass (*Saccharum spontaneum*) giving three cuttings a year
kani	-	Local unit of measure equal to .13 ha (.33 acres)
karati	-	Saw operator
kash	-	*kaisha*
kayem, kayemi	-	Permanent, old, or established
kaon	-	Fox-tail millet
khas	-	Publicly owned
kheya	-	Local boat landing point
khal	-	A drainage channel or canal either natural or man-made
kharif	-	Summer/wet season
kilogram (kg)	-	Kilogram = 1.11 sheer
kilometer (km)	-	Kilometer = 0.625 miles
kutcha	-	Flimsy construction of a temporary nature, in the chars usually of grass, bamboo, straw, or similar materials
lathiyal	-	A stick-wielding private army employed to carry out the will of a locally powerful leader
macha	-	A raised platform
mashkalai	-	A type of pulse (lentil); see *dal*
matbar	-	Leader of the local community
maund	-	A unit of weight, 1 Maund = 40 sheer = 37.5 kilograms
mauza	-	A village revenue collection and cadastral mapped unit
MCSP	-	Multipurpose Cyclone Shelter Program
mile (mi)	-	Mile = 1.6 kilometers
MPO	-	Master Plan Organization (of Ministry of Irrigation Water Development and Flood Control), now called WARPO (see below)
MSS	-	Multi-Spectral Scanner (Landsat satellite sensor)

musur	-	A type of pulse (lentil); see *dal*
nara	-	Straw
NGO	-	Non-Government Organization
PACT	-	Private Agencies Collaborating Together
paiker	-	Wholesale trader
para	-	Neighborhood
PoE	-	Panel of Experts (of FPCO)
pourashava	-	a municipality, usually the urban center of a district
pucca	-	Sturdy construction of a permanent nature, usually of such materials as brick, concrete, or corrugated iron sheets
rabi	-	Winter/Dry Season
RDRS	-	Rangpur Dinajpur Rural Service (an NGO)
REIS	-	Riverbank Erosion Impact Study
return period	-	average interval in years between floods of a given magnitude
RRA	-	Rapid rural appraisal
sadar	-	The urban core (administrative headquarters town) of a thana or district
salish	-	local informal court
samaj	-	Society, community; a formal arrangement between members of a community whereby each member has certain rights and privileges
sarik	-	Lineage-mates
SCI	-	Service Civil International (an NGO)
shabuk	-	Ancient
sheer	-	A unit of weight = 1/40 maund = 0.94 kg
shon	-	A variety of grass (*Imperata cylindica*) giving one cutting a year; also a generic term for thatching grass
SPARRSO	-	Space Research and Remote Sensing Organization
SPOT	-	System Pour Observation de la Terre
SRDI	-	Soil Resources Development Institute
SSC	-	Secondary School Certificate
tahsil office	-	Local land record and survey office
Taka (Tk.)	-	Bangladesh currency, US$ 1 equalled approximately Tk. 40 in late 1992-early 1993
T. aman	-	Transplanted aman paddy
thana	-	A sub-division of a zila, or district
til	-	Sesame (*Sesamum indicum*)
tishi	-	Linseed
TM	-	Thematic Mapper
ton	-	An imperial ton = 1,016 kg
union	-	Sub-division of a thana
upazila	-	Previous name for a thana (subdivision of a zila or district)
ustha	-	Bitter gourd (*Momardica charantia*)
uthuli	-	An informal contract between a landholder and a temporary migrant, under which the migrant is allowed to shelter on the landowner's property in exchange for labor services
WARPO	-	Water Resources Planning Organization
zamindar	-	Landlord
zila	-	A large administration unit formerly known as a district

EXECUTIVE SUMMARY

The chars and mainland adjacent to the main rivers are prone to the twin hazards of floods and erosion, which destroy crops, homesteads, and land, and bring death and suffering to their inhabitants. This rapid rural appraisal (RRA) investigated social and economic conditions in an area of island chars and nearby mainland (including mainland separated from adjoining areas by secondary channels) in the Padma River.

The study found that most of the land in the island chars visited had accreted in the past few years, but they had also experienced erosion. Satellite images show that the river channel has been widening in the past decade, and this was evident in the attached char villages, which have experienced considerable erosion in recent years resulting not only in loss of agricultural land but also displacement of households and loss of infrastructure.

The uncertain life of these chars, and their low productivity, are probably the main reasons why most of the island char land (and to a lesser extent the attached char land) is controlled by a few large landowners and locally powerful people. Many of the char people are completely landless and in addition to sharecropping land they rent homestead land from the landowners, who arrange the settlement of chars and allocation of land. These patrons thus have a body of supporters, and are able to claim new areas of land when they emerge. In return, the poor char people avoid the risk of losing their land to frequent erosion, and can obtain access to land (albeit on unfavorable terms) when it emerges.

Soils are very sandy and low-lying in most of the island char areas, resulting in low cropping intensities dominated by local boro, aus, and groundnuts. The attached chars are less low-lying and support more intensive agriculture characterized by mixed aus and aman and a range of rabi crops. Financial returns per hectare to family labor appear to be low throughout the area, and are lower in the island chars—even when the risk of loss from natural hazards is ignored. Livestock are a critical component of the farming system since much of the island char land is underwater in a normal monsoon, and cattle can be kept in the homesteads and stall-fed. Livestock numbers are relatively high, but the extent to which the poor benefit is limited as many raise cattle under a share system.

Over half of homesteads in the study villages earn a living for at least part of the year from fishing. The majority use bamboo traps within the char areas where access is free and uncontrolled and a modest income can be made. There are also locally important *hilsha* and fry fisheries in the area, so that in total the value of fish caught is substantial. It is possible that the fry fishery is depleting the stock, and this will need to be monitored and fishermen involved in managing their resource if this important livelihood is to be sustainable.

Quality of life is notably poorer in the island chars than the attached chars, with many more households per hand tubewell, often lower food availability, long distances to primary health care centers (which are separated by river journeys), fewer schools, and poor access to local government.

It is difficult to make recommendations that would make major improvements to the lives of most char people in the Padma area without suggesting changes to the existing power structure, and attempts to change the power structure are likely to make life worse for the poor in the short term and perhaps even be doomed to failure.

Priorities should be to reduce vulnerability of the poor and to enable them to create assets and get a return that is adjusted to the hazards of erosion and flood. Given constraints on agriculture in this area and the disincentive of sharecropping, and similarly the lack of incentive to plant trees,

efforts to improve agricultural or long-term homestead production may not be effective.

One advantage that the area has is its proximity to Dhaka, which has attracted the attention of a number of NGOs. The following possible measures might be further developed and tested by public agencies and NGOs in the area:

- assistance for livestock rearing to increase value added for char people from one of their few abundant resources—catkin grass—could include: credit, a search for naturally/locally available concentrates, and improved livestock treatment services;
- access to low cost credit and assistance for fishermen to form groups and increase their bargaining power, plus secure access to fishing grounds for those with licenses would help the substantial number of fishermen in the area;
- there may be some scope to improve agricultural returns through better marketing opportunities and increased cultivation of high-value crops such as vegetables or watermelons;
- to improve coping ability in floods and erosion events, engine boat services could be subsidized for the poor through local government contracts; this would enable speedier and cheaper evacuation of people, homesteads and cattle; and
- flood shelters would help the island char people, but would need to be located where land is most stable, in some places earth mounds might be possible, but it might be safer to widen embankments to create less erosion-prone evacuation sites for people and cattle. If this is the case then improvements to boat services will be even more important.

Chapter 1

INTRODUCTION

1.1 Background to the Study

1.1.1 History

The original design of the Flood Action Plan (World Bank, 1989) included among its components a socioeconomic study of the active floodplains of the Brahmaputra-Jamuna, Ganges, Padma, and Meghna rivers. The active floodplain was defined at that time as areas within the main river channels and nearby areas of mainland, both of which are frequently subject to erosion and accretion and cannot be protected from floods. The aims of the active floodplain study were to:

- assess present agricultural practices, settlement patterns, and disaster responses;
- estimate the number of affected households living on chars (mid-channel islands created by accretion) and within a short distance of the river banks;
- estimate the number of households living on existing embankments; and
- prepare guidelines to be used in feasibility studies to ensure that in project planning full account is taken of the active floodplain populations.

As the detailed terms of reference (TOR) of FAP 14, the Flood Response Study, were being drawn up by the government of Bangladesh and finalized with donor agencies, it became apparent that the intended study would not immediately be possible. A more general study was first needed to establish—for the full range of flood environments inside and outside the chars—the context in which flood response occurred. In addition, the active floodplain study required the use of remote sensing data and satellite image interpretation, but the facilities and trained staff to achieve this within the FAP would not be ready until at least late 1991.

During 1991, the first full year of FAP studies, it became clear that regional studies were unable to devote sufficient resources to the specialized work of socioeconomic studies of the active floodplain. Most used the main rivers as their study area boundaries. Of the regional FAP studies only FAP 3.1, the Jamalpur Priority Project, attempted detailed socioeconomic studies in the chars, investigating those along the reach of the Jamuna adjacent to the project in 1992. In addition, FAP 14, the Flood Response Study, carried out socioeconomic surveys in 10 active floodplain villages.

Finally, in 1992 ISPAN, on advice from the Flood Plan Coordination Organization (FPCO), agreed to undertake an inventory of resources and people in the main river charlands. This study, then, fulfills the need—foreseen in the Government of Bangladesh/World Bank Flood Action Plan of 1989—for a socioeconomic study of the people and resources of the active floodplain. Although it does not consider in detail the populations living long-term on embankments along the main rivers, analysis of erosion and accretion patterns has been added.

The inhabitants of the charlands are among the most hazard-prone people of Bangladesh, exposed as they are to floods and erosion. Structural flood protection measures are unlikely to benefit these people, and embankments may even raise flood levels within the charlands, increasing the risks to which they are exposed. Reliable information

about these areas and the people who live in them has always been scarce. The difficulty of gaining access to chars and their constantly changing environment has made studying them a complicated undertaking. As a result, prior to this study, what little information was available did not cover in any detail all the main river charlands.

1.1.2 The Charland Study

The Charland Study is a special study under the Bangladesh Flood Action Plan (FAP). It was executed jointly by FAP 16, the Environmental Study, and FAP 19, the Geographic Information System (GIS), both of which are undertaken by the Irrigation Support Project for Asia and the Near East (ISPAN) and funded by USAID.

This study has two objectives. The first is to provide databases and a geographic information system (GIS) that can be used as planning tools both for direct interventions in the charlands and for other interventions (such as embankments) which may affect the char areas. The second objective is to use the data collected, along with additional socioeconomic studies, to make general policy recommendations for the charlands and to test and develop means of rationally assessing the potential benefits of flood proofing measures in these areas.

The objectives have been addressed with five tasks.

- Making an inventory of resources, people, and infrastructures in the Brahmaputra-Jamuna, Meghna, Padma, and Ganges charlands and collecting additional information on hazards (led by FAP 16).
- Using satellite images to analyze physical changes and land use in these areas, and integrating this analysis with inventory data using a GIS (FAP 19).
- Conducting supplementary socioeconomic studies using rapid rural appraisal (RRA) methods in six river reaches (building on the Flood Response Study, FAP 14).
- Conducting detailed studies of flood losses and flood proofing potential in two areas along the Jamuna River (building on the Flood Proofing Study, FAP 23).
- Integrating the results of the above tasks into a comprehensive report.

This report gives the findings for one of the six Rapid Rural Appraisal (RRA) study areas—the Padma (Figure 1.1 shows the charland study areas).

1.2 Methods

1.2.1 Rapid Rural Appraisal

RRA methods are essentially non-quantitative, and involve direct observation and collecting qualitative information from a range of key informants or small groups in different representative villages in the study area. The method is systematic, however, using standard checklists covering all the main subject areas investigated as the basis of the information gathering; information is cross-checked and verified from a range of informants and sources. Locational biases are avoided by visiting both remote and more accessible areas, and socioeconomic biases are avoided by including coverage of groups such as women and the landless whose opinions might otherwise not be heard. In this way reliable information can be built up by an experienced team of specialists covering a range of disciplines based on an iterative process of questioning and expert judgement.

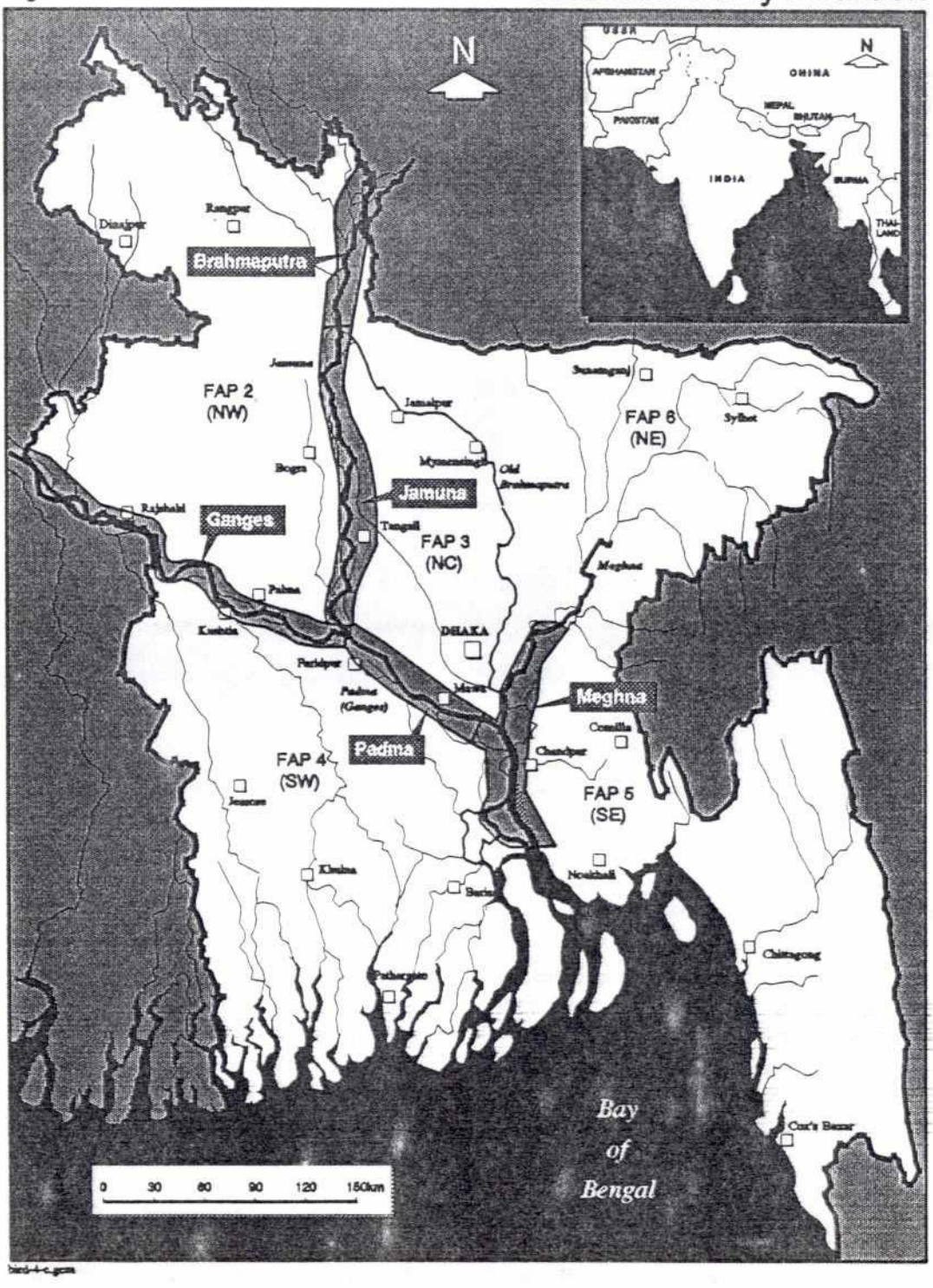
Additionally, RRAs in the Charland Study have the advantage of access to some quantified data from the Charland Inventory and GIS for all the mauzas within the study reach; this data is integrated where appropriate into the RRA report.

1.2.2 Field Method

The RRA team comprised specialists in: geography, economics, agriculture, social anthropology, fisheries, and botany. Fieldwork took place from 10 through 16 July 1993 and was based in Char Bhadrasan Thana headquarters. The primary

Figure 1.1

Charland Study Location



sources of information were key informants; for example, knowledgeable farmers, members and ex-members of Union Parishads, schoolteachers, fishermen, traders, landless people, and women living in villages within the study area. Access was by boat, and river levels were relatively high at the time of the survey, so it was not possible to walk transects through the area.

The method was to select a total of six focus mauzas spread throughout the area and covering a range of environments (based on the February 1993 Landsat image of the area) within the study area: two different island char complexes, and attached charland on both left and right banks. These char types are illustrated in Figure 1.2. Defining attached charland in the study area was difficult, however. Some areas that have lesser channels separating them from the mainland proper have been treated as attached chars (Table 1.1). The RRA focused on island char and attached char mauzas (three mauzas of each), and did not consider the strips of setback land between the bankline and embankments that fringe the study reach.

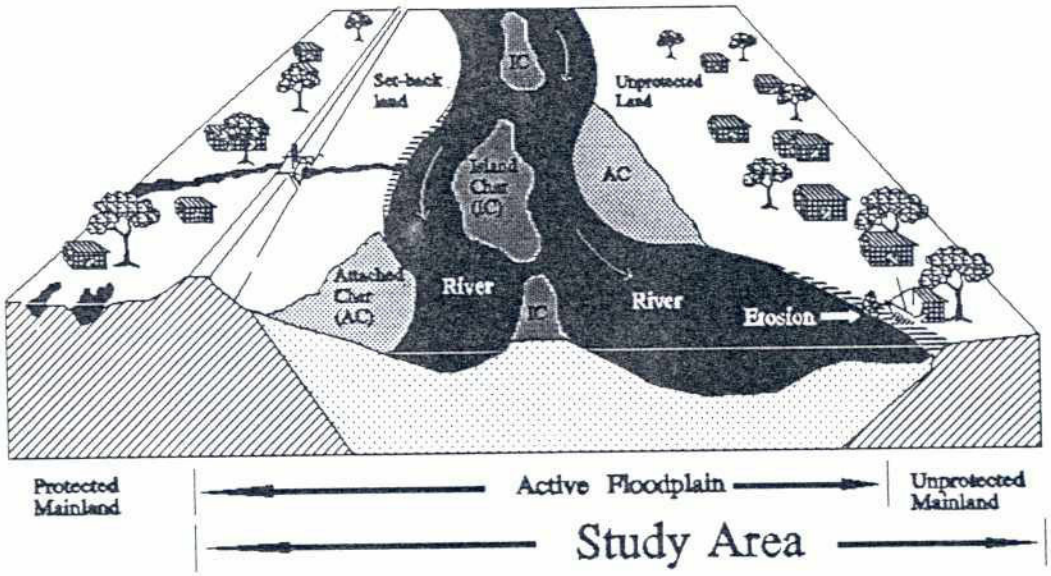


Figure 1.2 Charland Classification.

Three island char mauzas were visited and three attached char mauzas (although one of these is separated from the mainland by a minor channel throughout the year and another is on much older charland with mainland characteristics.

Most of the mauzas visited contain a number of *paras* (except for one newly accreted char with a small population). In each mauza where it was possible, the team split up and visited more than one *para*. Individuals collected information on their specialized subject areas for the mauza, but often concentrating on the experiences of the inhabitants of a particular *para*. The information so gathered has been consolidated so that the tables generally refer to whole mauzas. In this way any important differences between *paras* could be investigated and more general information could be cross-checked between different groups of informants within a mauza.

1.2.3 Acknowledgements

The team is grateful to the Union Parishad chairmen and members of Char Harirampur, Moham-

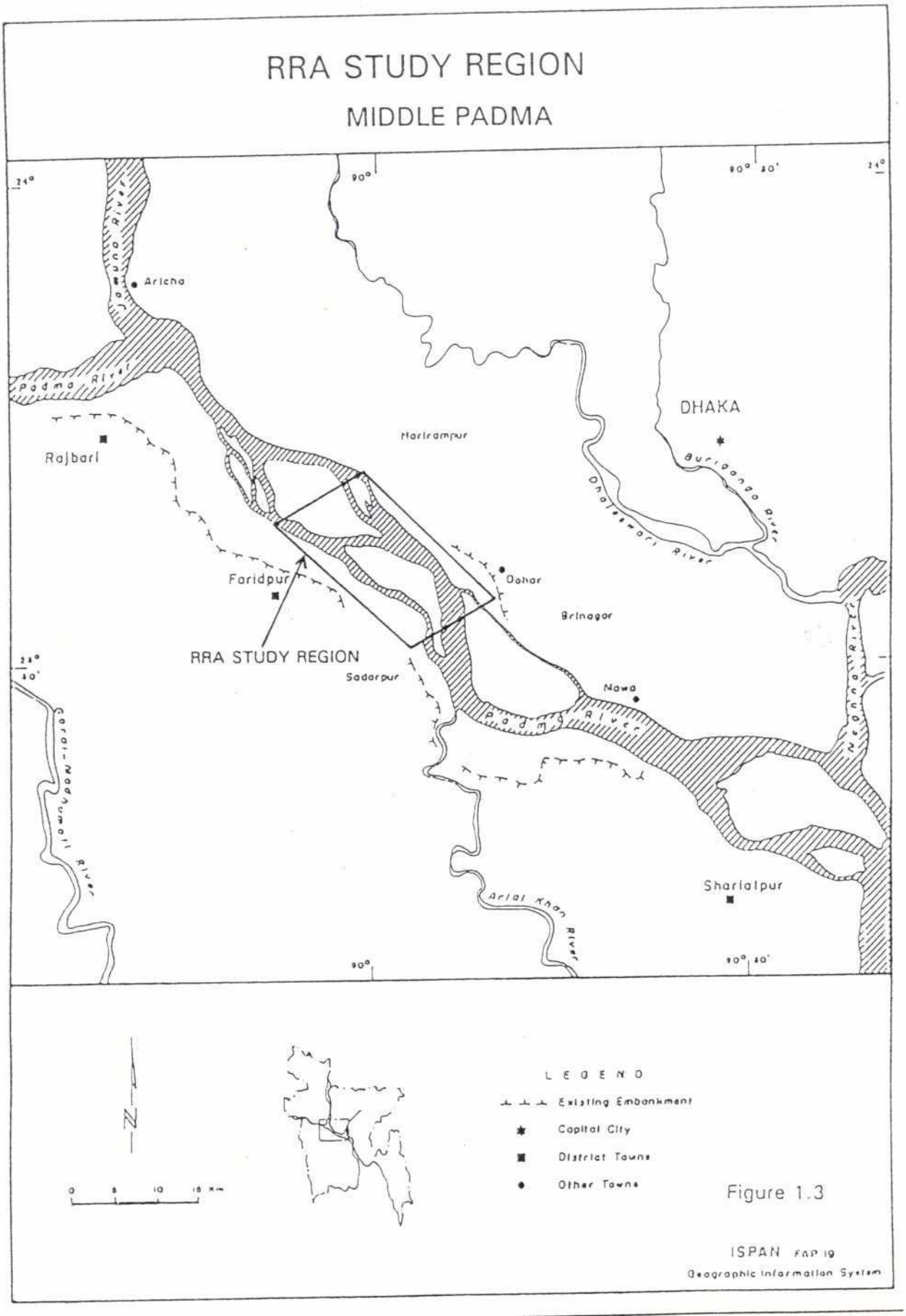

RRA STUDY REGION
MIDDLE PADMA
Jamuna River
Aricha
Padma River
Rajbari
Faridpur
RRA STUDY REGION
Sadarpur
Harirampur
DHAKA
Buriganga River
Dhaleswari River
Dohar
Brinagar
Nawa
Padma River
Kirtikhola River
Gorai-Nabaganga River
Arial Khan River
Sharialpur
90°
90° 30'
24°
24° 30'
N
0 5 10 15 Km
LEGEND
Existing Embankment
Capital City
District Towns
Other Towns
Figure 1.3
ISPAN FAP 19
Geographic Information System

Table 1.1 Mauzas by Predominant Land Type in Middle Padma Study Region

Thana	Submerged	Island Char	Attached Char	Unprotected Mainland
Char Bhadrasan				
Mauzas	1	9	0	5
Area (ha)	198	4,166	0	5,462
Dohar				
Mauzas	4	10	1	44
Area (ha)	618	3,060	392	4,760
Faridpur Sadar				
Mauzas	5	7	3	3
Area (ha)	291	1,761	3,777	1,331
Harirampur				
Mauzas	7	37	0	30
Area (ha)	499	8,144	0	6,154
Total				
Mauzas	17	63	4	82
Area (ha)	1,606	17,130	4,169	17,707
% of Total Area	4	42	10	44

Source: Charland Inventory

Note: The only part of Sadarpur Thana included in the study area is Muzaffarpur mauza, the land records for which are kept under Dohar Thana.

madpur, North Channel, Azimnagar, and Narikelbari unions in the thanas of Char Bhadrasan, Dohar, Faridpur, Harirampur, and Sadarpur, respectively. We are grateful to the many informants—farmers, fishermen, landless, and women—who provided the information on which this report is based.

1.3 Padma Study Region

The study region is along the Padma River opposite and slightly upstream of Char Bhadrasan Thana headquarters, some 50 km southwest of Dhaka (Figure 1.3). The area was purposely selected to include the widest reach of the Padma, where there are two large mid-channel island char complexes. Along either side of the main channel are substantial areas of attached char. It was also selected because FAP 14 household surveys on flood response done in 1991 in two mauzas in this reach could provide background information on the area to assist in selecting case study villages.

The western limit of the reach defined for the study is the large island char complex in Harirampur Thana opposite North Channel Union; and the eastern limit of the reach is at the start of the narrower Padma channel at the border of Char Bhadrasan and Sadarpur thanas. The char study area extends as far as embankments which have been built some distance from the main channel along both banks of the river. The extent of flood protection provided in these areas is unclear. Near Faridpur and in Dohar Thana there are flood control embankments complete with regulators, but in Char Bhadrasan what were referred to as flood control embankments by local people appear in fact to be earth roads, since there are bridges along their irregular alignments.

The study region from which the six mauzas were selected covered parts of 20 unions: four in Char Bhadrasan Thana, eight in Harirampur Thana, two in Faridpur Thana, and six in Dohar Thana. Several of these unions only include a few mainland mauzas within the study area.

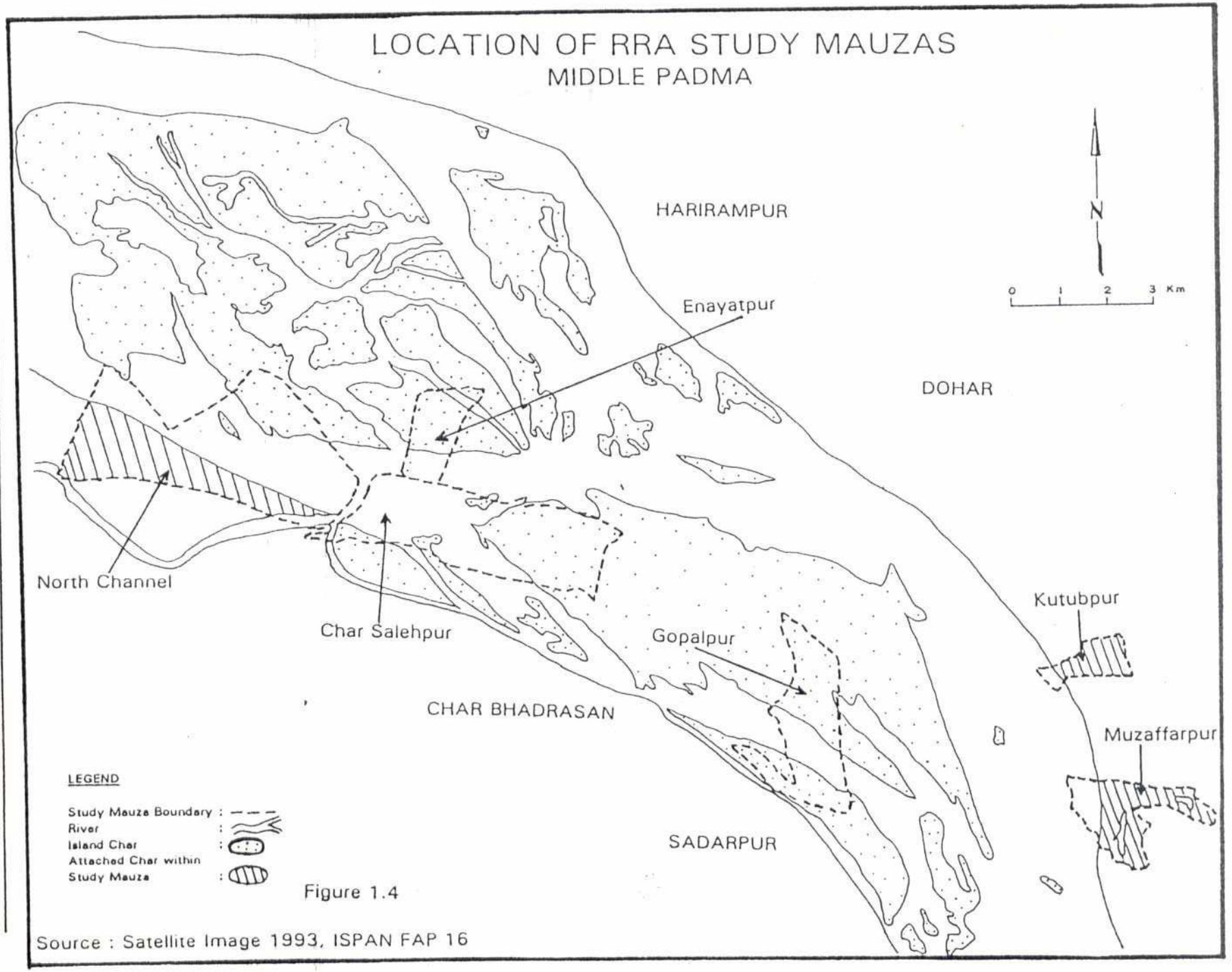


Figure 1.4

Source : Satellite Image 1993, ISPAN FAP 16

There are 166 mauzas within the study region. Table 1.1 shows that the majority were categorized in the inventory as either island chars or unprotected mainland (17 are submerged and uninhabited). The total area of the reach is just over 40,600 hectares, and most of this area is located in Char Bhadrasan, Dohar, and Harirampur thanas.

1.4 Study Mauzas

The RRA visited a total of six mauzas where relatively detailed socioeconomic data was obtained. Their locations are shown in Figure 1.4, which is based on a 1993 Landsat image. Locations were verified using hand-held global positioning system (GPS) equipment.

- Gopalpur—island char, FAP 14 study village (Jhaukanda Union, Char Bhadrasan Thana);
- Char Salehpur—island char, FAP 14 study village (Harirampur Union, Char Bhadrasan Thana);
- Enayatpur—island char (Azimnagar Union, Harirampur Thana);
- North Channel—right bank attached char separated from the mainland year-round by a minor channel (North Channel Union, Faridpur Thana);
- Muzaffarpur—left bank attached char (Narikelbari Union, Sadarpur Thana); and
- Kutubpur—left bank attached char (Mohammadpur Union, Dohar Thana).

The mauzas studied by FAP 14 in 1991 were revisited as part of the RRA, in both cases the majority of inhabitants present in 1993 had moved onto the char either just before or after the 1991 survey. The FAP 14 surveys also provide some quantified household level data to supplement, and for comparison with, the more qualitative information from the RRA.

Since many inhabitants of these villages have moved due to erosion in the past two or three years, information in some cases was also gathered on the mauzas where the people had previously lived. For example, in Uttar Nawabganj mauza (which seems to have straddled Char Bhadrasan and Dohar Thanas, since it is listed for both in the 1981 census data in the BBS Small Area Atlas) data was collected for the 1988 floods from people who moved to Kutubpur when it disappeared in

Table 1.2 Population and Area of Study Region

	Island Char	Attached Char	Unprotected Mainland	Total*
Area (ha)	17,130	4,169	17,707	40,613
% water	40	28	15	29
% sand	27	11	6	16
% land	33	61	78	55
1981 population	21,544	13,017	146,261	188,130
1993 population	17,771	11,711	189,645	219,127
1993 households	3,113	2,308	32,252	37,673
1981 persons/km^2	126	312	826	463
1993 persons/km^2	104	281	1,071	540
% change in population 1981-93	-18	-10	+30	+21

Source: Charland Inventory

*Total includes submerged mauzas covering 1,606 ha and having a population of 7,308 people in 1981.

1991. In addition, information was gathered in Char Bhadrasan Thana and in Hajiganj Bazar, one of the main markets serving the study area.

The areas in Table 1.2 are derived from analysis of the 1993 Landsat image and show that much of the island char mauzas was sand. Also, most of the water area (in the dry season) is concentrated in island char mauzas. According to the inventory, average household size in 1993 was just under six people. Population density has been calculated relative to total mauza area since the area of land in 1981 is not known. Overall population grew by 21 percent in the study area, but in 1993 was only 540 people per km^2. This is misleading, however, since there has been relatively rapid growth in the mainland areas, where most of the study reach population is crowded (87 percent of the 1993 population is in unprotected mainland). In the island and attached chars population density was very low and the population fell between 1981 and 1993. This reflects widespread erosion and changes in the channel, which are discussed further in Chapter 3. Still, it is important to remember that while this report argues that the island chars are a particularly hazardous environment and their inhabitants face many problems, the chars that form the focus of the report contain less than 15 percent of the flood-prone inhabitants of the reach.

The remainder of this report concentrates on data and qualitative analysis based on information gathered in the RRA fieldwork from the eight focus mauzas.

Chapter 2

SOCIOECONOMIC ORGANIZATION

2.1 Settlement Pattern

2.1.1 Houses and Homesteads

Homesteads in most of the villages visited are clustered rather than scattered. Typically, higher land is in limited supply. People prefer to construct houses in a linear pattern, but suitable land is not always available, so settlements are often discontinuous lines.

In the island chars almost 99 percent of the houses are thatched, made entirely of locally available grass. Very few houses have corrugated iron (CI) roofs, but even these have walls of catkin grass stems. Thatched houses of Char Gopalpur and Char Enayatpur are mainly constructed with catkin grass (*kaisha*), houses of Char Muzaffarpur are made of sun grass (*shon*) and those of North Channel are of wheat straw (*tonga*; Table 2.1). A thatched house costs between Tk.1,000 and Tk.2,000 to build, and a CI-roofed house costs Tk.7,000 to Tk.8,000. Thatched roofs, and grass walls if they have been inundated, must be replaced every year.

Almost all homesteads are often threatened by waves. People buy bamboo (not grown in the

Table 2.1 Settlement Parameters

	Char Salehpur	Enayatpur	Gopalpur	Muzaffarpur	North Channel
Char age (years)	5-6	5-6	5-6	12	35
Settlement (years)	2*	2	2	10	30
Settlement pattern	Linear	Linear	Mixed	Linear	Mixed
Thatching material	*Kaisha*	*Kaisha*	*Kaisha*	*Tonga/kaisha* (no *kaisha* in this char)	*Tonga* (wheat straw)
Cost of thatch house (15x10 ft)	Tk.1,200-1,500	Tk.1,500-2,000	Tk.1,000-1,500	Tk.2,000-2,500	Tk.2,000-2,500
Cost of CI house	Tk.7,000-8,000	Tk.8,000	Tk.7,000	Tk.7,000-8,000	Tk.7,000
Trees	*Jiga*, banana	*Jiga*, banana	Banana, *jiga*, mahogany (rare)	Banana, *jiga*, dates (sandy soil)	Banana, betel nut, coconut, mango

Source: Charland RRA
*Largest part of mauza; some settled earlier.

island chars) and cut stems into pieces about 1.5 m long, these bamboo stumps are used as pilings for the eroding sides of the homesteads. The many households that cannot afford bamboo use *jiga* shoots and *dhaincha* stems. Then they cut, carry, and pile heaps of grass against these piles or stumps. On average it was reported that about Tk.500 is spent on homestead protection per household per year. These measures are based on locally available natural resources, are within the means of the charland households, and are reported to be partly effective in protecting against homestead erosion.

2.1.2 Homestead and Wild Plant Resources

Bananas are almost the only trees grown in these chars, although some other trees, such as *jiga*, are planted around homesteads. Table 2.2 details the main plants grown around homesteads. Vines of sweet gourd, bottle gourd, and white gourd are the main vegetables cultivated; others include *dhundul*, *jhinga*, and *chichinga*. Fruit trees that are common in most of Bangladesh, such as mango, blackberry, and guava, could be grown but the people of the study area chars do not grow them for two

Table 2.2 Homestead Plants and Trees in the Padma Chars

Local Name	English Name	Scientific Name	Common Uses
Aita kola	Banana	*Musa* spp.	Vegetable, fruit, income, soil stabilizer, privacy fencing, cleaning agent
Badam	Peanut	*Arachis hypogea*	Oil, food, income, fuel
Begun	Brinjal	*Solanum melongena*	Vegetable, fuel
Chal kumra	White gourd	*Benincasa hispida*	Vegetable, income, fuel
Dhaincha	Sesbania	*Sesbania canabina*	Fodder, fuel
Dhundul	-	*Luffa cylindrica*	Vegetable, income, fuel
Jhinga	Stripped gourd	*Luffa acutangula*	Vegetable, income, fuel
Kachu	Arum	*Colocasia esculenta*	Vegetable
Kadu	Bottle gourd	*Lageneria siceraria*	Vegetable, income, fuel
Kaisha	Catkin grass	*Saccharum spontaneum*	Fuel, fodder, housing material, soil fertility, income
Kumra	Sweet gourd	*Cucurbita maxima*	Vegetable, income, fuel
Nalkhagra	Reeds	*Phragmites karka*	Fuel, fodder
Pepe	Papaya	*Carica papaya*	Vegetable, fruit, income, fuel
Sim	Bean	*Vicia faba*	Vegetable, income, fuel
Shon	Sungrass	*Imperata cylindrica*	Housing material, fuel, soil stabilizer
Venna	Castor oil	*Ricinus communis*	Oil, fuel, income, soil stabilizer, privacy fencing

Source: Charland RRA and ISPAN Botanist

main reasons. First, they do not own their homestead land; and second, the charland is very vulnerable to erosion by the Padma.

Women play an important role in managing homestead resources and in kitchen gardening. Immediately after a new char surfaces people displaced from their land by erosion usually start to settle the new char. In the first year, in addition to constructing houses, they plant a fast-growing wild type of banana locally called *aita kola*. In addition to using the trees for consumption, a household can reportedly make Tk.300 to Tk.500 per year from the sale of bananas. Banana plants have the additional advantages of helping to stabilize land by protecting against soil erosion and acting as wind breaks. *Jiga* trees, initially planted to protect the homestead boundaries, are later cut for posts and fuel.

In the following year people start cultivating vegetables. If the soil is loamy they begin cultivation immediately, and if the soil is sandy they allow catkin grass (*Saccharum spontaneum*) to continue growing as it aerates the soil and enriches it with organic matter. Some women make holes in the sandy soils and fill them with dung or compost, after a month or two they sow the seeds of vines and other vegetables.

Grasses are an important natural resource for the char people, particularly in Char Gopalpur and Char Enayatpur where there are large stands of catkin grass. Grasses are sources of construction material, erosion protection, fodder, and fuel, they are used for household consumption and cash income.

The complex pattern of dependence and use of catkin grass is shown by the range of local names used for each stage in the plant's growth. The first generation of catkin grass in virgin charland is called *nota*, this growth is the most palatable fodder and children chew the sweet stems as they would sugarcane. Women also make brown sugar from *nota* extract. *Nota* stems are macerated and boiled with water, after about an hour the water is decanted and evaporated until crystals of sugar are deposited. After the first harvest two parts of the grasses are used: the top leafy portion of the catkin grass is called *kaisha* and the bottom part of the stem is called *bonn*. The top of the catkin grass is used as the primary source of fodder grass during monsoon season and the bottom portion is used for fencing. On drier chars the whole plant is allowed to grow and flower in the winter. After flowering the whole plant is called *jhanti* and forms a strong house-building material. The leaves and upper part of the grass is used for roof construction and the stem and bottom part is used for wall construction. Additionally, in the dry season the whole catkin grass plant is harvested and sold for use as shade materials for betel leaf gardens.

2.2 Occupational Structure

Agriculture is the most important dry season occupation in both island and attached chars. In the wet season, fishing becomes the primary occupation in island chars, and in attached chars, day laboring is most important (Table 2.3). Many people who have been rendered landless by erosion shelter in the attached chars, these people mainly work as day laborers. Since the attached chars adjoin mainland areas they are more accessible. As a result, small numbers of people are involved in a wide range of other occupations including salaried jobs (government and nongovernment), rickshaw pulling, small business, boat operating, and milk and cattle trading. In the island chars there are virtually no such income sources. In North Channel mauza, which is close to Faridpur town, there is a local concentration of spawn fishing and some people work at "C&B" ghat, mainly breaking stones and bricks.

Of those who reported agricultural occupations, a majority were sharecroppers (Table 2.4). This is particularly the case in the island chars, where most households are tenant farmers who even pay rent for their homestead land. Some people own land but also lease land under sharecropping arrangements. Large landowners own much of the land in the study area but most were reported to be absentee owners who live in towns or in

Table 2.3 Primary Household Occupation by Season

Mauza	Agriculture		Day Labor		Fishing		Other		Main other occupation
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	
Char Salehpur	45	45	25	20	25	30	05	05	•boat operator •small business •salaried job
Enayatpur	65	30	15	15	15	50	05	05	•boat operator •small business
Gopalpur	40	10	40	20	15	65	05	05	•grass seller •fish trader •boat operator
Kutubpur	50	45	20	15	20	30	10	10	•rickshaw puller •salaried job •small business
Muzaffarpur	25	25	55	45	05	15	15	15	•cattle business •salaried job •rickshaw puller •small business •boat operator •milk trader
North Channel	50	40	25	20	20	35	05	05	•small business •rickshaw puller •salaried job •boat operator •stone/brick breaker
Island Char	48	32	27	19	20	44	5	5	
Attached Char	44	38	31	25	17	29	8	8	

Source: Charland RRA

Dhaka. For example, one third of land in North Channel mauza was reported to be owned by two people (a minister and an industrialist); in Gopalpur mauza the landlord is an ex-Union Parishad chairman; and in Char Salehpur and Enayatpur mauza two people are known as *zamindar* (landlord) by all.

2.3 Day Laboring

Day laboring is a major occupation in the Padma charlands. In the dry season, 31 percent of households in attached chars mainly depend on day laboring, and in island chars 27 percent do so. In

Table 2.4 Sharecropping among Mauza Farmers

Mauza	Percent of Farmers Sharecropping
Char Salehpur	60
Enayatpur	75
Gopalpur	80
Kutubpur	40
Muzaffarpur	60
North Channel	50

Source: Charland RRA

Table 2.5 Day Laboring Work by Season

a) Agricultural work	
Dry Season	Wet Season
• Harvest rabi crops • Harvest aman crops • Cultivate rabi crops • Cultivate aus/aman crops • Weeding fields	• Harvest jute • Harvest aus
b) Non-agricultural Work	
Dry Season	Wet Season
• Soil digging • Stone breaking • Brick breaking • Rickshaw pulling • Construct/repair road/embankment	• Rickshaw pulling • Stone/brick breaking

Source: Charland RRA

the monsoon the laborers mainly depend on fishing or go outside the area for work, as the only on-farm work available in the study area is harvesting aus and jute, and the areas of these crops are limited (Chapter 5). The main sources of day laboring work are shown in Table 2.5, which confirms the lack of monsoon season work—apart from fishing there is no nonagricultural work available in the island chars.

Most women in the area do not work for payment outside the home, but there are some women day laborers in Muzaffarpur, North Channel, and Kutubpur mauza who are employed in a road repair and reconstruction project of CARE, an international NGO. In the island chars (Enayatpur, Char Salehpur, and Gopalpur) women work as harvesters, getting one eighth of such crops as groundnut.

Wage rates for male laborers are more or less uniform throughout the study area: for agricultural labor the rate ranges from Tk.25 to Tk.40 per day plus one meal for working about nine hours. During the monsoon season, when there is little work available in the chars, laborers mainly go to the nearby thana towns for work, but some go as far afield as Faridpur, Jessore, and Dhaka. Day laborers in towns were reported to earn between Tk.25 and Tk.30 per day plus three meals. Laborers are generally away for 15 to 20 days at a time in the wet season. Despite these low wages farmers said that day laborers were better off since they receive money each day, whereas floods often damage groundnut, aus, and aman crops, making farmer's incomes uncertain. People of Muzaffarpur and North Channel mauzas reported that less nonagricultural work is available now than in previous times.

Chapter 3

CHANGES IN LAND AND SETTLEMENT

3.1 Physical Changes

The Charland Inventory revealed that the Padma, which experienced substantial, rapid bank erosion over the past nine years, is a very dynamic river. Most of the island chars have eroded or submerged during this period. Analysis of changes in the RRA study area confirms that the middle reach of the river is typical of this general pattern.

The banklines of the Padma were digitized from Landsat images of the 1984 and 1993 dry seasons. This analysis ignores within-bank changes, including erosion and accretion of island chars. The island chars were the focus of the RRA, and the remaining sections of this chapter show that those chars are subject to extensive morphological changes resulting in frequent shifts of home for their inhabitants.

Table 3.1 shows that a high proportion of the total area (11 percent) was eroded along the banklines between 1984 and 1993. Since there was very little bankline accretion this means that the river was widening in this reach. Approximately a third of mauzas in the study reach experienced bank erosion in this period. As might be expected, the attached chars, which by definition are along the bankline, experienced more bank erosion. They also experienced widespread accretion, but of very small areas. One implication of the analysis is that in 1984 quite a high proportion of what are now classed as island char mauzas included some mainland; in 1984 they were about 12 percent

Table 3.1 Bank Erosion and Accretion in the Study Region, 1984-93

	Island Char	Attached Char	Unprotected Mainland	Total*
Area (ha)	17,130	4,169	17,707	40,613
% Eroded	11.07	19.35	10.25	11.52
% Accreted	0.01	1.70	0.67	0.50
% Channel	88.28	13.92	10.12	42.73
% Land	0.65	65.04	78.96	45.25
% Mauza with Erosion	31.75	50.00	31.71	32.21
% Mauza with Accretion	3.17	25.00	10.98	8.05

Source: FAP 19 Satellite Image Analysis
*Includes mauzas submerged in March 1993.

mainland, but by 1993 only 0.7 percent of their total area was mainland. It should be noted that the "channel" category in Table 3.1 includes island chars and the total area within the banklines in 1984 and 1993; similarly "mainland" is the total area that was outside the banklines in those years.

Hence there has been substantial recent erosion of mainland in the study area, and virtually no accretion of new land along the banklines to compensate for the loss. The Landsat images show that the island char complexes in this reach changed markedly during the period, but this could not easily be quantified. The next section concentrates mainly on changes in island chars as reported by the present inhabitants.

3.2 Erosion and Accretion Impacts

This section summarizes how human settlements have changed over time in the six mauzas investigated in the RRA. Estimates of areas eroded and accreted could not easily be made by respondents because of the frequent changes and large areas involved, so the focus is on settlement changes and sequence of events.

Erosion and accretion have been the major factors in the settlement histories of all the mauzas studied, usually both directly and indirectly. Directly in the sense of erosion displacing existing inhabitants, or accretion attracting people, and indirectly in the sense of erosion elsewhere forcing people to move to more stable lands.

It appears from the small number of mauzas visited that island chars have experienced less erosion in the recent past, and have generally been accreting, whereas attached chars have recently experienced persistent erosion (Table 3.2). In 1988 and 1991 the movement of people was greatest; in 1988 this coincided with severe flooding and both erosion and accretion.

Most inhabitants of the island and attached char mauzas have been affected by erosion and have had to move their homes in recent years, particularly in 1988 or 1991. Erosion events seem to have been more severe in the middle Padma than in some other areas, such as the Upper Meghna, where erosion is gradual and few households are affected in any one year.

After accretion settlement can be rapid or can take about five years. Gaps of up to five years were reported, for instance, in North Channel. In recent years, however, the gaps between accretion and settlement have been two or three years (Gopalpur and Enayatpur). This may reflect increasing pressure to settle land as soon as possible as a result of population growth, as well as continuing loss of densely populated mainland as the river widens. It may also be associated with the quality of the newly accreted land. Informants in Enayatpur reported that if new land is silty it can be cultivated with local boro in the next dry season; if it is sandy loam then catkin grass is allowed to grow for six months and then groundnut can be cultivated; and if it is sand then it can only be cultivated with groundnut after three years of catkin growth.

Some loyalty to particular areas is apparent. People tend to move to places where they have relatives or to areas where the landlords they rent from have land. In several cases, however, it was reported that people displaced by erosion left for their mauza of origin. In 1988, for example, of some 500 North Channel households whose homesteads were eroded, about 200 were reported to have returned to places in Dhaka District from which they had emigrated about 25 years earlier when the land in North Channel accreted. This can have administrative implications. Muzaffarpur mauza appears to have split affinities; the land is registered under Dohar Thana, which is in Dhaka District; while the union parishad, to which people elect a member, is under Sadarpur Thana (Faridpur District). Although the mauza is on the left bank (Dhaka side) of the Padma, its people are really "right bankers" and have their social connections with that side of the river.

One consequence of frequent movement due to erosion is a decline in household fortunes. One

Table 3.2 Erosion and Accretion Impacts on Settlement

Mauza	Char Type	Erosion	Accretion	Settlement History
Char Salehpur	Island	Little	Before 1970; 1988 and subsequently	Settled as reaction to erosion elsewhere. Land distributed about 1971 in part of mauza. Other area accreted in 1988, settled in 1991 when much of Char Harirampur mauza eroded.
Enayatpur	Island	About 1970 all submerged; 1988 all submerged	First accreted before 1957; reappeared 1974; reappeared in 1988 after floods; accreting since about 1991	40 households came in 1957; 300 households moved out in 1970, returned in 1974; by 1988 700 households temporarily moved when submerged in floods.
Gopalpur	Island	About 1950 all eroded	Mostly in 1988, continuing	Present inhabitants came in 1991 and later mainly from Uttar Nawabganj (eroded).
Kutubpur	Attached	Some erosion	No information	Settlers from Nawabganj came in 1991 when their mauza was eroded, now living along the river bank.
Muzaffarpur	Attached	Continual in recent years, 1988 and 1991 worst	1978-79 accreted	Estimated 1,400 households eroded in recent years, most moved within mauza. 1991 in-migration when Kalikapur eroded.
North Channel	Attached	1988 worst; lost schools, mosque, market; 1992 and 1993: in latter lost health center (after RRA)	About 1958	Settled about 1963; 1988 about 500 households eroded; 1992 up to 300 households eroded; but in 1988 about 300 households migrated in due to erosion elsewhere.

Source: Charland RRA

reason is that moving itself is expensive. For example, it was reported that for one homestead (*bari*) of five households it took three days to move everything from Nawabganj to Kutubpur. In 1991 the cost of hiring a country boat (without engine) to do this was Tk.2,500-3,000 (up to twice the hire cost in normal times). Another reason is that even when the household gains access to accreted land it is likely to be as a tenant, and it may become difficult to reclaim land that the household owned when it re-emerges years later.

One household interviewed in Kutubpur reported a typical sequence of movements. From the respondent's grandfather's time they had lived in Sadarpur, but their land eroded when the respon-

dent was a child and they moved to Kalikapur. Eight years later, when the land re-emerged, they returned to Sadarpur for 8-10 years. When the land eroded again they moved to Nawabganj. Eight years later, in 1991, the whole mauza eroded and the family moved to Kutubpur where they were living at the time of the RRA in 1993. In Kutubpur they were renting homestead land close to the river bank and living mainly as fishermen, having lost their land over the years.

The other main loss from erosion is public assets. This mainly affects attached chars and unprotected mainland, since the island chars have very little infrastructure to be lost. The worst affected of the mauzas investigated were North Channel, where in 1988 a primary school, mosque, *madrashah*, and bazar were all eroded. The school and *madrashah* were relocated, but they are still near the bankline, and the shops in the market moved to Digir Char, an adjacent mauza. Then, in 1993, a primary health center of the Finnish Free Foreign Mission was threatened by erosion. This two-story building was planned in 1990 when the river was reported to have been 3 km away from the building site, but by the time it was completed in February 1992 the threat of erosion was apparent. At the time of the RRA (July 1993) it was within 100 m of the bankline, and in the *Bangladesh Observer* of 21 September 1993 it was reported to have been lost to erosion.

The long-term impacts of erosion and accretion are not easily separated from the system of land tenure that exists in the study area and is adjusted to the ever-changing land resource base. This is also linked with the system of social organization.

3.3 Land Tenure

While it is difficult to establish details of land distribution or rights in an RRA, a consistent pattern of control over land and tenancy in the Padma charlands emerged from discussions with a range of people from tenants and landless people to small farmers to local leaders (*matbars*) and larger landowners. This section briefly summarizes land related issues in each of the mauzas investigated.

3.3.1 Island Chars

A small proportion of households living in Gopalpur (about 12 percent) reportedly own agricultural land, the remainder are sharecroppers who moved into the mauza in 1991 or after and rent their homestead land for about Tk.3,400 a year. The landlords who control the land lease it from the government and then sublet it. There is some dispute over this system, however, as the land is on the border of two districts (Dhaka and Faridpur). It was said that the existing system has advantages for the tenants since they do not risk losing land to erosion and can more easily move in response to erosion, but they also have no incentive to improve their homesteads or grow trees since they do not own the land.

Char Salehpur is at the western end of the same complex of island chars. The older *para* in this mauza was settled around 1971 when *khas* land was distributed to erosion victims from other areas. Not all of these settlers were present in 1993 as some of the original land had submerged. A second phase of settlement took place in 1991 on land that had accreted in 1988. This was a second-choice location for people displaced by erosion in Char Harirampur—their preference was to move onto embankments, but only about 20 percent of households from Char Harirampur could find space on the nearest embankments, 40 percent dispersed, and the remaining 40 percent came to Char Salehpur. Some people who live on the embankment have access to land and live on the char in the dry season, while the "permanent settlers" have nowhere else to go.

Enayatpur, on the next island char complex to the west, has a similar history. It has been settled for periods between major erosion/submergence events for about 36 years (Table 3.2). Since the last submergence in 1988 some of the landowners have switched to only living there in the dry season,

whereas all the year-round inhabitants are share-croppers and rent their homestead land for nominal sums of Tk.50-100 a year. The union parishad chairman decides who can move to the charlands and arranges for settlement. There had been a dispute between competing chairmen in 1993, but they had come to an arrangement for sharing control of land between the competing unions. In fact, most of the land is known to be *khas* land, but it is distributed by the chairman who brings in a local surveyor (*amin*) to establish land ownership and survey plot boundaries when land emerges. Land settlement, therefore, is managed locally outside the government administrative system.

3.3.2 Attached Chars

North Channel mauza is actually an island but is separated from the Faridpur area by a secondary channel that has become connected to the Padma as erosion has progressed. There are both large landowners and small owner-farmers in this mauza. When much of the mauza was settled, some 30 years prior to the RRA, a major dispute broke out between two big landowners who were competing for control over the *khas* land. In 1993, about 12 percent of the land was owned by these two landowners, another 12 percent was owned by a few big absentee farmers, and the remainder was in the possession of small farmers. Since 1988 the settlement pattern has undergone major changes (Table 3.2) as large areas of land have eroded and people displaced by erosion from other areas have moved into the mauza increasing the number of landless people in North Channel. The net result is that there are now many erosion victims who rent homestead land in the mauza (a typical rate quoted was Tk.500 for 30 decimals (0.2 ha) per year). Part of the reason people immigrate to an eroding mauza is its instability. Large landowners do not mind renting out threatened land for homesteads instead of for cultivation. One informant reported that his land had declined in value from an expected sale price of about Tk.35,000 per ha in 1983 to Tk.22,000 in 1989 and Tk.13,000 in 1993, and that it would become unsalable once erosion was imminent. Renting the land out for homesteads, therefore, may be a good way of realizing an income from erosion-prone land.

The situation is similar in Muzaffarpur, on the opposite bank of the Padma. The present pattern of control over land was established around 1950-51 when the Hindu *zamindars* who had controlled the area left. There are 30 to 35 big landowners and about 90 percent of the Muzaffarpur landowners are reported to live outside the mauza. Despite being absent they have a tight control over land and society in the area:

- their agents or relatives come to collect rent (for example, many households made landless by erosion rent homestead land for Tk.300-500 a year);
- they control the many *samajes* in the mauza and decide who can settle in the mauza (in fact most people there could be termed *raiyatis* of the big landowners);
- they call in local surveyors (*amin*) to work for them in case of a land dispute; and
- they register land in the names of their associates to avoid any interference from the government.

The only regular contact the government has with the system of land tenure is in collecting land taxes. Where erosion is gradual the owners continue to pay as normal and do not report the erosion, but if all the land erodes the administration is notified to get tax remission. If it reappears then the landlords will pay the back tax and so keep control of the land.

3.3.3 Social Organization of Settlers

The process of settling new chars and *samaj* (society or community) formation was described by one *matbar* in Muzaffarpur mauza. Newly accreted chars are initially settled by relatives or associates of a large landowner who lays claim to the char. These people may live in temporary houses until the land becomes cultivable. When the land has stabilized and becomes cultivable then more people, friends and relatives of the original

settlers, are invited to settle. A new *samaj* for that locality will then be formed under the leadership of the first settlers, who have an allegiance to the landowners.

This process results in dominance by a few landowners, the situation found in the majority of the study reach mauzas. It is not clear whether these *samajes* are important in helping people cope with erosion. In the survey area it appeared that the *bari*, or homestead, comprising about five households often with kinship ties, is more important in organizing evacuation and providing mutual assistance when erosion hits.

3.4 Conclusion

The dynamic island char formations of the middle reach of the Padma are subject to frequent change and mainland in the area has been subject to continual, often rapid erosion in recent years. Padma charland society is adapted to this environment through the local power structure, which has limited links or interaction with the government administrative system, except through union parishad chairman who are often absentee leaders or landlords of the char areas.

Nor is there government involvement in surveying land to establish ownership, and in fact, local surveyors (*amins*) appear competent to do this job (one interviewed in Mohammadpur Union had copies of maps delineating plot and mauza boundaries and a set of brass surveying instruments). *Amins* typically are hired either to resolve boundary disputes (when both parties agree to abide by the survey outcome) or to establish plot boundaries on land that re-emerges, when a large landowner may hire the *amin*. These surveyors appear to have a respected position in society, and may be slightly less open to manipulation by the rich and powerful than outside surveyors since they are local people living in the same community as the smaller resident landowners. This may be beneficial in the attached char and unprotected mainland where *amins* live, but not in the island chars.

The majority of char residents are landless sharecroppers who rent homestead land and are completely dependent on their patrons, who control land ownership in the chars. Given the frequent changes in land form, owning small areas of land is likely to be untenable in the long term. This is because small landowners are likely to lose all their land to erosion and be unable to pay land tax or pay for a surveyor to reclaim their land if it ever reappears. The present system of land tenure may not be equitable, but it does give many char people some access to land, and when it erodes they can often get access on the same terms somewhere else, since large landowners are able to control a diverse and large enough area to ensure that when one area erodes another is likely to accrete.

Attempts to redistribute newly accreted *khas* land to the landless are unlikely to be effective in this context, since the people are subject to a more flexible, if inequitable, tenancy system than is likely to be achieved by government administration. In any case, local landlords are unlikely to support such measures.

Attempts to improve the welfare of char people, therefore, will have to be carefully designed not to threaten the existing system of land tenure or appear to wrest power from landowners. At the same time, benefits should be directed to the landless tenants in preference to their landlords. Given the sharecropping system and high risks from flood and erosion, programs to intensify agriculture through increased inputs are unlikely to succeed. Instead, success is more likely for efforts to capitalize on the natural resources of the chars: catkin grass and grazing land, the use of which is generally free and not controlled by landlords in the Padma chars. These resources are already a major part of the charland economy (see Chapter 2), but it may be possible for char people to increase their returns from grassland if, for example, they can raise more cattle or goats (see Chapter 6).

Attempts to improve homestead production should concentrate on vegetables; there is no incentive to

grow trees on rented land that may erode at any time. It is difficult to see how the system of renting homestead land can be changed to free tenants of this burden without a major conflict with the landlords, and without forcing more people to leave for embankments or urban areas when erosion takes away their land.

Table 4.2 Homestead Damage in 1988

Mauza	Flooded above Floor (%)	Flooded to Roof (%)	Damaged (%)	Destroyed (%)	Evacuated (%)
Char Salehpur	100	75	25	75	87
Gopalpur*	100	25	25	0	Few
Muzaffarpur	100	100	60	10	20
Nawabganj†	100	100	-	100	50
North Channel‡	100	0	25	25	100

Source: Charland RRA
NOTE: Enayatpur is excluded because all houses had been moved due to erosion or flooding.
*Data is for 1991 flood; mauza uninhabited in 1988.
†Data collected from people now living in Kutubpur who were erosion victims in 1991.
‡Data refers to about 500 houses (half of those in the mauza at that time) the remainder were eroded

While housing was severely affected in the 1988 flood (Table 4.2), damages were less than might be expected. This is partly because some people were able to move their houses, but more often it is because the houses are of low value and durability anyway—catkin grass walls and roofs are normally replaced every 1 to 1.5 years so normal deterioration may only have been advanced slightly by the flooding.

Moreover, in some villages it was reported that walls are removed during severe floods to allow flood water to pass through the house while the family lives on a *macha* at ceiling level or on the

Table 4.3 Sheltering Strategies During 1988 Flood

Mauza	Percent HH Moving	Destination	Duration (days)	Percent HH Staying	Reasons/Notes
Char Salehpur	87	50% embankment 50% higher houses in village	60	13	Had higher houses
Muzaffarpur	20	Embankment	45-60	80	To protect homestead and property
Nawabganj	50	Embankment to save cattle (moved early)	45	50	*Macha*/roof, no space left on embankment when caught by flood
North Channel	100	Embankment	15-30	00	Fear of erosion, which affected half households in mauza

Source: Charland RRA
NOTE: All households from Enayatpur moved in 1988, 90 percent of houses were destroyed by erosion overnight, everyone stayed on an embankment for three to four months until the char reemerged. A few households in Gopalpur moved to the school adjacent to the village in the 1991 flood, the mauza was uninhabited in 1988.

roof. In this way they try to avoid house collapse due to the force of water on the walls, but there is a risk that the remaining raised platform, with its high center of gravity, may tip over and collapse due to the pressure of flood water.

Given the severity of flooding in this area in 1988, many households left their homes and moved to embankments, but a substantial number stayed and coped with difficult conditions, living on *machas* or boats for about a month (Table 4.3). Erosion and the need to move cattle to higher places mainly resulted in evacuation, while people who remained were there to safeguard their property and in some cases could find nowhere else to shelter.

Many of the residents of Char Salehpur moved to the char while it was flooded in 1991. Their previous homes in Char Harirampur had been eroded and they were unable to find space on the nearest embankments, so they moved their house materials and possessions to Char Salehpur and built *machas* to wait out the flood (the normal cost of moving a house was Tk.300 per household for a large boat without an engine).

4.3.2 Livestock Impacts

Cattle were found to be an important source of household income in the study chars (Chapter 6). Although some cattle are sold before the monsoon season, unlike in the Upper Meghna there is still plentiful fodder available (on a cut-and-carry basis) during that season, and many cattle remain in the chars at that time of year. In all the mauzas visited raised earth mounds are used to keep cattle above monsoon inundation, and catkin grass is used to further raise cattle platforms if floods occur. In 1988, however, most cattle had to be moved to higher refuges outside the study mauzas, usually to flood control or road embankments.

In 1988 there seem to have been few engine boats available in the area, so cattle (and houses) were moved using large country boats, which reportedly offered satisfactory services. In Enayatpur and Char Salehpur, for example, there were no engine boats, but country boats were used to move cattle to an embankment four miles away at fixed rates of Tk.50 per cow and Tk.25 per calf, the 1993 cost of engine boat service for comparable distance was Tk.20 per cow. In Muzaffarpur people reported that in 1988 most cattle were moved by boat about five miles to an embankment, and although they had to pay, the boat owners charged less than normal on humanitarian grounds.

Since most cattle were moved to higher places, cattle losses appear to have been low in 1988: only two were lost in Enayatpur and none died in Nawabganj (both island chars). Although 10 percent were reported lost due to flooding and a further 40 percent from disease after the flood peak in Muzaffarpur (attached char), these figures may be exaggerated.

4.3.3 Relief and Recovery

Relief provisions during and after the 1988 flood seem to have been reasonable in this area compared to some of the char areas in other rivers studied. For example, in 1988 Char Salehpur's Union Parishad provided free boat service to households without money to help them move onto the embankment; and in North Channel the Union Parishad provided three non-engine boats to help erosion victims. In Enayatpur, while evacuated households were living on an embankment, the Union Parishad provided about 3 kg of flour (*ata*) per household per day. Those flooded in Nawabganj in 1988 received food and water purification tablets.

In 1991, a lesser flood, relatively more relief was available: Char Salehpur and Gopalpur received relief from their Union Parishad (in the form of wheat), and from World Vision and the Finnish Free Foreign Mission (NGOs). The latter also provided hand tubewells for drinking water, and more recently shallow tubewells for irrigation, as part of its recovery program.

Ill health, mainly dysentery, was widely reported. Although 60 people were reported to have died due to the floods in the five mauzas for which

Chapter 4

FLOOD HAZARD

4.1 Flood Frequency and Severity

Past flood experience in the study mauzas has been variable reflecting differences in the duration of settlement and the lack of incentives to raise homesteads in unstable island chars (Table 4.1). All the mauzas that were inhabited in 1988 were severely affected by the worst flood in recent years. The severity of damage was compounded by in 1988 by serious erosion in the area (although erosion has continued at varying rates since then).

4.2 Typical Flood Preparation and Response

When flooding is anticipated or imminent, typical preparatory measures taken by those who can afford to consist of readying boats and building *machas* to safeguard household residents and food. Many households are too poor to have any stocks of food grain to store. Straw is raised as much as possible, usually on a platform at the same level as the house plinth, but other fodder supplies, such as groundnut stems, are put in the house rafters in preparation. Part of normal monsoon preparation consists of keeping cattle on raised ground (often higher than the house plinth) in the courtyard, and when flood threatens, bundles of catkin grass are used to raise cattle further. Grass mattresses are widely used to protect house plinths from wave action and rain, but while there is abundant catkin grass in the area, the bamboo needed to retain the mattresses around the plinth must be purchased.

Few house plinths are raised much above ground level. Households in Char Salehpur, for example,

Table 4.1 Years of Major Flooding Since 1980

	Flooding Years				
Mauza	1981	1987	1988	1991	1993*
Char Salehpur	-	Flood	Flood	Minor	Crop only
Enayatpur	-	Flood	Eroded†	-	-
Gopalpur	NA‡	NA	NA	Flood	Flood
Muzaffarpur	Flood	Flood	Flood	-	-
North Channel	-	-	Flood	Flood	Crop only

Source: Charland RRA

*All mauzas reported some damage to groundnuts and aus paddy; those highlighted as "crop only" reported particularly high losses. Only in Gopalpur had houses been flooded by mid-July (the time of the survey).

†All houses were removed for about four months, but by mid-October (*Kartik*) the char had re-emerged and was resettled by the same people.

‡NA = not applicable (uninhabited).

said they did not raise plinths in response to 1991 flooding because there was little incentive to do so—their homestead land is mostly rented and the risk of erosion is very high. For similar reasons there is a lack of incentive to plant trees (other than bananas) on homestead land, so there is no vegetative protection from wave action. Even on the relatively older land of North Channel these factors apply, because the people living there were previously affected by erosion and do not invest in improving or raising their new rented homesteads.

While people in all the mauzas visited reported hearing about recent floods on the radio, they did not consider it the same as getting an advance warning that was relevant to them. Anticipation of flooding is largely dependent on past experience and interpretation of rising water levels. People in all of the mauzas reported that they pay more attention to the radio than they did before 1988 (and there is more radio ownership in the chars), but that radio information is not meaningful to them or is difficult to interpret for their area.

4.3 1988 Flood Impacts

4.3.1 Warning, Evacuation, and Damage

There are many similarities in the 1988 flood experiences of the people in the six study mauzas, and this section gives a brief description of the sequence of events and nature of flood impacts in illustrative and distinctive mauzas. Table 4.2 summarizes the extent of housing damage, and Table 4.3 summarizes the evacuation effects of the flood. As previously noted, an important feature of the 1988 flood in the Padma study area was its association with a major erosion event. Therefore, evacuation occurred because houses that would otherwise have been flooded were eroded, and in some cases it is difficult to separate the two aspects of the event. Despite the events of 1988, however, people did not generally believe that erosion is strongly associated with severe floods. Erosion, they said, is unpredictable and has been continuing in the period since 1988. In Gopalpur, which was not inhabited in 1988, the most recent flood experience was in 1991.

In none of the mauzas visited did people receive any formal warning of flooding before the 1988 event, and some had not experienced homestead flooding before (at least not in that location). The general pattern adopted with respect to flooding (and erosion) was a "wait-and-see" approach. When flooding or erosion was imminent or had already started, households built *machas* to raise themselves and their property above the rising water. Those with cattle seem to have reacted earlier—as soon as water entered their courtyards—to save this important asset and in the process moved themselves to the safety of embankments. Systems for moving livestock in the 1988 flood appear to have been relatively good although respondents complained of the cost (Section 4.3.2).

In Enayatpur, rising water levels were noticed in the evening, and within 10 hours the village had been washed away. Miraculously there were no deaths, but only 10 percent of the residents were able to dismantle and remove their houses to safety by boat. Most households had only small boats and could not carry their houses with them, and richer households, although they had larger boats, had cattle to move. The evacuees made their way to mainland in Dhulsunra and took shelter on an embankment. Those who escaped received help from relatives, land owning patrons, and the Union Parishad. They also collected catkin grass and purchased bamboo to build shelters on the embankment. The villagers remained in Dhulsunra waiting for their char to reemerge and largely dependent on relief assistance for three to four months, some found day labor work, others fished or sold catkin grass as fodder and fuel. Cultivation restarted the following winter, but the flood had remolded the char and deposited large amounts of sand, so farming has not been as productive since, but is expected to improve shortly as the extensive catkin grass areas improve the cropping capability of the land.

information was obtained, the claim that 50 of these people drowned in Muzaffarpur is thought to be unreliable.

Chapter 5

AGRICULTURE

5.1 Introduction

Land is a fundamental resource base of charland inhabitants, along with the fish resources discussed in Chapter 7. The RRA therefore attempted to assess the relative productivity of agriculture in different char types in the study area, as well as the impact of flood risk on cultivation. Most of the information in this chapter was collected through discussions with small groups of farmers in each of the focus mauzas visited during the RRA. Information was obtained on: land types, cropping patterns, yields, inputs, and harvest and land prices. More qualitative information was sought on the impacts of hazards, changes over time, and the potential for improvement.

Table 5.1 Mauza Areas and Extent of Dry Season Submergence

Mauza	Total Area (ha)	Underwater (%)	Above Water (%)
Char Salehpur	1,089	60	40
Enayatpur*	55	30	70
Gopalpur	592	35	65
Kutubpur	147	10	90
Muzaffarpur	369	25	75
North Channel	1,187	50	50

Source: Charland RRA and Bangladesh Bureau of Statistics
*The villagers of Enayatpur report that total area is about 162 hectares.

5.2 Land Types

Table 5.1 confirms that a substantial part (more than 30 percent) of the island char areas are presently underwater in the dry season. In addition, a high percentage (25 percent or more) of the dry season land area is not cultivable in the island chars (Table 5.2). This is counterbalanced by lower population densities and hence less land under homesteads. In any case, homesteads cover less land per household on island chars than in the mainland since the high risk of submergence and

Table 5.2 Land Use Patterns

Mauza	Total Land Area (ha)	Homesteads (%)	Agricultural Land (%)	Non-Agricultural Land (%)
Char Salehpur	436	10	50	40
Enayatpur	39	5	70	25
Gopalpur	385	10	65	25
Kutubpur	132	30	70	0
Muzaffarpur	277	10	70	20
North Channel	594	40	50	10

Source: Charland RRA and Bangladesh Bureau of Statistics

Table 5.3 Soil Type and Age of Land

Mauza	Soil Type			Age (years)
	Sandy (%)	Sandy Loam (%)	Clay (%)	
Char Salehpur	50	35	15	North side, 18 South side, 5-6
Enayatpur	65	35	0	5-6
Gopalpur	50	50	0	5-6
Kutubpur	20	60	20	40
Muzaffarpur	50	50	0	12
North Channel	25	60	15	35

Source: Charland RRA

renting of homestead land leave little incentive to grow trees or vegetables.

Not only is less of the island char area cultivable but the land quality is lower. Table 5.3 shows high percentages of sandy soil in the island chars. Reported soil type appears to be closely associated with age of land in this area; the only clay soils reported are on the older land of the attached chars and in the older of the island chars. This probably reflects the unstable nature of the midchannel island chars, which might not change soil type in the unlikely event that they were to stabilize.

Associated with their unstable nature is the land level of the midchannel chars. Table 5.4 shows a much higher percentage of low land in the island chars, which have little high-medium land. Low land typically is inundated from early May (late *Baishakh*) to mid December (the end of *Agrahayan*), about three months longer than medium land (underwater from early June, the end of *Jaisthya*, to mid-October, late *Ashwin*/early *Kartik*). High land is reportedly only inundated for about two months in normal years from early August, late *Sraban*, through late September/early October, late *Bhadra*.

The characteristics of the land suggest that farming in the island chars should be less intensive, less productive, and more hazardous. The only mauza with any mechanized irrigation is North Channel, where a small area, about 5 percent of the low land, is irrigated by shallow tubewells.

5.3 Cropping Patterns

Table 5.5 shows that the island chars have a surprisingly high overall cropping intensity (at least for the cultivable land), which is comparable with the other mauzas, except for Enayatpur,

Table 5.4 Distribution of Agricultural Land by Depth of Normal Inundation

Mauza	High Land (%) (<1.2m)	Medium Land (%) (1.2-1.8m)	Low Land (%) (>1.8m)
Char Salehpur	25	10	65
Enayatpur	0	10	90
Gopalpur	0	25	75
Kutubpur	50	40	10
Muzaffarpur	25	25	50
North Channel	15	50	35

Source: Charland RRA

Table 5.5 Reported Cropping Intensity

Mauza	Single Cropped (%)	Double Cropped (%)	Triple Cropped (%)
Char Salehpur	35	50	15
Enayatpur	75	25	0
Gopalpur	25	65	15
Kutubpur	15	60	25
Muzaffarpur	40	40	20
North Channel	25	50	25

Source: Charland RRA

which has the highest percentages of sandy and low land in the surveyed mauzas.

There is little difference in cropping intensity between land levels in island and attached chars when averaged across char types. Surprisingly, higher land in the island chars appears to be more intensively cultivated, but this may be because there is so little higher land available in the island chars so that maximum use is made of this land. Tables 5.6 and 5.7 show the average cropping patterns by land level on the island and attached char mauzas surveyed in the RRA. On high land dry land crops like groundnuts and sweet potatoes are relatively important, but only on the low land in island chars is there a high percentage of local boro. For the remainder of land in both char types pulses are the main *rabi* season crops, with moderate areas of wheat on medium land. There appears to be a complete absence of millets from these chars, in contrast with the high intensity of millets in the Jamuna chars. Aus, but not aman, is common on the lower land of island chars, imply-

Table 5.6 Cropping Pattern on Island Chars (average % land per crop)

Crop	High	Medium	Low
Groundnut	50	-	13
*Masur**	30	6	-
*Mashkalai**	-	17	-
*Mug**	-	13	5
*Sola**	10	13	-
*Khesari**	-	13	5
Mustard	-	10	-
Wheat	10	33	-
L. Boro	-	-	57
Dhaincha	-	-	3
Aus	15	28	42
Aus + Aman	50	57	-
Aman	25	-	8
Til + Aman	10	-	-
Dhaincha	-	2	-
Crop Intensity	200	192	133
Area (ha)	40	74	381
% of Land	8	15	77

Source: Charland RRA
*Local pulse varieties.

Table 5.7 Cropping Pattern on Attached Chars (average % land per crop)

Crop	High	Medium	Low
Groundnut	27	3	6
*Masur**	13	13	-
*Mashkalai**	-	33	17
*Khesari**	-	33	30
Mustard	-	-	10
Wheat	6	20	8
Patal†	20	-	-
Ustha†	6	-	-
Sweet Potato	13	-	-
Coriander	13	-	-
L. Boro	-	-	3
HYV Boro	-	-	2
Aus	7	13	17
Aus + Aman	33	87	33
Aman	-	-	17
Dhaincha	7	-	-
Crop Intensity	145	202	143
Area (ha)	175	221	187
% of Land	30	38	32

Source: Charland RRA
*Local varieties of pulse.
†Vegetable crops.

Table 5.8 Average Yields and Output Prices of Main Crops in 1992-93

	Island Chars				Attached Chars			
Crop	md/ac	tn/ha	Tk/md	Tk/tn	md/ac	tn/ha	Tk/md	Tk/tn
Groundnut	24.7	2.28	517	13,851	18.3	1.69	550	14,736
Dal	14.0	1.29	545	14,602	14.1	1.30	486	13,021
Khesari	19.5	1.80	250	6,698	16.5	1.52	238	6,376
Wheat	21.8	2.01	198	5,305	26.3	2.42	200	5,358
Mustard	15.0	1.38	550	14,736	12.0	1.11	500	13,396
L. Boro	36.0	3.32	190	5,090	24.0	2.21	180	4,823
HYV Boro	-	-	-	-	50.0	4.61	200	5,358
Aus	24.3	2.24	184	4,930	15.8	1.46	197	5,278
B. Aman	23.3	2.15	193	5,171	18.5	1.71	195	5,224

Source: Charland RRA (see Appendix A)

Table 5.9 Average Cost of Cultivation Per Bigha (0.13 ha) of Main Crops in 1992-93

Crop	Plowing Cost (Tk)	Irrigation Cost (Tk)	Seed		Fertilizer		Weeding		Harvesting		Total Cost (Tk)
			Kg	Tk	Kg	Tk	Days	Tk	Days	Tk	
Groundnut	333	-	20	333	-	-	12	600	8	400	1,666
Masur	283	-	5	166	-	-	-	-	5	250	700
Wheat	466	-	12	233	41	158	8	400	8	400	1,757
Aus + Aman	450	-	16.5 +5.5	275	22.5	138	16	800	7	350	2,025
L. Boro	-	-	30	375	-	-	-	-	9	450	825
Khesari	-	-	5	133	-	-	-	-	6	300	433
Sola	150	-	5	150	-	-	-	-	8	400	700
Patal	500	-	0.5	200	-	-	20	1000	20	1000	2,700
Ustha	500	-	1	300	-	-	8	400	24	1200	2,400
Mashkalai	-	-	2.6	125		-	-	-	4	200	325
Mustard	-	-	0.5	50	-	-	-	-	3	150	200
HYV Boro	500	500	15	250	80	500	20	1000	8	400	4,150
Sweet Potato	500	-	-	500	50	300	6	300	20	1000	2,600
Coriander	500	-	4	125	15	100	10	500	8	400	1,625

Source: Charland RRA

ing that flood peaks are expected to come after aus is harvested, whereas mixed aus and aman are the main monsoon crops on all land levels in the attached chars, suggesting less risk of rapidly fluctuating flood levels. The high incidence of fallow low land is notable in the monsoon reflecting deep flooding, but it is not clear why the higher land on attached chars in the area appears to have such a low intensity of cropping.

5.4 Yields, Inputs, and Prices

No systematic differences were found in crop yields, harvest prices, or input levels between different land levels. Yields are broadly similar for each of the main crops in the island and attached chars (Table 5.8). For six of the main crops, including aus and aman paddy, yields are reported to be higher in the island chars than in the attached chars. This may ignore the risk of flood losses, however, since the yields are typical yields expected by farmers. Yields are also comparable with those found in other studies in Bangladesh, although the local boro yields reported on island chars are relatively high. Harvest prices last obtained by farmers (1992-93) are little different between the two char types, the differences are within the range of variation reported by farmers within and between mauzas in each char type.

Average production costs reported by farmers for the main crops were not found to differ in any systematic way between mauzas or char types, and have been averaged for the whole study area in Table 5.9. This indicates that most of the crops grown are low input crops; pulses, local boro, and mustard, for example, are mostly grown with no inputs other than sowing seeds and harvesting. Chemical fertilizer is only used on wheat, sweet potato, mixed aus and aman (in low quantity), and HYV boro (which also requires irrigation). Vegetable crops have relatively high labor demands for weeding and harvesting, as do sweet potatoes.

5.5 Productivity of Charland Agriculture

Based on Tables 5.6 to 5.9 it is possible to estimate financial profits per hectare of cultivated land in the island and attached chars. These figures should be regarded as indicative only. It is assumed that farmers pay market rates for land preparation, weeding, and harvesting but that other labor costs are borne by family members with no imputed cost to the family. Minor crops, which are mostly grown for consumption or household use (such as *dhaincha*), have been ignored.

On a hectare basis the average cropping pattern in island and attached chars has been computed from Tables 5.6 and 5.7, the yields and harvest prices from island and attached chars in Table 5.8 then give the gross return per crop. Production costs have been assumed to be the same in both island and attached chars, and the average figures given

Table 5.10 Land Prices

Mauza	Homestead Land (Tk/ha)	Agricultural Land (Tk/ha)	Non-Cultivable Land (Tk/ha)
Char Salehpur	25,000	22,000	7,500
Enayatpur	25,000	25,000	11,000
Gopalpur	25,000	22,000	7,500
Kutubpur	75,000	50,000	25,000
Muzaffarpur	30,000	25,000	12,000
North Channel	37,000	37,000	12,000
Island Char	25,000	23,000	8,666
Attached Char	47,333	37,333	16,333

Source: Charland RRA

Table 5.11 Flood Damage to Crops, 1983-93

Mauza	Flood Years	Worst Year	Damaged Crops	Percentage Lost
Char Salehpur	1988, 1991, 1993	1988	Mixed Aus-Aman	100
Enayatpur	1993	1993	Aus	75
			Groundnut	75
Gopalpur	1991, 1993	1991	L. Boro	50
			Groundnut	50
			Mixed Aus-Aman	100
Kutubpur	1987, 1988, 1991	1988	Mixed Aus-Aman	100
			Jute	100
Muzaffarpur	1987, 1988, 1991, 1993	1988	Mixed Aus-Aman	100
North Channel	1987, 1988, 1991, 1993	1988	Jute	100
			Aman	100
			Aus	50

Source: Charland RRA

in Table 5.9 were used. Based on these tables the average net return to family labor is estimated at Tk.10,950 per cultivable ha per year in the island chars and Tk.12,650 per cultivable ha per year in the attached chars. This implies that agriculture gives about a 15 percent greater return in the attached chars. These calculations do not take account of risks of crop loss due to floods and erosion, however, and the yields in Table 5.8 give no indication of higher risks to crops in the island chars, but this was reported in the RRA surveys. An alternative measure of the level of agricultural productivity and returns is to use land prices. Table 5.10 shows that all land values are considerably higher in the attached chars, implying that agricultural returns may be about 60 percent higher on attached char farmland compared with island char farmland. This may reflect the risks to crops and loss of land (and hence the expected life of the land), but there is a risk that the high incidence of tenancy in the island chars results in a distorted land market.

5.6 Flood Hazard and Other Agricultural Problems

A wide range of problems were reported by farmers in both charland types, among them:

- flood damage to mixed aus and aman;
- river erosion of land;
- early flood damage to groundnuts, local boro, and aus;
- turbidity (muddy water) damage to aman;
- sand deposition;
- strong river current;
- water hyacinth problem; and
- access to and cost of seeds, fertilizer, and pesticide.

In addition, island chars farmers complained of a lack of agricultural inputs and implements; while attached char farmers reported the following:

- heavy rainfall results in waterlogging;
- roads and embankments create waterlogging problems;
- high oil price; and
- absence of block supervisor.

Floods are a recurrent problem for farmers in this area. Table 5.11 illustrates the extent of damage to crops and shows that even in 1991 and 1993 there was considerable damage to crops in the area. The relative severity of floods since 1988 appears to have been worse in the island chars, but this is partly because there was little agriculture before 1991 in the mauzas visited.

There have been few attempts to improve agricultural production systems in the study area. In North Channel mauza the Finnish Free Foreign Mission (which has a health care program in the union) gave 10 diesel-powered shallow tubewells to farmer's groups in the union. This is the only mechanized irrigation found in the study mauzas. There has been no governmental help to solve the agricultural problems. Farmers suggested loans to buy cattle and poultry could be provided by the Union Parishads, Thanas, and NGOs, but did not suggest ways of intensifying agriculture.

There nonetheless have been some minor changes in cropping patterns in the area. The people of Char Salehpur said that groundnut, a relatively new crop in the area, became popular seven or eight years prior to the RRA. In North Channel mauza people said HYV boro (irri) and groundnuts are new crops. If marketing facilities could be improved and credit for more expensive crops provided, then it might be possible to increase production of vegetables and other higher value crops in the chars. Agronomic research aimed at helping charland farmers in this area get better returns in the dry season could also be helpful, at present the charland farmers seem to be neglected.

Chapter 6

LIVESTOCK RESOURCES

6.1 Livestock Numbers

Rich grazing lands and a seasonal abundance of fodder resources make livestock rearing a lucrative activity in the Padma charlands. In the study mauzas, cattle and goats are almost equally popular, with 67 percent of households keeping cattle and 70 percent raising goats (Table 6.1). While 51 percent of households reported rearing ducks, chickens, kept by 99 percent of the households, are generally preferred. The raising of ducks is mostly confined to the wet season (mid-April through mid-December, or *Baishakh* through *Poush*), when water levels are high enough to provide forage for the birds. In the dry season, when water recedes from around the homesteads, about 90 percent of the ducks are sold. Sheep were observed only in North Channel Union, where 5 percent of the households were reported to keep three or four sheep each.

Table 6.2 indicates that the highest availability of cattle per household was observed in the attached north bank chars of Kutubpur (2.9) and Muzaffarpur (3.0). The lowest ownership was found in Enayatpur (1.0), which may be due to the fact that the mauza had been settled very recently.

6.2 Fodder Resources

The main fodder sources in the study mauzas are grass, catkin, and paddy straw. In the dry season, *kalai* (a variety of pulse) and groundnut leaves are also used, but these are only available for short periods: *kalai* between November and January

Table 6.1 Distribution of Livestock by Mauza

Mauza	Number of Households	Households with Livestock (%)			
		Cattle	Goats	Chickens	Ducks
Char Salehpur	325	90	50	98	10
Enayatpur	160	50	10	80	10
Gopalpur	175	75	75	100	30
Kutubpur	500	95	80	100	60
Muzaffarpur	550	75	75	100	25
North Channel	1,400	50	75	100	75
All Study Mauzas	3,110	67	70	99	51

Source: Charland RRA

Table 6.2 Livestock Per Household

Mauza	Cattle	Goats	Chickens	Ducks
Char Salehpur	2.7	1.5	5.0	0.7
Enayatpur	1.0	0.2	3.2	0.5
Gopalpur	2.3	2.5	4.0	2.4
Kutubpur	2.9	3.2	5.0	4.8
Muzaffarpur	3.0	3.0	6.0	1.4
North Channel	2.0	2.3	6.0	5.3
Average of Mauzas	2.3	2.1	4.9	2.5

Source: Charland RRA

(*Agrahayan*, *Poush*, and *Magh*) and groundnut leaves for about a month during late-April to early June (*Baishakh* to *Ashar*). All the households store paddy straw to feed cattle in the monsoon. Catkin grass is used throughout the year, as is oil cake mixed with rice bran for concentrates.

6.3 Livestock Tenancy and Draught Power

Rearing cattle and goats on a share (*barga*) system is common in the study mauzas. Under the *barga* system the owner, usually a mainlander, and tenant fix a market value of the calf or young goat at the time of agreement and the tenant rears the animal until it reaches peak sale value, then the sale price of the animal is shared equally between the owner and tenant after deducting the original value, which is given to the owner. In another version of the system, if there are two offspring from a goat during the period of tenancy, then one will belong to the tenant and the other one to the owner. By this means a poorer households can accumulate a small number of goats that provide them with a source of income free of the need to raise the capital cost of livestock. On average, 54 percent of the study area cattle are reared under the system, but it is most common in the island chars of Gopalpur, Char Salehpur, and Enayatpur, where 60 to 70 percent of the cattle are under *barga*.

There is no overall shortage of draught power in the Padma char areas, but not all farming households have cattle so some hire in draught power from neighbors. Some farmers of North Channel, Salehpur and Kutubpur hire power tillers from the mainland for land preparation. About 25 percent of land in Char Salehpur is said to be prepared by power tillers at a cost of Tk.300-500 per bigha (0.13 ha), compared with Tk.300-400 per bigha for plowing by cattle.

6.4 Livestock Disease and Treatment

Char people said that the incidence of livestock disease is lower than in the mainland, and they are careful to look after livestock, one of their major sources of income and livelihood. Fodder is not a problem and cattle appeared healthy during the RRA field visit in the char areas.

Nonetheless, commonly mentioned livestock diseases in the area are: fever/rheumatism, *khura rogh*, diarrhoea, *buj buja rogh* (swollen belly and softening of muscles), and *batash laga*. In most cases, the char people prefer to go to mainland veterinarians (*palli* doctors) in Char Bhadrasan, Faridpur, Joypara, and Jitka. In addition, residents of Char Salehpur said that people, locally called *ghosh*, who are skilled in livestock treatment come from Jessore every year from October through December (*Kartik* to *Poush*). The *ghosh* provide both *kabiraji* (herbal) and allopathic medicines for livestock. The villagers also sometimes depend on local *fakirs* to treat *batash laga rogh* (bad air).

6.5 Marketing of Livestock and Products

6.5.1 Prices

Cattle are mainly bought and sold at four periodic markets (*hats*) serving the study reach: Tepakhola (Faridpur), Jitka (Manikganj), Joypara (Dohar), and Kamalganj (Nawabganj).

There is no seasonality in cattle rearing or trading, people usually sell their cattle whenever necessary to meet family needs. Respondents in Enayatpur (island char) said that they sell some of their cattle during the months of October, November, and December (*Kartik* to *Poush*) to raise cash required for groundnut cultivation. Some people buy cattle in the monsoon season because prices are low then, but at that time of year rearing cattle is complicated by inundation.

There is some cattle raising, trading, and fattening on a commercial basis in the study area. People cited as an example that if someone buys a cow at Tk.3000 in June (*Ashar*) he could sell the animal for Tk.5000 four months later in October (*Kartik*), making a profit of Tk.2000. Cattle are also purchased for plowing and fattening after the recession of flood water in September or October (*Ashwin* to *Kartik*). There are, therefore, some seasonal changes in livestock prices, but they are small and there is little variation between markets. Average sale prices of animals, milk, and eggs are shown in Table 6.3. Prices of both eggs and milk increase somewhat in winter.

6.5.2 Milk Marketing

As a rule, milk is not directly marketed by the cattle rearer. Instead, middlemen, called *goalas*, collect milk from every household having diary cows and then sell it in the nearby markets. The *goalas* and the cow owners fix a farm gate price for milk that is usually between Tk.8-10 per kg, about Tk.1-2 below the current market price. The price of milk goes up during March and April (*Chaitra* and *Baishakh*) when there is a scarcity of green grass and milk production is low. In the summer and monsoon the price of milk goes down as green grass, catkin grass, and straw are plentiful.

In the Char Bhadrasan study area, three different milk marketing arrangements were observed:

- In Enayatpur, Char Salehpur, and North Channel (all island chars), *goalas* make a profit of Tk.2-3 per kg and in addition take 20 percent of the milk as a service charge for collection and conveyance.
- In Muzaffarpur, *goalas* make a profit of Tk.1-2 per kg and do not take any service charge for collecting and selling milk. This arrangement was also found in the char areas of the Ganges, Meghna, and Brahmaputra rivers (other Charland Study RRA surveys).
- In Kutubpur mauza (which is close to market), five to seven dairy cow owners form a sellers' group and each member, in

Table 6.3 Market Prices of Livestock, Milk, and Eggs by Mauza

	Market Price of Livestock (Tk/head)				Milk	Eggs
Mauza	Bullock	Cow	Goat	Chicken	(Tk/kg)	(Tk each)
Char Salehpur	4,000-8,000	5,000-12,000	500-2,000	65-70	8-10	1.5-2.5
Enayatpur	5,000-7,000	7,000-12,000	600-1,200	60-70	8-10	1.5-2.0
Gopalpur	6,000-8,000	8,000-1,0000	500-1,500	60-65	8-10	2.00
Kutubpur	5500-12,000	7,000-15,000	500-3,000	70-80	10-12	2-2.5
Muzaffarpur	5,000-15,000	8,000-12,000	500-2,200	50-60	8-10	2.00
North Channel	4500-8,000	5,000-12,000	500-1,500	45-60	8-10	2-2.5
Average	5,000-9,700	6,700-12,700	520-1,900	58-67	8-10	1.75-2.25

Source: Charland RRA

rotation, collects milk from the others and sells it. The sale proceeds for the day are kept by the seller. The members usually send the same amount of milk to market each day, but a daily account is kept so that the return can be adjusted when necessary. In this arrangement the farmers get the actual market price of milk.

6.6 Conclusions

6.6.1 Problems and Constraints

Common problems associated with livestock rearing were similar in all the mauzas visited by the RRA, they were:

- theft of livestock, particularly in monsoon season. Households living close to the river (in Kutubpur, for example) are more vulnerable to theft as poachers and bandits (*dacoits*) come by engine boat and can quickly get away after taking cattle. This is not an acute problem, nor is it common to all mauzas. Kutubpur residents reported three or four incidents in the year prior to the RRA, all of them confined to river bank households. Two incidents of livestock theft were reported in Muzaffarpur and Char Salehpur in 1992. People have since posted night watches and said that incidents of poaching have decreased.
- inadequate boats for quick evacuation during floods. The cost of moving cattle by boat during past flood was very high.
- inadequate livestock treatment facilities in char areas.
- unhealthy cattle shed and inadequate space for cattle during floods.

Unless the above factors can be addressed, the expansion of livestock rearing in the study area would be limited.

6.6.2 Recommendations

Despite the difficulties, there is tremendous potential for further livestock resource development in the charlands of the Padma. Livestock rearing is generally profitable, unconstrained by fodder supplies, and well adjusted to the char environment. Livestock assets can provide char dwellers with a regular income source, can be realized in times of stress, and can be moved when floods and erosion strike. The following measures would help char people to overcome the financial and physical risks and constraints that currently limit livestock rearing, and improve their economic well being:

- Providing livestock treatment and vaccination services in the char area. For example, someone in each char village could be trained so that they could independently carry out vaccination and treatment of common livestock diseases.
- Providing credit facilities to the char people so that they can buy more cattle and goats. Access to formal credit is presently limited for char people by their lack of collateral and frequent movement due to erosion. A means of working with societies (*samaj*) could be appropriate since these groups to some extent hold together when erosion forces people to move.
- Making engine boats available during floods for quick evacuation of livestock at reasonable cost.
- Shelters in the char areas or on mainland river banks so that people can safely keep their cattle and goats in times of high flood.

Chapter 7

FISHING

7.1 Extent of Professional Fishing

After agriculture, fishing is the most important source of income and livelihood for the people of the Padma study area (see Table 2.3). During monsoon months, most households fish, either for income or for consumption, not only in the river but also in inundated charlands and flooded fields.

Among professional fishermen, two types of fishing predominate: shrimp (*icha*) fishing and *hilsha* fishing. Table 7.1 shows the percentage of professionals engaging in the capture of these two species. In some cases, households were found to be doing both types of fishing.

Fishing activity, whether subsistence or commercial, tends to be concentrated in the monsoon season; only a few full-time professional fishermen are active throughout the year. During the dry season, when fishing is poor, professional fishing households generally make a living from other activities such as cultivating their own land or share cropped land, working as agricultural day laborers, or raising livestock. All but a few of the professional fishing households were reported to be Muslims, the exceptions were a few Hindu fishermen in a *para* of North Channel mauza. People from Gopalpur mauza said that before 1947, all the area fishing families were Hindus, who migrated to India after the partition.

Table 7.1 Professional Fishing Households by Fishing Type

Mauza	Shrimp Fishing	*Hilsha* Fishing
Char Salehpur	75	60
Enayatpur	65	35
Gopalpur	100	10
Kutubpur	60	40
Muzaffarpur	65	35
North Channel	55	45

Source: Charland RRA

7.2 Fishing System

7.2.1 Fishing Seasons

As was previously noted, fishing is most intense in during the monsoon season, when water levels rise, *hilsha* runs are at their peak, and many species are migrating to spawning grounds. At that time of year many farmers and laborers in the Padma charlands switch to fishing for a living, particularly shrimp (*icha*) fishing using bamboo traps called *duars*. In addition to *hilsha* and *icha* fishing, spawn fishing is important in this area from mid-April to mid-August (*Baishakh* to *Sraban*).

Hilsha fishing peaks in mid-August through mid-October (*Bhadra* through *Ashwin*), and *icha* fishing peaks mid-September through mid-October (*Ashwin*), when water recedes from inundated charlands. Some fishermen reported that they get their best market prices for fish in March and April (*Chaitra*) because of the scarcity of fish in the dry season.

Table 7.2 Fishing License Fees by Gear Type

Gear Type	Species Caught	License Fee (Tk)
Current jal	*Hilsha*	400-900
Shanglay jal	*Hilsha*	100-150
Savar jal	Spawn	400
Bheshal jal	Miscellaneous	750-1,000
Moi jal	*Icha, bailla*, etc.	50

Source: Charland RRA

The people of Gopalpur only fish for *icha* in the wet season, although a few work as laborers (*bhagi*) in *hilsha* boats. Some Muzaffarpur and Kutubpur residents (about 5 percent) go to the Bhola-Noakhali area every year to work as fishing laborers in large *hilsha* fishing boats (*chandi*) operated by 10 to 14 men. For three months' work from mid-July to mid-October (*Sraban* through *Ashwin*) each person earns about Tk.5,000-6,000 per month.

7.2.2 Fisheries Management

Fishing in the Padma is restricted, and fishermen are required to have a license from the appropriate local thana Fishery Office. Licenses are necessary for fishing with nets called *hilsha jal, savar jal* (for carp spawn), *bheshal jal*, and *moi jal*. Fishermen using *duars* and smaller nets like *jhaki jal* and *thela jal* have free access to fishing grounds. License fees vary according to the size and type of fishing gear. Table 7.2 shows the range of license fees for different gear types reported in 1993.

7.2.3 Income

Accurate information about fishing income was unavailable in the study area, since none of the fishermen keep any record of income and expenditures. But discussions with fishermen yielded a generalized profile of fishing income in the study mauzas.

The respondents said that fishing income is always uncertain; on some days they have no catch at all, but when they have a good catch they can survive for three or four days on the income it generates. Considering this uncertainty, an average daily income for peak and lean seasons by type of fishing gear was estimated, and the results are presented in Table 7.3. It is evident from the table that income level varies considerably between seasons, with the average income in peak months being about 200 percent higher than in the lean months.

7.2.4 Spawn Fishing

Spawn fishing is a particularly important activity in the Padma charlands. Spawn trapping, using a set of 10 to 20 fine-mesh bag nets called a *savar*, starts in mid-April (*Baishakh*) and continues until mid-July (the first week of *Sraban*). The spawn caught are mostly of two carp species: *rui* and *catla*. In the process, however, hatchlings of other species are also trapped, the majority of which are *icha*. The hatchlings are generally destroyed.

About 2,000 *savars* were reported to be operating in the minor channels (*kharis*) of the Padma River, covering 20 km of the south (right) bank of the Padma from Daulatdia ghat to Momin Khar *hat*. Most of the *savar* owners are from the "C & B ghat" area of Faridpur and not from the charlands, only about 20 percent are from North Channel union. About 30 metric tons of fish spawn are reportedly caught annually in this area (15 kg/*savar*/year).

Table 7.3 Fishing Income by Gear Type

	Income/person/day (Tk)	
Fishing Type	Peak Period	Lean Period
Hilsha Fishing	80-120	30-60
Duar Fishing (50 duars)	100-150	25-40
Moi jal Fishing	100-200	35-60

Source: Charland RRA

Approximately 50 people from North Channel mauza work as laborers operating *savar* nets for about three months. Their wages are Tk.800-1,200 per month, including food.

Prices of spawn vary according to supply and the stage of the season. Prices in 1993 ranged from Tk.500 to Tk.4,000 per kg of spawn. The early spawn are sold at higher prices.

7.3 Fish Trading

The RRA survey found one fish trading group, consisting of 16 members, in Char Salehpur mauza. The group owns five country boats, and sometimes hires an additional engine boat to convey fish to market. The boat operators collect *icha, bailla*, and other small fish species from bamboo trap operators in several island char mauzas, then take them to Molla Dangi village in Char Salehpur mauza at about 3 p.m. each day. In Molla Dangi, the fish are bought by larger traders (*beparis*) from Mawa (further downstream) and shipped by engine boat to Dhaka markets.

During peak season the daily landing at Molla Dangi is 300-375 kg of fish, and in the lean season it is 150-225 kg per day, implying that around 80 metric tons of fish are sold via this route each year from part of the study area. During peak season the average sale price for a typical catch of *icha* for the fishermen is Tk.40-50 per kg, while in the lean season prices go up to Tk.80-90 per kg (Table 7.4), implying that fishermen sell about Tk.6 million worth of fish from one part of the study area through this landing center.

The traders, each of whom has his own capital and purchases fish individually, reported that they normally make a trading margin of Tk.5 per kg. None of the traders appeared to specialize, and when the *icha* season ended they switched to trading *hilsha*, mainly juvenile *hilsha* (*jatka*), the catching of which is prohibited by law. From mid-October through mid-March (*Kartik* through *Chaitra*) they sell 40 to 120 kg of *jatka* daily at Bandura and Kartikpur markets.

7.4 Conclusion and Recommendations

Fishing is a major economic activity in the Padma char areas; members of almost every family are involved in fishing for their livelihood either full- or part-time. Char dwellers with no agricultural land can easily subsist on fish caught in and around their charlands. Commercial fishing in the Padma study area is mainly for *hilsha* and *icha*. *Hilsha* fishing, however, requires boats and nets that most people cannot afford, so they work in other people's boats as fishing laborers. Due to lack of facilities and access to institutional credit systems in the area, poor fishermen often depend on local money lenders who charge usurious rates (10 percent per month) for capital loans.

Local fishermen reported that the catch of *hilsha, icha*, and other varieties of fish is gradually declining in the Padma, and they pointed out that massive harvest of carp spawn and juvenile *hilsha* has contributed to that decline.

The lack of fishermen's cooperatives in the RRA study area means that fishermen have little or no

Table 7.4 Seasonal Landing and Price of *Icha**

Month	Daily landing (kg)	Price Tk/kg
Mid-March to mid-May (*Chaitra* to *Baishakh*)	150 - 200	80-90
Mid-May to mid-September (*Jaisthya* to *Bhadra*)	200 - 250	50-60
Mid-September to mid-November (*Ashwin* to *Kartik*)	300 - 400	40-50

Source: Charland RRA
*Data is for Molla Dangi landing, which covers the catch of about six adjacent mauzas.

economic bargaining power or cooperative spirit. These fishermen could benefit from assistance in forming community savings groups that would enable them to help each other during difficult times, and help them obtain access to credit and capital. They could also raise their own capital from savings for purchasing fishing materials and other essentials. NGOs do not appear to be active with open-water fishermen and could develop appropriate fishing community development and credit programs in the char areas. However, this would probably require official help in enforcing licensed fishermen's rights, as dominant local power groups and large traders are presently in a strong bargaining position and would be unlikely to permit erosion of their economic power.

Chapter 8

INSTITUTIONS, TRANSPORTATION, AND MARKETS

8.1 Institutions

There is little in the way of infrastructure or public facilities in the Padma charlands visited by the RRA, particularly in the island char mauzas. Table 8.1 shows that none of the island chars were reported to have any formal health care facilities, for example. Attached chars fared somewhat better, with 25 percent reporting some health care facilities, and only 19 percent of the unprotected mainland mauzas had such facilities available. Poverty and the distance of health centers often prevent charland people from seeking medical services on the mainland (Chapter 9).

The island chars are also poorly equipped with educational facilities, only 31 percent of the island char mauzas reported having a primary school, while 75 percent of attached char mauzas and 46 percent of unprotected mainland mauzas had such schools. People living in island chars are usually reluctant to send young children to distant mainland primary schools, and even when they might like to do so they find it difficult to arrange transportation. They are therefore almost totally reliant on their local schools, which frequently are closed due to lack of teachers or loss of the school building to flood or erosion.

Markets generally appear to be concentrated along the attached chars, but some island chars have small markets that improve people's access to essentials. As Table 8.1 shows, about a quarter of the island char mauzas are reported to have markets. The study area is well covered by NGO activity, particularly in comparison with charlands in the other rivers studied: NGOs were found to be active in 67 percent of the mauzas.

The RRA paid particular attention to the accessibility of union parishad and thana offices, data for which are shown in Table 8.2. The table indicates that the island char mauzas are relatively remote; the average distance to the union office was 10 km and the thana headquarters was 12 km away. The attached char mauzas were considerably closer to their union parishad office, only 4 km away, but were only marginally closer to thana headquarters, 10.5 km away. Respondents in the island chars said that the difficulty of arranging transportation, as well as its cost, made access to their local

Table 8.1 Infrastructure and Facilities in Inhabited Mauzas of the Study Region (percent)

Facility	Island Char	Attached Char	Unprotected Mainland	Total
Health Care	0	25	19	14
Primary School	31	75	46	43
High School	7	50	15	14
Weekly Market (*hat*)	24	50	22	23
Launch Ghat	3	0	4	4
Electricity	0	25	18	13
NGO Activity	69	75	66	67

Source: Charland Inventory

Table 8.2 Accessibility of Government Offices by Char Type

Char Type	Average Distance from Village (with range) in km	Dry Season (one way)			Wet Season (one way)		
		Average Time (hr)	Average Cost (Tk)	Mode of Transport	Average Time (hr)	Average Cost (Tk)	Mode of Transport
a) Union Parishad Office							
Island Char	10.2 (8-13)	2.35	5.35	On foot; engine boat	2	7.70	Engine boat
Attached Char	4 (1.6-5.5)	0.85	2.70	On foot; boat; rickshaw	0.85	4.00	On foot; boat; rickshaw
b) Thana Headquarters							
Island Char	12.35 (9.5-16)	2.5	4.70	On foot; engine boat	2.35	8.30	Engine boat
Attached Char	10.5 (4-19)	2	8.30	On foot; rick-shaw; bus	1.8	9.00	Engine boat; rickshaw; bus

Source: Charland RRA

Table 8.3 Boat Ownership Patterns by Char Type

Char Type	No. of House-holds	Small Country Boat				Engine Boat			
		No. of HH with Boats	% of HH with Boats	Total Boats	HH/Boat	No. of HH with Boats	% of HH with Boats	Total Boats	HH/Boat
Island Char	660	200	30	205	3.2	-	-	-	-
Attached Char	2,450	372	15	460	5.3	31	2	33	74

Source: Charland RRA

government institutions particularly hard. Just as the residents of the chars find it difficult to get to government officials, the officials experience the same problems and therefore seldom visit the island chars.

In general, the attached char mauzas and unprotected mainland mauzas were better served by a network of roads and short waterways. Comparing data on travel time and costs during dry and wet seasons (Table 8.2), travel time is found to decrease in the wet season; however, cost per km goes up mainly due to the fact that engine boats are used more frequently.

8.2 Transport Facilities

Boats are the most important mode of transportation for the char people, particularly during monsoon season. Boats are used to cross rivers, carry catkin grass and agricultural produce, and transport cattle, as well as for fishing and transportation to distant places for personal and business purposes. The boat ownership data reported in Table 8.3 show that as many as 30 percent of the households in the island chars own small country boats. No household in the island chars owned an engine boat. In the attached chars, which usually enjoy better access to the mainland through road connections, only 15 percent of the households owned small country boats. In these chars, there are a small number of engine boats, which are mainly used for commercial purposes. During the monsoon these boats are often used for fishing, but char people also reported that engine boat services for passengers and goods were available to them on a fairly regular basis during the monsoon months.

8.3 Markets

8.3.1 Market Location and Prices

People from the study mauzas regularly use a dozen marketplaces (see Appendix B). Although people generally use the marketplace nearest their home for purchasing daily essentials, major transactions, such as purchasing bulk agricultural inputs, selling produce, and procuring supplies for weddings and other ceremonies, are often made in more distant, larger markets. Two such important marketplaces in the area were Hajiganj Bazar and Piajkhali Bazar.

In the months of December and January, large harvests of catkin grass are sold to traders from the southern district of Barisal, where catkin is in high demand for making betel leaf enclosures. Hajiganj Bazar is the most important market for this purpose. Large quantities of grass produced in the island char mauzas are also sold for fodder in Hajiganj during the winter. Fishing households were found to depend quite heavily on Hajiganj Bazar for the purchase of fishing gear. Piajkhali Bazar is where people from the RRA mauzas go to market large quantities of onion, garlic, and groundnuts.

The char people market milk and winter vegetables in Char Bhadrasan Bazar, which is in the thana headquarters. They reported that these items fetch better prices in the market because they are consumed by people in the town. Fish are either sold by the riverside at landing places or at Kartikpur Bazar, which is on the northern side of the river and relatively better connected with the Dhaka market.

Data on the average market price of selected commodities during dry season and monsoon are presented in Table 8.4. Most prices rise somewhat during monsoon season, the increases being particularly steep for salt, straw (used for fodder), potatoes, chilies, and rice, which are in short supply. Unlike other commodities, the price of cattle drops during the monsoon months, when it is more difficult to maintain the animals.

8.3.2 Hajiganj Market: A Case Study

Hajiganj Bazar, located between Char Bhadrasan and Faridpur, is one of the main markets serving the study reach. Business in the market is reported to have been increasing in recent years. Since the

1988 flood, about 50 new shops have reportedly been added bringing the total number of shops to about 300. There is a morning market each day and a twice weekly *hat*.

The main items traded in the *hat* are:

- Molasses, a major product in the area (some 450 metric tons per day is reportedly sold over the three month peak season), which is locally made and mostly sold to wholesalers from other parts of the country. Little of the molasses (perhaps 10 percent) comes from the charlands.
- Cash crops (*rabi* season) such as onions and garlic (60 percent from the charlands), and groundnuts (all from the char areas) are traded locally and for export out of the area.
- Jute from the mainland is sold to traders.
- Rice from other regions, such as Faridpur and Jessore, is brought to the area to meet local demand.
- There is a retail fish market which is locally important, and where in season substantial amounts of *hilsha* are traded.
- Large quantities (40 metric tons a month) of rice bran are reportedly imported into the area from Rajshahi for cattle feed, but this is presumably for the mainland since the chars are reported to have plentiful fodder.

The *hat* was estimated to serve an area of approximately an 11 km radius, with about 40 percent of the people coming from the charlands (mainly Char Harirampur, Jhaukandi, and Char Bhadrasan unions). Over the past 10 years molasses has increased in importance at the expense of jute, with little change in the pattern of trade with the charlands. Apart from cash crops, the main char product traded is catkin grass during the summer and early monsoon when 400-500 bundles (Tk.20,000-30,000) are sold per *hat*. The permanent shops serve local people and people visiting the *hat*, over 50 percent are general grocery stores, the remainder are mainly clothing stores, pharmacies, and tea shops. There are also about 20 rice and oil mills and about 50 warehouses (*godowns*), most of them private.

It was reported that there was a lack of markets and *hats* along the banks of the Padma due to erosion, even though access to Hajiganj from the

Table 8.4 Average Price of Selected Commodities

Commodity & Units	Dry Season Price (Tk)	Wet Season Price (Tk)	Percentage Change from Dry Season to Wet Season
Rice (kg)	9	11	+22
Flour (kg)	8	9.5	+19
Chili (kg)	35	45	+29
Pulses (*masur*; kg)	28	32	+14
Soybean Oil (kg)	38	45	+18
Potato (kg)	7	9	+29
Salt (kg)	6	8	+33
Lungi (per piece, average quality)	80	85	+6
Sari (per piece, average quality)	130	135	+4
Bamboo (one large piece)	75	90	+20
C.I. sheet (pieces adding to 22 m)	2,300	2,500	+9
Straw (1 maund)	15	20	+33
Cow (one, average quality)	6,000	5,500	-8
Goat (one, average quality)	900	800	-11

Source: Charland RRA

chars is only possible by boat in the monsoon (at other times there is a 6 km walk or rickshaw ride). This market was little affected by the 1988 flood, a few of the low-lying shops were flooded to about 30 cm, but it did not disrupt business.

8.4 Conclusion

There is a low level of infrastructure provision in the island chars, while the few attached chars appear to be at least as well off as the unprotected mainland areas, possibly because they have good river communications and are linked with the mainland. The island chars are relatively removed from administrative centers, particularly from their union parishad offices, in terms of distance, time, and cost. Engine boats are an important means of communication, although ownership in the study mauzas was low; many households have their own small boat.

A number of markets serve the area, all of them located on the mainland; those near the river have mostly eroded. Prices tend to be somewhat higher during the monsoon, although at this time access to the markets is easier for char people. Much of the trade involves protected mainland areas. So far as the charlands are concerned people earn an income from selling *rabi* season cash crops (groundnuts, onions, and pulses) and catkin grass. This income is used to buy rice and other basic commodities. Because the markets are some distance from the river bank, trade does not appear to have been affected much by severe floods.

Chapter 9

HOUSEHOLD WELFARE

9.1 Introduction

This chapter is based on discussions with groups of women in the study villages.[1] While information from women has also been used in the other chapters, women are thought to be the best informants on the issues of food consumption, cooking and fuel use, water and sanitation, and health. While household welfare in the Padma charlands, and the attendant responsibilities of women, do not appear to differ from other parts of Bangladesh, the information gathered points to a number of specific problems faced by households in the study area, particularly during floods.

9.2 Water and Sanitation

Tubewells are the main source of drinking water for most of the people in the mauzas covered by the RRA. As Table 9.1 shows, most households, even in the island chars, appear to have access to tubewell water. In the island chars, however, there are many more households per tubewell. All the people in North Channel mauza have access to tubewell water for drinking purposes, mainly because this mauza received a large number of tubewells from an NGO (the Finnish Free Foreign Mission). Although people use tubewell water for drinking, they do not like to use it for cooking

Table 9.1 Availability of Tubewells and Latrines

Mauza & Char Type	No. of Tubewells	Households Per Tubewell	Percentage of Households Drinking Tubewell Water	Percentage of Households with Latrines	
				Kutcha	*Pucca*
Char Salehpur (Island)	7	50	75	50	–
Enayatpur (Island)	3	50	95	50	–
Gopalpur (Island)	6	30	90	25	–
Kutubpur (Attached)	70	7	95	90	5
Muzaffarpur (Attached)	75	7	85	94	1
North Channel (Attached)	140	10	100	90	5

Source: Charland RRA

Table 9.2 Types of Fuel Used by Season

Mauza	Dry Season	Monsoon	Flood	Comments
Char Salehpur	Straw, hay, catkin grass, weeds from crop fields, left over from grass collected as fodder	Dried cow dung, dried peanut plant, rice husks	Dried cow dung, rice husks	Fuel supply is sufficient in all seasons, including flood season if fuel is properly preserved
Enayatpur	Straw, hay, catkin, grass, dried cow dung, dried peanut plant	Catkin grass, dried peanut plant, dried cow dung	Catkin grass, dried cow dung, dried peanut plant	Fuel sufficient in all seasons; catkin grass is also sold as fuel in the market during monsoon
Gopalpur	Straw, hay, left over from grass collected as fodder, bamboo stick, dried *dhaincha* plant, dried cow dung, rice husks	Catkin grass, dried peanut plant, dried cow dung, rice husks	Catkin grass, dried peanut plant, dried cow dung, rice husks	Fuel supply is sufficient in all seasons
Kutubpur	Straw, hay, catkin grass, dried lower portion of wheat plant, dried sweet potato plant	Catkin grass, dried peanut plant, dried cow dung	Catkin grass, dried peanut plant, dried cow dung	Fuel supply is sufficient in all seasons; some wealthier households buy fuel wood from the market
Muzaffarpur	Straw, hay, catkin grass, dried peanut plant, dried *dhol kolmi* plant	Catkin grass, dried peanut plant, dried *dhol kolmi* plant	Catkin grass, dried peanut plant, dried *dhol kolmi* plant	Fuel supply is sufficient in all seasons
North Channel	Straw, hay, dried *dhaincha* plant, dried *venna* plant, weeds from crop fields	Dried peanut plant, dried cow dung, rice husks	Dried cow dung, dried peanut plant, rice husks	Fuel supply is sufficient in all seasons

Source: Charland RRA

because, in their opinion, it makes the food less tasty and turns it blackish in color (due to the iron content of the water). During the dry months of March, April, and May when the river water recedes from the homestead areas, people dig small wells in the ground to obtain cooking water.

During floods, many tubewells in the charlands are submerged and obtaining clean water becomes a problem. Fetching water from distant places where one or two tubewells on high ground could still be functioning proves rather difficult, particularly when the weather is inclement. In addition, many people do not have the boats required to carry water from distant places. Therefore, during floods many people use flood water for drinking. *Fitkiri* (alum) is usually used to purifying this water; purifying water by boiling it is relatively rare. The reasons for this are both a lack of awareness and the cost of the fuel required. Only in North Channel, where the Finnish Foreign Mission had made people aware of purification by boiling, did people use the technique.

Table 9.1 also indicates a severe lack of sanitation facilities in the island char mauzas; 50 to 75 percent of the households there have neither *pucca* nor *kutcha* latrines. The inhabitants of the attached chars generally had *kutcha* latrines and even a few *pucca* ones. In general *pucca* latrines were extremely rare.

9.3 Fuel

The RRA found that the supply of fuel in the study mauzas was adequate during the dry season. Hay and straw, dried catkin grass, and dried *dhaincha* were commonly used during this season (Table 9.2), and in some attached chars people also used bamboo sticks. A variety of fuel materials were stockpiled for the monsoon months, when buying fuel is both more difficult and more expensive. Storing dried cow dung was relatively common, and groundnut plants were often dried after harvest and stored. Other plants that were dried and stored to be used as fuel included *dhaincha*, *dhol kolmi*, and catkin grass. Relatively better off households with large paddy harvests also stocked paddy husks (called *tush* or *kura* depending on whether the husks were fine or course). The storing is done on elevated platforms (*machas*) constructed inside houses.

9.4 Food

Rice was found to be the staple in all the mauzas covered. Home-made unleavened bread (*chapati*) was also a common food. People who cannot afford rice year-round often stretch their rice supply by combining it with potatoes and sometimes millet. Only the relatively wealthy households were reported to consume fish on a some-

Table 9.3 Seasonal Variation in Number of Meals Eaten

	Percentage of Households Eating Per Day					
	Dry season			Monsoon		
Mauza	3 meals	2 meals	1 meal	3 meals	2 meals	1 meal
Char Salehpur	10	80	10	10	60	30
Enayatpur	90	10	--	80	20	--
Gopalpur	20	80	--	50	30	20
Kutubpur	10	60	30	10	60	30
Muzaffarpur	50	50	--	20	80	--
North Channel	20	80	--	10	90	--

Source: Charland RRA

Table 9.4 Common Diseases Among Char People

Mauza & Char Type	Cold & Fever	Chicken Pox	Scabies	Diarrhoea	Measles	Eye Infection	Gastric Ulcer	Dysentery	Post-natal Diseases	Distance to Nearest Health Center (km)
Char Salehpur (Island)	✓	✓	✓	✓	✓	-	✓	-	✓	11
Enayatpur (Island)	✓	-	✓	✓	✓	✓	✓	-	✓	16
Gopalpur (Island)	✓	✓	✓	✓	✓	✓	-	-	✓	9
Kutubpur (Attached)	✓	✓	-	✓	✓	-	-	✓	✓	4
Muzaffarpur (Attached)	✓	✓	-	✓	✓	-	-	✓	✓	8
North Channel (Attached)	✓	-	-	✓	✓	-	✓	-	✓	Within mauza (FFF Mission Health Center)

Source: Charland RRA

what regular basis. Other households consumed small fish only occasionally. Although the area is famous for its *hilsha* catch during monsoon, the price of this fish mostly remains beyond the reach of the general population. Among vegetables, spinach and pumpkin, grown mostly in kitchen gardens, are quite commonly consumed during the dry season. Banana is also commonly available.

Table 9.3, which shows the percentage of households eating one, two, or three meals per day by season, indicates that fewer meals are generally eaten during monsoon. This is mainly because food is in shorter supply, becomes more expensive, and market access is more difficult.

The price of rice goes quite high during floods, and as a result reliance on boiled potatoes and home-made unleavened bread increases. The poorest households eat flour paste during such times. Vegetables become a rarity since these are mostly lost due to inundation.

9.5 Health

Table 9.4 presents the data gathered about the common diseases of the charland people in the study mauzas. With the exception of North Channel, where the Finnish Free Foreign Mission has established a health center, people usually go to local healers (*kabiraj* or *fakir*) for treatment of diseases. Only when the diseases become serious do people consider going to a health facility. As the table indicates, however, the island char mauzas are quite a distance from the nearest health facility, so the inhabitants of those mauzas find it physically difficult as well as relatively costly to take patients there.

The study mauzas were reportedly well covered in terms of basic immunization, and family planning workers were reported to be making monthly visits to the mauzas.

NOTES

1. These interviews were conducted by the female members of the RRA team.

Chapter 10

CONCLUSION

10.1 Summary of Findings

Life in the island chars and, to a lesser extent, in the attached chars of the Padma is very different from that on the adjacent mainland.

The middle reach of the Padma is one of the most dynamic char areas along the main rivers of Bangladesh. Most of the land in the island chars visited had accreted in the past few years, but they had also experienced erosion. Satellite images show that the river channel has been widening in the past decade, and this was evident in the attached char villages, which have experienced considerable erosion in recent years resulting not only in loss of agricultural land but also displacement of households and loss of infrastructure.

On the new island chars vegetation is dominated by catkin grass, *Saccharum* spp., which helps to stabilize new islands and create soil suitable for cultivation, provides building material for houses, and provides a free commodity that can be cut and sold for cash income. This resource is vital to the charland economy, and enables the many landless people in the Padma chars to supplement their living and build houses at minimal cost, which is important as houses are often destroyed or have to be moved in response to erosion or floods.

The uncertain life of these chars, and their low productivity, are probably the main reasons why most of the island char land (and to a lesser extent the attached char land) is controlled by a few large landowners and locally powerful people. Many of the char people are completely landless and in addition to sharecropping land they rent homestead land from the landowners, who arrange the settlement of chars and allocation of land. These patrons thus have a body of supporters, and are able to claim new areas of land when they emerge. In return, the poor char people avoid the risk of losing their own land to frequent erosion, and can obtain access to land (albeit on unfavorable terms) when it emerges.

Soils are very sandy and low-lying in most of the island char areas, resulting in low cropping intensities dominated by local boro, aus, and groundnuts. The attached chars are less low-lying and support more intensive agriculture characterized by mixed aus and aman and a range of *rabi* crops. Financial returns per hectare to family labor appear to be low throughout the area, and are lower in the island chars—even when the risk of loss from natural hazards is ignored. The risk of crop loss during floods plus loss of the land itself by erosion, is likely to disadvantage the island chars further and is reflected in land prices, which are almost half those of attached chars. Livestock are a critical component of the farming system since much of the island char land is underwater in a normal monsoon, and cattle can be kept in the homesteads and stall-fed. Livestock numbers are relatively high, but the extent to which the poor benefit is limited as many raise cattle under a share system.

Over half of homesteads in the study villages earn a living for at least part of the year from fishing. The majority use bamboo traps within the char areas where access is free and uncontrolled and a modest income can be made. There are also locally important *hilsha* and fry fisheries in the

area, so that in total the value of fish caught is substantial. It is possible that the fry fishery is depleting the stock, and this will need to be monitored and fishermen involved in managing their resource if this important livelihood is to be sustainable.

Quality of life is notably poorer in the island chars than the attached chars, with many more households per hand tubewell, often lower food availability, long distances to primary health care centers (which are separated by river journeys), fewer schools, and poor access to local government. This situation is worsened by floods since the island char people, with their uncertain homestead tenure, have no incentive to raise their plinths and so often have their homes flooded. At best this is an inconvenience, damages crops, and poses a health hazard. In severe floods, such as in 1988, many houses were flooded to the roof and were destroyed, flooding was severe in the attached chars but resulted in less damage. The majority of island char people had to leave their homes, most moving to embankments some distance from their islands (incurring the costs of boat journey to move cattle and property). Hence the costs and hazards of evacuation are greater for island char people, and if their land remains submerged they may be forced to remain squatting on the embankments for months or even years.

10.2 Suggested Priorities

It is difficult to make recommendations that would make major improvements to the lives of most char people in the Padma area without suggesting changes to the existing power structure, and attempts to change the power structure are likely to make life worse for the poor in the short term and perhaps even be doomed to failure.

Priorities should be to reduce vulnerability of the poor and to enable them to create assets and get a return that is adjusted to the hazards of erosion and flood. Given constraints on agriculture in this area and the disincentive of sharecropping, and similarly the lack of incentive to plant trees, efforts to improve agricultural or long-term homestead production may not be effective.

One advantage that the area has is its proximity to Dhaka, which has attracted the attention of a number of NGOs. The following possible measures might be further developed and tested by public agencies and NGOs in the area:

- assistance for livestock rearing to increase value added for char people from one of their few abundant resources—catkin grass—could include: credit, a search for naturally/locally available concentrates, and improved livestock treatment services;
- access to low cost credit and assistance for fishermen to form groups and increase their bargaining power, plus secure access to fishing grounds for those with licenses would help the substantial number of fishermen in the area;
- there may be some scope to improve agricultural returns through better marketing opportunities and increased cultivation of high-value crops such as vegetables or watermelons;
- to improve coping ability in floods and erosion events, engine boat services could be subsidized for the poor through local government contracts; this would enable speedier and cheaper evacuation of people, homesteads and cattle; and
- flood shelters would help the island char people, but would need to be located where land is most stable, in some places earth mounds might be possible, but it might be safer to widen embankments to create less erosion-prone evacuation sites for people and cattle. If this is the case then improvements to boat services will be even more important.

APPENDICES

APPENDIX A DETAILED AGRICULTURAL DATA

Table A.1 Cropping Patterns and Yields on High Agricultural Land

	Rabi				Kharif I				Kharif II			
Mauza	Crop	% of Land	Yield md/ac	Price Tk/md	Crop	% of Land	Yield md/ac	Price Tk/md	Crop	% of Land	Yield md/ac	Price Tk/md
Char Salehpur	Groundnut	50	20	500	Aus + Aman	50	24	175	Aman	100	24	180
	Masur	30	15	600	Aman	25	-	-	-	-	-	-
	Wheat	10	18	180	*Til* + Aman	10	15	400				
	Sola	10	16	450	Aus	15	24	175				
Enayatpur	-	-	-	-	-	-	-	-	-	-	-	-
Gopalpur	-	-	-	-	-	-	-	-	-	-	-	-
Kutubpur	Sweet Potato	40	360	80	M.Aus-Aman	100	15	180	Aman	100	24	200
	Wheat	20	30	200								
	Coriander	40	15	450								
Muzaffarpur	Groundnut	80	16	550	Millet	20	10	150	-	-	-	-
	Masur	20	12	550	*Dhaincha*	20	-	6000				
North Channel	*Patal*	60	-	24000	Aus	100	18	180	-	-	-	-
	Ustha	20	-	30000								
	Masur	20	15	550								

Source: Charland RRA

Table A.2 Cropping Patterns and Yields on Medium Agricultural Land

	Rabi				Kharif I				Kharif II		
Mauza	Crop	% of Land	Yield md/ac	Price Tk/md	Crop	% of Land	Yield md/ac	Price Tk/md	Crop	% of Land	Yield md/ac	Price Tk/md
Char Salehpur	Wheat	60	21	210	Aus + Aman	75	18	180	Aman	75	21	190
	Khesari	40	15	250	Aus	25	21	180				
Enayatpur	*Mashkalai*	40	24	450	Aus	60	21	1851	-	-	-	-
	Mustard	30	15	550								
	Mug	20	15	600								
	Wheat	10	24	200								
Gopalpur	*Mug*	20	18	600	Aus + Aman	95	21	185	Aman	95	24	200
	Mashkalai	20	18	400	*Dhaincha*	05	-	6000				
	Masur	20	18	600								
	Sola	10	18	600								
	Wheat	30	24	200								
Kutubpur	*Mashkalai*	40	15	450	Aus + Aman	100	18	180	Aman	100	21	200
	Khesari	40	21	225								
	Wheat	20	30	200								
Muzaffarpur	*Masur*	40	15	550	Aus	40	18	180	Aman	60	18	200
	Khesari	60	18	250	Aus + Aman	60	15	180				
North Channel	*Mashkalai*	50	15	400	Aus + Aman	100	18	180	Aman	100	15	200
	Wheat	40	21	200								
	Groundnut	10	21	550								

Source: Charland RRA

Table A.3 Cropping Patterns and Yields of Low Agricultural Land

	Rabi				Kharif I				Kharif II			
Mauza	Crop	% of Land	Yield md/ac	Price Tk/md	Crop	% of Land	Yield md/ac	Price Tk/md	Crop	% of Land	Yield md/ac	Price Tk/md
Char Salehpur	L. Boro	50	36	180	Aus	50	24	180	-	-	-	-
Enayatpur	*Mug*	15	12	650	Aus	50	36	200	-	-	-	-
	Groundnut	20	24	500								
	Khesari	15	24	250								
	L. Boro	50	36	200								
Gopalpur	L. Boro	70	45	185	Aus (*Jali*)	25	30	195	Aman	25	24	200
	Groundnut	20	30	550								
	Dhaincha	10	-	7000								
Kutubpur	*Khesari*	60	15	225	Aus + Aman	100	15	180	Aman	100	18	190
Muzaffarpur	Mashkalai	20	15	450	Aus	50	15	180	-	-	-	-
	Khesari	30	12	250								
	Groundnut	20	18	550								
North Channel	Mustard	30	12	500	-	-	-	-	Aman	50	15	180
	Mashkalai	30	12	450								
	Wheat	25	24	200								
	L. Boro	10	24	180								
	HYV Boro	05	40	200								

Source: Charland RRA

Table A.4 Cost of Cultivation Per Bigha (0.13 ha) for Main Crops*

Mauza	Crop	Plowing Cost (Tk)	Irrigation Cost (Tk)	Seed		Fertilizer		Weeding		Harvesting		Total Cost (Tk)
				Quantity (kg)	Cost (Tk)	Quantity (kg)	Cost (Tk)	Labor/ day	Cost (Tk)	Labor/ day	Cost (Tk)	
Char Salehpur	Groundnut	400	-	20	300	-	-	12	600	10	500	1800
	Masur	250	-	5	150	-	-	-	-	8	400	800
	Wheat	500	-	12	300	45	275	8	400	10	500	1975
	Sola	150	-	5	150	-	-	-	-	8	400	700
	Khesari	-	-	6	150	-	-	-	-	8	400	550
	Aus + Aman	500	-	15+5	250	25	150	12	600	10	500	2000
	L. Boro	-	-	30	350	-	-	-	-	10	500	850
Kutubpur	Sweet Potato	500	-	-	500	50	300	6	300	20	1000	2600
	Mashkalai	-	-	2	100	-	-	-	-	6	300	400
	Khesari	-	-	5	150	-	-	-	-	6	300	450
	Aus + Aman	500	-	18+6	300	15	100	20	1000	6	300	2200
	Coriander	500	-	4	125	15	100	10	500	8	400	1625
	Wheat	500	-	15	250	40	250	10	500	8	400	1900
Muzaffarpur	Groundnut	300	-	20	400	-	-	20	1000	6	300	2000
	Aus + Aman	300	-	15+5	250	25	150	24	1200	4	200	2100
	Masur	200	-	5	200	-	-	-	-	4	200	600
	Khesari	-	-	4	100	-	-	-	-	4	200	300
	Mashkalai	-	-	3	150	-	-	-	-	4	200	350
North Channel	*Patal*	500	-	0.5	200	-	-	20	1000	20	1000	2700
	Ustha	500	-	1	300	-	-	8	400	24	1200	2400
	Mashkalai	-	-	3	100	-	-	-	300	3	125	225
	Wheat	400	-	10	150	40	250	6	200	6	300	1400
	Groundnut	300	-	20	300	-	-	4	-	8	400	1200
	Mustard	-	-	0.5	50	-	-	-	-	3	150	200
	Masur	400	-	5	150	-	-	-	-	3	150	700
	L. Boro	-	-	30	400	-	-	-	1000	8	400	800
	HYV Boro	500	1500	15	250	80	500	20	500	8	400	4150
	Aus + Aman	500	-	18+6	300	25	150	10	500	7	350	1800

Source: Charland RRA

*No information available for Enayatpur and Gopalpur.

APPENDIX B PADMA CHARLANDS MARKETPLACES

Mauza	Markets	Goods Bought and Sold	Distance (km)	Mode and Cost of Transportation			
				Dry Season	Cost (Tk)	Wet Season	Cost (Tk)
Char Salehpur	Hajiganj Bazar	Daily needs, agri. produce, catkin	11	On foot + Boat	5	Boat	7
	Char Bhadrasan	Daily needs, sell catkin, fish	12	On foot + Boat	5	Boat + On foot	8
	Dhulsara Bazar	Daily needs	19	On foot + Boat	12	Engine Boat	15
	Kartikpur Hat	Sell fish	19	On foot + Boat	12	Engine Boat	15
	Tepakhula Hat	Cattle	24	Boat + Bus	25	Engine Boat	15
Enayatpur	Dhulsara Bazar	Daily needs, agri. produce	11	On foot + Boat	10	Engine Boat	15
	Baroi Bazar	Daily needs	14	On foot + Boat	12	Engine Boat	20
	Tepakhola Hat	Cattle	16	On foot + Boat	25	Engine Boat + Bus	15
	Gendamullah Hat	Daily needs, sell catkin	11	On foot + Boat	6	Boat	10
	Hajiganj Bazar	Daily needs, agri. produce, sell catkin	9	On foot + Boat	5	Boat	10

(continued)

Mauza	Markets	Goods Bought and Sold	Distance (km)	Mode and Cost of Transportation			
				Dry Season	Cost (Tk)	Wet Season	Cost (Tk)
Gopalpur	Char Bhadrasan Bazar	Daily needs, agri. produce, fish	9	On foot + Boat	5	Engine Boat	8
	Hajiganj Bazar	Agri. produce, fish, bamboo	16	Boat + on foot + Bus	15	Engine Boat + Bus	20
	Kartikpur Bazar	Fish, bamboo	24	Boat + On foot	20	Engine Boat	25
	Joypara Bazar	Daily needs, cattle	12	Boat + On foot	12	Engine Boat	15
	Piazkhali Bazar	Agri. produce	24	Boat + On foot	20	Engine Boat	25
Kutubpur	Joypara Bazar	Daily needs, milk, cattle	4	On foot	-	On foot	-
	Meghla Bazar	Daily needs	6	Rickshaw	5	Rickshaw	7
	Piazkhali Bazar	Agri. produce	16	Boat	15	Engine Boat	20
	Palanging Bazar	Daily needs	9	Rickshaw	10	Rickshaw	15
Muzaffarpur	Joypara Bazar	Daily needs, milk, Cattle	8	Rickshaw	8	Rickshaw	10
	Riazkhali Bazar	Daily needs, agri. produce	8	Boat	10	Engine Boat	15
	Meghla Bazar	Daily needs, fish	4	On foot	-	Boat	5
	Char Bhadrasan Bazar	Catkin, fish	16	Boat	20	Engine Boat	25

(continued)

Mauza	Markets	Goods Bought and Sold	Distance (km)	Mode and Cost of Transportation			
				Dry Season	Cost (Tk)	Wet Season	Cost (Tk)
North Channel	Tepakhola Bazar	Cattle, daily needs	4	On foot + Boat	2	Boat + Bus	5
	Hajiganj Bazar	Agri. produce, daily needs, fishing gear	11	Rickshaw	10	Boat + Rick-shaw	12

Source: Charland RRA