

People's Republic of Bangladesh
Ministry of Irrigation, Water Development
and Flood Control

Flood Plan Coordination Organisation

JAMALPUR PRIORITY PROJECT STUDY

Caisse Francaise de Developpement
and
Commission of the European Communities

FAP 3.1

BN-96
A-117

FINAL FEASIBILITY REPORT

Annex 9

CHAR STUDY REPORT

January 1993

A-28
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Consortium

SOGREAH/ HALCROW/ LAHMEYER

in association with
Engineering & Planning Consultants Ltd.
AQUA Consultants and Associates Ltd.
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MINISTRY OF IRRIGATION, WATER DEVELOPMENT AND FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANISATION

JAMALPUR PRIORITY PROJECT STUDY

CHAR LAND STUDY REPORT

January 1993

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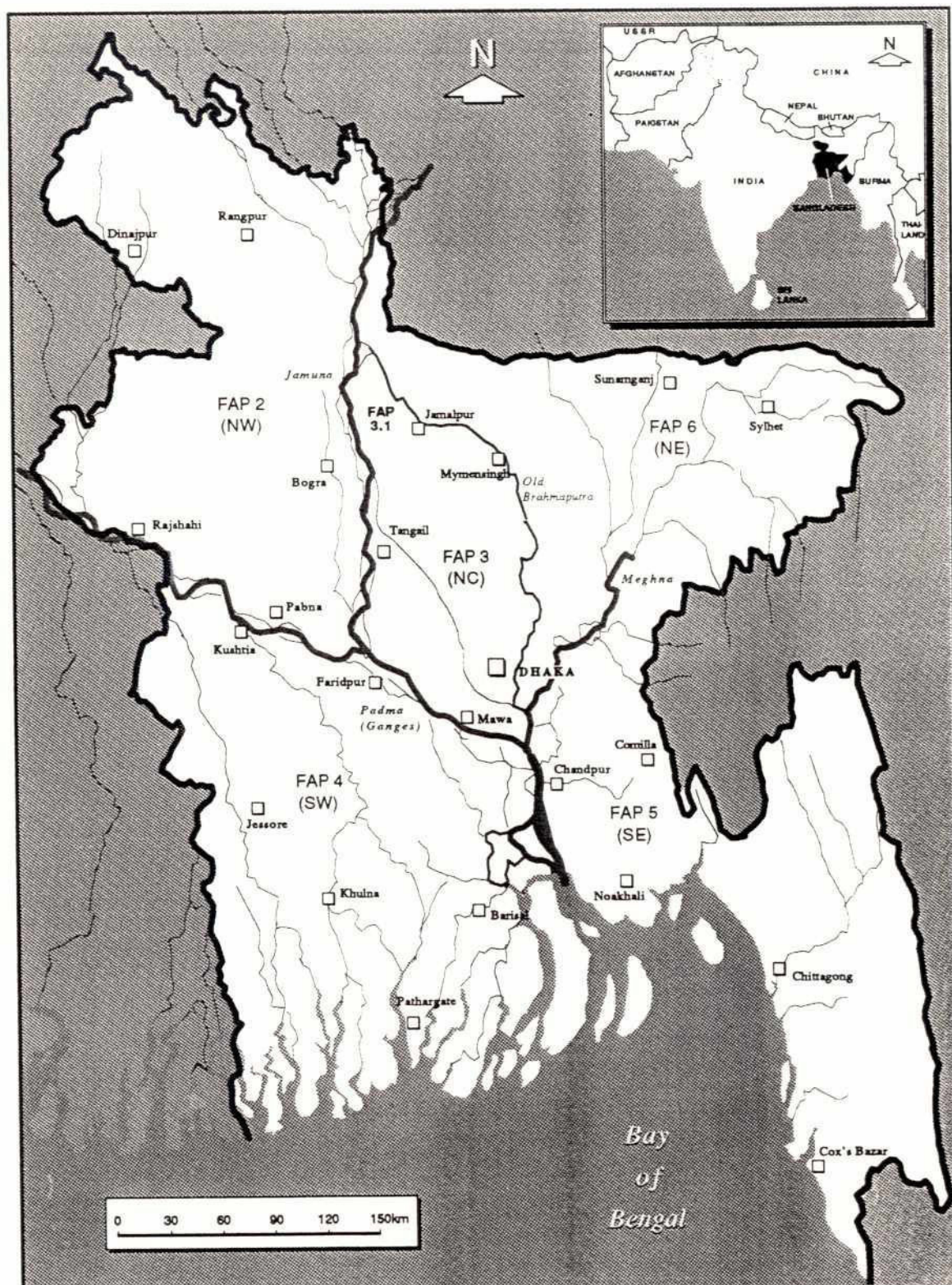
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FOREWORD

This Annex of the Jamalpur Final Feasibility Report covers the Studies carried out on the Char Land adjacent to the Mainland Study area. Unlike the work for the Mainland Study area, this is not a feasibility level study but a reconnaissance and scoping study to ascertain present conditions in the area and formulate a possible intervention for the unprotectable land adjacent to the Mainland Study area. The fieldwork for the study was carried out during June and July 1992 and originally drafted in August 1992. It has subsequently been revised in the light of comments made on the original draft by FPCO, the Panel of Experts of FPCO and the Donors.

The study developed from concerns voiced by members of the 3.1 mainland study team that the situation on the adjacent Char Lands was being omitted from the FAP when in fact the flood risk there appeared to be greater than the mainland and any proposed intervention using controlled flooding on the mainland would make the flood situation in the Char lands still worse. A working paper was produced as a result of a short reconnaissance site visit in late 1991. This contained a proposed staff and work programme and formed the basis of this study. Unfortunately, due to donor constraints, the original expatriate staff resources proposed were cut back to three person months, one each for a Sociologist, a Socio-Economist and an Environmental Planner. Due to the fact that there was an existing NGO working in the Char lands close by and who had experience in flood proofing programmes, the study was carried out in conjunction with them and also for the data collection exercise with the assistance of academic geographers who had carried out previous Char land studies. Close collaboration was maintained with the FAP 16 National Charlands Study and their data has been freely used in this study.

The aim has been to produce a document which outlines the present situation in the unprotectable lands adjacent to the western boundary of the original FAP 3.1 Mainland Study area and proposes a parallel intervention programme for it based upon a needs led assessment.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

Aims, Delineation and Data Collection

The aim of the FAP 3.1 Char land study was to examine the present social and physical environmental situation in the reach of the Jamuna river adjacent to the FAP 3.1, Jamalpur Priority Project Study area. This was prompted by concern that the area has a more serious flooding problem than the mainland and was being excluded from the FAP. Added to this was the realisation that the already serious flooding problem could be made still worse due to the interventions being proposed by FAP 3.1 and the combined effects of other possible interventions including the Jamuna Multi-purpose Bridge.

The defined area of study was all that land which lies between the existing and proposed main Jamuna embankments. This is shown clearly in the Regional Context Map, Figure 9.1.1. The degree to which these are regarded as Char land is a rather academic point as different people have their own definitions of Char lands. The major criteria for delineation is that the Char study area covers all of the land which lies between the existing west (right) embankment under study by FAP 1 and the FAP 3.1 proposed east (left) embankment. It thus covers all of the land which, if FAP 3.1 were to be implemented, would be unprotected from river flooding.

Baseline data collection was carried out to ascertain the present situation with particular emphasis on flooding conditions with a view to seeing the consequences of how these are likely to be made worse by construction of main river flood protection embankments, based upon the latest computer modelling of FAP 25. The work included assessments of both the natural and human environment and identification of key issues that need to be considered in drawing up a development planning strategy for the area. This included a "bottom up" needs led approach to public participation so that those issues which are considered by local people to be of priority importance could be identified. This also included canvassing their suggestions for tackling these issues and the degree of commitment they would be prepared to give to achieve this in the hope of making any intervention more likely to succeed and be self-sustaining.

Within the Char study area differing types of land form have been identified. The criteria for classifying these were varied and changed as the study progressed. The criteria included location, size, age, stability, and if cultivated and/or inhabited or not. At the outset 12 different sampling areas were delineated for sampling of socio-economic data. For data collation these were aggregated into 6 zones and this is the basis upon which data has been tabulated. However in the light of analyzing and interpreting the data, and also that of the FAP 16 National Char Lands Inventory, it would seem necessary for future work to

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reformat the data into five locational categories. These include a separate category for Island Chars (defined as those requiring a main river channel to be crossed for access even in the dry season low flow situation), Attached Chars which lie between the peak river flood limit of a "normal" annual flood and the extent of the low flow situation main river channels, and Set-back land which is essentially mainland which lies between the existing and proposed embankments and the "normal" year peak flood extent. The latter two categories need to be separated between west and east bank for practical planning purposes and the data split down to Thana level. The FAP 3.1 Char land study has concentrated on the Island Char area as the Attached and Set-back land on the east bank had already been studied under the main study and the staff resources originally planned for the work were not fully forthcoming. The gross area and population data for the Attached and Set-back land have been based upon FAP 16 total Mauza summary data which is at present preliminary pending incorporation into a Geographical Information System at FAP 19 and apportionment of split Mauzas, followed by production of distribution maps.

Data collection has been carried out for both the natural and human environment. For the natural environment use has been made of historical maps and particularly time series digital Landsat imagery of the last 20 years obtained and processed by FAP 19. This has included study of erosion and accretion patterns, including analysis of land age and stability. Land utilisation has also been mapped along with the diffusion of agricultural use of the land as part of the accretion and stabilisation process. This has allowed a classification of Char land to be made and areas to be digitally measured from satellite imagery. In addition inventories were carried out of flora and fauna in the study area with a specific listing being made of homestead flora and its utilisation.

For socio-economic data collection a sample questionnaire survey of 580 households was carried out. These were selected using land holding stratification criteria from 63 villages drawn up according to their locations to give a range of places in the 12 identified land types. From this sample data estimates of population were extrapolated for the Island Char area and data presented according to locational zone. The data collected included population migration patterns, socio-economic activities and livelihoods including agriculture, fisheries and livestock production. In addition data was collected on occupations, employment patterns, income, land tenure, household assets, housing, health, sanitation and education. Present hazard risk was also assessed with an emphasis on flooding and erosion and peoples responses to these. This data was entered into a database and output tables produced separating the Island Chars from the Attached Chars and Set-back land. These were then analyzed, interpreted and used as the basis for drawing up a development strategy for the area once a basic framework had been established from the perception and needs assessment.

As part of the FAP 16 National Char Lands Study a major resources inventory has been carried out using Mauzas as the smallest data

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collection and mapping unit. The preliminary summary data from this survey has been made available to the FAP 3.1 study for the middle reach of the Jamuna/Brahmaputra river. This has been used in the drawing up of population estimates of the full FAP 3.1 study area. This data has mapped all the Mauza boundaries at 1:100 000 as an overlay to the Landsat imagery of 8th March 1992. It is tied to the BBS geo-coding system and will be interfaced and checked against the 1991 BBS data when this becomes available.

As part of the socio-economic survey work an assessment of existing Government and Non-Government Organisations and Institutions in the area has been carried out. In addition a major participation exercise was carried out which comprised structured group discussions to ascertain peoples priorities, needs, perceptions and ideas to cope with these including their commitment to this. Detailed case study interviews were also held to give insights as to household level perceptions and decision taking.

CONCLUSIONS

From the satellite imagery analysis and field enquiries the conclusions are that the main river has been eroding along much of the right bank and alternately eroding and accreting on the left bank. The point erosion along the east bank is of a catastrophic nature in three specific locations and is a far more serious problem for local people than river flooding. This particularly effects people resident on the main land which after the construction of the proposed FAP 3.1 embankment will fall within the Set-back land. There has to be concern as to how any proposed embankment can be protected and quickly rebuilt should it be eroded away. The greatest benefit of embankments to these displaced people could be as permanent places of residence above flood level. Embankments should thus be designed for multi-purpose use with a berm suitable for house placement on the protected side. This should also be drawn up with the provision of flood refuge sites as a specific objective. The disappearance of low Island Chars once the annual river flood subsides is a more common occurrence than bank edge erosion but ironically of a less serious problem as the population expect this to happen and have experience in dealing with such situations. However there was a specific problem with the large shallow Island Char during the 1988 flood when over 300 people were drowned. The overall conclusion is that the river channel has been getting wider, especially when compared to the situation in the early part of the 20th Century.

Island Chars are very different from each other and this is a function of their age and stability. Two of the large Island Chars are very stable and although suffering from localised side bank erosion are accreting southwards and the southern one could well attach itself to the mainland and eventually be incorporated into it as others have in the past. Land utilisation has been mapped for 1992 and the last 20 years using ground truthed satellite imagery. The spread of land cultivation from stabilised nodal centres can be clearly seen. Agricultural activity in the Island Char

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land is centred around dry land farming systems, despite the area having a high flood risk. The reason for this is that during the dry season the largest area of land is exposed but soils are poor at holding water and irrigation is not perceived as a feasible option.

The household census data when integrated with the FAP 16 data has produced population estimates for the FAP 3.1 Char land area which are shown in Table 9.S.1. Care must be exercised in using these figures as the FAP 3.1 work is from sample data extrapolated over the total Island Char area whereas the FAP 16 data includes all those Mauzas which have any part of them in the unprotected area. This work will need to be refined in any next stage by which time the FAP 16 data should be dis-aggregated using the GIS and the FAP 3.1 data has to be reclassified by location. This should allow classification down to individual Mauza level. The 1991 BBS data should also be available by this time and a cross-check will need to be run between the three sets of data. In addition the 1981 BBS census data should be added to the data base to give an indication of trends and also allow comparisons with the mainland and national data. Resources need to be made available for this to be done before any further planning work takes place. To make full use of this data the Char lands Pilot Phase Programme will need access to the FAP 19 GIS facilities or ideally be provided with a suitable GIS system of its own.

From this estimated data the mean population density for gross land area (including sand areas on the Chars) is 304/km² in the Island Chars and 691/km² on the Attached and Set-back land. For cultivable land measured from satellite imagery analysis the figures are 686/km² and 1 191/km² respectively. There is a concentration of "temporarily" located households in the Set-back land and fewest on the Island Chars. This would seem to illustrate that displacees are concentrated on the mainland, many probably being victims of first time main river bank erosion. Those people on the Island Chars who do move appear to do so more frequently than those elsewhere but move shorter distances, probably within their own Mauzas. The existence of split Mauzas, where previously separate Mauzas are now sharing the same piece of land, is highly concentrated in those areas of severe bank erosion. Household sizes are on average larger on the Island Chars and also amongst households owning greater areas of land.

The level of total landlessness is high in the Attached and Set-back land at 66% where the figure for the Island Chars is 37%. In addition the mean area owned per household is much higher on the Island Chars (1.68 acres) than the Attached and Set-back land (0.80 acres). However consideration needs to be made of the poorer quality and higher flood risk of the Island Char land resulting in its lower utility. The reasons for the low figures on the Attached and Set-back land are probably due to the concentration of erosion displacees. This trend is also true for operated land.

The arrangements regarding land ownership that actually occur have evolved despite the law. All land in the area is allocated and there appears to be no Khas land. Households maintain their land rights by paying land tax even when their land is lost to the river in the expectation (normally correctly) that it will re-emerge at some time in the future. Mauza boundaries were fixed around 1906 and have remained virtually the same ever since and there is very strong territoriality. Some land presently on the east bank was originally on the west bank in 1905, the river having subsequently moved. Residents appear to still maintain stronger links to "their" side of the river despite the obvious difficulties in communication.

The level of infrastructure provision and particularly formal education and medical care is low in the Char land and particularly the Island Chars when compared to the mainland. The provision of safe drinking water appears to be relatively adequate throughout the area. This is probably due to the ease of groundwater extraction and the availability of hand pumps. There could however be a problem with this during peak flood times where access to sources becomes difficult. Housing materials on the Island Chars appear to be deliberately selected to be more transportable and durable with the further advantage of being a saleable asset in times of need. The general level of asset holding is higher (13% higher by value) in the Island Chars than the Attached and Set-back land but the type of assets held is different. There is an emphasis on agriculture (particularly ploughs) and boats on the Island Chars and more bicycles and motorbikes on the Attached and Set-back land. Surprisingly there is little difference in the two areas between levels of fishing net ownership. This ties with figures for household head main occupations which show that professional fishermen are concentrated on the Attached and Set-back land not the Char land, probably because they require good access to market outlets. Farming is the predominant occupation on the Island Char lands and twice as prevalent as the Attached and Set-back land where daily labouring is most important. The situation for second occupations is however reversed and possibly explained by Island Char household heads working during the wet season on the mainland and those from the Attached and Set-back land on the Island Chars during the dry season. There are fewer children working on the Island Chars than on the Attached and Set-back land despite the fact that schooling levels are lower. However there are more young adults working on the Island Chars. Annual household incomes are disproportionately distributed with 78% below 15,000Tk per annum and little difference within the area. Some 22% of households are indebted each year and 25% take credit, over 60% of which is for food purchase, the figure for the Island Char being slightly lower. The figure of 15% of all credit being taken for land capital purposes in the Attached and Set-back land could possibly be for payment of land tax arrears on presently eroded land which households are maintaining their land rights on.

Paddy production is more widespread on the Attached and Set-back land where as there is more substitution of dry land crops in the Island

Chars in an effort to minimise risk and dependency on poor water availability when the maximum area of cultivable land is available. However in cash terms paddy is still the most important crop on the Island Char lands. Some 18% of all households catch fish but over 70% of these directly consume all the catch themselves. There are more draught animals per household on the Island Char land than the mainland, possibly due to a greater availability of grazing but also out of necessity as farming operations are more remote and require greater self-reliance.

The strength of formal government institutions appears to be weaker in the Attached and Set-back land than the mainland but poorer still on the Island Char land. The NGO and Co-operative organisations are stronger in the Attached and Set-back land than the mainland as they have recently been implementing targeted programmes there in response to perceived needs. The Island Chars have the lowest level of such activity, however this deficiency is recognised by the larger more experienced NGO's in the area and they are considering mobilising programmes in the Island Chars and have expressed great interest in the present study and a willingness to act in partnership with donors and implementing agencies.

Data from FAP 16 indicate that whilst erosion is a serious hazard in terms of household livelihood it rarely causes death. However serious flooding as happened in 1988 caused 370 direct and indirect deaths totalling a mean ratio of 1 in 2122 people, with a concentration higher than this in the Island Char lands. A flood proofing programme to prevent this would seem to be justified on humanitarian grounds irrespective of any increased flood risk due to embanking the mainland. The difficulty is justifying it in the narrow economic terms defined in a conventional economic benefit analysis.

The present strategies developed at household level for tackling flood conditions centre around risk minimisation. Given the scarce economic resource base most of the affected people these are small scale. There are general underlying survival strategies for economic livelihood such as diversification, second seasonal occupations in different locations and the practise of dry land farming techniques. To deal directly with high floods the following strategies are followed to varying degrees, depending upon individual household circumstances:

- the construction of a raised platform on the house floor where family members can cook, sleep and remain until flood water recedes.
- the evacuation of livestock, family members and some assets to nearby higher level areas.

Loss of property and livestock is frequent during flood periods. During these times, the flood victims become dependent on informal assistance from neighbours, relatives and friends and some local wealthy people.

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With a FAP 3.1 left bank embanked situation as is being proposed under Option B5 and with Jamuna Bride in place it has been predicted by FAP 25 that water levels in the southern end of the study area will rise by 0.74m in peak flood times such as happened in 1988. This is predicted to reduce progressively to 0.07m at the northern end of the study area. However the more important situation is the timing, extent, depth and duration of flood times when previously there were none. This is likely to have different implications in the three different land types:

- In the Set-back land that is presently mainland but will not be protected there is likely to be an increased flood risk although this could be quite low depending upon local topographic conditions. There may also be an increased risk of main bank erosion although this seems hard to predict. This land at present does not flood in the peak of a "normal" year and people are not so used to coping with such situations. As such it may require very specific flood proofing work, but the use of the close by embankment a multipurpose permanent settlement area and also as a temporary place of refuge would seem to be attractive.
- The Attached Char land presently floods every peak flood time each year. It thus has a higher present flood risk than Set-back land but people are more used to dealing with it. However much of it is some distance from the proposed embankment and a small scale community and household approach to flood proofing would seem more appropriate.
- Island Chars already have the highest flood risk but people are used to coping with this in a normal year. However human deaths due to drowning in the 1988 flood and consequential ones appear to have been significant. Under embanking of the mainland this will be made worse still, although its detailed nature is uncertain until more hydrological modelling and flood risk mapping are carried out. It is quite likely to seriously effect the area of land available for agriculture during the wetter times of year and the timing of these increased flood incidence will be crucial in changing possible cropping patterns.

The assessment of this requires the new flooding pattern to be modelled as a matter of urgency. This is presently being carried out by FAP 25 as part of their national programme. A four dimensional output is required using recent topographic data. This needs to show the predicted flood pattern under various scenarios and give mapping of flood extents, depths and duration using a digital terrain model like the work provided for FAP 20. It has recently been learnt that the Char lands mapping programme that was to have been carried out by FAP 18 from the 1990 air photography has been removed from their programme. This is considered a serious constraint to the next stage of the work. Alternative techniques to study Char flood risk will have to be investigated, including consideration of time series remote sensing data

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(satellite radar imagery may be available by this time) on a rising flood.
This may need significant resources.

RECOMMENDATIONS

The needs assessment has indicated that the Char land residents have identified very specific and serious problems in coping with life in their area, due to its dynamic and risk-prone nature. Their priorities and the data collected both by FAP 3.1 and FAP 16 have indicated that flooding is a problem most years but peak flooding is particularly serious and caused a significant number of deaths in 1988. It is certainly a much more serious problem than on the mainland but Char people are used to coping with it and also as a more regular occurrence. However in comparison the number of deaths in the Char lands from disease is even higher and the present level of medical facilities is very poor indeed. In social welfare terms it could be that improved medical services offer an even greater benefit than trying to tackle the flooding problem. Erosion is also a very serious problem, particularly for those displaced from the main river bank areas. It rarely kills people outright but can impoverish them brutally and often in quite short periods of time. The root cause of main bank erosion is difficult if not impossible to solve, but steps could be taken to reduce the effects of this by making peoples livelihoods more secure through diversification of economic activity that depends less on the farming of land.

A big problem is the economic and social justification for any intervention in the Char lands, particularly bearing in mind the difficulties in quantifying social benefits and the narrow economic criteria that have been adopted in the FAP Guidelines for Project Assessment (GPA). This questions why a major intervention to control flooding in the mainland was originally proposed in isolation from the unprotectable land and presumably considered as a higher priority than action in the Char land where the flooding problem has now been demonstrated as being much more acute, even if the inhabitants have developed their own strategies to deal with it. In this situation the people in the Char lands would seem to have a strong case for claiming they are at least being forgotten. However if the mainland intervention were to be implemented in isolation, it seems certain to actually make the situation in the Char lands even worse: then serious issues of equity, perceived discrimination and likely social conflict with political implications would arise and require very careful consideration. The basic principle outlined in the GPA Environmental Impact Analysis (EIA) is that no person is to be worse off as a result of any FAP intervention and all negative impacts are to be mitigated for with the cost of this equated with the benefits. Using this methodology it would follow that the quantified benefits of controlled flooding to the mainland should be used to at least redress the balance to the Char lands and irrespective of this there is a very strong case in its own right for significantly improving their present position.

It would now appear, particularly from a social and humanitarian perspective, that there is a clearly demonstratable case for a major intervention in the unprotectable land, aimed at saving lives and reducing homestead losses and household socio-economic decline during and after times of flooding. This would seem a priority

irrespective of any mainland intervention but with of even higher priority if the controlled flooding programme were to be implemented as this is likely to make the situation worse. This has been used as the basis for drawing up an appropriate integrated flood proofing programme for the unprotectable area, aimed at being implemented in parallel with the mainland controlled flooding intervention.

The justification for intervention in the unprotectable land requires to be judged using different criteria than for the mainland and is subject to a political decision as to its comparative priority. At the very minimum the situation should be made no worse than it is already but there would seem to be a very strong case indeed for promoting an integrated flood proofing programme there as a priority. However care needs to be taken to ensure that the programme is made sustainable from an engineering point of view. This requires careful consideration of the locational criteria for flood proofing sites and priorities based upon erosion risk analysis being compiled by FAP 19's time series satellite imagery work and also the flood risk proposed for the next stage of the study. This is in addition to the socially based criteria for location.

If it is assumed that a parallel intervention of flood proofing in the unprotectable land is being carried out then the calculation of the part of it attributable to the FAP 3.1 intervention becomes easier. This is the incremental increase in peak flood levels that needs to be mitigated for and is presently calculated as a mean figure of 0.3m compared to an average figure of 3.0m used for the earthworks calculations for flood proofing. These costs can also be apportioned between the differing geographical areas related to other interventions that have already taken place but their negative impacts will not be fully realised until they are combined with those of FAP 3.1. Specifically this is the case with the Brahmaputra Right Embankment (BRE-FAP 1) which is already in place and which could be attributed to cause half of the increased flood problem in the Char lands. By rights this cost should have been equated with its benefits when the decision was taken to build it. This is discussed in more detail in Section 5 of the main report and also Annex 3.

The intervention thus involves flood proofing for some 602 000 people in 114 000 households, 20% of whom live on the Island Chars, 30% on the west bank Attached and Set-back land and the remaining 51% in the east bank attached and Set-back land. The intervention programme will also have to recognise that although there is a far more significant priority to be attached to the southern reach of the river diminishing northwards as the induced flood risk decreases this is only a fraction of the overall existing flood risk.

The previously proposed intervention for mitigation has been an integrated flood proofing programme based around the Option A proposal previously looked at but now rejected for the whole of the FAP 3.1 mainland area. Its principle aim is to save life and in the case of individual homestead flood proofing, secure fixed and movable

homestead assets from flooding. However it does not secure agricultural land from flooding and is not in itself full mitigation. Economic livelihoods are still likely to be negatively effected and further steps will be needed to promote conditions where these can be diversified and made less prone to effects by flooding.

Because many of the other issues faced by the Char land population are intrinsically linked to flood risk, it is considered that an integrated approach to socio-economic development is required, with flood proofing as a core activity but which at the same time tackles the issue of economic livelihood and risk. Aligned to this are problems of erosion displacement, lack of community facilities and difficulties of access. This proposed strategy will be aimed at:

- securing human and livestock from death during flooding
- protecting homesteads and fixed homestead assets from loss and damage during flooding
- reducing flood damage to household livelihoods
- flood proofing and developing community infrastructure
- diversify and enlarge household resource bases to make them less vulnerable and more self-reliant.

This has five components:

- Minor Structural Flood Proofing
- Community Infrastructure Development
- NGO Support
- Institutional Support
- Technical Assistance

A widespread but small scale flood proofing programme covering 5 000 households in a 3 year first phase pilot programme is proposed. This can then be followed by a programme for the remaining 109 000 households. The Minor Structural Flood Proofing programme centres around the raising of individual homesteads to a level above the 1988 flood plus the additional raising needed to overcome the induced peak flood rise caused by embanking the left bank. In addition it is proposed that there be provision for a subsidised building materials component for 50% of the homesteads, to be targeted to those unable to carry out this work from their own resources.

The second component is a proposal for construction of 400 communal flood proofing packages as the major component in a community infrastructure programme. It is proposed to use NGO involvement in the planning and implementation of this as they already have successful experience in this although at a much smaller scale level. The first stage will be group formation and assessing peoples detailed needs and requirements. Great flexibility will be needed in planning from the small-scale collective level (a "willing group") down to the individual household.

It is proposed that the minor structural flood proofing programme be 70% subsidised with the remaining 30% being loans to be repaid on a rolling programme, set up in a way so as to promote self investment and negate dependency on external sources. The first phase pilot programme cost estimate for flood proofing is Tk47million this would then be followed by a rolling programme for the whole area estimated to cost a further Tk1036million making a total cost of Tk1083million. This is equivalent to Tk1797 per head when compared to Tk2212 per head for the mainland intervention.

The community development component will be centred around multi-purpose flood shelters with basic facilities including a tubewell, latrines and a multi-purpose building which could be used as school, welfare centre and a flood refuge with stocks for around 15 days. The design criteria of these will be drawn up to be as flexible as possible to allow them to be appropriate to local people's needs and conditions. The estimated cost of these is typically Tk500 000 each with a proposed 50 units in the first phase and a further 350 subsequently at a total cost of Tk200million, Tk25million being in the pilot programme.

In addition there will also be NGO support for income generating activities, which will retain the present emphasis on dry-land farming and promote a wider range of crops. Other programmes already carried out and proposed include land stabilisation using Catkin grass, promotion of small scale fisheries, poultry and egg production, goats, tree planting, petty trade and other services.

An institutional structure has been proposed with technical support from an appropriately experienced consultant developing an incremental rolling programme with a large training component. There will also need to be an NGO support programme that will provide the means for them to operate as a catalyst for mobilisation, including group formation, detailed needs assessments down to household level, provision of materials, supervision of construction and recovery of loans. The Technical Assistance programme to the project will set the design criteria for design and implementation. This will operate under a Project Management Organisation which will be the executing agency for the Government of Bangladesh.

The wider issue of possible Char land development within the national context has been raised and the formation of a Char Land Development Board suggested. This could build on a FAP component based upon the FAP 16 National Char Lands Inventory. However it is recommended that the area adjacent to the FAP 3.1 area be considered a pilot programme and be developed in parallel with the FAP 3.1 mainland project, with the Technical Assistance component being pooled and shared by both programmes.

It will also be necessary to set up a Monitoring and Evaluation Unit to keep the programme on track and learn by it experiences, feeding back into the implementation programme. A Technical Assistance programme

is also proposed for the development of a multi-purpose Master Plan for all of Bangladesh's Char lands.

The total cost of the proposed programme is Tk1460m (US\$ 36.5 million), with the pilot phase being Tk145m. Of this some 12% is recoverable loans and 4.2% (Tk62.3m) of the total cost can be attributable to the effects of the FAP 3.1 embankment. In all the cost per head of population is estimated to be Tk2140 compared to Tk2212 for the mainland controlled flooding intervention which has the additional advantage of securing agricultural land from peak river flooding.

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Table 9.S.1

FAP 3.1 Char Land Population Estimates 1992

THANA	ISLAND CHARS	ATTACHED AND SETBACK LAND			TOTAL
		WEST	EAST	SUB- TOTAL	
KAZIPUR	22 578 *	2 913	48 166	51 079	73 657 +
SARISHABARI	0 *	0	54 054	54 054	54 054 +
DHUNAT	470 *	10 484	0	10 484	10 954 +
SARIAKANDI	44 214 *	36 826	29 130	65 956	110 170 +
MADARGANJ	9 407 *	0	45 267	45 267	54 674 +
SONATALA	0 *	26 072	0	26 072	26 072 +
SUGHATTA	0 *	59 069	0	59 069	59 069 +
ISLAMPUR	11 288 *	0	99 122	99 122	110 410 +
PHULCHHARI	24 459 *	39 766	0	39 766	64 225 +
DEWANGANJ	5 644 *	0	33 674	33 674	39 318 +
TOTAL	118 060 *	175 130	309 413	484 543	602 603 +

Sources: * FAP 3.1 Stratified Sample Survey
+ FAP 16 Summary Mauza Key Informant Data
All other figures are proportionally calculated by land area

1 INTRODUCTION

1.1 Background to the Study

1.1.1 The Importance and Context of Char Land Within Bangladesh

During the early course of the FAP 3.1 Jamalpur Priority Project Study (JPPS) it became apparent that the delineation of the western limit of study area as being up to the east bank of the main Jamuna river channel was restricting its attention only to the mainland and omitting consideration of the adjacent Char land from the FAP programme, despite the fact that the flood risks in these areas are higher than the mainland.

Based on a population census conducted in the Char regions by the SCI-Bhuapur Development Project in December 1990 it was estimated that 1.5 million people were living between the banks of the main river in the reach from Sundarganj (where the Jamuna splits from the Old Brahmaputra) to Nagarpur in the south, where the Jamuna joins with the Ganges. Within the context of the aims of the Flood Action Plan (as defined by the 11 Guiding Principles) this left a large area of land with a significant population outside the scope of the FAP.

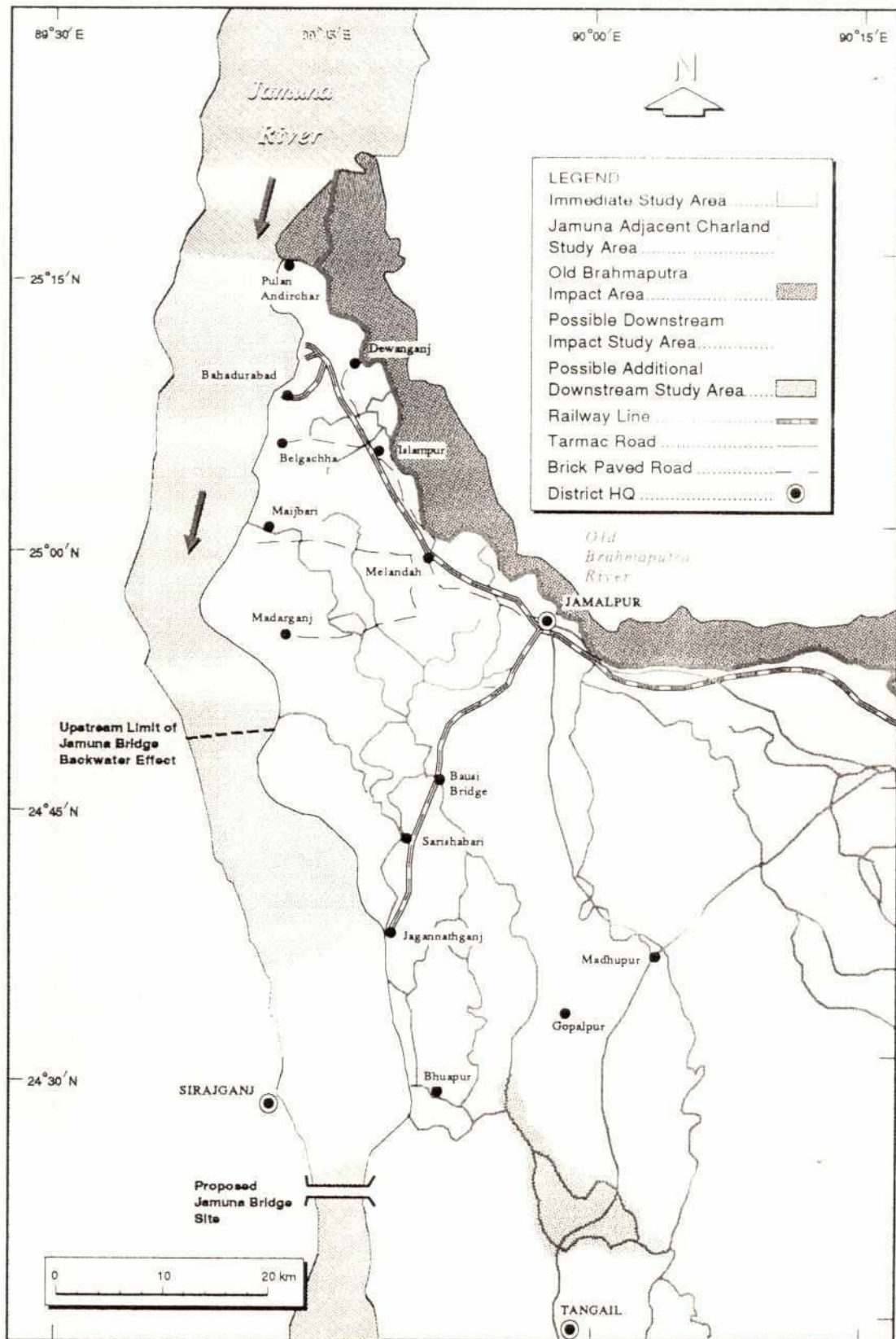
In addition, the Char land (defined for the purposes of this study as that land within the limits of the main banks of the Jamuna in a peak flood situation) for a "normal" year has a significantly greater flood risk than the mainland. Another factor to be borne in mind is that the defined limit of the "mainland" is itself very dynamic due to the constant processes of main bank erosion and accretion. Within the Char Land there are very different types of land forms having significantly variable natural and human environmental conditions. These are outlined in more detail in section 2.2.1 but broadly speaking include Charland which is attached to the main land during the dry season and Islands that require a main river channel to be crossed to reach them, even in the dry season. This classification has emerged as work progressed and includes unprotectable main land (known as set-back land) in addition to the Charland. The locations are shown in Figure 9.2.11.

There was unease expressed from many quarters that the Char land areas were being omitted from the planning framework of the Flood Action Plan, when in fact they are the very areas where the flood problem is most severe. This concern was also shared by staff working on FAP 3.1, with the result that in late 1991 the project Socio-economist made a reconnaissance visit to the Char land abutting the FAP 3.1 reach of the left bank. This resulted in the production of the FAP 3.1 Char land Working Paper of January 1992 and led to the proposal for a special study on the Jamuna Char land adjacent to the FAP 3.1 area.

Another major consideration is that the initial Environmental Impact Analysis (EIA) of the types of possible project interventions being considered by FAP 3.1 indicated that there were likely to be significant

Figure 9.1.1

FAP 3.1 Regional Context



effects on the adjacent and downstream Char land areas as a result of these. These external effects required further study as part of the FAP 3.1 EIA work. The locations of these areas within the regional context of FAP 3.1 are shown in Figure 9.1.1.

1.1.2 Char Land Within the Context of the FAP

The reason why the Jamuna Char lands have been omitted from the FAP is that the delineation of the country into five regional planning units (see the Frontpiece map) has used the centres of the large rivers (the Brahmaputra, Jamuna, Ganges, Padma and Meghna) as their boundaries. Whilst this is in direct contradiction with the established river basin planning philosophy of watershed management, within the context of Bangladesh it is a logical division of the country. A major justification for this is that because of the size of the rivers, along with the density of human population and resource use, they are perceived as being large physical barriers rather than lines of easy communication. This is reinforced by the history of settlement into the area which appears to have been from the land and not by the river. Another major factor that should be considered is the dynamic nature of river movement and the fact that the Jamuna did not exist in the study area prior to 1787. The present river system has thus been superimposed on an existing dense human settlement pattern and then relatively recently.

The basic aim of the FAP 3.1 Char land study is to collect data as to the present situation in the area, including both the natural and human environment and particularly the processes which have significant influence on socio-economic conditions for the inhabitants. This data collection programme included a major local participation element, particularly the perceptions of Char land dwellers so that they could give their priorities for any development interventions. The aim is to develop a sustainable planning framework for drawing up a development strategy for the area that addresses peoples needs, their proposed solutions to tackle these and the level of commitment that they themselves are prepared to give to achieve them.

As part of this approach, a contract for the implementation of the study was signed between the consulting consortium of FAP 3.1, (SOGREAH/HALCROW/LAHMEYER in association with E&PC Ltd and AQUA C&A Ltd), and Service Civil International (SCI) an NGO which has been working in the Char lands for more than 10 years. Because SCI has limited experience in conducting household surveys, the technical fieldwork data collection has been carried out on their behalf by Development Planners and Consultants (DP&C) under the direct supervision of the FAP 3.1 study team. However, the contribution of SCI has been significant with respect to the formulation of recommendations for the development of Char lands, based upon their experience with such programmes in very similar areas.

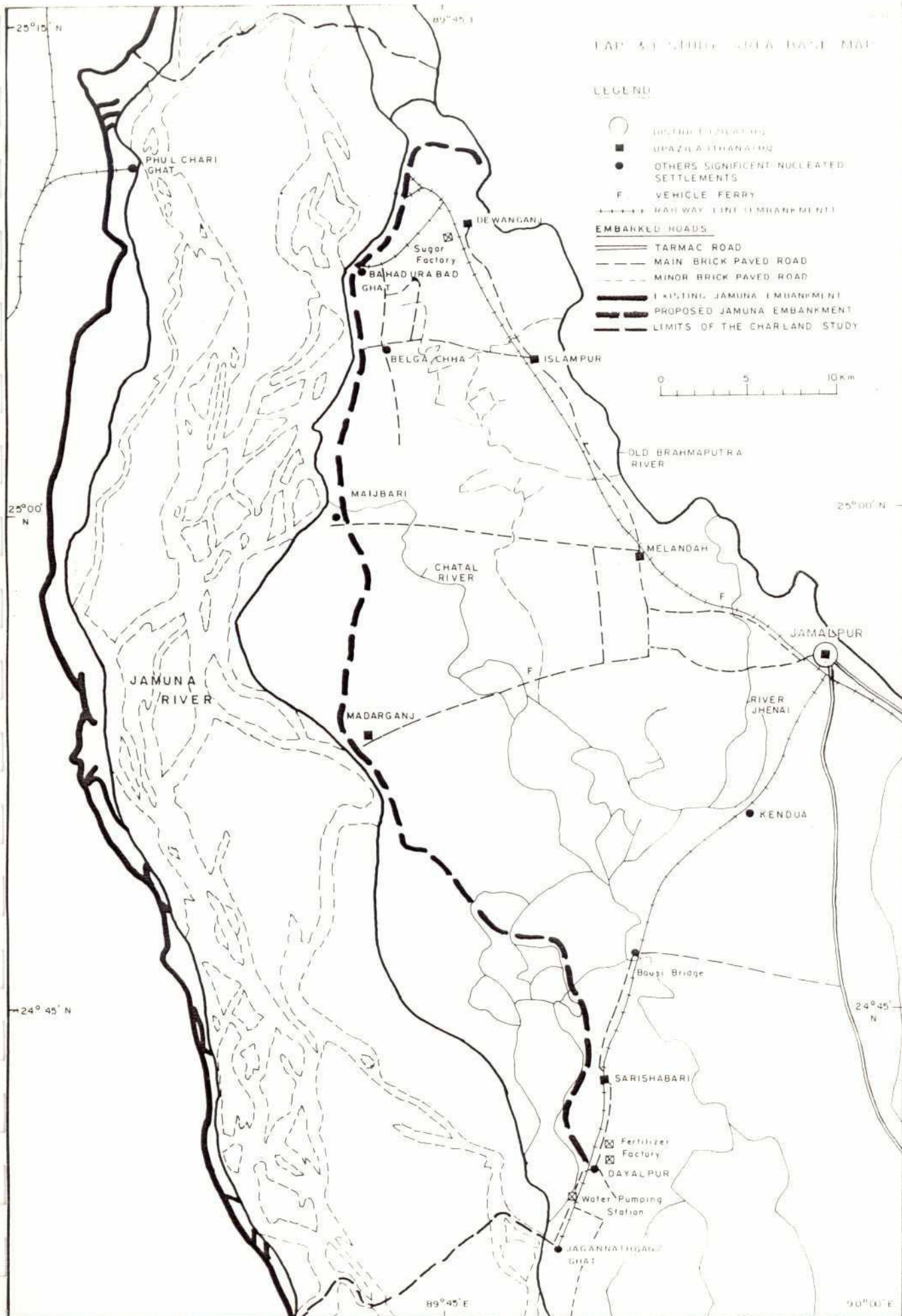
1.1.3 Delineation of the FAP 3.1 Char Land Study Area

The delineation of the total area to be covered by the FAP 3.1 Char land study is shown in Figure 9.1.1 and in more detail in Figure 9.1.2. It is broadly defined as the minimum area of land that it is thought could not, for engineering reasons, be protected by flood embankments. However for the socio-economic work emphasis has been placed on a smaller area within the limit of a "normal" year (defined by reference to and classification of the Bahadurabad Ghat hydrograph, 1990 is a good example, see Figure 3.2.9 in Annex 3) peak flood main river banks. This includes all Island Chars and some Attached Chars. The remainder (known as Set-Back land) is mainland at the moment but under intervention conditions will be unprotected and is likely to experience higher flood risk than at present. The east bank Set-back and Attached Char land areas have already been studied as part of the FAP 3.1 original mainland project area study. The extent of peak flooding can be seen on the Landsat Image of 18th August 1987 which was the peak flood at Bahadurabad. This is given as Figure 5.3 in the Main Report.

The total Char land study area on the right bank includes all land on the unprotected (i.e east) side of the Brahmaputra Right Embankment which is under study by FAP 1. On the left bank the eastern limit has been initially defined as extending to the surveyed embankment alignment under the proposed development Option B% of FAP 3.1. This proposes to have a controlled flooding and water management programme for the largest area possible within the mainland. However the FAP 3.1 main study area overlaps this to some extent, as it covers the land up to the limit of the "normal" peak flow channel of the Jamuna. For the purposes of the field study the eastern limit was thus considered to be the peak flood extent of a "normal" flood year. However the intervention area has been widened out to include all unprotectable land as the adjacent reach of the river.

The northern limit of the FAP 3.1 Char land study area was initially delineated to include all of the large island Char west of Bahadurabad Ghat. Similarly the southern limit was fixed as the dividing channel between the two large segments of the island Char opposite Jagannathganj Ghat. This is likely to prove problematic in the future, as the administration boundaries of the area and hence the collection of existing data and perhaps the basis for implementation of any development programme do not correspond with the physical land limits. Due to the dynamic nature of the area this is not surprising, but it may be necessary to revise the exact limits at a later date. This will need to be addressed when data from the FAP 16 National Char Land Study is integrated into the FAP 3.1 Char Land Study as is proposed for the next phase of the study.

The present administration limits were defined on the basis of the Jamuna river position in 1905/6 and are still rigidly applied today. There is a strong sense of attachment and belonging to a defined village or Mauza area (a village revenue and cadastral unit). For this reason data



Base Source: SPOT Satellite Image of 20th November 1990, Updated with Landsat TM Imagery of 8th March 1992.

collection work has been carried out at the Household, Village and Mauza level rather than for a particular discrete piece of Island Char land.

1.1.4 Likely Impacts of Development Proposals on Char Land

As mentioned above, one of the reasons for considering commissioning a Char land study was the concern expressed as to the likely impacts of FAP proposals on the Char lands. The most significant possible impacts are likely to be the increased flood risk to unprotected land as a result of containing flooding to the main river channel by the construction of flood protection embankments. In addition the external project effects, both positive and negative, of any mainland development need to consider the present and often complex relationships between the mainland and the Char land.

On the right bank of the Jamuna an embankment is already in place and is the responsibility of FAP 1. This runs for a considerable length of the right bank from the Teesta southwards to the Padma confluence. Due to on-going erosion it has been regularly breached and then retired and rebuilt over the last years.

On the left bank, adjacent to the study area, there are proposals to develop a system of controlled flooding centred around the construction of flood protection embankments and water control structures as part of the FAP 3.1 study.

The area north of the Old Brahmaputra comes under FAP 6, the North East Regional Study. They at present have no plans for any large scale river training or embankment works in the area. However the question of treating the Old Brahmaputra as a hydraulic planning unit in its own right has been raised by both FAP 3 and FAP 3.1. It is considered important enough to warrant a separate integrated specialist study in the needs assessment and consideration of possible increased flood risks as a result of the FAP 3.1 Mainland intervention.

For the area south of Jagannathganj, FAP 3, the North Central Regional Study, have recently submitted proposals for a phased programming of sub-regional development studies. The prioritisation and phasing of these 13 sub-regions (of which the FAP 3.1 area is one) follows the methodology for the Flood Action Plan Guidelines for Project Assessment (GPA). Interventions being considered cover a wide range of water management possibilities including the construction of embankments for control of flooding under a wide range of development options.

The area immediately downstream of Jagannathganj is already protected from main river flooding by an existing embankment and for this reason has been recommended as the next area to be considered for sub-regional planning after the FAP 3.1 area. This is because it is seen to offer benefits without the need for significant expenditure and is likely to have fewer negative environmental impacts than interventions in other sub-regions. However in the context of future development planning in this area, concern similar to that at FAP 3.1 has been expressed as to the past neglect of the adjacent Char lands in the FAP planning process.

It would thus seem logical to include the adjacent Char lands within any designated FAP 3.2 study area.

The area downstream of the second planned intervention area (i.e. south of Bhuapur) is the subject of considerable uncertainty due to the strong possibility for the go-ahead being given for the construction of the Jamuna Multi-purpose Bridge. This could pre-empt the range of possible scenarios that could be considered by FAP 3. In practical planning terms it requires consideration of the likely hydrological impacts that such a large structure is likely to cause, particularly backwater effects. These have been studied to some extent by the EIA component of the Bridge Study.

The computer hydraulic modelling of the main rivers in Bangladesh is being tackled by FAP 25, linked to the Surface Water Modelling Centre. For the Brahmaputra/Jamuna river system they are working through a programme of gradually refining the computer simulation model, then using this to predict flow patterns under various scenario conditions, including differing degrees of embankment provision. In order for this to be used in the analysis of Char land flooding there still remains a considerable amount of work to be done. The results of the modelling will need to be combined with topographic elevation data to give some idea of likely depth, duration and extent of flooding. Topographic data was planned to be collected by FAP 18 as part of the FAP mapping programme, however it has been learnt that this has been removed from their work programme. Consideration will now have to be given to alternative techniques for doing this including time series radar imagery under study by FAP 19. This could be a major constraint to development planning for the area. The particular requirement for study of the Char lands is for comparative hydraulic analysis of the situation at present and under an embanked scenario and also with the Jamuna Bridge in place. This will need to be carried out for a range of flow conditions. FAP 24, River Surveys, have also recently commenced their work programme which includes some Hydrographic Modelling Work.

An outline of the impacts of possible future development programmes on the FAP 3.1 Char are dealt with in more detail in Section 3.5 of this report.

1.1.5 Inter-Relationship with the FAP 3.1 Main Study

As stated above, the stimulus for proposing a study of the Char land area developed from out of the main FAP 3.1 work. Originally the Char land study was seen as a separate exercise, aimed primarily at investigating development possibilities for the area, particularly in the context of it being unprotected land within the range of studied FAP 3.1 scenarios. It is now being considered as part of an overall development programme for unprotected areas.

The basis that is being used for project appraisal under the GPA is multi-criteria economic analysis. This requires and assumes that the

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benefits and dis-benefits of project interventions can be predicted, quantified and valued in economic terms. Whilst for programmes such as increased agricultural production or avoidance of flood damage this may be possible, for those with primarily social objectives (preservation of life, increased welfare levels etc) this methodology is inappropriate and will unfairly discriminate against them. It is more difficult to predict outcomes and quantify them, let alone place a value against these, particularly in financial terms. The benefits are also often likely to be of a longer term nature and more widely spread. The important issues that underpin these type of targeted, socially based programmes are what are the defined policy objectives, what resources are available for implementation and how best to apportion them according to the policy objectives? In the case of foreign aid assisted programmes the conditionality of the donor is an important constraint.

Within the context of the criteria used for economic analysis of the JPPS, a targeted programme based in the Char lands is unlikely to be easily justified on narrow economic grounds. As such it needs to be judged by different criteria. For this reason it would seem preferable to treat the protectable Mainland study area and the unprotectable land separately, although in parallel, recognising the link between the two but justifying each intervention in its own right.

There is however a major link between the two areas. This is the way in which the benefits and dis-benefits of proposed interventions carried out only on the mainland will be apportioned. The particular issue is the degree to which the likely dis-benefits of embankment construction, primarily the resulting increased flood risk to unprotected land, are felt outside the project area and yet they are likely to receive few of the benefits. Of particular concern are times of less extreme river water levels which presently do not flood land and homesteads but under an embanked and controlled flooding situation may do so. The degree to which this could be mitigated and the cost of doing so also needs to be considered and off-set against the perceived benefits. However the present flood risk in the Char lands is already high and the increase in flood risk created is proportionally quite small. This raises the question of development priorities for the Charlands versus the the Mainland.

The basic premise of the impact analysis is that no person or group of people is to be worse off as a result of the project intervention and that the costs of mitigation are to be incorporated into the overall economic analysis. This has tied the protected mainland and the unprotected Char land together in the Final Environmental Impact analysis. The justification and criteria used for deciding funding for interventions in the Char land area should take this into account. However this should not render flood proofing as a recommended strategy in the Char land dependant upon an embankment construction programme for the mainland. A case is made here for flood proofing in the Char land irrespective of any other project intervention, the proposed intervention of FAP 3.1 Mainland component makes this an even higher priority. As

a result the Char Study has now been fully integrated into the mainland study work.

1.1.6 Link to other FAP Studies

As mentioned above very close integration and support is required with other FAP components which are likely to have significant on-going work and influence in the area. These include the following studies:

- FAP 1 The Brahmaputra Right Embankment
- FAP 3 The North Central Regional Study
- FAP 14 Flood Response Study
- FAP 16 - Particularly the National Char Land Inventory
- FAP 18 For topographic data
- FAP 19 For satellite imagery and GIS support
- FAP 21/22 Bank Protection/River Training Study
- FAP 23 Flood Proofing Study
- FAP 24 River Surveys for topographic data
- FAP 25 For hydraulic modelling of the Jamuna river and interfacing this with the topographic elevation data to provide data as to likely flood depths, extents and duration under different scenario conditions.

Both the present FAP 3.1 Char land Study and the FAP 16 National Char land study do not have components specifically looking at river morphology. Study of these processes requires a longer term programme of data collection and analysis and is being handled partly by FAP 1 and will also be addressed by FAP 24 and FAP 21/22.

Links have also been established with non FAP programmes and particularly NGO's working in the same geographic area and also on relevant programmes elsewhere. Much of the work for the study was actually done under a contract with SCI, an NGO with extensive experience in development programmes in the Char lands particularly centred around flood proofing carried out with the assistance of the Mennonite Central Committee. In addition assistance was given by Action Aid based in Belgachha at the northern end East bank side of the study area. Discussion with regard to future interventions, including Flood Proofing in the area having been ongoing with FAP 23 and CARE.

1.1.7 Link to FAP 16 and FAP 19

There is at present a major on-going National Char Land Inventory being carried out by FAP 16, the National Environmental Support Programme. This is also relying on close support from FAP 19, Geographical Information Systems, particularly in the use of time series satellite imagery analysis. There are very close links with these and the FAP 3.1 Char Study and great care has been taken to make sure that they are compatible with each other and do not result in wasteful duplication. Information from the FAP 16/ISPAN preliminary work has been freely used in this Report as it provides the only broad picture of the area

pending the release of the 1991 BBS census data. Image analysis carried out by FAP 19/ISPAN for FAP 1 Support Studies into erosion and accretion has also been used extensively.

The FAP 16 Char Land Inventory concentrated on the Brahmaputra and Jamuna rivers during the 1992 dry season field work period. This comprises a major inventory of Char resources, covering both the human and natural environment aspects. Data collection has been carried out by visiting every Mauza in the area between the existing and proposed flood embankments and holding open meetings with key informants to obtain baseline data for future planning use. The main subject areas for data collection include:

- Char Physiography
- Human Population and Settlement
- Infrastructure and Service Provision
- Primary and Secondary Occupations
- Agricultural Cultivation and Livestock Distribution
- Environmental Hazards
- Social Conflicts

This data has been entered onto a computer database and then interfaced with a digital mapping system and recent Landsat Satellite imagery of the area to form a Geographical Information System. This will provide basic planning data to be accessed down to Mauza level and the production of distribution maps of various attributes. Correlation analysis can also be carried out to see if there is a link between Char type and the nature of human settlement and resource use. Simple summary data for the FAP 3.1 has been used for planning interventions, however in the proposed pilot phase of the FAP 3.1 Charland work the FAP 16 data will be required to be used interactively on a GIS.

As part of the FAP 16 Char land Inventory considerable use is being made of time series satellite imagery. There are 9 images available for the last 19 years and this has allowed digital analysis to be carried out which when combined with ground truthing can produce mapped data for the following variables:

- Age of Char land over the last 19 years
- Erosion patterns over the last 19 years
- Present land cover and utilisation
- The length of time of cultivation over the last 19 years

Copies of the preliminary mapped outputs are included in this report with some brief interpretation.

1.2 Objectives and Components of the Study

As stated in the Terms of Reference (TOR) for this study (see Appendix D), the intention was to extend the geographical area of the Jamalpur Priority Project Study (FAP-3.1) westward to include all the Chars up to the right bank of the Jamuna River adjacent to the present Right Embankment under study by FAP 1.

The main objective of the study was to propose appropriate development strategies, centered around flood proofing, for unprotectable land including Island and Attached Char land and unprotectable Mainland (known as Set-Back Land). These require very different interventions than the protectable mainland. The detailed objectives of the study were to:

- estimate the total population living on Jamuna chars
- obtain baseline information on social stratification, land tenure and major occupations
- ascertain the socio-economic conditions of Char inhabitants
- appraise the legal rights to land holding
- identify the constraints faced due to flooding, erosion and other environmental hazards
- identify the people's perceptions of these environmental hazards
- propose strategies to improve the living conditions of Char inhabitants
- identify the people's reactions to these possible strategies
- propose solutions to minimize the adverse effects of flooding

It had been hoped to give comparable data for the 3 Charland types split between west and east bank and the protectable mainland. However as the resources for the study were considerably cut back from what had been planned for, it has not been possible to do this in a systematic manner. This will need to be carried out as part of the following pilot phase of the project.

The study, which has been designed in the light of the above mentioned objectives, has been divided into the following components:

- Description of the Natural and Physical Environment
- Population Census
- Household Survey

- Assessment of People's Perceptions.

1.2.1 Description of the Natural and Physical Environment

The work to be carried out under this component includes:

- Mapping, defining and categorizing Char land to include and differentiate Island Chars, presently Attached Chars and Set-back land. The Set-back land includes older Char lands that have been incorporated into the mainland as well as mainland which is or will lie on the unprotected side of existing or proposed embankment alignments. The categorisation and definition of these are given in section 2.2 and shown in Figure 9.2.11.
- A preliminary assessment of the present hydrology and flood hazards in Char land and the implications for the nature of flood proofing strategies required as a consequence of the present development proposals, specifically the building of the embankments.
- An assessment of the natural resources of the Char lands, including land, water, flora and fauna.

1.2.2 Population Census

For the purposes of development planning in the area it is necessary to provide some working estimates of the population residing in the study area. To do this the following procedures were followed:

- A listing was produced of all 438 Mauzas in the Char study area by reviewing existing data (BBS Small Area Atlases, 1981 Census Data and Thana maps) followed by physical identification in the field. These were plotted on a 1:100 000 map based on the Landsat imagery of 8th March 1992. From this a listing was made of 399 villages covering all 280 in the Island Chars and some 119 in the Attached and Set-back land. This listing is given as Table 9.A.1.1.
- A sample of 63 villages in 59 Mauzas was selected from the 399 villages listed according to 12 identified Char type categories. A population census was carried out of these which gave a figure of 33 967 people in 5922 households. The locations of the sampled villages and the Char types are shown in Figure 9.2.12. From this data estimates were made of the total study area population using an average population figure for each village.
- An assessment of the administrative structure was carried out which identified the existing institutional provision in the area. An inventory of the actual nature and level of service provision was carried out. This included health, education, credit facilities,

and markets provided by both Government and Non-Government Organisations.

Once the 1991 data becomes available then this can be used to provide official total data for population numbers and other parameters.

1.2.3 Household Survey

In order to develop a better understanding of the living conditions of the Char land population, a detailed household survey was undertaken. The main objectives of the survey were to provide information on:

- the demographic characteristics of the population, including, family size and age-sex distribution
- the human population migration patterns in the Char land
- the socio-economic status of the population with respect to livelihood considering occupations, employment patterns, income, land tenure, household assets, housing, health, sanitation and education
- the nature and range of economic activity in the area including agriculture, fisheries and livestock production patterns
- the impacts of flooding and people's responses to these

A detailed socio-economic survey was carried out for 580 households selected from the sample of 63 villages used for population estimation. The 580 households were selected by a stratified sampling technique utilising the area of household landholding (including absolute landless and those with up to 0.02ha) as the criteria. A copy of the administered questionnaire is given in Appendix C.

1.2.4 Assessment of People's Perceptions

Several group discussions and case studies were carried out so as to obtain information on the people's perceptions of their problems and possible solutions to these. This allows a needs assessment to be made for the area which can be used in drawing up a relevant development strategy for the area. FAP 16 has also collected data on the level of Government and Non-Government Organisation involvement in the area, indicated by the note of the last visit from a range of Key Officers to the Mauza. This data will be analysed during the follow-up studies.



1.3 Approach and Methodology

1.3.1 Description of the Natural and Physical Environment

Mapping of the Study Area

All the available data sources were utilised to map, define and categorize Char land into Island Chars, presently Attached Chars and Set-back land, the latter also including older Char lands now incorporated into the mainland. This included time series digital satellite imagery held and processed by FAP-19. A map of the present situation was compiled using 1:100 000 scale enhanced Landsat imagery of 8th March 1992. This was assisted by superior resolution but only partial cover SPOT imagery of 20th November 1990 and some very incomplete 1:20 000 panchromatic air photography of a similar date.

Definition and Categorisation of Char Land

There are great difficulties in defining Char land in both conceptual and geographical terms. It needs to be considered in the context of the historical and geographical perspectives of a dynamic process and in the case of the Jamuna river a very recent and dynamic one at that. The word Char is a Bengali term and has been defined as "a mid-channel island that periodically emerges from the river bed as a result of accretion" (Elahi, Ahmed and Mafizuddin 1991). The FAP 3.1 study and the FAP 16 National Char Lands study have found this to be a simplistic and narrow definition, particularly in the context of the Flood Action Plan where the great issue of concern is those areas which for technical reasons are unable to be protected from major river flooding by embankments, if this were to be desired. There are cases of mid-channel islands which are not accreted but are remnants of the mainland which have been cut off from it by encirclement of the river. There are also Char lands that are accreting but are attached to the mainland. There are also relic Char lands that are now totally assimilated into the mainland. In fact some people would maintain that virtually all lowland Bangladesh is Char land!

For the purposes of this study a pragmatic definition of Char land has been drawn up. All land which lies within the limits of the present and proposed main river flood protection embankments has been considered as unprotected land. This forms the geographical extent of areas to be considered for the study. Within this there are three broad categories of land which have different characteristics and have varying influence over socio-economic conditions in the area. These include the Island Chars, Attached Char land and main land which can not be protected by embankments referred to as Set-Back land. The categorisation and delineation of these is discussed in detailed and mapped in Section 2.2 of this report. This considers various criteria including location, size, age, stability, and if cultivated and inhabited. It must also be appreciated that this is very dynamic, depending upon the effects of erosion and accretion linked to the seasonal cycles of river levels.

The main FAP 3.1 Mainland study had already addressed the left bank land to the limit of the low flow river channel, including the left bank Set-Back and Attached Char land. The FAP 3.1 Char land study has thus predominantly concentrated on the Island Char land in the reach of the river adjacent to the FAP 3.1 area with some consideration of the Attached and Set-Back land, including the right bank which lies in the FAP 2 Regional planning area. Population estimates have been made using both FAP 3.1 and FAP 16 data for the whole unprotected area between the existing and proposed embankments.

In the planning stage of the study concern was felt that evidence of the possible great diversity to be found in the area may be lost as a result of unrepresentative sampling of data. To try and prevent this the area was sub-divided by land type, location and if inhabited and cultivated or not. The sampling programme for village selection from the master village list of the area then considered these as strata for from which a random sample of households was to be selected. The locations are shown in Figure 9.2.12 and the criteria are explained in section 2.2.1. The major criterion is physical location related to flood risk and resulted in the following classification:

- 1 Large Island Char -North
- 2 Large Island Char -Middle
- 3 Large Island Char -South
- 4 Small Island Char -Inhabited and Eroding
- 5 Recently Emergent/Accreting Settled Island Char Land
- 6 Attached Char Land - North Left Bank
- 7 Attached Accreting Char Land -Left Bank
- 8 Attached Eroding Char Land -Left Bank
- 9 Attached Stable Char Land - Right Bank
- 10 Attached Eroding set back land Right Bank
- 11 Set-Back Land -Left Bank
- 12 Attached Char Land -Right Bank

These classes were subsequently simplified into six geographical zones for the purpose of data presentation and all tables in this report have been classified in this way:

- Z1 Island Chars -North
- Z2 Island Chars -South
- Z3 Attached Chars -North
- Z4 Attached Chars -South
- Z5 Set-Back Land -North
- Z6 Set-Back Land -South

It became apparent during the data analysis stage that there was little difference between the north and south zones of each Char type and also that in the selected villages there was little difference between Attached Char land and Set-back land. However care needs to be observed in coming to this conclusion as the numbers of Attached and particularly Set-back land located villages in the sample are under-

represented when compared to the total population of the unprotected area. This must be seen in the context of the resources allowed by the Donor for the study and the conscious decision that was made to concentrate on the Island Chars as the Attached and Set-back land on the left bank had already been studied as part of the main FAP 3.1 study and the Right Bank is in the FAP 2 regional study area and a sample area at Gaibanda was already being considered by them.

It has however emerged that for development planning purposes a classification of the area is necessary according to five major geographical areas related to Char land type which is linked to flood risk. In addition there is a priority transition which decreases from south to north as the likely induced increased flood risk declines. However the FAP 16 flood duration and extent mapping appears to indicate that this should perhaps be reversed. It is suggested that for the next stage of the study a major classification exercise is carried out particularly for population data. This should preferably use the 1991 BBS census data (this has already been released for Thanas in the south of the country) down to Mauza and even sub-Mauza (i.e. Village and Para) level. Failing this use should be made of the FAP 16 summary Mauza data and in any case the FAP 16 verified Mauza mapping at 1:100 000 scale should be used. This work will need to classify each Mauza into its predominant location type and from this summary data tables can be produced for socio-economic characteristics from both FAP 3.1 detailed data and FAP 16 summary Mauza data. It would also be very valuable to incorporate the 1981 BBS census data into the same framework for study of time series comparisons. It should be divided by Thana into the following geographical areas:

- Set-back land west bank
- Attached Char land west bank
- Island Chars
- Attached land east bank
- Set-back land east bank

This will require access to the FAP 16 data and a GIS system with hard copy output.

Hydrology and Flood Hazards in Char Land

The resources and Terms of Reference for the study did not allow for a formal assessment of hydrology and river morphology. This is the responsibility of other longer term FAP components, particularly FAP 1, FAP 21/22, FAP 24 and FAP 25. However a preliminary assessment of the hydrology of the Char lands has been made with an emphasis on the implications for the nature of possible flood proofing strategies required as a result of present development proposals, particularly the building of the embankments. This required liaison with other FAP studies and a simple review of existing data of the area held by FAP-1 (Jamuna Right Bank Embankment Study), FAP-25 (Flood Hydrology Study), the Jamuna Bridge Impact Study and the Chinese Study. In

addition time series Landsat imagery analysis carried out by FAP 19 was extensively used to study trends in erosion, accretion and land cover/utilisation over the last 19 years. The results of the FAP 16 National Char Lands Study data has also been used, particularly their summary data for the percentage of Mauza area flooded and duration for the peak flood in 1988, 1990 and 1991. More highly specific work will be required if the range of possible interventions in the Char lands are taken up. A particular requirement is for flood modelling in a before and after FAP intervention situation to allow adequate flood proofing to be designed.

Assessment of Natural Resources

A preliminary assessment of the present natural resource base has been made based on existing secondary information which has been cross-checked by field visits. In addition time series satellite imagery has been analyzed by FAP 19 which has allowed interpretation of land cover and utilisation patterns over the last 19 years. Of specific concern is the process by which Char land accretes and is colonised by grassland species and the time and nature of human settlement and cultivation of these areas. Flora and fauna lists were drawn up for the area and from field checking of these it emerged that homestead vegetation is a very important component in the interaction between the natural environment and human livelihoods. A separate brief listing was therefore made of this.

1.3.2 Population Census

Estimate of Total Population in the Study Area

Secondary information is available at the Union Parishad level as to the human population and household numbers in the Char lands. However past experience has often proved this to be unreliable throughout Bangladesh and it was particularly considered unwise to use it in ascertaining the population numbers in the Char land. The latest BBS national census data available is for 1981 and experience from the mainland study has shown this to be badly out of date. The dynamics of the Char land area would make this even worse for this study. The 1991 BBS data is being gradually phased released for the country, starting with the southern Thanas. It probably offers the best complete population data source and future work for the Char land area should use it once it has been verified against the FAP 3.1 sample data and FAP 16 Mauza summary data.

In the meantime an alternative methodology had to be devised to give estimated population numbers for the area. This relies on enumerating a given number of villages in the study area and then estimating the total population by multiplying the mean population of sampled villages by the total number of villages in the study area. Based on available information on the village size distribution, it is expected that the margin of error of the population estimate obtained from a sample size of 50

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villages will be less than 20%. This technique was proposed for the area and outlined in Table 7 on Page 15 of the FAP 3.1 Working Paper, Jamuna Char, Initial Findings. It must be emphasised that this technique relies for its accuracy in the selection of a representative sample of village population sizes in the area under study.

To do this 63 villages (see the listing in Table 9.A 1.2) were selected from the list of villages in the study area (Table 9.A 1.1) and a population census was carried out. Using the census results a mean population per village and by Char type location was calculated and then used as the basis to infer the total population of the area. This data has also been compared to the summary Mauza population data for from the FAP 16 Char lands study. The conclusion is that the FAP 3.1 figure of an average village population size of 470 people is valid for the Island Chars as the sample was concentrated in these, but less so for the Attached Char land and particularly the Set-back land. The total population obtained from the FAP 16 study has thus been used for the total unprotected land figure and the FAP 3.1 figure for the Island Chars. The total figure for the aggregated Attached Chars and Set-back land has been calculated from these. These figures were then apportioned by Thana according to the number of villages in each of the Thanans of the Island Chars and also from the Thana data from the FAP 16 data.

This summary data is shown in Table 9.1.1. It should be noted that the margin of error in the FAP 3.1 Island Char population estimate is in the order of +/- 15%. This is the best that can be expected for planning purposes pending the release of the 1991 BBS data. All future work should use the BBS data once it has been cross checked and compared with the 1981 BBS data. This should enable more accurate population estimates to be made and allow those Mauzas where only part lies within the unprotected land to be proportionally split. Similarly the splitting of the Attached Char land and the Set-back land could be carried out from the community split published data but experience with apportionment of Mauza data at FAP 16 has shown this to be very problematic.

Table 9.1.1 FAP 3.1 Char Land Population Estimates 1992

THANA	ISLAND CHARS	ATTACHED CHARS & SET-BACK LAND	TOTAL
KAZIPUR	22 578 *	51 079	73 657 +
SARISHABARI	0 *	54 054	54 054 +
DHUNAT	470 *	10 484	10 954 +
SARIAKANDI	44 214 *	65 956	110 170 +
MADARGANJ	9 407 *	45 267	54 674 +
SONATALA	0 *	26 072	26 072 +
SUGHATTA	0 *	59 069	59 069 +
ISLAMPUR	11 288 *	99 122	110 410 +
PHULCHHARI	24 459 *	39 766	64 225 +
DEWANGANJ	5 644 *	33 674	39 318 +
TOTAL	118 060 *	484 543	602 603 +

Sources: * FAP 3.1 Stratified Sample Survey
+ FAP 16 Summary Mauza Key Informant Data

Listing of Char Land Villages for Village and Household Selection

As part of the FAP 16 National Char Land Study a list was made of all Mauzas having any part within the unprotected area of the Jamuna and Brahmaputra river. This used the BBS Small Area Atlas listing and followed the same numerical coding system by Zila (District), Thana (formerly Upazila), Union and Mauza. The locations of these were also plotted onto a 1:100 000 overlay map to the 8th March 1992 Landsat imagery. This listing was used as the basis for constructing a more detailed village listing for the FAP 3.1 Char lands study. This was done by reference to secondary data sources (Union Parishad lists etc) and then physical checking and verification in the field. This resulted in the compilation of a complete list of all 280 villages on the Island Chars and also a sample of 119 on the Attached Char and Set-back land. Less emphasis has been placed on the latter two classes, particularly for the east bank, as this area had already been covered in the FAP 3.1 mainland study. This listing is attached as Table 9.A.1.1 in Appendix A)

Difficulties were experienced in classifying the zones in which the villages were located as these are not always easy to identify on the ground and the criteria evolved as the study progressed. However this has still allowed the Island Char data to be separated from the Attached Char land and Set-back land. From these 399 villages 63 were selected ensuring cover in most of the 12 Char land strata. The locations of

these sample villages are shown in Figure 9.2.12 and they are listed in Table 9.A.1.2 of Appendix A.

Household Census

A population census was carried out on the 63 selected villages. From these 5922 households a 10% stratified sample was selected using the criteria of area of landholding per household (including totally landless). A detailed household questionnaire was carried out on these 580 households, a copy of which is attached as Appendix C.

Inventory of Institutions

In order to prepare an inventory of both Government and Non Governmental Organisations and Institutions a structured checklist was used (see Appendix C1). This was applied to key informants and use made of secondary data sources to produce a listing of such Institutions for the whole of the Char lands study area.

1.3.3 Household Survey

The sampling methodology for selecting the 580 households from 63 sample villages from the total study area has been indicated above.

Design of Questionnaire

As elaborated above, a formally structured household questionnaire was designed, discussed, field tested and approved. The enumeration team was then mobilised after proper training of the 20 field personnel and under the close field supervision of the specialist staff through field co-ordinators. As can be seen from the contents of the questionnaire a wide range of information relating to the agro-socio-economic situation and dynamics of the Char people (including legal property rights and common practices) were obtained. These include the bases of livelihood, environmental aspects (particularly hazard risk), the linkages with the mainland and population migration considerations.

Data Processing and Presentation

All questionnaire returns were entered into a data base and dummy tables constructed to highlight the possible differences between geographical locations and Char types. It was immediately apparent that the original classification of 12 Char locations was unwieldy and these were simplified into the six mentioned previously. As a result of the limited sampling frame utilised for areas outside the Island Chars, created by the constraints dictated by the resources allowed for the study, it was considered unwise to segregate the data for the Attached Char land and Set-back land. These have thus been aggregated for most of the summary tables and where this has not been done, great care should be exercised in interpreting the data.

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It is apparent that the major differences lie between the Island Chars and the rest of the unprotected land, where as major differences between the Attached Char land and Set back land are not so apparent. However caution should be exercised in drawing conclusions from this due to the small size and possible unrepresentative locations of the sample villages used. The next phase of any Char Study will need to tackle this issue with great care and sufficient resources, although the results of the FAP 16 data will be able to help with this. Another difficulty was classifying the village locations of the Attached Char land and Set-back land in the field and it is apparent that some of these have been mis-coded although some are quite likely to straddle the boundary between the two. The next stage of any study should attempt to rectify this with the help of the 1991 BBS data and census maps and revise the data summary tables accordingly.

Within the Island Chars it is apparent that size of island is not a major influence on socio-economic conditions and a far more important consideration is age and/or permanence of the land. As a result it was felt that there was little justification for separating the Island Char data by size of island. The following six zones have been used for the presentation of the primary data tables which are in Appendix A.

- Z1 Island Chars -North
- Z2 Island Chars -South
- Z3 Attached Chars -North
- Z4 Attached Chars -South
- Z5 Set-Back Land -North
- Z6 Set-Back Land -South

However in the main body of the report (particularly Sections 2.3 to 2.5 and 3.4), summary tables have been given which aggregate the north and south data for each land type and also the Attached Char land and Set-back land. The headings on the tables for Char land cover all Island Chars where as the Set-back land also includes Attached Char land, The original thinking behind the north/south differentiation was that the likely induced flood risk differences as a result of embanking could be categorised in this way (particularly as the Jamuna bridge impact was only over the southern reach). However it is now apparent that the increased flood risk difference is likely to be small in comparison to the existing Flood risk and for practical planning purposes a split between the west and east banks is of more use. The next phase of any Char study should reformat the data by these locational criteria as a matter of priority.

1.3.4 Local Peoples Perceptions and Participation

The need to integrate local people and their representatives as participants in all stages of the project cycle is gaining recognition among Governments, Donors, and development practitioners around the world as the key to implementing sustainable development programmes. Bangladesh has also recognized the crucial importance of participatory

planning in the implementation of resource development projects. The Government of Bangladesh, in its Fourth Five Year Plan, has incorporated this philosophy by laying down its own policy that local people are to be included in a "bottom up" planning process that begins by assessing the needs of the local people. This includes large, multipurpose projects like the Flood Action Plan.

To ensure participation of the local people in the development of a planning framework for the area the study used two methods of participation, namely group discussions and case studies.

Group Discussion

Although of recent origin as a research methodology, group discussion is being widely used as one of the principal study tools for rural development work. Group discussions are widely used to obtain information about peoples perceptions, attitudes and behaviour and when utilised as a systematic and conscious qualitative research method with a definite goal, can yield a considerable amount of information and create a widespread awareness of development possibilities amongst the target population. It is often advisable to hold these discussion amongst specific target groups to avoid dominance of one over another or issues of specific concern of one group being neglected in favour of those of a more powerful or influential one. This is particularly a problem in a country like Bangladesh where there is considerable social division. Discussion can be held amongst groups of similar socio-economic level, occupation, age group and gender to try and overcome this problem.

In holding group discussions, no formally structured questionnaires are used, however a check-list of issues or guidelines is held in mind or noted so that possible issues are not inadvertently omitted and the respondents minds can be opened to a full range of potential issues. It does however require highly skilled animators who whilst not influencing discussion, can guide it to address all possible issues and by tactful questioning can recognise and raise issues that would have otherwise have been omitted.

In conducting the study of the FAP 3.1 Jamuna Char lands, such participatory methods were used as a tool to collect information about Char inhabitants perceptions, attitudes and behaviour on topics that were considered to be of greatest importance to them. Group discussions were held in about 50% of the 63 sampled villages. Where the resources allowed, this work was supervised by an expatriate expert fluent in Bangla who was able to intervene in informal discussions when required to pursue topics relevant to the specific location. If necessary sub groups were split off to tackle these issues and obtain the views of specific interest groups (landless, women etc.) without influence of others. The following steps were followed:

- Identification and Selection of Social Strata and Groupings

To enable more meaningful and representative group discussions from a wide range of perspectives, the composition of groups was deliberately widened to include people from different social strata (using the amount of land owned - including landlessness, as a criteria) and occupations, including both women and men. In villages these were held at suitable "neutral" locations, usually school yards, and Union Parishad premises and occasionally homestead court yards of respondents which had been earlier selected by the study team. The responses of the participants were recorded in either written form or sometimes with the help of a mini cassette recorder. These were later structured and classified to allow consistent and systematic analysis of the responses. The predominant issues were identified and prioritised by the frequency at which they were raised. The nature of the views was scored from highest to lowest to allow a ranking exercise to be carried out.

- Identification of Major Problems and Issues

Problems and issues, both specific and general in nature, were identified from the responses recorded and then classified, analyzed and prioritised using local peoples perceptions in the scoping process during the group discussions. The ones that were felt by the local people to be most important were taken up for further in-depth study.

- Gauging of Individual People's Commitment

Once the local peoples main issues and concerns were identified then in depth discussions were held to enlarge upon their different dimensions and possible solutions as well as perceived constraints in achieving these. This included gauging local people's level of commitment and ability to participate in providing measures to overcome or solve their problems and concerns.

- Collection of Institution's Commitments

The role of various different Institutions and Organisations, both Government and Non-government were discussed in the context of assisting local people to implement strategies to solve their perceived priorities for development. This included consideration of the Institutions nature and role within the community and the level of commitment and participation that local people would give to these.

Case Studies

The term "Case Study" usually refers to a fairly intensive detailed examination of an operational single unit, such as a person, a small group of people engaged in a collective activity or a single organization.

Case studies are able to give valuable insights as to what actually makes an individual or collective group behave in the way they do and particularly what criteria guide their decision taking be it conscious or instinctive, rational or irrational. It is often best done in a historical context to look back over past progress and decision taking and what were the results and if in hindsight people would have acted in different ways. It is a particularly useful technique which brings a strong focus of reality to what could be very simplistic or deterministic analysis. It does however have a danger that the particular case studies carried out could be very untypical of the whole area under consideration and care must be taken not to be over-influenced by what may be very obscure or exceptional incidences. It allows analysis to concentrate on real issues of what actually happened and reveal how people think and perceive issues and what their priorities and strategies are.

The case study approach offers a means of viewing and arranging socially based data with the aim of preserving it within the wholeness of its decision making context. The key actor to identify is the decision or operating unit and its degree of independence and freedom of action and how this effects decision making. From case study work like this the social scientist aims to abstract and separate those properties that are common to, or typical of, many other similar situations. Special consideration also needs to be given to exceptional cases as these shed light on situations where there may be sudden changes in parameters. The aim is to be able to generalize and to construct types or groupings based upon a range of case studies reinforced with empirical data.

- Identification of Cases

In the course of the Char land study critical issues were identified and taken up for detailed case study. The criteria for selecting cases included the nature of the activity being pursued, its degree of dependence, along with its intensities and location of operation. Subject areas included education, health and transport provision to the area and peoples specific experiences with these. Occupational case studies include fishermen and migrant labourers and a response case study to flooding.

- Preparation of Case Studies

In preparing case studies three steps were followed. The first was to clearly define the issue or activity to be studied. It is necessary to avoid building up vague impressionistic views of the issues to be studied. The actors must be clearly identified and their roles focused, along with their perceptions and aims. This requires clear descriptive information of their present status and circumstances and background information as to how they arrived at their present situation and the key variables which determined this. The second step involves speculation as to the range of options that were available to them and how or why they chose to do what they did. Of particular concern is to identify the

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constraints to their decision making and if these were accurately perceived or not. The degree and nature of risk taking is a major consideration in this. The final stage is either to return at a later date to see what actually transpired or in the case of a past situation use recall data to see if the outcome was as expected or hypothesised and if not why not. From this work key variables, constraints and issues can be identified and the degree to which they influence people decision making be assessed. The case studies are written up in Section 3.1 of this report.

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2 ENVIRONMENTAL PROFILE

2.1 The Natural Environment - Processes

2.1.1 Climate

The Char lands adjacent to the Jamalpur mainland study area have similar climatic characteristics to the mainland but the effects of these are different due to the prevalence of large uninterrupted tracts of open water. There is pronounced seasonal variation within the year and the timing of these can be different from year to year.

Mean annual rainfall is between 175 to 250cm with a pronounced seasonal peak during the monsoon period which can occur anytime between June and September. However these dates are highly variable as are the intensity and distribution of rainfall. Temperatures are at their lowest in January with the daily mean being 17⁰c, night time figures drop well below this and fog is common. Temperatures peak in March and April with the daily mean reaching 30⁰c. Humidity levels are relatively high throughout the year, and are lowest in January to March before the onset of any pre-monsoon rains. These are brought in on south westerly winds which commence between March and May before the full monsoon rains arrive. They can be very strong and squally, posing a particular problem in Chars with long reaches of open water on their down wind side. From June to September the winds are variable but start to veer northwards and stabilise towards the end of this period continuing until February. In addition there are more generalised severe cyclonic storms with heavy rain and high winds which occur most commonly in March and April. There have been some five or six such incidences in the area during the last 30 years, causing some loss of life, damage to property and disruption to economic activity, particularly agriculture.

2.1.2 Surface Water Hydrology

Study of the surface water hydrology of the Jamuna is being carried out by FAP 25 (under the control of the Surface Water Modelling Centre) as part of the development of a general model of all the major rivers of Bangladesh. This uses existing river level and flow data, with the nearest gauging station being at Bahadurabad Ghat. The aim of FAP 25 is to develop the model to allow predicted simulations to be made under different embanked conditions. It is at present essentially a one dimensional model and requires interfacing with a digital topographic data of the Char land before more idea can be gained of the depth, extent and duration of flooding. The FAP 16 National Char lands Study has obtained field information as to the approximate percentage peak flood water extent and duration for each Mauza for the years 1988, 1990 and 1991. In addition study has been made of time series Landsat imagery over the last 20 years. Whilst most of these are dry season images taken at the low flow state there is one for the peak flood day of 18th August 1987 and another for 8th November 1988. The FAP 16

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Mauza summary data gives indicators of the extent of peak flooding for a "normal" year (1990), a high normal year (1991) and an extremely high year (1988). This simple classification is based upon interpretation of the river hydrograph for Bahadurabad Ghat over the last 20 years.

The following table indicates the overall situation for the total FAP 3.1 Char study reach of the Jamuna.

Table 9.2.1 Flood Extents and Durations

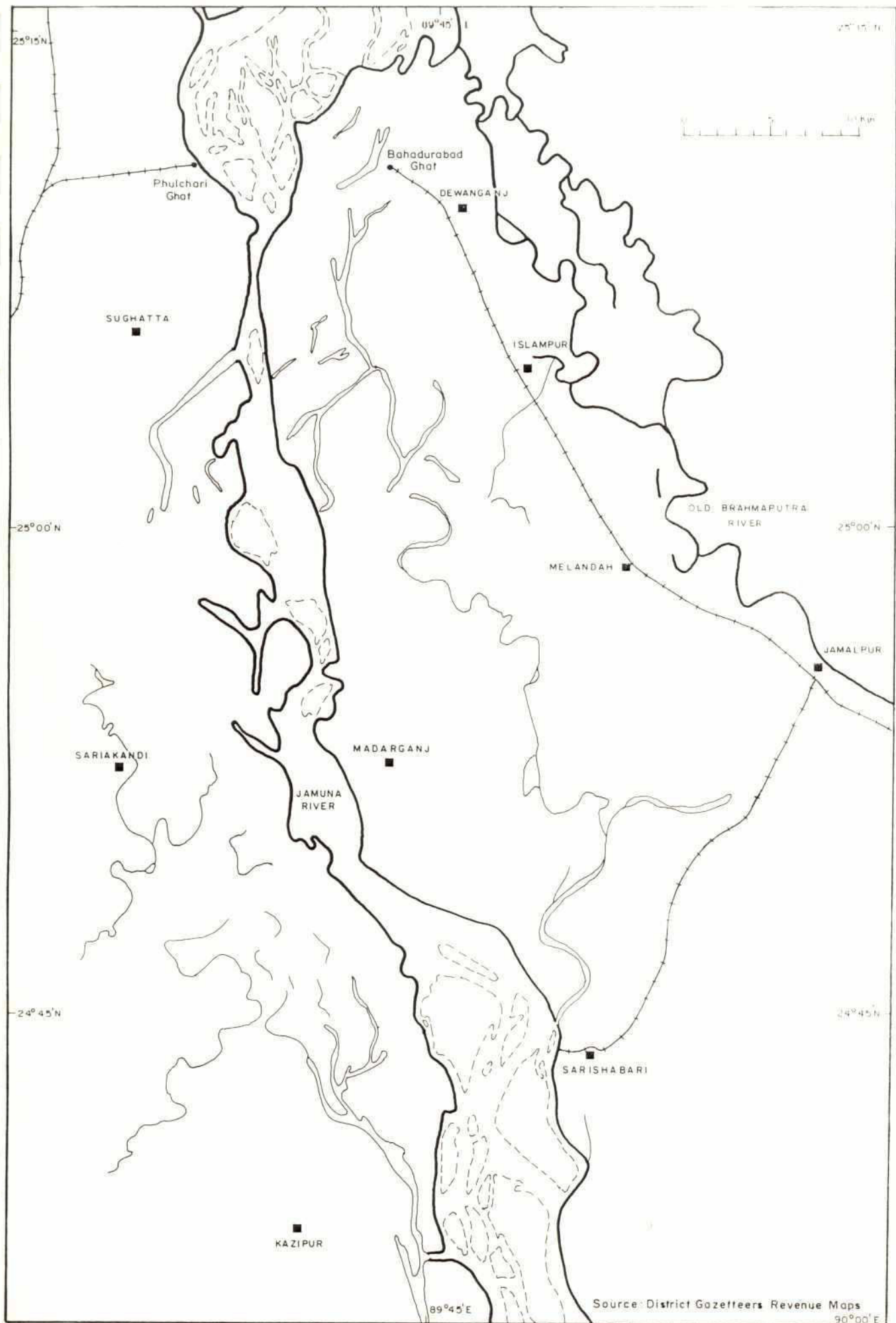
Year of Flood	Mean Days Duration of the Annual Peak Flood	Estimated % Area Inundated at Annual Peak Flood
1988	24	79%
1990	14	53%
1991	12	46%

Source: FAP 16 National Char Lands Study, Mauza Summary Data 1992

It is interesting to note that although the peak flood level at Bahadurabad Ghat in 1991 was considerably higher than that during 1990 the flooded area and its duration was less. This can be explained by the fact that although the peak level was high it was not sustained for very long in comparison with a lower but longer duration peak flood in 1990. The FAP 16 data also records 315 deaths in the area directly due to the 1988 flooding and a further 55 attributed to subsequent flooding. This total figure amounts to 1 in 2122 of the study area population and is likely to be much higher in the Island Char areas. The extent of peak flooding can be clearly seen on the 18th August 1987 peak flood image given as Figure 5.3 in the Main Report.

The major parameters to be considered for flooding of Char land and the land area available at any one time period, is the timing, duration and height of water level change in the Jamuna river, related to land levels of the Chars. The river levels follow a yearly seasonal cycle, although the timing and rate of rise and fall of these can vary greatly from year to year. A crucial factor is the date of commencement of river level rise as a result of snow melt in the upper catchment. This appears to determine how rapidly the water level rises, a later start producing a quicker rise. The peak water levels appear determined by the pattern of monsoonal rainfall in the catchment and how these are phased with snow melt run-off. The timing and duration of peak flooding has different implications for economic activity, (specifically agricultural land use), in the Island Chars, Attached Chars and Set-back land. This is related to land level, channel development and human access.

A major hydrological consideration is how any proposed embanking of the main river channel will effect water levels, both in terms of their peaks but also the increase in Char land inundation occasions when previously there were none.



2.1.3 River Morphology

The development of the Jamuna river system is very dynamic indeed, the present broad location of the river through the study area has been in existence for only the last 200 years, previously to this it ran along the present course of the Old Brahmaputra. It changed its alignment over a 30 year period as a result of river capture in the upper catchment and changes in the course of the Teesta due to sudden catastrophic flooding in 1787. The river has thus been imposed upon an existing settlement and land use pattern which is a less usual occurrence than the converse. It is highly dynamic as a result of main bank erosion in both the high and low flow situations. Peak flow inundation and sand carpeting lead to both erosion and accretion of Island and Attached Char land.

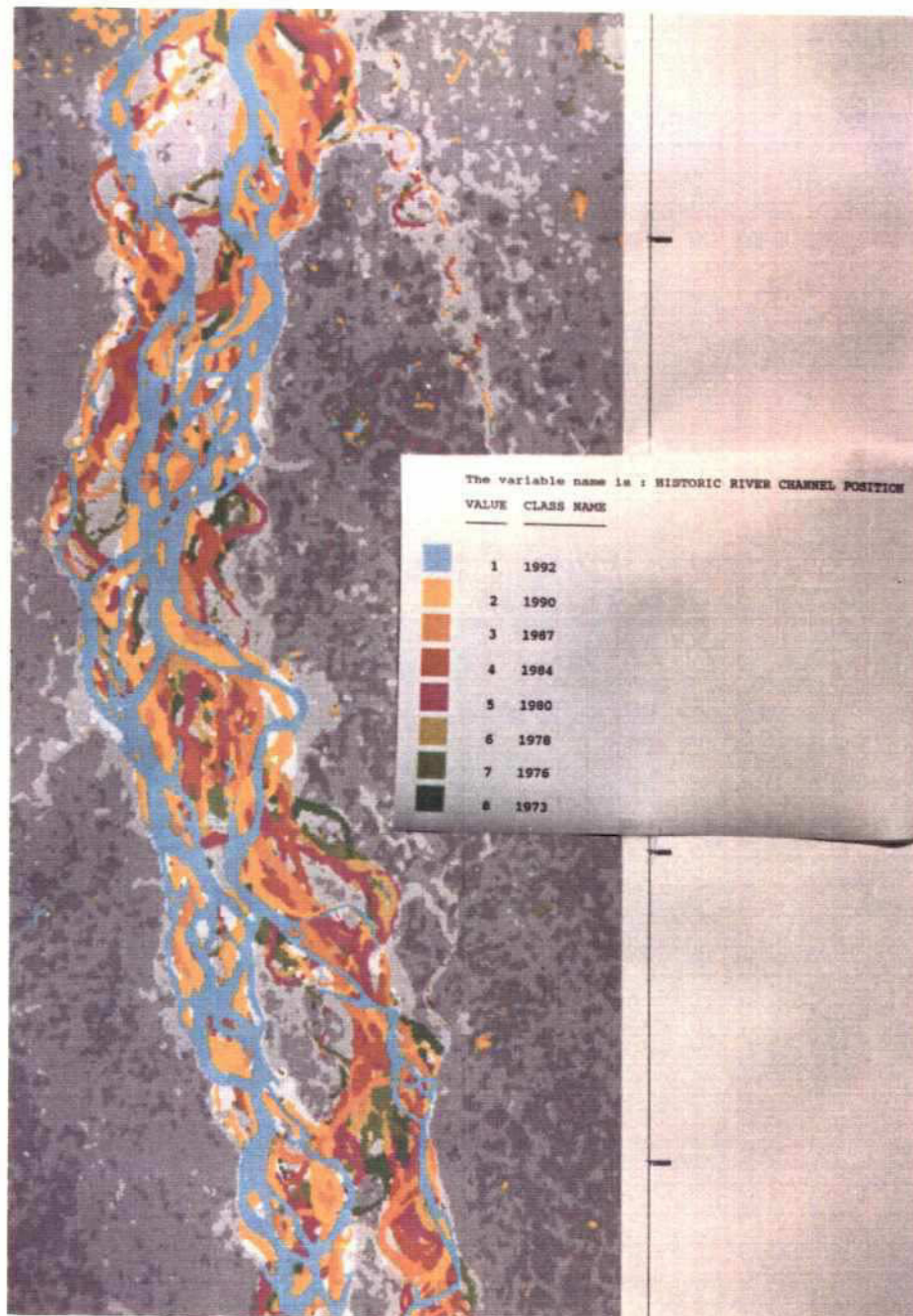
Figure 9.2.1 shows the river location and extent of Island chars compiled from maps dated between 1907 and 1937. It should be noted that the river was, in general, much narrower than at present with far fewer Island Chars. Study of the results of these processes and within the context of human activity has been concentrated on the last 20 years using time series satellite imagery of a similar low flow season. Using digital techniques it is possible and easy to superimpose the past main river channel positions onto that of the present. This is shown in Figure 9.2.2, the March 1992 channel being shown in blue with the parts that are presently land being indicated as to what year they were last in the main low flow river channel. Those areas which have not been part of the main river channel in the last 20 years are shown in grey. Interpretation of this would seem to indicate that the northern and southern Island chars have remained relatively stable, although the southern one has been accreting to the south east. The middle Island Char is very dynamic and has accreted in a fragmented way over the last 20 years, much of it over the last 10 years. The Attached Char land on the left bank appears to be being incorporated into the mainland as the main river channel moves westwards. The exception is the piece of Attached Char land on the right bank in the northern reach of the river which has accreted in the last 10 years. It must be emphasised that their work has mainly been confined to the last 20 years data which is inadequate to get a complete picture of the situation. More historical data is required and is presently under study by FAP 1/19 and 21/22.

2.1.4 Erosion

The major types of erosion are main river bank erosion and loss of Island or Attached Char land evident once a peak flood has receded and the land that was previously there is no longer.

The process of bank edge erosion can be more clearly seen in Figure 9.2.3 which gives changes in bank edge location from 1973 to 1992 indicating those areas which have accreted and those which have eroded. This work was carried out by FAP 19/ISPAN for FAP 1 and more detailed work is underway by them for specific locations, including

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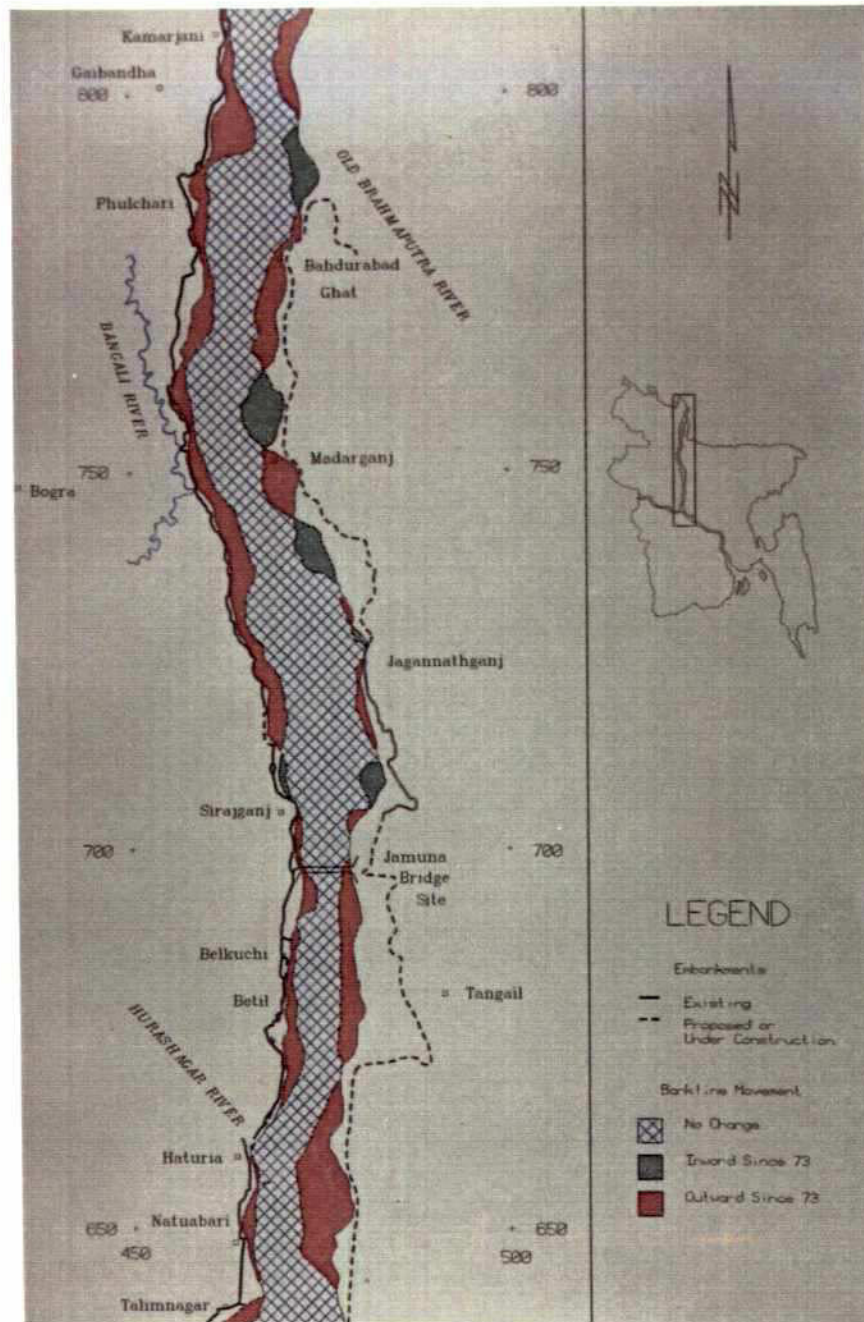


River Channel Positions in the Last 20 Years

(From Landsat Imagery Analysis at FAP19/ISPA)



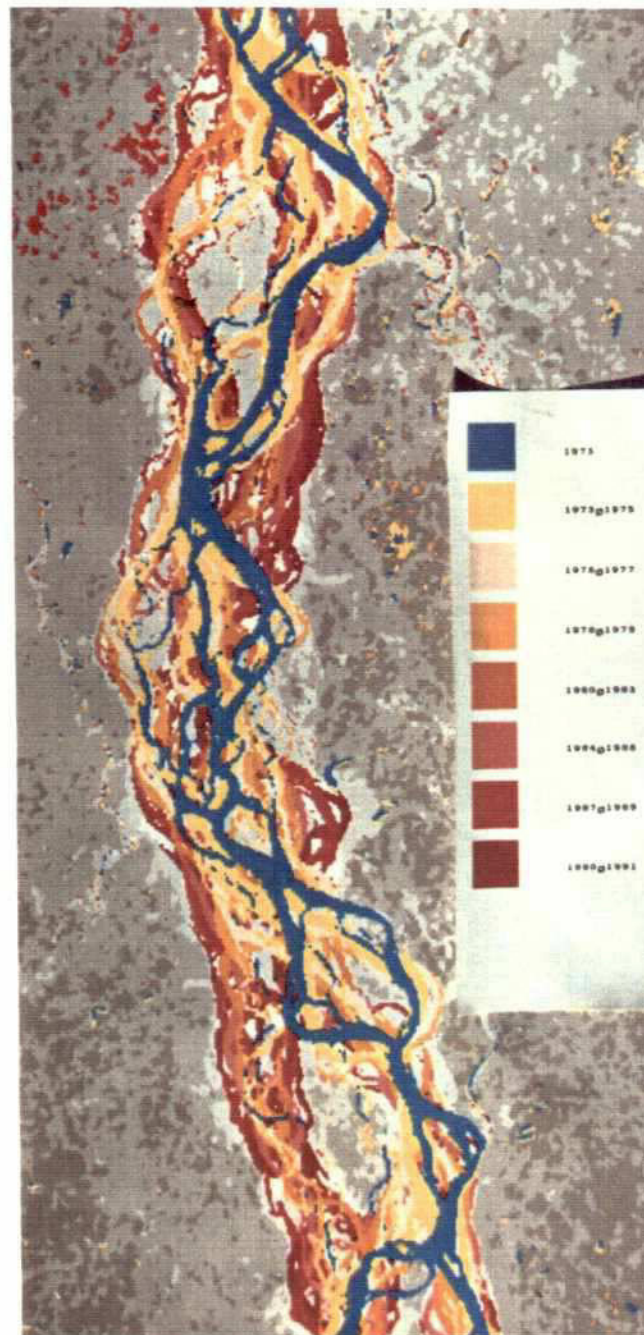
56



Main Bank Erosion and Accretion 1973 to 1992

(From Landsat Imagery Analysis at FAP19/ISPAN)

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Progressive Main Bank Erosion Over the Last 20 Years

(From Landsat Imagery Analysis at FAP19:ISPAN)

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Maderganj, Pulchari and Bahadurabad Ghat for FAP 21/22 and FAP 24. In general terms the right bank has been under erosion throughout the study area reach of the river and the left bank has experienced alternate erosion and accretion. This analysis masks the complexities of what has happened during intervening years. This is shown in Figure 9.2.4 using the 1973 low flow channel in blue as the reference situation with the subsequent channel positions shown at approximately three year intervals. This clearly shows the westward movement of the river channel in the southern half of the study area and the alternate erosion on the left bank, particularly south of Bahadurabad Ghat. Figure 9.2.5 shows the river channel erosion pattern retrospectively from the March 1992 position. All those areas not shown in grey were sand and water in 1992 and those in blue have only been so for 2 years. The classification gives the time since the present sand and water areas were land up to 19 years ago, with that area in dark green having been sand and water all of that time.

In summary it can be seen that the low flow river channel movement is very dynamic, with newer formed channels in alternate locations on the left bank, the eastern edge of the large northern Island Char and the right bank south of Pulchari Ghat and particularly south of the Attached Char land area.

Detailed analysis carried out by FAP 19 (ISPAN/GIS) for FAP 1 (the Brahmaputra Right Embankment Study) has segmented the main river long section into short reaches and using time series satellite imagery has measured the average annual movement of the main bank lines. This is expressed as a diagram in Figure 9.2.6 for the left bank and Figure 9.2.7 for the right bank. The reach of the river within the FAP 3.1 study area is indicated and from this it can be clearly seen that the right bank has eroded westwards along its total length at an average rate of up to 150m a year over the last twenty years. The exception is two small areas immediately downstream of hardened protection points built for major settlements. The situation on the left bank is very different having been subject to alternate erosion and accretion with up to 300m average annual accretion in some places and 250m erosion in others.

2.1.5 Sedimentation

The process of sediment deposition is the major one responsible for the emergence of Char land, although it is greatly assisted by dune formation due to aeolian action, particularly in the low flow dry season period, of continuous northerly winds. Waterborne deposition normally occurs during seasonal peak flood times, exposing newly deposited land as the water levels fall progressively during the start of the dry season from November onwards. Whilst this is a major stage in the formation of new land for human use it can also be a serious hinderance where sand carpeting occurs on the top of existing Char land. This can temporarily render formerly cultivable land unsuitable for such purposes due to the high infiltration rate of the soil and its lack of water retention

properties. This can be improved naturally by the addition of organic matter to the soil by the process of Catkin grass colonisation. Longer term work on this has recently been started by FAP 24 and specific work is ongoing for FAP 1 and FAP 21/22.

2.1.6 Land Age and Stability

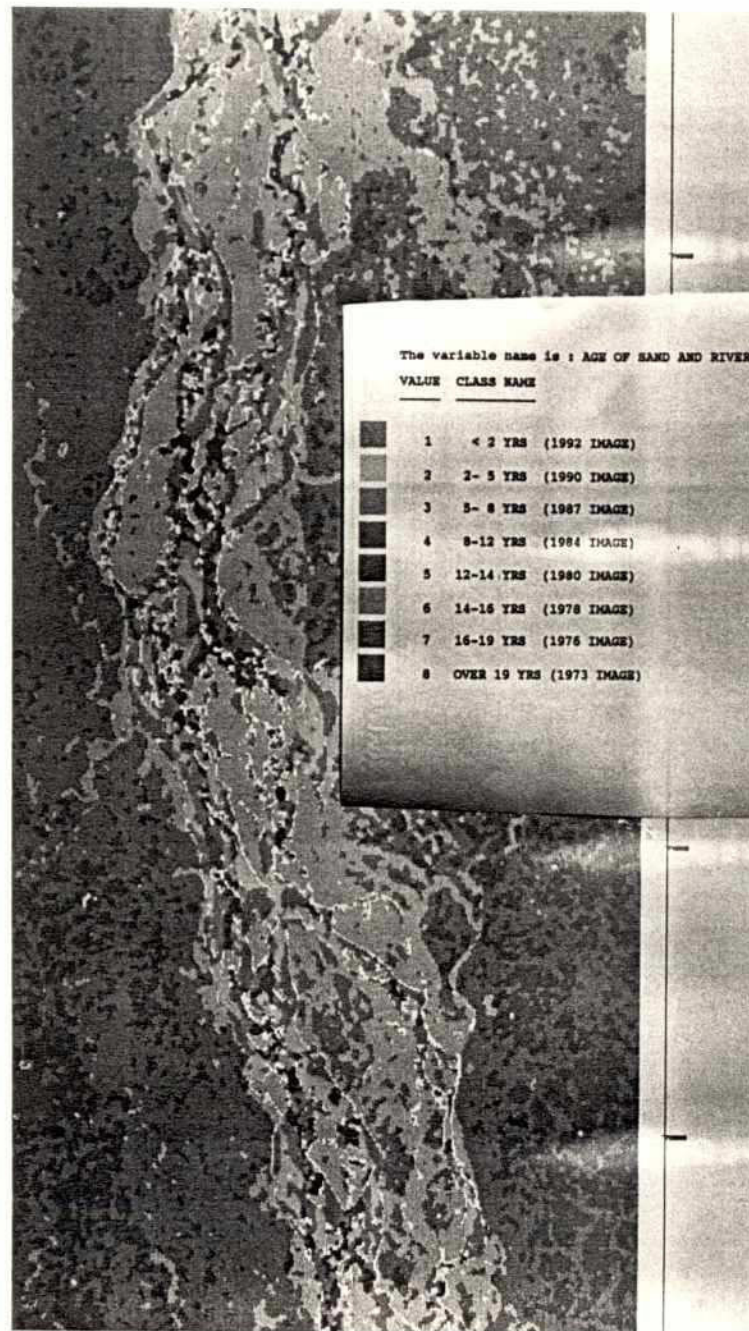
Again using time series dry season Landsat imagery taken at approximately three year intervals over the last 19 years it has been possible to map the time period since present cultivated and vegetated land was sand or water. This is shown in Figure 9.2.8 with the grey areas being the most stable having appeared as cultivated or vegetated land in all of the images studied over the last 19 years. This has been field checked and confirms that both the northern and southern large islands have been quite stable over the last 20 years but the middle Island Char is relatively recent and very unstable. This exercise also clearly shows the areas of accretion in the Attached Char land and how these are being incorporated into the mainland on the east bank. Notable areas are those north of Madarganj and west of Sharishabari. This map is also a good indicator of land stability but must be interpreted in conjunction with Figure 9.2.5 for the Island Char banks (adjacent areas shown in blue are the most erosion prone) and Figure 9.2.4 for the main river banks (adjacent areas shown in bright red are the most recently eroded parts). As a broad generalisation the two more stable Island chars suffer from erosion of both sides but have been accreting southwards. This is a major factor to be considered when placing any infrastructure such as flood refuges. However significant work is required to produce flood risk mapping. Unfortunately the FAP 18 mapping programme for the Charland using the 1990 air photography has been discontinued and alternative techniques using the FAP 25 modelling and perhaps time series Radar imagery will need to be investigated. This is ongoing at FAP 19.

2.1.7 Soil and Land Resources

The process by which Char land is accreted, colonised by vegetation (particularly Catkin grass resulting in soil change) and then used by humans in a progressively more intensive manner (grazing land followed by cultivation and then habitation) can be considered as one of on-going development. Attempts have been made to systematise this in a conceptual framework displayed in a diagram, particularly related to Char type, (Island or Attached), age and stability. However it is considered too early at this stage to reproduce this in a report. It requires further verification with the data that has been collected in both the FAP 16 National Char Land Inventory and the FAP 3.1 detailed household questionnaires along with work carried out on FAP 1, 21/22 and 24..

At this point in the work it is considered worth noting that the colonisation of newly accreted Char land by vegetation is a crucial stage in these process. The degree of human utilisation appears to be mainly

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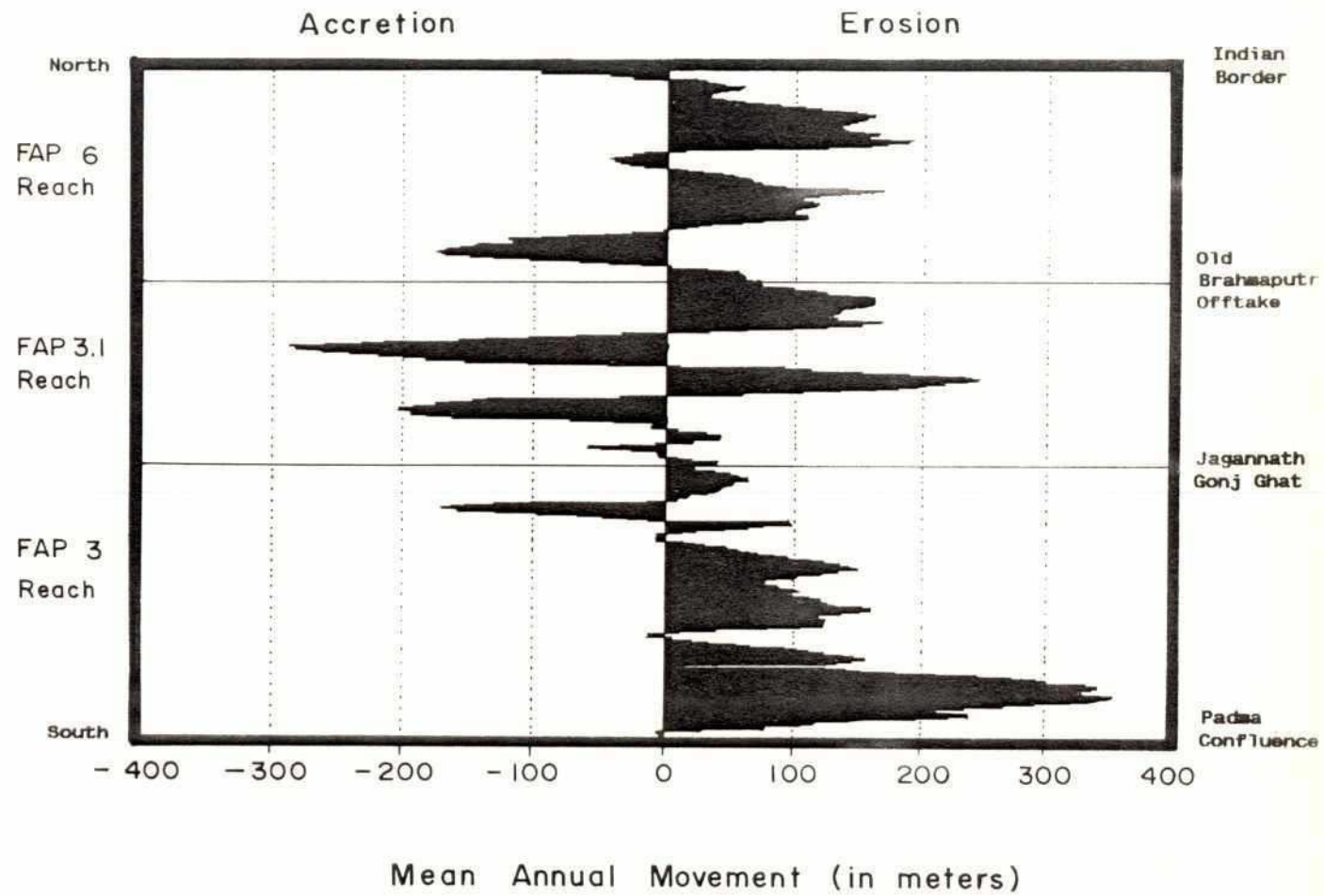


Time Since Erosion of Present River Channel & Sand Areas

(From Landsat Imagery Analysis at FAP19/ISPAN)

JAMUNA LEFT BANK ANNUAL MOVEMENT

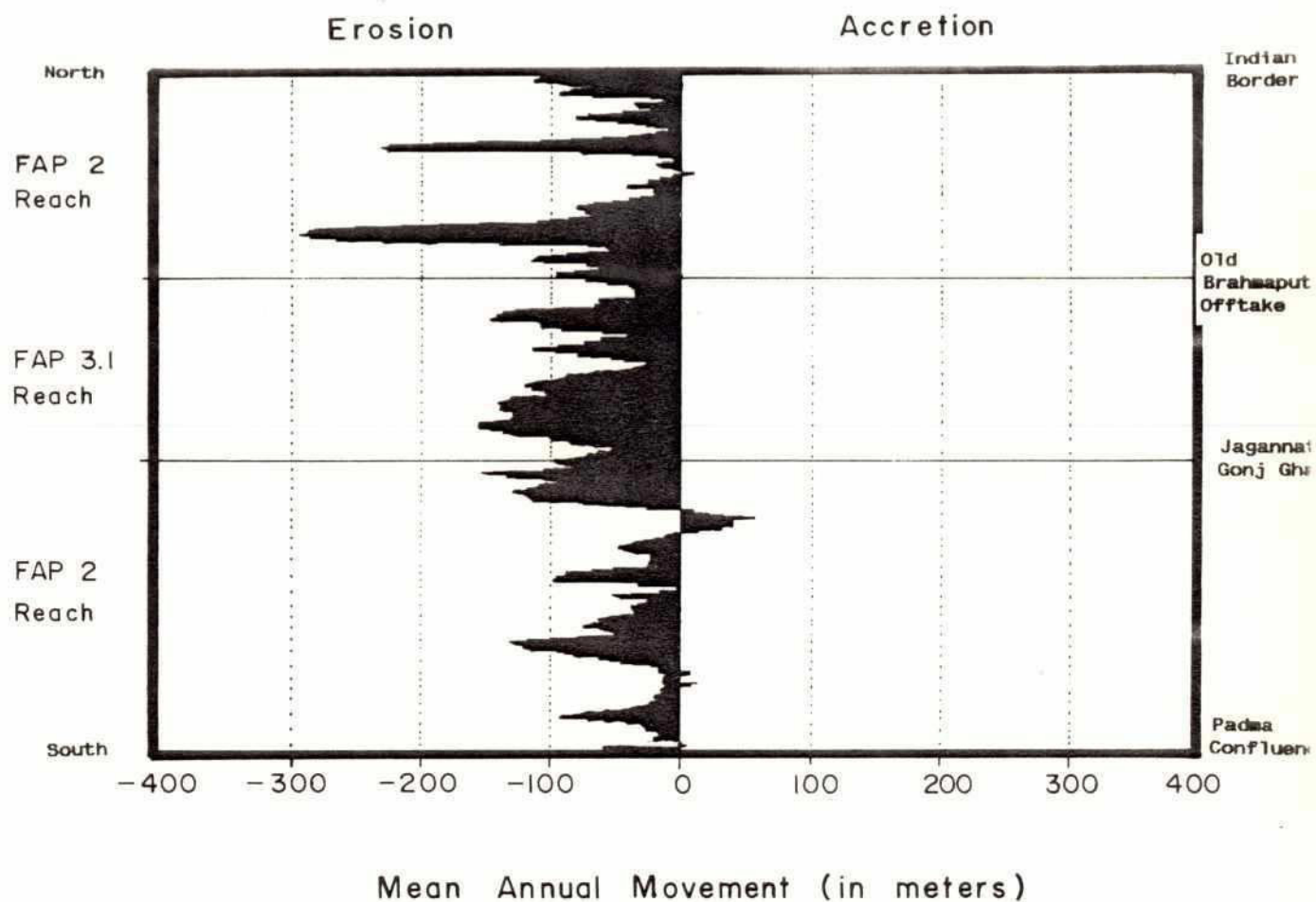
Based on 20 years of Landsat data



Jamuna Left Bank Mean Annual Movement Over 20 Years

(From Landsat Imagery Analysis at FAP19/ISPAN)

JAMUNA RIGHT BANK ANNUAL MOVEMENT Based on 20 years of Landsat data



Jamuna Right Bank Mean Annual Movement Over 20 Years

(From Landsat Imagery Analysis at FAP19/ISPAN)

a function of pressure on land (mainly linked to land loss due to main bank erosion) although access is also an important factor and the whole issue is overridden by the highly formalised nature of land holding and Mauza boundaries.

2.1.8 Land Utilisation

As part of the work of the FAP 16 Char land study the March 1992 Landsat imagery was ground truthed in the field for land cover. This analysis produced a broad classification of land cover for the FAP 3.1 Char land study area as shown in Figure 2.9. In addition this data was analyzed to give digital area counts split between each of the Char land types. These are shown in Table 9.2.2.

TABLE 9.2.2 LAND COVER/UTILISATION FAP 3.1 CHAR LAND AREA MARCH 1992 IN ha

Land Cover / Utilisation	Set-Back Land	Attached Char Land	Island Char Land	Main River Channels	Totals	%
Water	203	1 070	*	20 801	22 074	22
Sand	519	11 439	21 538	0	33 496	33
Vegetated/Cultivated	11 435	6 381	6 899	0	24 715	24
Recently Cultivated	3 594	8 010	10 307	0	21 911	21
Totals	15 751	26 900	38 744	20 801	102 196	

Source: Digital classification of March 1992 Landsat TM imagery by FAP 19

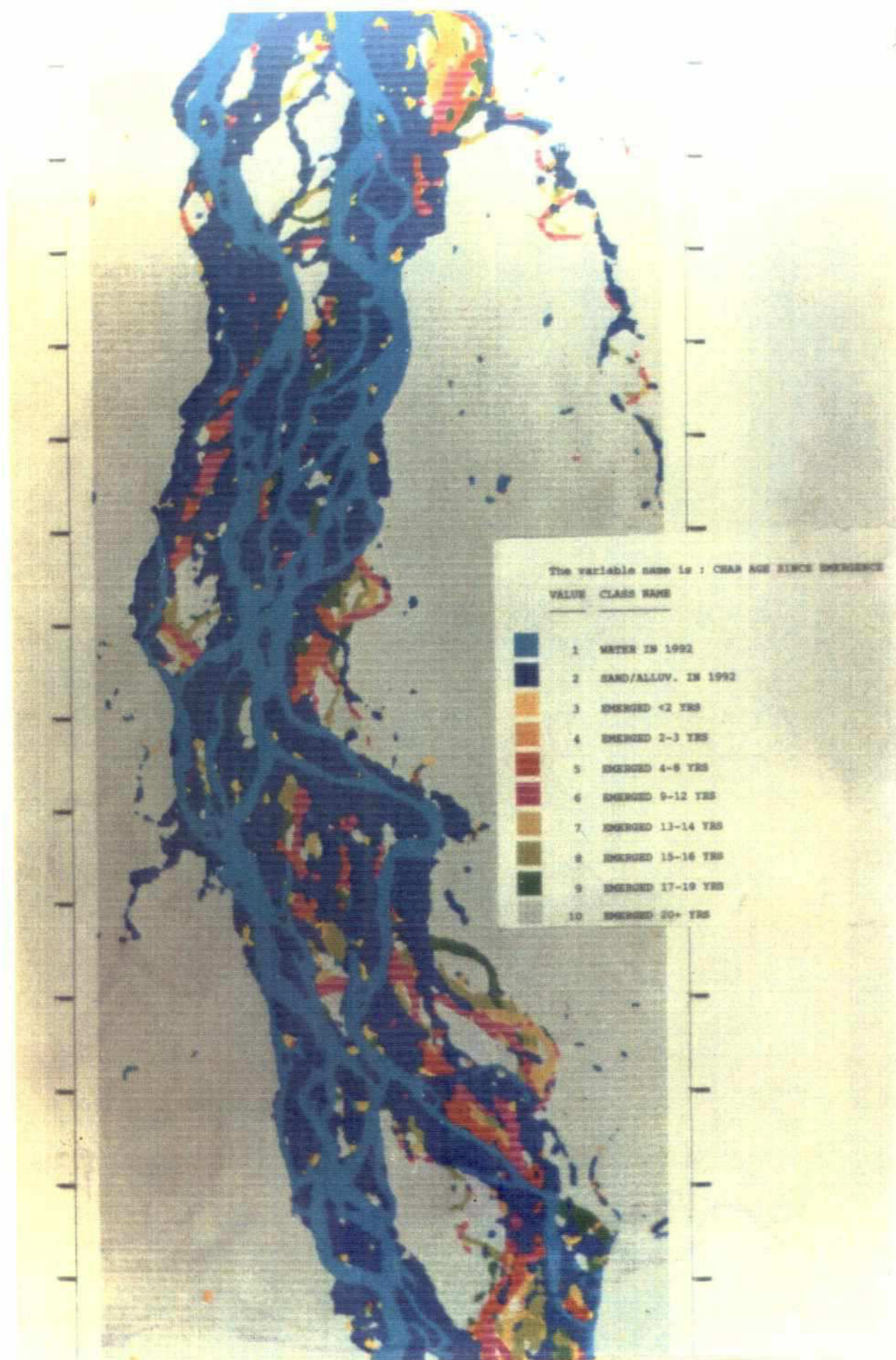
Notes: All areas are in hectares

* The water within the Island Chars is included in the main river channel

From this data, the total maximum area that is thought likely to have been under cultivation in the previous 12 months is 46 626ha of which 31 597ha lies in the Island and Attached Char land. This compares with a preliminary FAP 16 Mauza summary estimate of 36 536ha for the Island and Attached Chars. It must be pointed out that there is inconsistency in the delineation and classification of Char land types between the two studies. Any future Char land work needs to resolve this issue as a matter of priority but there are difficulties in dealing with continuous satellite data, discrete Mauza data and Charland classification.

The land cover classification exercise was also carried out for all of the images over the last 19 years producing a map showing the length of time of cultivation of the land. This is shown in Figure 9.2.10, with that land cultivated on all images being shown in grey. This needs to be interpreted in the light of land availability shown in Figure 9.2.8. A pattern diffusing from the nodal centres on the most stable parts of the large Island chars can be seen clearly. The Attached Char land that is

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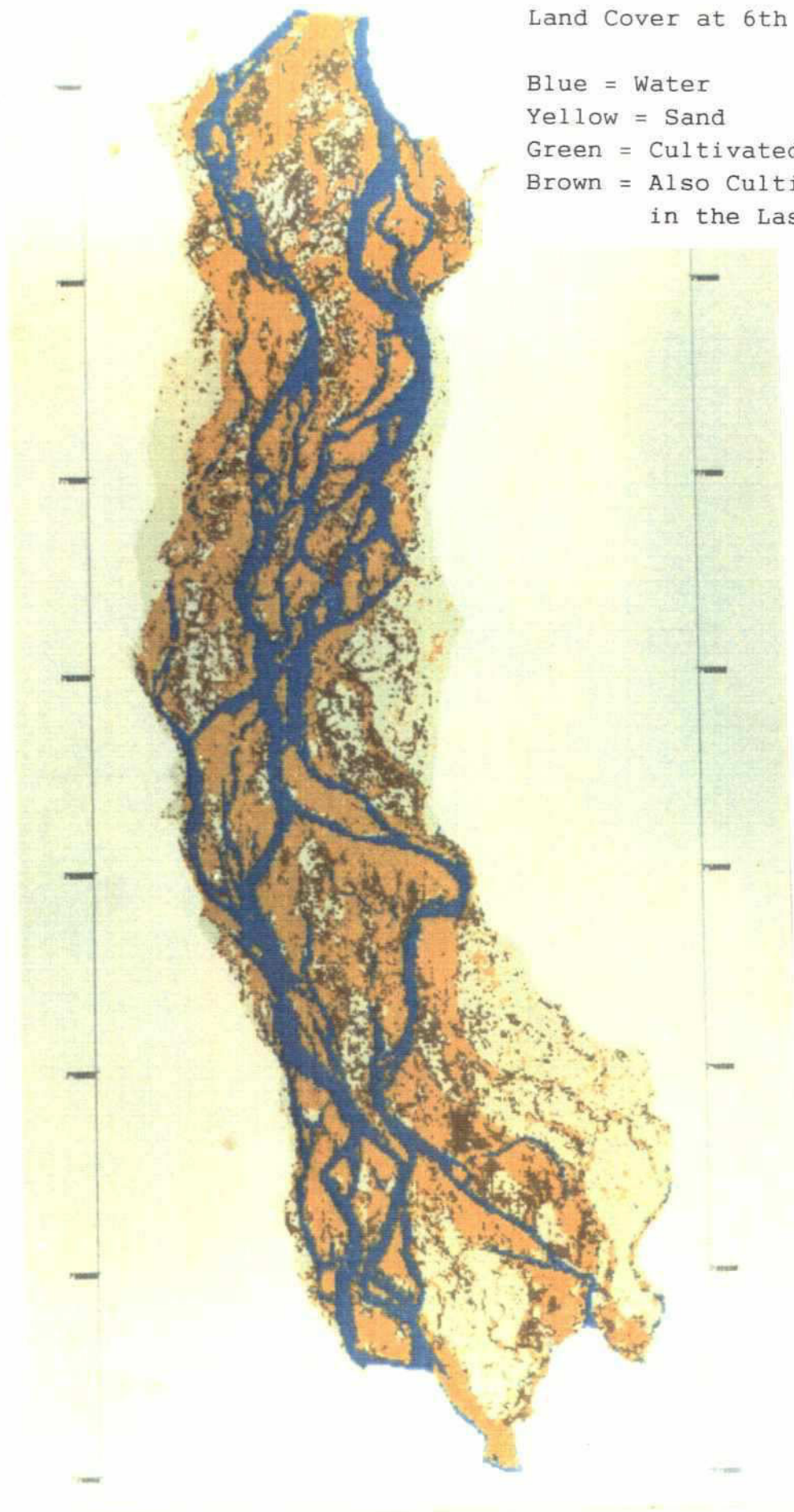


Age of Char Land

(From Landsat Imagery Analysis at FAP19/ISPAN)

Land Cover at 6th March 1992

- Blue = Water
- Yellow = Sand
- Green = Cultivated/Vegetated
- Brown = Also Cultivated
in the Last Year



Present Land Cover & Utilisation

(From Landsat Imagery Analysis at FAP19/ISPAN)

accreting on the left bank also shows a similar pattern. The small Island Chars are characterised by very small pockets of land that have only been cultivated for the last one or two years, even when the land has been in existence for much longer than that. In general it appears that there is a two year lag between land emergence and the first cultivation. It should be possible at a later stage to integrate the two Figures digitally to give a map showing this time delay.

2.1.9 Flora

Inventories were made of the major flora of the Char lands in the study area and these are included in Table 9.2.3. Of particular importance are those species which play a major role in the land stabilisation process. The human utilisation of many of the flora species was found to be widespread and sophisticated, as has been the case on the mainland.

2.1.10 Fauna Including Fisheries

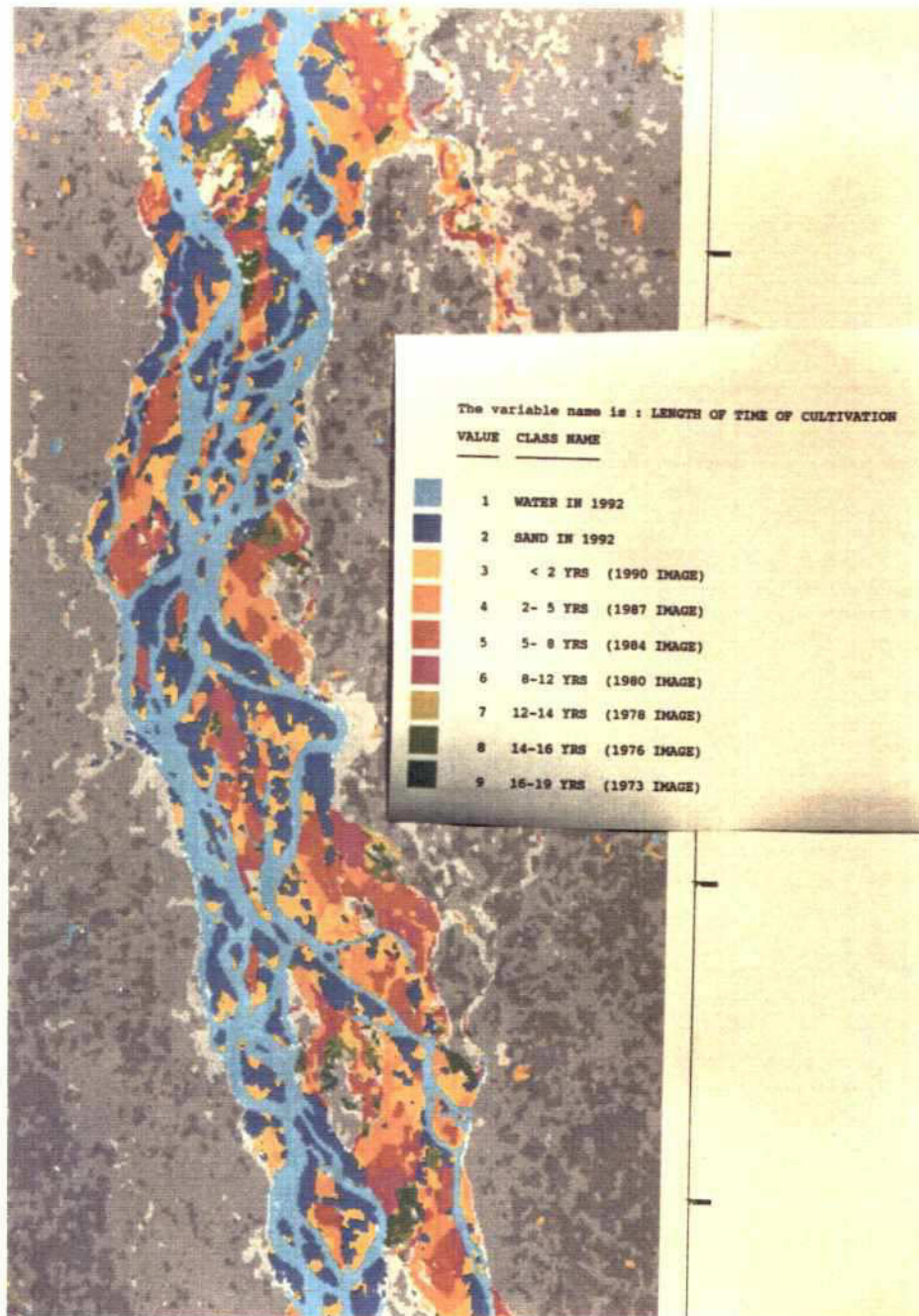
A limited listing of fauna was also made from field observation and interviews with key local informants. Of particular note were water bird species, although their importance in terms of national conservation and bio-diversity priorities are uncertain in the absence of a clearly defined, detailed National programme. It would appear that the areas further to the north, by the Indian border, present better conservation possibilities due to their greater remoteness. The recent study on water birds carried out by the Asian Wetlands Bureau for FAP 6 should be studied in this context when it becomes available.

The utilisation of flora and fauna in Char land homesteads is shown in Table 9.2.4. Attempts are being made to gain more information as to the specific uses of medicinal plants.

2.2 Classification of Char Land Types

The present nature and distribution of resource use on the Char lands is extremely complex with many two way processes happening simultaneously. In analyzing this it is apparent that it would be useful to draw up a conceptual classification of Char land types taking into account the major identified characteristics. This can then be used as a basis for data analysis and interpretation. It may be that Chars of similar classification types could have common resource use and socio-economic parameters. The major criteria that have been developed for classification of the Char land study area are location, consideration of age/stability and land area (which is a function of erosion and accretion processes) and if they are inhabited and/or cultivated. A map showing the broad classification that has emerged is given as Figure 9.2.11.

The following comments are made from individual case studies and may show unrepresentative or extreme situations. When the 100% Mauza summary data is received from FAP 16 and access to a GIS is possible, then a systematic classification will be investigated and correlation



Length of Time of Cultivation Over the Last 20 Years

(From Landsat Imagery Analysis at FAP19:ISPAN)

Table 9.2.3a: Charland Flora

LOCAL NAME	BOTANICAL NAME	INDICATION
Ada	<i>Zingiber officinale</i>	Plant, Spice, common.
Am	<i>Mangifera indica</i>	Tree, fruit edible, fuel and inferior timber, plywood, common.
Amra	<i>Spondias mangifera</i>	Tree, fruit is edible, rare.
Arhar	<i>Cajanus cajan</i>	Seasonal plant, Arhar-Dal, used as food. Fairly common.
Ata phal	<i>Anona squamosa</i>	Tree, homestead, fruit edible, fairly common.
Babla	<i>Acaica nilotica</i>	Tree, fodder, throughout area concentration around Sarishabari, common.
Badam	<i>Terminalia catappa</i>	Root, oil, fruit edible, fairly common.
Ban Bans	<i>Bambusa tulda</i>	Tree, for fencing, household work, common.
Bara lebu	<i>Citrus medica</i>	Homestead plant, used as salad, pickle making, common.
Bara sim	<i>Vicia faba</i>	Creeper, vegetable, common.
Barbati	<i>Vigna sinensis</i>	Vegetable, common.
Batavi Lebu	<i>Citrus grandis</i>	Homestead plant, used as salad, pickle making, common.
Begun	<i>Solanum melongena</i>	Vegetable, common.
Bina	<i>Avicennia officinalis</i>	Plant, used to protect soil erosion along mud roads, roof making, common.
Bot	<i>Ficus bengalensis</i>	Juice used for medicine. Common in the past. Less common now.
Chalta	<i>Dillenia indica</i>	Tree, fruit edible, fairly common.
Chichinga	<i>Trichosanthes anguina</i>	Vegetable. Common.
Dhatoora	<i>Datura alba</i>	Tree, used in medicine, leave and fruits have medicinal value, fairly common.
Dhokalmi	<i>Ipomoea fistulosa</i>	Creeper, used to protect soil, fairly common.
Dalia	<i>Dahlia hybrida</i>	Seasonal flowering plant, common.
Dhoney	<i>Coriandrum sativum</i>	Spices, common.
Dhunchi	<i>Sesbania canabina</i>	Fairly common.
Dopati	<i>Impatiens balsamina</i>	Flowering plant, common.
Eucalyptus	<i>Eucalyptus fitriodora</i>	Tree, introduced. Medicinal oil, fairly common.
Gab	<i>Diospyros embryopteris</i>	Tree, the bark and fruit are used for tanning fishing nets and for painting the bottom of country boats.
Ghora Neem	<i>Melia azedarach</i>	Tree, leaves used as medicine, common.
Golalu	<i>Solanum tuberosum</i>	Underground stem, vegetable, common.
Golap	<i>Rosa centifolia</i>	Flowering plant, common.

Table 9.2.3b: Charland Flora

LOCAL NAME	BOTANICAL NAME	INDICATION
Gulancha	<i>Tinospora cordifolia</i>	Medicinal plant common.
Jaba	<i>Hibiscus rosa-sinensis</i>	Flowering plant, common.
Jalpai	<i>Elaeocarpus floribundus</i>	Tree, timber used for furniture and fruit for pickle making fairly common.
Jam	<i>Eugenia jambolana</i>	Tree, good timber for house construction, fruit edible, fairly common.
Jambura	<i>Citrus grandis</i>	Tree, fruit edible, fairly common.
Jiga	<i>Coromandelica</i>	Tree, wood is used in spear and cart wheel, fire wood, common.
Kadam	<i>Anthocephalus cadamba</i>	Tree, used in medicine, common.
Kagagi Lebu	<i>Citrus aurantifolia</i>	Small tree, fruit used for pickle making, common.
Kalmishak	<i>Ipomoea aquatica</i>	Creeper, kalmishak used as vegetable, common.
Kamini	<i>Murraya paniculata</i>	Flowering plant in the garden, fairly common.
Kamranga	<i>Averrhoa carambola</i>	Tree, fruit edible, fairly common.
Kash, Chan	<i>Imperata cylindrica</i>	Grass, common.
Kata Mandar	<i>Erythrina variegata</i>	Used mainly for fencing. Common.
Katanotay	<i>Amaranthus viridis</i>	Fooder for livestock.
Kath bel	<i>Feronia limonia</i>	Tree, fruit is edible, fairly common.
Kathal	<i>Artocarpus integrifolia</i>	Tree, wood is valuable, common.
Kesaraj	<i>Wedelia chinensis</i>	Fairly common.
Khag, Kash	<i>Saccharum pontanicum</i>	Seasonal plant, use to protect soil erosion, common.
Khajur	<i>Phoenix sylvestris</i>	Tree, juice edible, fire wood, fairly common.
Kochori	<i>Caesalpinia digyna</i>	Aquatic weed, common.
Kochu	<i>Colocasia esculenta</i>	Plant, medicinal value, under ground stem, leaves are used as curry, common.
Kola	<i>Musa paradisiaca</i>	Plant, fruit edible, common.
Kool, Boro	<i>Zizyphus mauritiana</i>	Tree, fruit edible, common.
Koroi	<i>Albizia procera</i>	Tree, timber wood, fairly common.
Krishnachura	<i>Delonix regia</i>	Tree, flowering plant, fairly common.
Kumra	<i>Cucurbita pepo</i> De.	Creeper, vegetable, common.
Kunjalata	<i>Ipomoea quamoclit</i>	Creeper, flowering plant, fairly common.
Lau (Ground)	<i>Legenaria sicceraria</i>	Creeper, vegetable, common.
Litchu	<i>Litchi chinensis</i>	Tree, fruit edible, common.
Marich	<i>Capsicum frutescens</i>	Spice, common.

Table 9.2.3c: Charland Flora

LOCAL NAME	BOTANICAL NAME	INDICATION
Masur/Masuri	<i>Lens culinaris medik</i>	Seasonal plant, used as food, common.
Mehede	<i>Lawsonia inermis</i>	Plant, medicinal use, common.
Mehgoni	<i>Swetenia mehgoni</i>	Tree, timber used for furnitures, fairly common.
Misti Alu	<i>Ipomoea batatus</i>	Root, under ground stem is edible, common.
Mouri	<i>Foeniculum vulgare</i>	Spice, fairly common.
Nalkhagra	<i>Phragmites karko</i>	Creeper, common.
Narkel, Narikel	<i>Cocos nucifera</i>	Tree, fruit edible, common.
Neem	<i>Azaderachta indica</i>	Tree, medicinal use, common.
Pargacha	<i>Loranthus ampullaceus roxbi</i>	Parasitice found on most trees.
Pepe	<i>Carica papaya</i>	Fruit edible, common.
Piaj	<i>Allium cepa L. (Liliaceae)</i>	Underground stem, used as food, common.
Pitraj	<i>Apnana mxis polystachya</i>	Tree, fruit oil used to relief pain, fairly common.
Pyara, Gaya	<i>Psidium guajava</i>	Tree, fruit edible, common.
Rasun	<i>Allium Sativum L. (Liliaceae)</i>	Spices, common.
Sajna	<i>Moringa oleifera</i>	Tree, fruit used in curry has medicinal value, common.
Saluk	<i>Nymphaea nouchali</i>	Aquatic, fruit, common.
Segun	<i>Tectona grandis</i>	Tree, timber wood, fairly common.
Shapla, Kumudini	<i>Nymphaea nouchali</i>	Aquatic weed, used as table, common.
Sunn	<i>Crotalaria juncea</i>	Fibre for rope making, fairly common.
Supari, Gua	<i>Areca catechu</i>	Tree, tanning plant, common.
Tetul	<i>Tamarindus indica</i>	Tree, precious wood, fruit edible. Fairly common. The seeds are used in jelly industries and painting, wood, glue
Tit begun	<i>Solanm indicum</i>	Plant, medicinal uses, vegetable, common.

Table 9.2.3d: Charland Fauna

English Name	Scientific Name	Indication
<u>Mammals</u>		
Bengal Fox	<i>Vulpes bangslensis</i>	Present
Fishing Cat	<i>Felis viverrina</i>	Present
Flying Fox	<i>Pteropus giganteus</i>	Present
Jackal	<i>Canis aureus</i>	Present
Rats		Present
Small Indian Mongoose	<i>Herpestis auropunctatus</i>	Present
<u>Reptiles</u>		
Bengal Grey Lizard	<i>Varanus bengalensis</i>	
Common Smooth Water Snake	<i>Enhydris</i>	
Common Worm Snake	<i>Typhlina diardi</i>	
Garden Lizard	<i>Calotes versicolor</i>	Present
Grey Lizard	<i>Varanus bengalensis</i>	Present
House Lizard	<i>Hemidaetylus brooki</i>	Present
Land Tortoise	<i>Geochelone emys</i>	Present
Rat Snake	<i>Ptyas mucosus</i>	
Wall Lizard	<i>Hemidaetylus flaviviridis</i>	Present
Yellow Lizard	<i>Varanus flaviscens</i>	Present

Table 9.2.3c: Charland Fauna

English Name	Scientific Name	Indication
<u>Amphibians</u>		
Bull Frog	<i>Rana tigrina</i>	Present
Cricket Frog	<i>R. Limnocharis</i>	Present
Skipper Frog	<i>R. Cyanophlyetis</i>	Present
Toad	<i>Bufo Melanostictus</i>	Present
Tree Frog	<i>Rhacophorus bimaculatus</i>	Present
Tree Frog	<i>Rhacophorus maximus</i>	Present
<u>Turtles & Tortoises</u>		
Common Roofed Turtle	<i>Kachuga tectum</i>	Common
Soft Shelled Turtle	<i>Chitra indica</i>	Present
Spotted Flap Shell Turtle	<i>Lissemys punctata</i>	Present
<u>Birds</u>		
Brown Shrike		
Bull Herone		
Bush Lark		
Common King Fisher		
Common Moina		
Fly Catcher		
Golden Backed Wood Peaker		
Green Bee-eater	<i>Merops orientalis</i>	Present
Grey Headed Moina		
Grey Heron	<i>Ardea cinerea</i>	Present
Hoopoe		
Tree Frog	<i>Rhacophorus bimaculatus</i>	Present
Tree Frog	<i>Rhacophorus maximus</i>	Present
<u>Turtles & Tortoises</u>		
Common Roofed Turtle	<i>Kachuga tectum</i>	Common
Soft Shelled Turtle	<i>Chitra indica</i>	Present
Spotted Flap Shell Turtle	<i>Lissemys punctata</i>	Present
<u>Birds</u>		
Brown Shrike		
Bull Herone		
Bush Lark		
Common King Fisher		
Common Moina		
Fly Catcher		
Golden Backed Wood Peaker		
Green Bee-eater	<i>Merops orientalis</i>	Present
Grey Headed Moina		
Grey Heron	<i>Ardea cinerea</i>	Present
Hoopoe		

Table 9.2.3f: Charland Fauna

English Name	Scientific Name	Indication
House Crow	Corvus splendens	Common
House Sparrow		
Indian Pipit		Common breeding
Indian Sandlark	Hydrophasianus chirurgus	Resident
Jacana		Present
Magpie Robin		Present
Marsh Sandpiper	Tringa stagnatilis	Present
Marshy Horrier		
Marshy Kite		
Pallas's Fish Eagle	Haliaeetus leucoryphus	Present
Pariah Kite	Milvus migrans	Present
Pied King Fisher	Gallinago stenura	
Pintail Snipe		Present
Plam Swift		
River Lapwing	Vanellus vanellus	Present
Sand Piper		
Small Pratincole		Present
Solitary Snipe	Gallinago solitaria	Present
Spotted Dove		
Stroke Billed King Fisher		
Sun Bird		
White-breasted Kingfisher	Heleyon smyrnensis	Present
Yellow Watled Lapwing		
<u>Fish</u>		
Cesp	Catla catla	Common
Carp	Cirrhinus mrigala	Fairly common
Carp	Labeo rohita	Common
Fish water sharf	Wallago attu	Common
Pangas	Pangasius pangasius	Common
Cat fish	Mystus aor	Common
Barp	Puntius sarana	Fairly common
Shrimps		
Silon		
Puffer fish	Tetraodon cuneutia	Common
Snake headed fish	channa marulius	Fairly common
Carp	Labeo calbasu	Fairly common
Kajuli	Ailia coila	Fairly common
Chitol	Notopterus chitala	Fairly common

Source: Field Survey, May - July '92.

Table 9.2.4 Charland Homestead Flora and Utilisation

LOCAL NAME	BOTANICAL NAME	INDICATION
Ada	<i>Zingiber officinale</i>	Plant, Spice, common.
Ata phal	<i>Anona squamosa</i>	Tree, homestead, fruit edible, fairly common.
Bara lebu	<i>Citrus medica</i>	Homestead plant, used as salad, pickle making, common.
Bara sim	<i>Vicia faba</i>	Creeper, vegetable, common.
Barbati	<i>Vigna sinensis</i>	Vegetable, common.
Batavi Lebu	<i>Citrus grandis</i>	Homestead plant, used as salad, pickle making, common.
Begun	<i>Solanum melongena</i>	Vegetable, common.
Dhunchi	<i>Sesbania canabina</i>	Fairly common.
Jalpai	<i>Elaeocarpus floribundus</i>	Tree, timber used for furniture and fruit for pickle making fairly common.
Jam	<i>Eugenia jambolana</i>	Tree, good timber for house construction, fruit edible, fairly common.
Jambura	<i>Citrus grandis</i>	Tree, fruit edible, fairly common.
Kath bel	<i>Feronia limonia</i>	Tree, fruit is edible, fairly common.
Kathal	<i>Artocarpus integrifolia</i>	Tree, wood is valuable, common.
Kochu	<i>Colocasia esculenta</i>	Plant, medicinal value, under ground stem, leaves are used as curry, common.
Kola	<i>Musa paradisiaca</i>	Plant, fruit edible, common.
Kool, Boroi	<i>Zizyphus mauritiana</i>	Tree, fruit edible, common.
Kumra	<i>Cucurbita pepo</i> DC.	Creeper, vegetable, common.
Lau (Ground)	<i>Legumaria siccararia</i>	Creeper, vegetable, common.
Litchu	<i>Litchi chinensis</i>	Tree, fruit edible, common.
Marich	<i>Capsicum frutescens</i>	Spice, common.
Misti Alu	<i>Ipomoea batatas</i>	Root, under ground stem is edible, common.
Narkel, Narikel	<i>Cocos nucifera</i>	Tree, fruit edible, common.
Neem	<i>Azadirachta indica</i>	Tree, medicinal use, common.
Pepe	<i>Carica papaya</i>	Fruit edible, common.
Piaj	<i>Allium cepa</i> L. (Liliaceae)	Underground stem, used as food, common.
Pyara, Gaya	<i>Psidium guajava</i>	Tree, fruit edible, common.
Rasun	<i>Allium sativum</i> L. (Liliaceae)	Spices, common.
Sajna	<i>Moringa oleifera</i>	Tree, fruit used in curry has medicinal value, common.

analysis carried out to see if any there is a significant relationship between the differing physical attributes of the various Chars and their human utilisation.

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2.2.1 Location

A broad categorisation of three different types of location for the land in the Char study area has been drawn up. These are Island Chars, Attached Chars and Set-Back Land. In addition local people still refer to the flood plain of the Old Brahmaputra as Char land. This is in effect relic Char land that is in the process of becoming incorporated into the main land. This area is outside the limits of the FAP 3.1 Char study.

Island Chars are defined as that land which even in the low flow dry season situation requires a major river channel to be crossed before reaching it. Set-Back land is defined as that which lies from the unprotected side of any main river embankment up to the limit of river edge in a peak flood of a "normal" year. This latter limit may often be a distinct river terrace, as is the case north and west of Madarganj. This land is in effect mainland which due to the engineering criteria for location finds itself on the unprotected side of the embankment. Attached Char land is defined as that between the peak flood limit of a "normal" year and the low flow main river channel or channels. In the dry season it does not require a main river channel to be crossed when approaching it from the mainland.

The areas delineated by this classification are of course very dynamic, depending upon the nature and intensity of river erosion and accretion patterns.

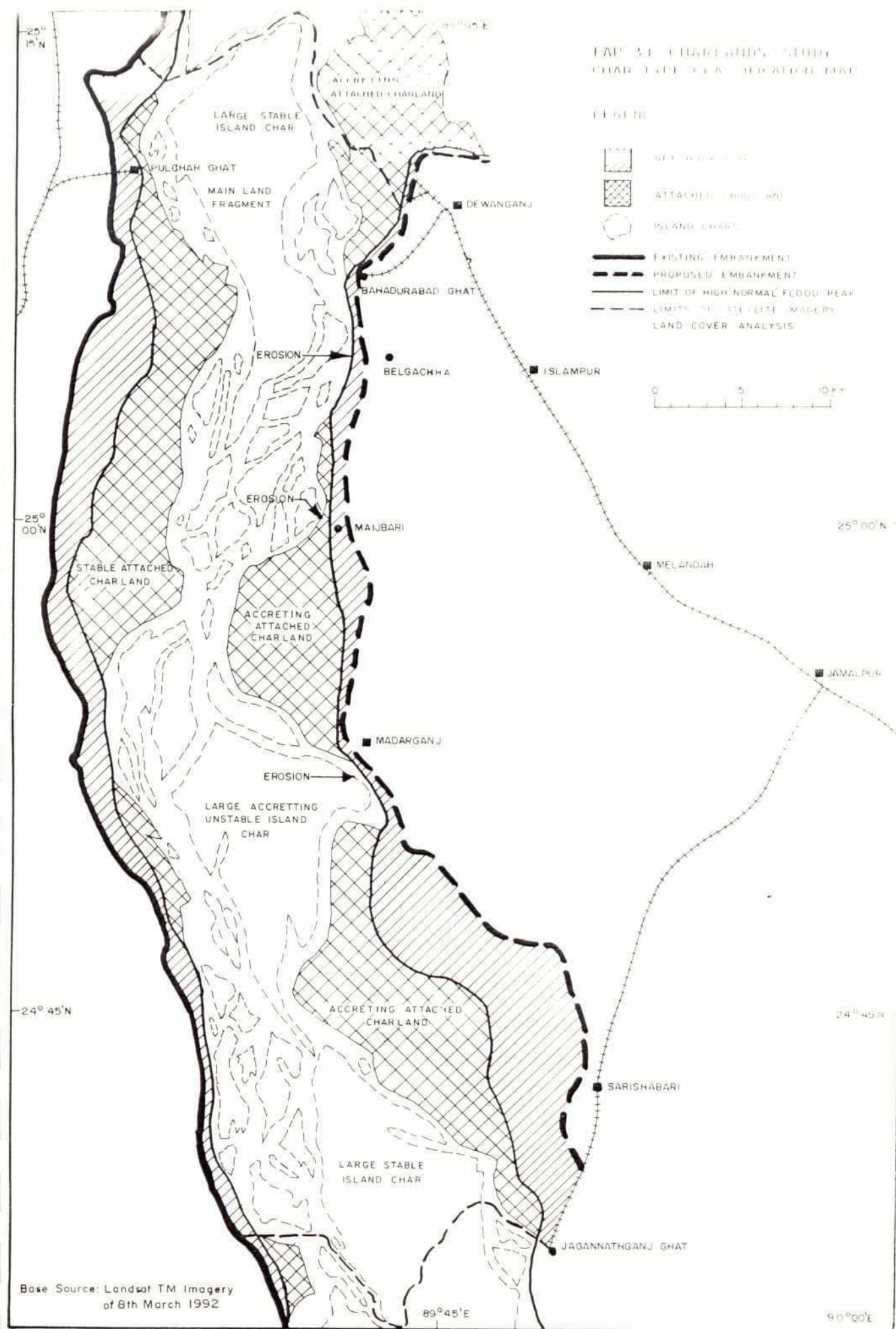
2.2.2 Size, Age and Stability

These three features are highly inter-related, all being a function of the nature of erosion and accretion processes. They are in turn major indicators of flood risk and inundation depths. The study has three large Island Chars in its reach of the Jamuna river, however they are very diverse in character being formed by different processes. Figure 9.2.8 shows the age of land for the last 19 years derived from digital analysis of time series satellite imagery.

The northern large Island Char has a nucleus of old and stable land fragments braided by intermediate narrow channels. Study of the SPARRSO NOAA weather satellite imagery for the peak flood on 15th September 1988 (see Figure 3.2.5 in Annex 3 of the Final Feasibility Report) indicates that parts of this were not inundated even at this time. The Landsat image of 18th August 1987 also shows this. Enquiries in the field have confirmed that this was indeed the case and it is apparent that this land is probably a fragment of the mainland that has been cut off by the river. Much of it is shown as being in existence as an Island Char on the 1920's District maps (see Figure 9.2.1).

Conversely the large Island Char opposite to Madarganj is, with the exception of a narrow and discontinuous spinal ridge, nearly all newly accreted and very unstable. It is low lying with a high flood risk confirmed by study of the peak flood satellite imagery and field

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interviews. Much of it is very sandy as is apparent in Figure 9.2.9 showing sand cover as at 8th March 1992 in yellow.

The other large island Char at the southern end of the study area west of Jagannathganj Ghat is a large consolidated and stable piece of land. It is however in the process of being joined to a similar piece to the south of it by in-fill accretion.

There are very many small islands, only a few of which are stable. Many are accreting and some suffer from bank erosion, particularly those which are higher in elevation. The flood prone lower areas also have problems with sand carpeting once river flood water recedes. There is also considerable sand dune formation in the dry season due to wind action.

Attached Char land tends to be either reasonably stable, as is the case on the right bank, or accreting as can be seen on the left bank. The piece of right bank stable Attached Char is an exceptional occurrence when compared to the whole length of the river in Bangladesh. In general the right bank is under constant attack, and this is shown for the last 19 year period in Figure 9.2.7. In the study area reach of the river the pattern on the left bank is one of alternate erosion and accretion. This is also clearly shown for the last 19 years in Figure 9.2.6.

The Set-back land is thus reasonably stable where the Attached Char land is accreting or unchanging, but where not then it is under erosion attack.

2.2.3 Cultivated Land

As indicated in Section 2.1.7 above there is a progressive process by which land accretes, is colonised by vegetation (principally Catkin grass) and is then brought under human use. Initially this is often as livestock grazing land, which whilst damaging some of the vegetation (cattle tend to pull up vegetation by its roots when feeding), can add organic matter to the soil, although under pressure of human population this may be collected as a household fuel source. There is also widespread cutting and collection of Catkin grass for use as stall fed fodder, domestic fuel and house building material. This is often on a commercial basis and is sometimes sold to the mainland.

The next step is the clearance of natural vegetation for the commencement of cultivation. The point at which this starts seems dependant upon many variables, not least the pressure of population, which is often a function of the degree of land loss experienced by local people due to main bank erosion. As all land is allocated by Mauza and village area and is very territorial a significant factor is the alternative land availability within that Mauza area. The seasonality of land availability is also a significant factor which is determined by the height of the land and its flood risk. This, along with the sandiness of the soil,

appears to be a major factor in determining crop types. There is a paradox in that the land is very flood prone but the largest area available for cultivation is during the dry season, when river levels are low and there is sufficient rain water and soil moisture retention only for dry-land farming.

Figure 9.2.9 shows the distribution of land under healthy vegetation on the 8th March 1992 (i.e. by definition very likely to be cultivated as the image is in the dry season) and also those areas of land which have minimal vegetation canopy at this time but are probably disturbed soil and have been cultivated in the recent past.

Cases have been found where people farm the land on Island Chars but do not live there, choosing to travel seasonally or even daily to tend it. This appears to be more common in smaller lower lying flood prone Chars.

The pattern of spreading land cultivation over the last 19 years is indicated in Figure 9.2.10. This shows nodal centres of stable land from which cultivation has spread out. More data is expected from FAP 16 as to the nature of land utilisation, particularly crop types. Preliminary estimates for the FAP 3.1 Char land area indicate that in the 1991/2 cropping year 36 500ha of Island and Attached Char land were cultivated under a wide range of crops with a predominance of millets over Aus Paddy and Aman Paddy closely followed by a significant amount of groundnut cultivation. The estimated data collected from the FAP 3.1 sample survey is given in Section 2.5.1. It must be remembered that the data collection methodology, locational classification criteria and coverage areas for the two sets of data are not the same and differences are to be expected.

2.2.4 Inhabited Land

The process of land colonisation for human habitation is complex but should be seen as being confined by a rigidly defined system of fixed Mauza and Village land allocation boundaries and individual household land rights within these. The general pattern is that the residents of a Mauza or Village will remain settled within its defined boundaries, moving to the remaining unflooded land when forced to do so by erosion. If all of the Mauza or Village area should be lost to the river then people are forced to "temporarily" live in a neighbouring area awaiting the re-emergence of land within their defined area. In reality this could be a long time. In the course of the FAP 16 study a few Mauzas were identified as having specifically recognised sub-divisions (up to 4 in exceptional cases). Many of these are communities from displaced Mauzas who are in this situation. It has been noted that the locations of these split Mauzas are highly concentrated near areas of major bank erosion.

It has also been found that there are two-way processes of seasonal household in and out-migration to the land. Formalised cases of trans-

humane have been found where people return every year to live on the same areas of Char land for the dry season months, farming for this time and then returning to their houses on the mainland during the flood season. Conversely there are households who have a main homestead on the Char but work seasonally for wage paid labour on the mainland.

In areas of great population pressure or where there is perceived to be a likely dispute over recolonisation of re-emerged land, then groups of households occupy the land as soon as it emerges. This was the case during the 1991/92 dry season with the eastern part of the large accreted Island Char west of Madarganj, even though it was obviously low lying and sandy and also very likely to be re-inundated as soon as the river started to rise. A major reason for this was the large number of mainland people recently displaced by river bank erosion south of Madarganj. Ease of access is also likely to be a significant factor. No significant incidences of Khas land allocation have been identified in the area, all land is allocated, including that presently under river channels. In view of the settlement history, level of population density and river dynamics of the area this is not surprising.

2.3 Population and Settlement

2.3.1 Number and Size of Villages

As outlined in Section 1.3.2 of this report the FAP 3.1 Char study used a sample of 63 selected villages for population estimation. This included a predominance in the Island Chars (49) and a few in the attached and Set-back land (14). The locations are shown in Figure 9.2.12. Difficulties were experienced in classifying the locations of some of these as there are sometimes no obvious features in the field and some villages lay close to the delineation lines of the Char classification types. The population size distribution for the sampled Island Char villages proved to be normal whilst that of the identified Attached and Set-back land were larger, more bunched at the lower end with a more gradual tailing off at the top end. The Island Char villages had populations of between 200-600 people whilst for the aggregated Attached and Set-back land this was found to be between 600-1200. The size distribution for these two broad categories are shown in Table 9.2.5. A fuller listing is given in Table 9.A.1.3 but this data should be treated with caution, particularly for the Attached Char and Set-back land where the sample sizes are too small for reliable statistical analysis.

Table 9.2.5 Size Distribution of Sampled Village Population

Village Size	Island Char Land		Attached Char & Set- Back Land	
	No	%	No	%
0-200	6	12.2%	1	7.1%
201-400	15	30.6%	0	0.0%
401-600	12	24.5%	1	7.1%
601-800	9	18.4%	6	42.9%
801-1000	6	12.2%	3	21.4%
1001-1200	1	2.0%	3	21.4%
Total for Sample	49	100%	14	100%

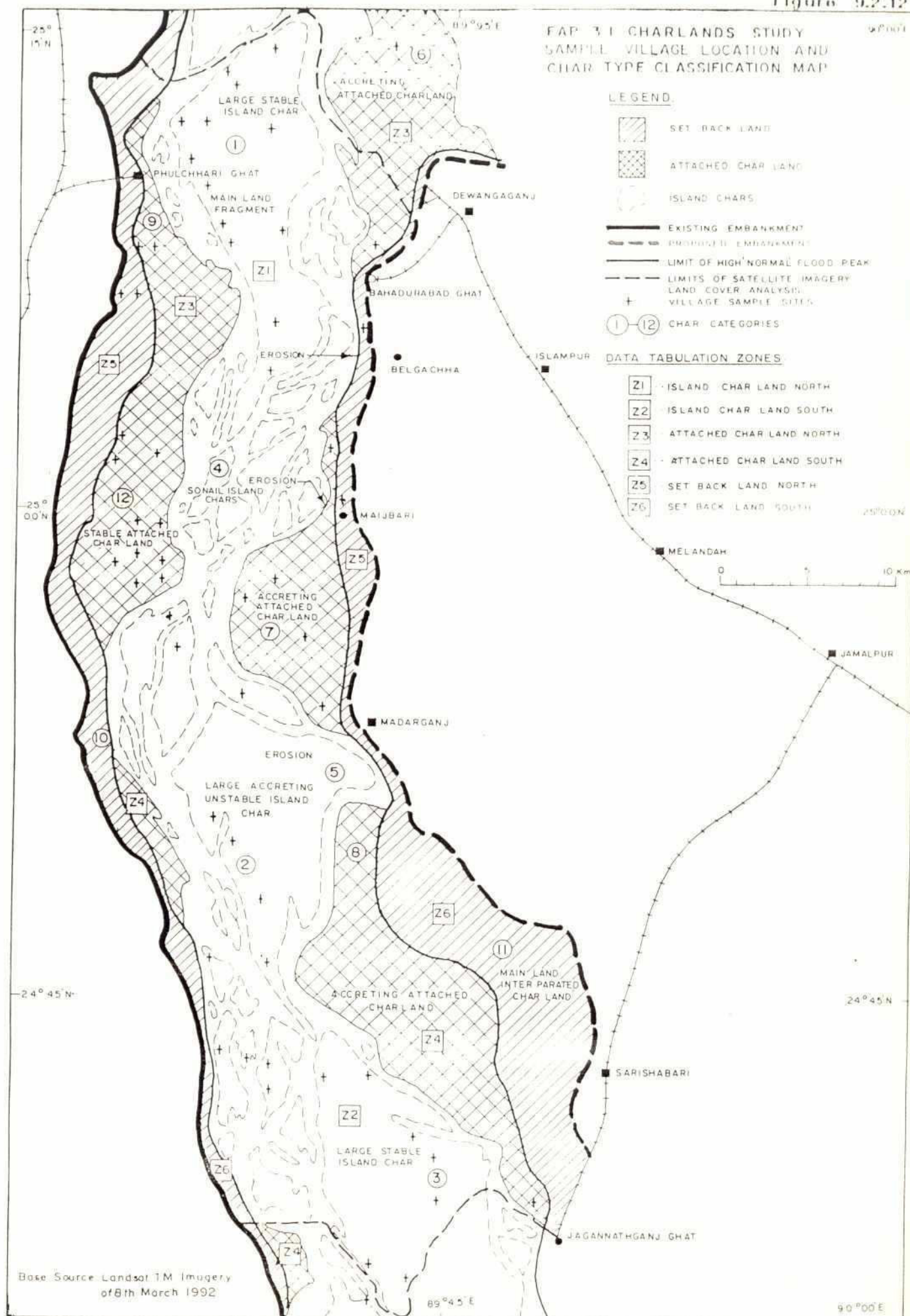
Source: FAP 3.1 Sample Char Land Village Survey Data 1992

2.3.2 Estimates of Population and Number of Households

In drawing up the complete listing of Island Char villages some 280 were identified. However due to the difficulty in classifying the locations of these it has subsequently transpired that at least 29 of these actually lie in the Attached and Set-back land. For the Attached Char and Set-back land a list of 119 villages was drawn up but evidence was obtained from FAP 16 data that it does not include all the villages in the unprotected land. This means that because the sample of 14 Attached Char and Set-back land villages has been drawn from an uncomplete frame of

Figure 9.2.12

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villages, the value of the mean population per village obtained from this sample is biased and cannot be used to provide a reliable estimate of the population of Attached Char and Set back land. Only the use of the 1991 BBS, when it becomes available, will resolve this.

In view of this the FAP 16 population data (based on Mauza figures) has been used and split proportionately by land area between the west and east banks to estimate the population in Attached Char and Set-back land. However, the figure obtained from the FAP 3.1 Island Char sample villages does not suffer from such a bias and can be used to estimate the population of the Island Char (confidence interval 15%). The estimated household numbers and size data are summarised in Table 9.2.6

Table 9.2.6 Estimated Total Population and Number of Households

Number of Households, Population and Density	Island Char Land	Attached & Set-Back	Total Study Area
No of Whole or Part Mauzas	216+	208+	424+
No of Villages	251*	NA	NA
Mean Number HH/Village	77**	NA	NA
Total Estimate HH	19,327	95,008	114,335
Mean People / HH	6.1**	5.1**	5.27
Mean People / Village	470	?	?
Total Population	118,060**	484,543	602,603++
Total Land Area (ha)	38,744	48,466	87,210
Mean Population Density per km ²	304	1,000	691
Cultivable Land Area (ha)	17,206	33,391	50,597
Mean Population Density per Cultivable km ²	686	1,451	1,191

Sources * FAP 3.1 Raw Data **FAP 3.1 Calculated from Sample Data
 +FAP 16 Mauza Summary Raw Data ++FAP 16 Calculated From Raw Data
 All other figures are calculated from those above.
 Land areas are for the slightly larger FAP 19 Middle Reach area.

The definition of in and out-migration are well understood demographic technical terms which indicate the direction and destination of population movement. More complex is the definition of seasonal, temporary and permanent migration all of which occur in the Char land study area. Seasonal migration is a cyclical arrangement in which individuals and less commonly whole households, have a main house and live and work from it for most of the year but routinely move for a season to another area for an alternative economic activity. This occurs in some parts of the Char land and in both directions, some people with permanent houses in the Island Chars often temporarily take up wage paid activities on the mainland, generally in the river flood season. Conversely some

people farm on the Char lands in the low flow season (some times taking a temporary house in sections with them) but have their main house on the mainland.

The concept of temporary migration in the context of Char land dwellers can be very open-ended. Those households forced to move away from their village land and even Mauza due to erosion consider this a temporary state of affairs (even though it could be for many years and involve many changes in homestead location). They are awaiting the re-emergence of "their" land so that they can re-establish themselves on it and become "permanent" residents again. Permanent migration in the case of Char dwellers or people originally from Chars involves the acceptance of not returning to their original homestead location and establishing a new independent livelihood in a different place. It would thus be quite logical to find a large number of "temporary" migrants in the set-back lands who have been displaced from their own land and are awaiting its re-emergence. Many of these will be de-facto landless households squatting on road or embankments near to the areas of river bank erosion, particularly in the Set-Back land. This explains why the population densities in many Set-Back areas are even greater than the mainland, where as the Island Chars densities are lower, pending the decision of land owners temporarily resident elsewhere to return, depending upon their perceptions and experience of flood risk.

Data from FAP 16 indicates that the total populations of 10 of the Mauzas in the study Area are presently temporarily displaced pending return to their lands in 1991 as a when they should re-emerge. Some 3% of households permanently returned to their lands in 1991 where as 2.5% were reported to have permanently left the area in the same period. Some 26% of the households are presently resident outside their Mauza and temporarily moved back onto their land on a seasonal basis, most likely for cultivation during low flow conditions. Conversely some 8% of households resident in their Mauza seasonally migrate away from it, often for wage paid employment on the mainland during river flood conditions. The FAP 3.1 sample household data for migration is summarised in Table 9.2.7.

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Table 9.2.7 Population by Type of Settlement

Type of Settlement	Island Char land (Z1-Z2)	Attached & Set Back Land (Z3-Z6)		Study Area
	(Z1-Z2)	(Z3-Z4)	(Z5-Z6)	
*Temporarily Located Households:				
% of all Temporary HH	20%	26%	54%	
% of all Households	8.3%	13.8%	26.7%	16%
*Of the Total Population:				
% Permanent Settlers	39%	24%	22%	85%
% Temporary Settlers	3%	4%	8%	15%

Source: Estimates from FAP 3.1 Char Land Sample Survey 1992



2.3.3 Demographic Characteristics

Family Size

The variation in the number of people in a household has been found to vary significantly amongst differing land owning strata as defined in the five BBS classes. There is a directly increasing relationship between larger family size, Char land location and a larger land holding. In a BBS defined landless household (i.e having no agricultural land by holding less than 0.02ha of land) there is an average of 4.5 people on the mainland as apposed to 4.9 in the Attached and Set-Back land and 5.1 on the Island Chars. For a household categorised as a large land owning one (defined by BBS as owning over 7.5ha of land) the equivalent household size figures are 9.5, 9.8 and 10.9. This might well be self determining in that landownership may be a major factor in affecting the size of a household. Of greater importance is the age range of the family members and how they came by the land. The only exception are medium size landowning households in the Attached and Set-Back land who have smaller average families than those in the mainland.

Table 9.2.8 Average Family Size by Location and Land Ownership

HH Land Ownership by BBS Class	Island Char Land	Set Back & Attached Land	JPPS Mainland
Landless	5.1	4.9	4.5
Marginal	5.2	5.0	4.8
Small	6.2	5.7	5.4
Medium	7.8	6.8	7.1
Large	10.9	9.8	9.5
Average	6.1	5.1	5.1

Source: Estimates from FAP 3.1 Sample Survey Data 1991 and 1992

Age-Sex Composition

The population age structure and distribution for the study area and the mainland is given in Table 9.2.9. This is similar for the Island Char land, Attached and Set-back land and also the FAP 3.1 Mainland study area. The main difference is that there is a higher proportion of under 14 year olds on the Island Chars than the other areas and a higher proportion of over 60 year olds in the Attached and Set-Back land. However the Male to Female ratio presents notable differences between areas. With the exception of 15-29 year olds on the Attached and Set-back land, in all of the areas and age groups there are more men than women and the total figure for each land type is higher than the overall national average of 108. This imbalance of males over females is

particularly notable for older people and especially for those over the age of 45 in the mainland study area where the figure is 145/100. The reasons for this are difficult to interpret but it could be that younger economically active men leave the heavily populated erosion victim displacee areas in the Attached and Set-back land in search of economic livelihoods elsewhere. This may also happen to a lesser extent to older men from the Island Char land, Attached Char land and Set-back land when compared to the Mainland area.

Table 9.2.9 Distribution of Population by Age

Age Classes Composition	Island Char Land		Attached Char and Set-Back Land		JPPS Mainland	JPPS Mainland
	%	Sex Ratio	%	Sex Ratio	%	Sex Ratio
0 - 14	45.4%	108	42.2%	110	41.9%	103
15 - 29	25.6%	108	25.0%	97	26.8%	101
30 - 44	17.0%	122	17.4%	124	19.6%	136
45 - 59	7.9%	124	9.3%	120	8.2%	143
>= 60	4.0%	120	6.0%	126	3.6%	143
Total Population	100.0%	112	100.0%	111	100.0%	109

Source: Estimates Calculated from FAP 3.1 Sample Survey Field Data 1991 and 1992

2.3.4 Household Migration Patterns

The frequency of household migration is summarised in Table 9.2.10. This has been defined as the need to make a major relocation of the homestead location. From this it can be seen that nearly half of the households in the Island Chars have moved more than 3 times in their existence where as the average figure for the Attached and Set-back land is 22%. Some 38% of the Attached and Set-back households have never had to move in their lives where as the similar figure for Island Chars is only 12%. No data have been tabulated on distance or destination of movement but it may well be that the Island Char households move frequently but short distances attempting to stay on their Island where as the Attached and Set-back households tend to make one major move to what they perceive is a less displacement prone location. The major reasons cited for migration are forced movement due to river erosion and also the search for a more secure economic livelihood.

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Table 9.2.10 Frequency of Household Migration

Number of Past Household Migrations	Island Char Land	Attached & Set-Back Land
	%	%
No migration	11.6%	37.8%
1 time	17.4%	29.5%
2 times	22.0%	10.1%
3 times	49.0%	22.6%
Total	100.0%	100.0%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The amount of household migration that is attributed to river erosion is shown in Table 9.2.11. This has been defined as the need to move the dwelling unit. From this it is apparent that 92% of the present Island Char land dwellers have moved at some stage, 80% of them 3 or more times and some 16% in excess of 9 times. In the Attached and Set-Back land 30% have never moved due to erosion but 30% have had to do so either once or twice.

Table 9.2.11 Proportion of Households which have Moved Dwelling Units Due to Erosion

No of Moves	Island Char Land	Attached & Set-Back Land
	%	%
0	8.3%	29.9%
1 - 2	11.3%	30.4%
3 - 4	25.1%	20.3%
5 - 6	22.9%	11.1%
7 - 8	16.3%	4.6%
> 9	16.1%	3.7%
Total	100.0%	100.0%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data

2.4 Socio-Economics

2.4.1 Education

Education is one of the most useful indicators of development levels. In both the Island Char land and the Attached and Set-Back land the level of institutional support for the provision of education is poor, especially when compared to the mainland and other parts of the country. It is often totally lacking. Over 80% of the population of the whole of the Char land study area are illiterate and have not benefited from formal education at any level. The literacy rates in the Island Char land was found to be 17% where as the figure for the Attached and Set-back land was little higher at 18% against a FAP 3.1 mainland figure of 24% and a national average of 25%. A more detailed summary by education levels achieved by location are shown in Table 9.2.12.

Table 9.2.12 Education Levels of the Population

Education Level Attained	Island Char Land	Attached & Set-Back Land	JPPS Mainland
	%	%	%
No Education	83.1%	81.8%	76.8%
Primarily Level	9.9%	11.4%	11.5%
Up to class X	4.1%	3.6%	7.6%
SSC to HSC	1.7%	1.6%	2.7%
HSC and above	1.2%	1.6%	1.4%
Total	100.0%	100%	100%

Source: Estimates Calculated from FAP 3.1 Sample Survey Field Data 1992

2.4.2 Health

The frequency of disease incidence and immunisation levels of the population are a valuable indicator of the level of health of the population. Immunisation levels for the Island Char land and the Attached and Set-back land are shown in Table 9.2.13. These are expressed as the proportion of those who have been immunised out of those who are eligible for it under past programmes. At 75% for the Island Char land and 82% for Attached and Set-back land these are surprisingly high for an area that is perceived to be remote and on the fringes of service provision.

It is probably a function of the high measure of success of recent, specifically targeted, vaccination campaigns implemented under the direction and resources of international agencies. Care must be used when looking at this data as it hides the number of people whole could

or should be immunised but lie outside the eligibility criteria of past programmes. Only 12% of the Attached and Set-back dwellers fall into eligible category where as the figure for Island chars is 17%.

Table 9.2.13 Levels of Immunisation Take-Up

Immunization levels	Island Char Land	Attached & Set-Back Land
	%	%
People Immunized	74.8%	82.5%
People Non Immunized	25.2%	17.5%
Total Eligible	100.0%	100.0%
Eligible Population as % of Total Population	16.1%	11.8%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The incidence of diseases is given in Table 9.2.14. This is the proportion of the total number of households reporting at least one incidence in the previous 12 months. The general fever category levels are high at around 40% for the Island Chars and 35% for the Attached and Set-Back land.

This can cover a wide range of ailments including typhoid and undiagnosed malaria. This may well be a function of living in very damp conditions in close proximity to permanent waterbodies. The levels of dysentery, including suspected but unproven cholera are high in the Attached and Set-back land at 32% and probably reflect poor sanitation conditions and the concentrated nature of peoples living conditions. The comparative figure for the Island Chars is 28%.

Table 9.2.14 Frequency by Cases of Disease Occurrence in the Previous 12 Months

Disease	Island Chars		Attached & Set-Back Land	
	% of all Cases	Incidence per People	% of all cases	Incidence per People
Cough	14.7%	1 in 23	14.6%	1 in 21
Fever (cold, typhoid)	39.9%	1 in 8	34.6%	1 in 9
Cholera/Dysentery	22.7%	1 in 15	31.5%	1 in 10
Stomach pains	13.3%	1 in 25	10.2%	1 in 30
Malaria	1.4%	1 in 249	1.6%	1 in 193
Others	8.2%	1 in 41	7.6%	1 in 40
Total No of Cases	100%	1 in 3	100%	1 in 3

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The provision of health facilities in the area is very poor, particularly in the Island Chars, and as a result many diseases are likely to go undiagnosed and untreated. Table 9.2.15 indicates the range of treatment sought and their incidence. From this it can be seen that by far the majority of people seek the help of Quack doctors and only 17% in the Island Chars seek formally trained or qualified medical assistance. The comparative figure for the Attached and Set-back land is 21% where as those forgoing treatment is 6% compared to 10% on the Island Char land.

Table 9.2.15 Frequency of Different Types of Treatment

Treatment	Island Char Land		Attached & Set-Back Land	
	% of all Cases	Incidence per People	% of all Cases	Incidence per People
No treatment	10.1%	1 in 33	6.5%	1 in 46
Ritual (Tabiz)	1.8%	1 in 187	2.1%	1 in 145
Indigenous (Hekim)	4.1%	1 in 83	4.2%	1 in 73
Quack doctor	66.5%	1 in 5	66.7%	1 in 5
Trained/MBSS	10.4%	1 in 32	9.6%	1 in 31
Hospital Clinic	7.1%	1 in 48	10.9%	1 in 28
Total No of Cases	100.0%	1 in 3	100	

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

2.4.3 Housing

A valuable indicator of the level of housing provision in the study area is the incidence of numbers of living rooms for each household. Care must be taken in interpreting this data as it could be purely a function household size rather than the resources people are prepared to put into housing provision. This data is summarised in Table 9.2.16. From this it can be seen that 65% of the households in the Island Char land have only one living room but the figure for Attached and Set-back land is even higher at 79%. This would indicate a poorer level of housing provision in the study area when compared to the mainland and other parts of Bangladesh but it may also be a function of uncertainty due to erosion and flood and the need to constantly dismantle and re-erect homes. The difference between the Island Chars and the Attached and Set-Back Land may also be that the Island Char households find that they need sufficient spare room to temporarily accommodate others in times of emergency. This could particularly be the case for those households located on the higher parts of stable Island Chars where

others seek refuge. However it could just be that the Attached & Set-back land dwellers have less assets and consider present locations as a temporary situation.

Table 9.2.16 Proportional Split of Number of Living Rooms Incidence by Household

No of Living Rooms	Island Char Land	Attached & Set-back Land
	% of HH	% of HH
1	64.7%	78.8%
2	26.2%	17.5%
3	7.4%	3.2%
4 and more	1.7%	0.5%
Total	100%	100%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

With regard to the type of building materials used for living room construction, it is apparent that there is a higher proportion of tin sheets being used in the Island Chars than the Attached & Set-back land. This may be a function of a greater need for a durable, easily transportable asset that can be easily dismantled, moved and re-erected at short notice due to erosion or flooding and/or an asset that can be easily realised in times of need. Conversely the higher proportion of use of natural materials in the Attached & Set-back land may be a function of their easier availability, price and the lack of resources available to poorer more recently displaced people to purchase rather than collect their own building materials. The incidence of semi-Pucca housing is lower, but significantly so in the Island Char land when compared to the Attached & Set-back land. This data is summarised in Table 9.2.17.

Table 9.2.17 Proportional Split of Living Room Construction Material Types by Household

Construction Materials Used	Island Char Land	Attached and Set-Back Land
	% of HH	% of HH
Bamboo/Leaves/Straw	52.0%	55.3%
Tin Sheets	46.6%	41.5%
Semi-Pucca	1.4%	3.2%
Total	100.0%	100.0%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

2.4.4 Water Supply

Almost all households in both the Island Char land and the Attached and Set-back normally land have access to safe tubewell drinking water. Only 1% of the households in the Island Char lands use open surface water as a main drinking water source and a similar figure use open wells in the Attached & Set-back land. There is on average one hand-pumped tubewell per 7 households on the Island Char land and per 10 households in the attached & Set-back land. Further details are shown in Table 9.2.18 and Table 9.2.19. The real problem with water supply provision is likely to be during flood times when access to normal services is difficult.

Table 9.2.18 Sources of Drinking Water

Sources	Island Char Land	Attached & Set-Back Land
	% of HH	% of HH
Tubewell	98.6%	99.1%
Well	0.3%	0.9%
Ponds	0.0%	0.0%
Canal/River	1.1%	0.0%
Total	100%	100%

Source: Estimates calculated from FAP 3.1 Char Sample Survey Field Data 1992

Table 9.2.19 Levels of Tubewell Provision

Types of Tubewell	Island Char Land		Attached & Set-Back Land	
	% of Total	HH per Source	% of Total	HH per Source
Hand Pumped Tubewell	78.5%	1 in 7	80.8%	1 in 10
Engine Pumped Shallow Tubewell	21.5%	1 in 26	19.2%	1 in 43
Total Tubewell	100%		100%	

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Data 1992

2.4.5 Land Tenure

The ownership of cultivable land is one of the most important factors in explaining the significant differences in the income and livelihood levels of households. Table 9.2.20 lists this by classes of an acre plus sub-

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divisions of 0-0.5 acre and 0.51-1.0 acre plus totally landless. The 0-0.5 class includes those households with only sufficient land for a homestead and no agricultural land. A sub-class of up to 0.05 acres is sometimes used for identification of this but the data here has been specifically collected for stratification classification purposes and is cultivable not homestead land. Marginal farming households are normally considered to be those with between 0.05 acre and 2.00 acres.

Some 66% of all households in the Attached & Set-back land have no legal right to cultivable land what so ever. This is a reflection of the large number of erosion victims and displacees in the area, particularly those squatting on existing embankments and road alignments. In the Island Char land the number of totally landless is relatively low at 37% as compared to Attached and Set-back land. The explanation of this is complicated by those households who have been "temporarily" forced to re-locate from the mainland to adjacent Island Chars due to main bank erosion. There is an incidence of this on the large newly accreted Island Char west of Madarganj. It is quite likely that there are localised high incidences of total landlessness in the Island Chars and these are probably distributed in a few highly concentrated spot locations related to the proximity of main bank erosion and the recent emergence of the newly accreted land in the same or adjacent Mauzas.

There is a markedly greater incidence of households owning between 0.01 acre and 2.0 acre (often categorised as marginal farming households) in the Island Char land (39%) when compared to the Attached and Set-back land figure of 24%. This is further accentuated when increased to include small farmers up to 3.0 acres when the proportions are 48% and 26% respectively. This can be explained by the population pressure on land made significantly worse by land dispossession due to erosion. This is well illustrated by the fact that the overall mean household land holding size (i.e including all totally landless households in the calculation) is over 2.1 times as great at 1.68 acres in the Island Chars than 0.80 acres in the Attached & Set-back land. However care should be exercised in interpreting this data, as an important parameter is land quality and productivity. Although the areas owned in the Island Char lands may be much larger than the mainland, a considerable proportion can be under water even during the low flow season and a significant area of the rest is very sandy and unfit or offers limited possibilities for cultivation.

Table 9.2.20 Distribution of Households by Total Holding Size of Cultivable Land Ownership

Total HH Land Area (acres)	Island Char Land	Attached & Set-Back Land
	% of HH	% of HH
0	36.6%	65.9%
0.01 - 0.5	9.6%	10.1%
0.51 - 1.0	14.3%	9.7%
1.01 - 2.0	14.9%	4.6%
2.01 - 3.0	9.1%	1.8%
3.01 - 4.0	5.0%	3.2%
4.01 - 6.0	5.2%	2.3%
6.01 - 8.0	1.7%	0.5%
8.0 and more	3.6%	1.8%
Total	100.0%	100.0%
Gini Coefficient	0.72	0.88
Overall Mean/ Household	1.68	0.80

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The distribution of household operated land (i.e. land actually worked by a household but not necessarily owned by it) by total holding size and Char type is given in Table 9.2.21. The overall mean (i.e. including only that land which is actually cultivated but all households whether they farm land or not) is estimated to be 1.81 acres in the Island Chars, while in the Attached & Set-back land it is 0.74 acres.

In the Attached & Set-back land 61% of the households have no operated land at all, while the equivalent figure for the Island Char land is significantly lower at 29%. There is a significant concentration of land operated by marginal and small farming households in the Island Chars (44% of households) whilst the figure in the Attached and Set-back land is 30%. The degree to which land renting and share cropping occurs would seem greatly constrained by the availability of land.

The variation in land ownership distribution by household and its spatial variation in relation to homestead location and erosion displaces seem key variables in this. The issue of comparative land flood risk, quality and productivity are also important considerations.

Table 9.2.21 Distribution of Households by Size of Land Holding (Net Operated Land)

Total Household Operated Land Holding Area (acres)	Island Char Land	Attached & Set-back Land
	% of HH	% of HH
0	28.7%	60.8%
0.01 - 0.5	10.5%	12.9%
0.51 - 1.0	15.7%	9.7%
1.01 - 2.0	17.6%	7.8%
2.01 - 3.0	11.8%	1.8%
3.01 - 4.0	5.6%	3.2%
4.01 - 6.0	5.0%	0.9%
6.01 - 8.0	1.7%	1.4%
8.0 and more	3.6%	1.4%
Total	100.0%	100.0%
Gini Coefficient	0.68	0.85
Mean per Total Households	1.81	0.74

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The distribution of land types in terms of constraints to use is given in Table 9.2.22 split by households and between Island Chars and Attached & Set-back land. This needs to be compared with the results of the Landsat imagery analysis given in Table 9.2.2. The areas of cultivatable land are remarkably similar.

The differences in the figures for sandy areas and submerged land can be explained by the apportionment of the land submerged under water which was different for the two sets of data, one being for 8th March 1992 and the other during the June/July 1992 wet season time. Another factor is that the Attached and Set-back land areas are for the slightly larger FAP 16 middle reach area.

The notable features are the larger proportion of households having both cultivable land and sandy land on the Island Char when compared to the Attached and Set-back land. The number of households claiming to have submerged land in the Attached and Set-back lands is very high at 55% but is consistent with the known erosion/displacement patterns. The total mean land areas per household are much higher on the Island Chars (2.22ha) than the Attached and Set-back land (1.23ha) however when

submerged and sandy land is taken into account the usable land is greatly reduced and the differential closes.

Table 9.2.22 Land Distribution by Land Cover/Utilisation Type in ha

Land Cover Type	Island Char Land			Attached & Set-Back Land		
	Area (ha)	% of HH having land type	Mean Land Type per HH (ha)	Area (ha)	% of HH having land type	Mean Land Type per HH (ha)
Cultivable	14,108	63.4%	0.73	28,502	34.1%	0.30
Sandy	5,218	29.5%	0.27	9,500	8.8%	0.10
Submerged	22,419	31.1%	1.16	76,006	54.8%	0.80
Homestead	1,159	72.7%	0.06	3,800	73.3%	0.04
Total	42,904	86.5%	2.22	117,808	82.9%	1.23

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Data 1992

2.4.6 Assets

Table 9.2.23 indicates the availability of assets to households. From this it can be seen that some 3% of Island Char households do not even have houses, however it could be that some of these may live full time on boats. The data demonstrates logical patterns of asset holding such as household access to boats being 6 times greater in the Island Chars than the Attached & Set-back land where as no motor bikes whatsoever were recorded on the sample Island Char households but bicycles were. The incidence of ploughs in the Island Chars is surprisingly high and three times that of the Attached and Set-back land however fishing nets are evenly distributed. This could indicate that whilst farming is more important on the Island Chars and a very individual occupation, fishing is as equally important in both areas. Radios are quite widely (1 in 7) and equally available to households in both areas, however the Island households are likely to be more isolated than the others and hence radio disseminated information is less likely to be further handed on. This is an important consideration for flood warning strategy design.

The value of household physical assets has been estimated from the sample data and extrapolated over the whole study area population and is summarised in Table 9.2.24. The total value of assets has been estimated at 1475 million taka with some 81% of these being held by households in the Attached and & Set-back land. It is important to differentiate items that are easily movable in times of a flood that requires evacuation from the homestead and those which would be at risk from both flood and theft if left there at such a time.



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Table 9.2.23 Household Availability of Assets

Main Assets	Island Char Land		Attached & Set-Back Land	
	% of HH Owning	HH per Unit	% of HH Owning	HH per Unit
Houses	97.2%	2.5 per HH	99.5%	2.5 per HH
Plough	63.1%	1	29.5%	1 in 3
Fishing Nets	19.8%	1 in 2	17.1%	1 in 2
Boat	16.3%	1 in 6	2.8%	1 in 36
Bicycles	3.6%	1 in 28	9.7%	1 in 10
Motorbike	0.0%		0.9%	1 in 109
Radio	17.1%	1 in 7	18.0%	1 in 6

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

Table 9.2.24 Estimated Value of Physical Assets

Asset Class	Island Char Land		Attached & Set Back Land	
	Value (m taka)	% by value	Value (m taka)	% by value
Agricultural	21.0	7.5%	93.0	7.8%
Transport	19.5	7.0%	60.9	5.1%
Furniture	23.6	8.4%	127.5	10.7%
Fishing Nets	4.3	1.5%	25.9	2.2%
Electrical Goods	4.8	1.7%	17.0	1.4%
Houses and Others	206.7	73.8%	870.8	72.9%
Total Value	279.9	100%	1195.1	100%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

2.4.7 Occupation and Employment

Table 9.2.25 indicates the main occupations of household heads in the study area. From this it can be seen that farming is over twice as prevalent on the Island Chars than on the Attached and Set-back land where daily wage paid labour is the predominant activity. Full time fishermen are more concentrated on the Attached and Set-back land than the Island Chars.

This could be related to their need for closer access to markets for sale of catches and other support services such as fuel for motorised boats etc. It should also be noted that over 40% of Island Char household heads have second occupations compared to 27% in the Attached and Set-back land. This would appear to indicate the seasonality of Island Char farming and the need for diversified economic livelihoods.

More details of secondary occupations are given in Table 9.2.26. This indicates that the major secondary occupation of Island Char household

heads is daily labouring followed by farming. For the Attached and Set-back household heads the situation is reversed.

Table 9.2.25 Main Occupation of Household Heads

Main Occupation	Island Char Land	Attached & Set-Back Land
	% of HHH	% of HHH
Farming	54.3%	27.2%
Trading	1.9%	9.7%
Fishing	2.2%	4.1%
Daily Labour	33.9%	41.9%
Service	2.5%	5.5%
Self-Employed/IGA	3.3%	7.8%
Other	1.9%	3.7%
Total Households No	100.0%	100.0%
% HH with 2nd Occupation	41%	27%

Source: Estimates Calculated from FAP 3.1 Sample Survey Field Data 1992

Table 9.2.26 Secondary Occupations of Household Heads

Secondary Occupations	Island Char Land	Attached & Set-Back Land
	% of HHH	% of HHH
Farming	9.7%	10.6%
Trading	7.5%	3.2%
Fishing	6.1%	2.8%
Daily Labour	13.5%	7.4%
Service	0.5%	0.0%
Self-Employed/IGA	1.4%	3.3%
Other	1.4%	0.0%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The distribution of household earning members by age is given in Table 9.2.27. This indicates that the main age range for economic activity is 15 to 44 years. Activity on the Island Char land is concentrated in the

lower half of this range where as the levels for children below the age of 14 are lower there than for the Attached and Set-back land. This may be related to the more limited opportunities for child labour or less economic pressure forcing this forward as a household survival strategy.

Table 9.2.27 Distribution of Household Earning Members by Age

Age Groups	Island Char Land	Attached & Set-Back Land
	% of HH	% of HH
0 - 14	9.0%	12.2%
15 - 29	37.4%	31.2%
30 - 44	32.5%	31.4%
45 - 59	15.2%	16.5%
60 - over	5.8%	8.7%
Total Earning Members	100.0%	100.0%
Crude Activity Rate	29.1%	31.8%
Mean No per HH	1.78	1.62

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

2.4.8 Credit and Income

A summary of estimated distribution of annual income by household is given in Table 9.2.28. This was generated from the detailed Socio-Economic Household questionnaire returns (see part 2 of this Annex). This gives a very skewed distribution with a concentration at the lower end, a sudden peak (over 45% of households are in the 5 000 - 10 000 Tk per annum class) followed by a steep fall then a gradual decline with a significant number (over 3%) at the very top income level when compared to those immediately below it. The differences between the Island Char land and the Attached & Set-back land are not particularly marked, the main one being the slightly longer tailing off effect from the peak in the Island Char land households.

Table 9.2.28 Distribution of Households by Income Groups

Annual HH Income (Tk)	Island Char Land	Attached & Set-Back Land
	% of HH	% of HH
Below 5 000	11.7%	11.3%
5 000 - 10 000	47.0%	46.3%
10 000 - 15 000	18.9%	20.5%
15 000 - 20 000	9.2%	8.5%
20 000 - 25 000	3.6%	6.5%
25 000 - 30 000	3.6%	2.3%
30 000 - 35 000	2.5%	0.5%
35 000 - 40 000	0.6%	0.9%
Over 40 000	3.0%	3.2%
Total	100%	100%
Gini Coefficient	0.37	0.41
Mean per Household (Tk)	12,239	13,253

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The distribution of household annual balance of income over expenditure is summarised in Table 9.2.29. This indicates that over 20% of households have more expenditure than income and a further 57% have an overall gain of less than Tk 4 000. The distribution then drops very quickly followed by a very gradual low tail off with a cluster at the very top end. Surprisingly there appears to be very little difference between the Island Char land and the Attached & Set-back land. The overall conclusion is that for some 77% of the population income accumulation is negligible and household turnover levels are in any case very low.

Table 9.2.29 Households Income Expenditure Balance

Annual HH Income (Tk)	Island Char Land	Attached & Set-Back Land
	% of HH	% of HH
Below (4 000)	1.4%	1.4%
(4 000) - 0	21.8%	20.3%
0 - 4 000	56.5%	58.5%
4 000 - 8 000	9.1%	11.5%
8 000 - 12 000	3.9%	2.3%
12 000 - 16 000	2.2%	2.3%
16 000 - 20 000	1.4%	0.5%
20 000 - 24 000	0.8%	0.9%
24 000 and over	3.0%	2.3%
Total	100.0%	100.0%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

Some 255 of households draw credit from various sources. The proportions of sources are shown in Table 9.3.30. Non-institutional sources include friends, relatives and Mahajans. There appears to be very little difference between the levels of credit received and its source for the Island Char land and the Attached & Set-back land.

Table 9.2.30 Proportion of Households taking Credit and Sources

Credit Sources	Island Char Land	Attached & Set-Back Land
	% of HH with Credit	% of HH with Credit
Institutional	11.7%	9.4%
Non-Institutional	88.3%	90.6%
Total HH with Credit	100%	100%
% of Total Households	25.9%	24.4%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

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The stated objectives of obtaining the credit are summarised in Table 9.2.31, by percentage distribution of households taking it. From this it can be seen that the major use is for purchasing food items, 68% of all credit in the Attached & Set-back land was for this purpose and the equivalent figure for the Island Char land is 61%. It would seem logical that this group of people would be concentrated amongst those whose household balance was negative or very low. When comparing this to the figures in Table 9.2.29 they correlate very closely. The second most important purpose in the Island Char lands was for the purchase of agricultural implements where as on the Attached and Set-back land it is for land purchase and business purposes. This would seem a logical picture bearing in mind the predominant economic activities in the two areas and where future investment is perceived to be worthwhile at the household level. The high figure for land purchase in the Attached & Set-back land may well include money borrowed in order to pay land tax on inundated or eroded land so as to maintain the legal right to it and avoid it defaulting to the state. If this is the case, it will be a major burden on erosion victim households livelihoods.

Table 9.2.31 Number of Households by Credit Objectives

Credit Objectives	Island Char Land	Attached & Set-Back Land
	% of HH Taking Credit	% of HH Taking Credit
Agricultural Implements	18.1%	5.7%
Livestock Purchase	6.4%	3.8%
Business/Land Capital	2.1%	15.1%
Fishing Gears	3.2%	0.0%
Food Consumption	60.6%	67.9%
Social Obligations	2.1%	1.9%
Debt Repayment	2.1%	3.8%
Other	5.3%	1.9%
Total HH taking Credit	100.0%	100.0%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

2.5 Economic Sectors

In terms of overall economic activity the agriculture production sector is considered to be the most important in terms of generating income for the inhabitants of the study area. Tables 9.2.25 and 9.2.26 showed the importance of farming and also daily labour (the majority of which would be expected to be agriculturally based) in terms of economic activities and

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Table 9.2.36 Fish Catch in the Study Area

Fish Catch (mt)	Island Char Land		Attached & Set-Back Land	
HH Mean Daily Catch (kg)	2.8		5.2	
HH Own Consumption (mt)	7.1	66.4%	58.5	69.3%
HH Fish Sales (mt)	3.5	33.6%	26.0	30.7%
Total Fish Catch (mt)	10.6	100.0%	84.5	100.0%

Source: Estimates calculated from FAP 3.1 Char Sample Survey Field Data 1992

2.5.3 Livestock

Estimates of livestock are given in Table 9.2.37. The draught animals category includes both water buffalo and draught cattle whilst the "others" is predominantly sheep and goats. Poultry are listed separately in Table 9.2.38.

The number of draught animals in the Island Char land, estimated at 1.4 per household is considered inadequate for the requirements of household level farming and is probably a constraint to increasing agricultural production. This is despite the fact that the Island Char land offers better potential for grazing land than the mainland. The equivalent figure for Attached and Set-back land is even lower at 0.6 per household. However it must be remembered that the number of households engaged in agricultural production is lower.

Surprisingly the number of Milch cows is also low, despite better grazing potential on the Island Chars when compared to the main land and the known concentration of grazing herds in the upper reach of the Brahmaputra Char lands.

Poultry are found throughout the study area and in most households. There is a higher proportion in the Island Char land (10.6 birds per household) than in the Attached & Set-Back land (8.1 birds per Household). Sales of both live birds and eggs supplement the household economy. The number of ducks is surprisingly low for a riverine area and this could offer a useful potential source of animal protein if possible cultural prejudices against them could be overcome.

Source: Estimates Calculated from FAP 3.1 Char Sample Field Data 1992

Yield Figures are given in Appendix A Table 9.A.13.3

2.5.2 Fisheries

The utilisation of fish caught in the study area is indicated in Table 9.2.35. A factor of major significance is that of the 20% of all households in the Island Char land that catch fish, 71% directly consume all the fish they catch. The similar figures for the Attached and Set-Back land are 17% and 78% respectively. The fisheries study work for the mainland has categorised these as occasional fishing households. This constitutes a very major source of "free good" animal protein which by-passes conventional economic analysis techniques of valuation. The remaining fish catch is partly self-consumed and the remainder sold.

Table 9.2.35 Use of Fish Catch

Fish Caught, Consumed and Sold by Household	Island Char Land	Attached & Set-Back Land
	% of HH Catching Fish	% of HH Catching Fish
HH Own Consumption Only	71.4%	77.8%
HH Consumption & Sales	28.6%	22.2%
Total Fishing HH	100.0%	100.0%
% of Total Households	19.8%	17.1%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The total fish catch of the study area households has been estimated using field data collected for 3 day periods in June 1992. This is summarised in Table 9.2.36. The estimated total catch for Island Char land households is 10.6 mt, whilst that for the Attached and Set-back land is 84.5 mt. Of these totals, 7.1 mt are directly consumed by the Island Char land households who catch them. The equivalent figure for the Attached and Set-Back land is 58.5mt. The condition is that surprisingly, fishing is not so important to Island Char household Socio-Economic as on the Attached and Set-Back Land. This would require further study linked to work on nutrition in the subsequent phase of the project.

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hence livelihoods. Sample survey data which is summarised in Table 9.2.32 has indicated that the cropping intensity is 1.99 and is the same for both the Island Char land and the Attached and Set-Back land. However yield figures are likely to be lower as the more marginal land. (See Appendix A, Table 9.A.13.3).

2.5.1 Agriculture

Table 9.2.32 Cropping Intensity in the Char Land Study Area

Cropping Intensity	Island Char Land		Attached & Set Back Land	
	Area (ha)	% of Total Cropped Area	Area (ha)	% of Total Cropped Area
1- NCA Land	14,108		28,502	
2- Cropped Area				
- Kharif I	12,248	43.7%	21,548	38.0%
- Kharif II	6,982	24.9%	16,128	28.4%
- Rabi	8,824	31.5%	19,030	33.6%
Total Cropped Area	28,053	100.0%	56,705	100.0%
Cropping Intensity	1.99		1.99	

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

Table 9.2.33 Cropping Patterns in Char and Set Back Land

Crop Type	Island Char Land		Attached & Set-Back Land	
	Area (ha)	% of Total Cropped Area	Area (ha)	% of Total Cropped Area
Paddy	10,416	37.1%	23,623	41.7%
Kaon	5,870	20.9%	7,171	12.6%
Wheat	2,317	8.3%	7,330	12.9%
Jute	3,495	12.5%	9,012	15.9%
Pulses	2,114	7.5%	1,992	3.5%
Spices	1,337	4.8%	1,439	2.5%
Ground Nut	1,007	3.6%	1,940	3.4%
Sweet Potato	500	1.8%	1,028	1.8%
Others	998	3.6%	3,172	5.6%
Total Cropped Area	28,053	100.0%	56,705	100.0%

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The cropping pattern data for the area is given in Table 9.2.33 based upon sample survey data. Paddy is the predominant crop but is less significant on the Island Char land (37%) than the Attached & Set-Back land (42%). Kaon (millet) cover 20% of the cropped area in the Island Char land and 13% of the rest. This is an important factor linked to the need for dry land cropping systems due to the poor moisture holding capacity of the land in the dry season when most land is exposed and available for cropping. There is also significant amounts of wheat and jute grown and these are more important on the Attached and Set-Back land. Pulses and groundnuts are significant in the Island Chars (11%) and are a valuable source of protein. Crop yields from which production is derived are given in Appendix A, Table 9.A.13.3. Although cropping intensities are high (i.e. areas are cropped upto twice a years, yields are lower than the mainland mainly due to environmental factors.

Agricultural production estimates based upon land areas, cropping intensity figures and crop types are shown in Table 9.2.34. Total paddy production is estimated to be 67 083mt, 14 181mt in Island char land and 52 902 in the Attached and Set-Back land. In terms of value the most important crops presently grown are Paddy, Jute, Wheat and Sweet Potatoes in the Attached and Set-back land with Paddy, Groundnuts and Pulses, Jute, Spices then Wheat in the Island Char land. However these figures must be viewed with great caution, especially for the Attached & Set-back land as they are estimates from relatively small samples taken from an extremely diverse area.

Table 9.2.34 Agriculture Production in the Study Area

Crop Type	Island Char Land		Attached & Set-Back Land	
	Prod (mt)	Value mTk	Prod (mt)	Value mTk
Paddy	14,181	90.1	52,902	335.0
Kaon	5,998	15.0	8,037	20.1
Wheat	3,661	23.1	10,623	67.1
Jute	4,038	32.3	13,489	108.1
Pulses	1,773	26.4	1,548	23.1
Spices	2,458	24.6	2,520	25.2
Ground Nut	1,348	13.5	2,191	21.9
Sweet Potato	4,544	18.2	7,988	32.0
Others	2,409	7.6	27,125	36.3
Total	40,408	250.8	126,425	668.7

Table 9.2.37 Distribution of Livestock in the Study Area

Livestock	Island Char Land		Attached and Set-Back Land	
	% of Total	Ratio/ HH	% of Total	Ratio /HH
Draught Animal	35.7%	1.4	29.2%	0.6
Milch Cow	12.2%	0.5	12.4%	0.2
Others	52.1%	2.0	58.4%	1.1
Total Livestock	100%	3.9	100%	1.9

Source: Estimates Calculated from FAP 3.1 char Sample Survey Field Data 1992.

Table 9.2.38 Distribution of Poultry in the Study Area

Poultry	Island Char Land		Attached & Set-Back Land	
	% of Total	Ratio /HH	% of Total	Ratio /HH
Duck	11.1%	1.2	15.5%	1.3
Hen/Chicken	81.5%	8.6	79.3%	6.4
Pigeon	7.4%	0.8	5.2%	0.4
Total Poultry	100%	10.6	100%	8.1

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

The total values of both livestock and poultry have been estimated using the sample data extrapolated over the total study area. This is shown in Table 9.2.39. It can be seen that although the proportion of poultry is greater in the Island Char land than the Attached and Set-back land, in terms of value poultry in the Attached & Set-back land is of greater importance than it is in the Island Char land.

Table 9.2.39 Estimated Value of Livestock and Poultry

Value (million Tk)	Island Char Land			Attached & Set-Back Land		
	Value (Tk)	% of Total Livestock Value	Mean Value per HH (Tk)	Value (Tk)	% of Total Livestock Value	Mean Value per HH (Tk)
Livestock	169.0	95.7%	8,759	388.0	92.6%	4,089
poultry	7.6	4.3%	394	31.0	7.4%	327
Total Value	176.6	100%	9,153	419.0	100%	4,416

Source: Estimates Calculated from FAP 3.1 Char Sample Survey Field Data 1992

2.6 Institutional Settings

The formal administrative structure for the area is shown in Figure 9.2.14. This indicates the Zila (District), Thana (formerly Upazila) and Union Boundaries. As part of the FAP 16 National Char Land Study the present Mauza boundaries have been mapped at 1:100 000 scale as an overlay to the Landsat imagery of 8th March 1992. This work should be used in any future FAP 3.1 Char lands work along with the database that is being set up based upon the Mauza units. The FAP 3.1 detailed household survey data can then be geo-coded into this.

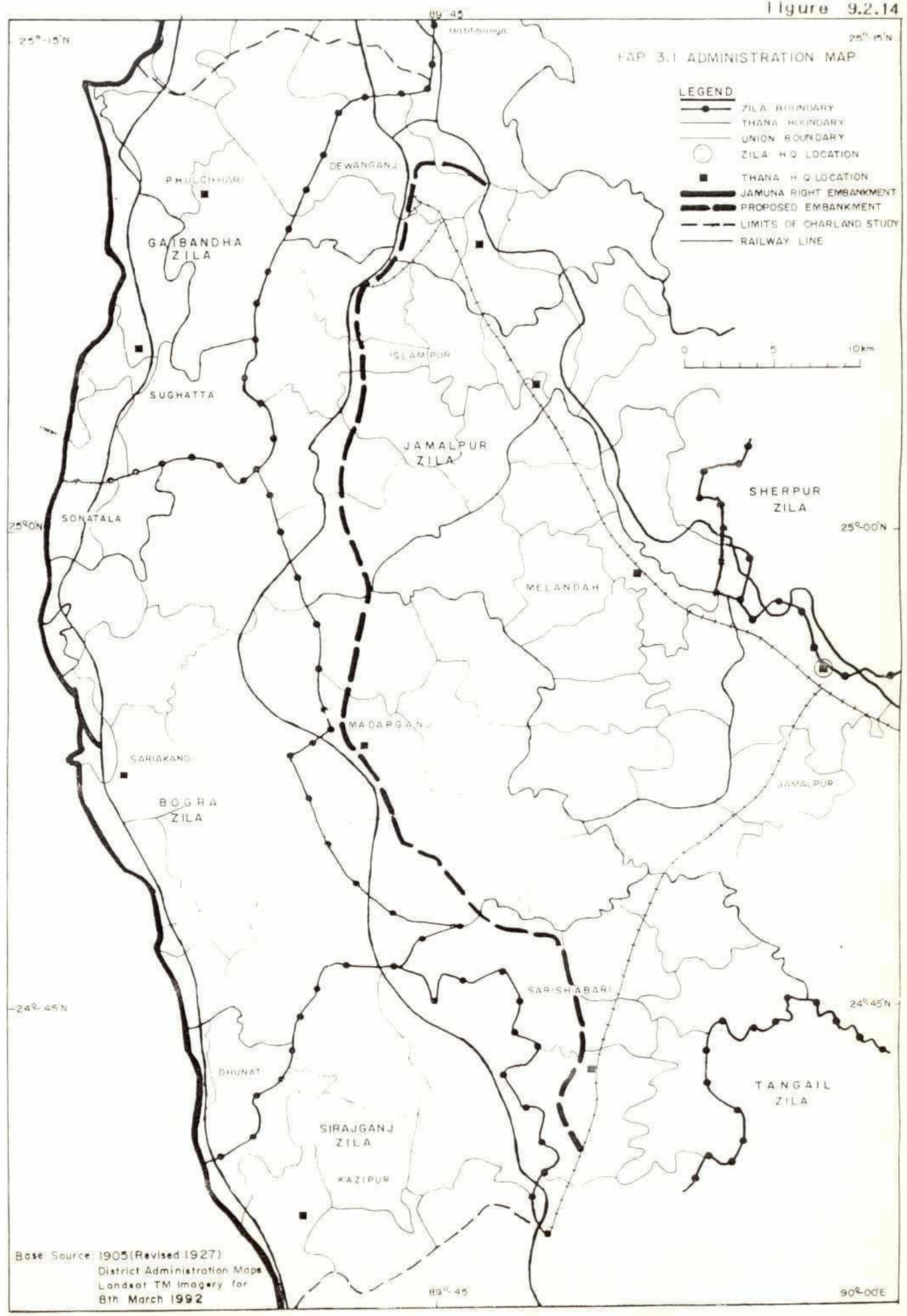
As part of the FAP 3.1 Char land study data was collected to provide information as to the existing framework and strength of institutions in the area with a view to assessing how adequate these were for dealing with present situations, particularly flooding. In addition this could also be used to identify possible institutional structures for possible future development programmes in the area, particularly community mobilisation and group formation with an emphasis on self help.

2.6.1 Institutional Strength for Community Development & Resource Mobilisation

The present level of institutional involvement in the local communities in the Char land study area has been assessed using data collected and compiled for the FAP 3.1 Mainland Study. This is summarised in Table 9.2.40 below. The conclusion from this is that the Island Char land area is poorly supported by NGO and Co-operative institutions where as the Attached and Set-back land has been deliberately targeted by them for action to the point where they are receiving more attention than the mainland. The data on educational institutions needs great care in interpretation as the source for the mainland is not consistent with the Char land. It seems likely the mainland data from BBS includes only government provided educational institutions where as the Char land data includes non-governmental ones, particularly Madrashas which are

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Figure 9.2.14



proportionally stronger in the remoter areas of the Char land. The other factor is that the size of the institution is not taken into account at all and it would be expected to have many small institutions in the Char lands and fewer bigger ones on the mainland. The other issue is the adequacy and quality of the service provided.

The main conclusion is that formal government institutions are weak in the Attached Char land and very poor in the Island Chars. The nature of service provision required on the Island Chars is in any case very different to that normally supplied by government. It needs small scattered units that are fairly self-sufficient and autonomous to be effective. NGO's have already mobilised themselves to work in the Attached and Set-back land in the last few years. They have yet to do so in the Island Char areas but at least two major NGO's have been considering this and have expressed great interest in this study to ascertain where the areas of greatest need appear to be.

Table 9.2.40 Institutions in the Study Area

	No of Villages	Educational Institutions	Co-operative NGOs	NGOs
Island Chars+ Per Village	46	29 .63	8 .17	4 .08
Attached & Set Back Land+ Per Village	14	10 .71	6 .42	4 .28
Jamalpur District Per Village *	2286	1274 .55	514 .22	561 .24

Source: * Bangladesh Population Census, 1981, Thana Series, Bangladesh Bureau of Statistics.

+ Interim Feasibility Report, Jamalpur Priority Project Study, June 1992.

2.6.2 Institutional Arrangements to Cope with Floods

The present institutional structure to disseminate flood warnings is as follows:

The Flood Information Centre (FIC) produces daily river stage readings and forecasts of the major rivers in Bangladesh for the following 24 and 48 hours. These are then passed on to the Flood Forecasting and Early Warning Division (FF & EWD) which is under the supervision of Surface Water Hydrology 2 of the Bangladesh Water Development Board. Using this data and a weather bulletin from the Meteorology Department plus weather satellite information from the Space Research and Remote Sensing Organisation (SPARRSO), the FIC produce a daily bulletin. This

relates present and predicted river levels to pre-determined danger points. This needs to be reviewed using newly created Flood risk Mapping at an out part from FAP 25 and FAP 18/19.

As soon as the river appears it is going to reach the pre-determined danger level then the FIC radio a warning to BWDB field offices who in turn pass it on to local Administrative Officers. This information is then disseminated to the public, warning them of the impending danger. In addition the Director or Deputies of Agricultural Extension inform their respective Thana (Upazila) Agriculture Officers (UAOs) who then communicate flood warnings directly to the respective Union Agriculture Assistants (UAA) or Block Supervisors (BS) with instruction on what information they should pass on to farmers in their Unions. This is shown in Figure 9.2.13.

In addition flood warnings are supposed to be disseminated using both radio and television and in the majority of cases this is the most common source of flood information. However television media is almost totally non-existent in the Char land and whilst one in seven households have a radio there must be concern as to how effective this type of warning is likely to be. What is specifically required is detailed local warnings that are timely and give some idea of a predicted situation that can be equated with a previously known one, i.e a direct comparison to a previous flood level date/incidence that people can appreciate the significance of in their local area. The above structure is that which is theoretically own right with suitable resources. However condition is that levels of radio ownership in the Char Lands are surprisingly high and should be an effective communication medium.

2.6.3 Institutional Arrangements for Disaster Management

A review of the Institutional arrangements for flood disaster management is being carried out in the national context by FAP 11 and FAP 23. At present the following institutions are involved in varying degrees:

- Ministry of Irrigation, Water Development & Flood Control
- Ministry of Relief and Rehabilitation
- Ministry of Food:
 - (a) Directorate of Rationing
 - (b) Directorate of Storage & Movement
- Ministry of Agriculture: Fisheries & Livestock Departments
- Ministry of Home Affairs
- Ministry of Defence
- Ministry of Health and Family Planning
- Post & Telecommunication Division

The following figure illustrates the institutional hierarchy for outflow of flood information

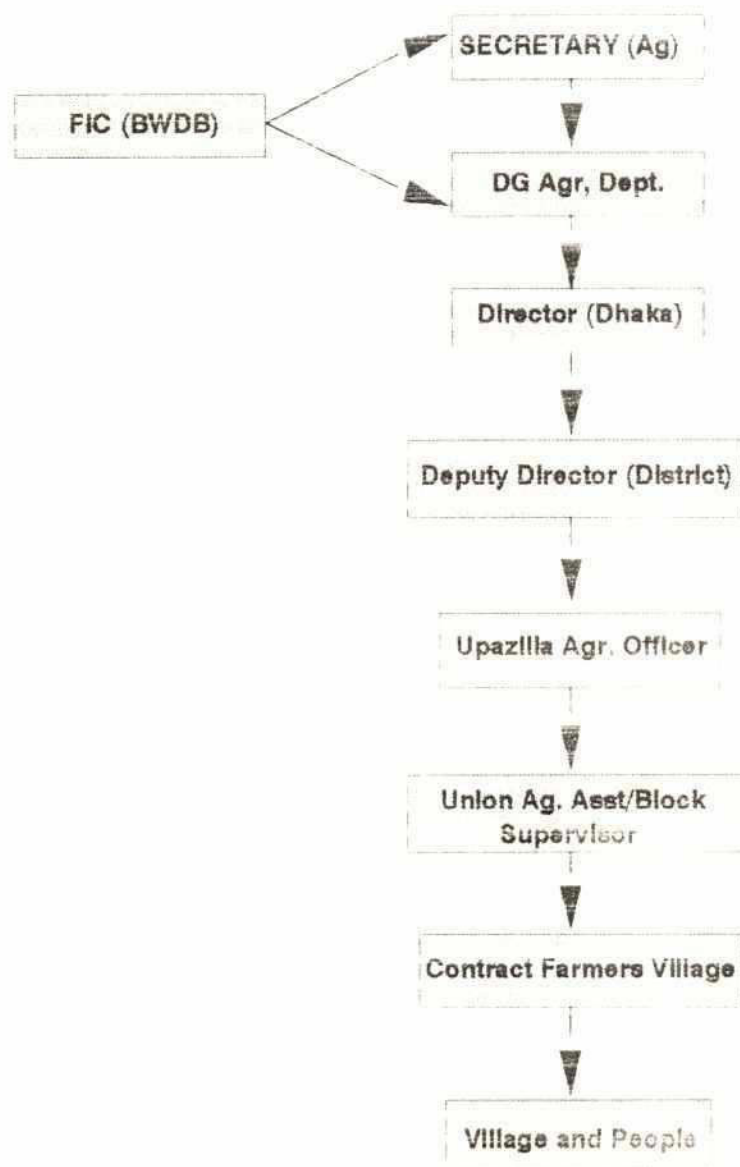


Figure 9.2.13 FIC Flood Forecast Network for the Agricultural Department

- Ministry of Local Government and Rural Development
- Ministry of Information and Broadcasting
- District Administration
- Thana (Upazila) Administration & Union Parishad

It would appear that the existing institutional arrangements for dealing with the Char lands are no different than for the rest of the country. Bearing in mind the very different degree and nature of flooding in the area it would seem necessary to consider drawing up special strategies for flood preparedness and disaster management that are specifically relevant to it. It could be that the rather formal and inflexible structures of the present institutions are not the best for such a place and a more localised approach is needed or one that cuts out some tiers of the present system if it is to be effective.

2.7 Legal Rights/Practices

The law and regulations relating to land which is accreted or eroded by the river are covered in various statutes and these are attached as Appendix B. The first shown dates from 1825, during the times of British colonial rule and last was drawn up in 1975. They cover the situation with regard to newly emergent land upon which there has been no previous land rights and also the situation with regard to paying tax on land and how this is to be dealt with should the land be taken by the river or sea. The raising of revenue on land was originally based on the Zamindar system of rent collection and subsequently modified to become the basis of a state land taxation system. The statutes also cover the situation in the case of loss of land by erosion. The progression of the development of this body of legislation is marked by its very experimental nature which has resulted in frequent reversals as various ideas (such as proportionally reducing neighbouring un-eroded land for reallocation to displacees) either failed or proved impossible to enforce or were so unpopular as to be unadopted in practice.

The basic principle is that any newly emergent land having no previous occupancy rights on it is the property of the state and is to be regarded as Khas land for distribution via the appropriate authority. In cases where there were any previous rights they will have been extinguished when the land was lost to the river and the requirement to pay land tax was waived. In the study area the first situation is not now relevant as due to the very dynamic nature of river bed movement, all land, even that under the present river beds, has in the recent past been mainland with established land rights on it. By 1905 much of the area had been divided amongst Mauzas and this can be seen in the Mauza and Gazetteer maps of the time which have been used to compile Figure 9.2.1 in this report. The little amount of land that was not allocated at that time, because it lay under the then river channel, has subsequently

been apportioned. There is thus no Khas land apparent in the study area.

The principle under law is that a person with land rights has to pay tax on this. In the case of land that is lost to the river then the right owner ceases to pay tax and their rights are extinguished. However should the land reappear the land defaults to the State and is treated as Khas land to be reallocated through the existing government channels. If the land that is taken by the river reappears within 20 years of its loss then the previous right owner has a preferential claim to be reallocated that land. This is provided that the total land holding of the previous owner is not in excess of a specified ceiling. However this is not applicable in cases of accretion of land due to artificial or mechanical processes undertaken by government. In other words any land holders in areas reclaimed by polderisation or similar work would not get a preferential claim to that land. Whilst this could be particularly relevant in coastal area it could also have implications for river embankment work.

In reality the people of the Char lands are well aware of their situation with regard to land law in such circumstances and have taken very pragmatic and rational steps to maintain their rights. Land being the ultimate asset that it is in rural Bangladesh and particularly in places with mean rural population densities of over 750 people per km², it is highly prized and valued. Present right holders will continue to pay tax on it even when it has been taken by the river for a long time, in the expectation that it will one day re-emerge, which it will eventually nearly always do. The only reason stated for non-payment of tax on eroded land was a lack of funds being available at the time and it was indicated that money would be borrowed to pay this and arrears would be paid in full as quickly as possible. In this way no land defaults to the state.

From enquiries in the field it would appear that land disputes in the area are very rare indeed as when land re-emerges it is re-apportioned according to the old Mauza maps (not easy to do if there are no reference markers) in a way that is acceptable to all parties. Any disputes are amicably settled locally avoiding recourse to higher authority which would be expensive, time consuming and open to manipulation.

3 LIVING IN CHAR LANDS : STRESS AND STRAIN

3.1 Case Studies

3.1.1 Introduction

This section of the report is the result of the informal case study work carried out by the sub-consultants and gives an insight into conditions for residents of the area on an individual household basis. No attempt has been made to edit this work or integrate it into the rest of the report as it is believed this would lessen its effectiveness. It stands as it is an informal but fascinating picture of some life style patterns from the Chars. It must be remembered that the weakness of all such work is its episodic nature and it can be very unrepresentative. The lack of time and resources given to the study did not allow a scoping or probing process to be carried out to select both the locations and socio-economic levels of respondents. Help was given by NGO'S in gaining background information to do this.

3.1.2 Overview

The present Char study reveals a struggling life pattern of Char people. These Chars are inherently unstable and susceptible to erosion. Chars are occupied as soon as they come up from the river. The laws relating to alluvion and diluvian are quite well known to the people, but in general, they follow their own age old practices in deciding ownership of newly accreted Chars. They divide these among themselves on the basis of legal documents they possess.

Although the population density is found to be lower than the mainland, people are worse off, as Char dwellers frequently have to shift from one Char to the other. This frequent shifting and resettlement leaves a straining impact on their social as well as economic life.

Lack of basic infrastructure facilities and institutions like communication networks, schools and colleges, hats/bazaars and health care facilities makes Char inhabitants' lives more difficult than in the main land.

The only mode of transport available in Char lands are country boats and mechanised country boats. These are also not available throughout the year because river channels remain navigable only during the rainy season. During the dry season channels get dried up and boats can not ply through these. Char dwellers have to rely only on their feet to travel from one place to the other.

The few available government facilities such as schools and health centers are also threatened by river erosion. Like people, institutions also migrate from one place to the other as soon as these are exposed to erosion. To add to the lack of civic amenities is the absence of markets or shops within the villages themselves. There however exists a long standing custom of sharing between families of food and supplies


which helps to mitigate the absence of marketing facilities in the nearby proximity.

In addition to all these odds of life people are exposed to frequent flood hazards and other natural calamities. Almost every year flood occurs in the Char lands. And when severe floods occur, people generally move out with the family units as well as with other kin groups leaving their homes and their belongings. The Char inhabitants always struggle with nature for survival.

The Char people provide others with shelters in their own land sometimes in exchange for payment of a negligible amount as rent and in some cases free of cost. The Char landers take care of one another simply because they share a common understanding of the river erosion and other natural calamities. Every one is aware that it may be his turn next to pack off and shift to safer places and float with uncertain existence as he has to start his life afresh.

Thus life in the Jamuna chars is unpredictable and uncertain and at the same time poor and short lived. The following case studies highlight the conditions of living in the Char land of the Jamuna River.

Case Study: Education



Sohrab Uddin comes of a poor peasant family, he is an inhabitant of Dicridorta village under Nishchintapur Union Kazipur Thana. He is the third among his 7 brothers and sisters. His elder brothers used to help their father in cultivation. During off season they used to work as day labourer. As a result the family could be maintained moderately. Sohrab Uddin could come to help in different household activities. But his mother and grandfather were interested to see that he goes to school. Specially Sohrab Uddin's mother was very keen about his education. But unfortunately there was no school, not only in the village but also in the areas around. So he had to go a long distance to enrol in Kazipur Govt. Primary School in Kazipur Thana. The school was 8 miles away from his village. Everyday he had to travel 16 miles on foot to attend his school. While at home Sohrab Uddin could not get time to learn his lesson, but used to graze the cattle and help the family in household activities. These arrangements were too burdensome on him. He was losing interest in learning. Moreover, his father was not interested in his education because he thought it to be an extra burden on the family. But his mother's ceaseless inspiration helped him in his going with pursuit of learning. In course of time Sohrab Uddin reached up to class IV. In the meantime, one of his maternal uncles was appointed a teacher in Pingna Primary School in Bhuapur at present under Tangail Zila. He took Sohrab Uddin with him to Pingna primary school and arranged food and lodging for him in one local farmer's house. But here most of the time he was to be involved in various household activities of the landlord. He could only manage very little time for study. However, he could complete his primary education. He then went to Sirajganj and got himself admitted in B.L. High School. But he could not

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continue his education because in Sirajganj he could hardly arrange any proper food and lodging facilities for him. So he came back to Pingna, and took admission in Pingna High School. Here he stayed in a relative's house for one year. Later he arranged food and lodging for him. For this, Sohrab Uddin used to teach the children of the lodging master. Moreover, he also had to do other work as assigned by the owner from time to time. As a result, he could not manage time for his own study. He even thought of leaving the school and going back to the village. But again, his mother intervened and convinced him to continue his education in spite of the hurdles. Sohrab Uddin changed his mind and devoted himself fully in his studies. Ultimately, he was able to pass Matriculation (10th Grade) examination with a second division from Pingna high School in 1951.

Sohrab Uddin wanted to study further. But he could not manage money to get admitted into a college. So in 1952 when he got a job with a monthly salary of Tk. 50 in the Postal Department, he had no choice but to accept it. But love for education led to his resignation from the service in the Postal Department. He then joined a primary school as a teacher in 1954. In the meantime, he got married with one of the daughters of his Pingna lodging master. Later he was blessed with 3 daughters and one son. He took active interest in the education of his children. His only son and a daughter have recently completed their University education. Younger ones are at different stages of their studies.

In 1986 Sohrab Uddin retired from the service and purchased 12 Bighas of land in the village from the money he received as retirement benefit. Now he passes his time by associating himself in different social activities of the village.

While commenting on education in the Char land Mr. Sohrab Uddin opined that the situation remained more or less the same in all these years. No tangible improvement in the sphere of education has taken place.

The above case study reveals the nature of the struggle for education of a very fortunate person, Mr. Sohrab Uddin. But most of the people living in the Chars are not so fortunate. It was observed during the course of the study that in many Island Chars there is no school. Even if there are schools these are frequently shifted from one Char to another. With every shifting students earlier enrolled one in many cases lost. Moreover, in many schools qualified teachers are not available.

Case Study: Health

Mohammad Kamal Mollah, aged 53 was born in the village of Chowbhagiya under Bharakhali Union of Phulchari Thana. He was the only son of a well-to-do peasant. He passed his childhood quite comfortably. But this did not last for long. At the age of 13 he lost his father. Kamal Mollah shouldered all the responsibilities of the family.

He did not bother much because the family owned around 50 Bighas of cultivable land. Within next three years his two sisters were married. For meeting the expenses of marriage Kamal Mollah had to sell around 15 Bighas of land. Naturally income of the family fell considerably. Meanwhile, the Jamuna started eroding near Chowbaghiya. The rate of erosion was so alarming that within next five years all his land was lost to the river. He shifted his homestead to the other end of the village. In this way during his lifetime he shifted his homestead for about twenty times of which twelve times at different places within Chowbaghiya and eight times to other nearby Chars. Lastly he shifted his house to Gabgachi Char under Phulchari Union of Phulchari Thana in 1980. Presently he is living there.

At the age of 29 Mohammad Kamal Mollah was married. Now he has a family consisting of his wife, two sons and three daughters. Erosion and flood became part of his life. In 1965 he was attacked by a serious disease. His whole body swelled. But no qualified doctor/physician was available in the locality. He could not even move to go to other places where qualified physicians were available. Kamal Mollah lost all hope for his life. Tapan Thakur, a Quack from Bharat Khali was called in to treat him. The Quack prescribed him some indigenous medicines. Three months later fortunately he became well again. To meet the expenses for treatment of his ailment Kamal Mollah had to sell two of his bullocks.

During next five years he pulled on quite well or did not have any major disease other than fever, headache and the like. But things were different in 1970. This time all on a sudden his lower limbs developed paralysis. As no qualified physician was available in his village as well as in the adjacent areas he had to rely on local Quacks for treatment. But unfortunately, his ailment i.e. paralysis of his lower limbs, did not get better. Finding no alternative Kamal Mollah was taken to Gaibandha for treatment. There a qualified physician (MBBS) treated him. He was under the treatment of the said physician for about 6 months. He could, after treatment, move his lower limbs. Finally he was cured of the disease. This time the treatment costed him Tk. 300. As the physician was a Government servant he did not have to pay him his consultancy fees. The whole amount was spent in buying medicines and covering transportation costs. To meet the treatment expenses Kamal Mollah's wife sold all the land which she inherited from her father. He developed at a later period (since 1986) acute stomach pain. But he did not have any money for the treatment. So his suffering continued.

During 1988 flood Kamal Mollah's house was completely damaged. Standing crops on his share cropped land were also totally washed away by the flood. After recession of the flood water cholera broke out in the village and his two sons and his wife were attacked with the disease. This time he had no money as well as assets to sell so that he could get the required amount for the treatment of his sons and wife. Moreover, no medical facilities whatsoever was available in the area. He

solely relied on Allah for their cure. Fortunately, in course of time they all got cured.

Mr. Mohammad Kamal Mollah reported that Char inhabitants mostly suffer from paralysis, cold, fever, and stomach related diseases. No medical facilities in the form of qualified physicians, health centers and medicines are available in the Char areas. To have access to medical services Char inhabitants have to go to the mainland on the either side of the river Jamuna.

Case Study: Life of a Migrant

Siddiquir Rahman lives in Sannyasir Char under Erendabari Union of Phulchari Thana in Gaibandha zila. He is an old man of 75. Siddiquir Rahman had three brothers and three sisters. His father possessed about 6 acres of land. During those days they were quite solvent. The family could live well on income generated from the yield of lands. When he reached 10, his land eroded into the Jamuna river. So the family was rendered homeless. His father shifted his family to a nearby Char called Paglar Char under Erendabari Union in Phulchari Thana. As per local custom, Mr. Siddiquir Rahman's family was provided with homestead land free of cost by the local people. In Paglar Char his family lived for 14 years. All his brothers and sisters got married during this period. His father, from a solvent farmer, became a day labourer. Siddiquir Rahman, along with his brothers, worked as labourer in the Char where they were residing and also in nearby Chars. Sometimes they earned a livelihood as share croppers. It is a common practice in Chars that when local people need share croppers they generally prefer people who have settled there because of erosion. When he was 20 he married Karimon Bibi of the same Char. In the meantime he lost his father. After four years of his marriage his homestead had to be shifted again because of the Jamuna erosion. Siddiquir Rahman along with his wife and 3 children shifted to Monoharpur.

The family lived in Monoharpur for about five years. Besides working as a day labourer he took to some commercial activities like buying and selling of bangles, match boxes, salt etc. The capital for such business was generated from the sale of silver ornaments of his wife. Life was moderately comfortable for him. But all on a sudden, Monoharpur was lost to the Jamuna by erosion. Siddiquir Rahman, with his family, went to a nearby Char Tin Thopa. He again built his house with the help of local people. Here he lived for 16 years. All his sons and daughters got married here. He took up the same profession of day labour in Tin Thopa. Again the river erosion damaged his homestead. This time he shifted his homestead to Bulbulir Char where he lived for 18 years till he shifted to Char Khaitamari.

By this time he grew old and could no more work as a day labourer and a share cropper. Instead of becoming a day labourer he became a fisherman. Throughout the day Rahman used to engage himself in small trading in Char areas. After seven years his homestead in Khaitamari

also went into the Jamuna. Siddiqur Rahman, along with his sons and other family members, shifted to Sannyasir Char where they are presently living. He earns his living by fishing and helping the family in household activities. Mr. Siddiqur Rahman did not face any problem in social relationship with the people where he has migrated to. The people of those Chars have to migrate from one place to the other like him. The only problems faced by the settlers is economic hardship. Local people naturally are better off than the settlers.

Case Study: Life of a Fisherman

Abdul Motaleb is a young man of 28. He lives with his wife and two sons in Char Kinarber. Originally he hailed from Aditpur. He shifted to Kiuaiber Char after all his land was lost in the Jamuna by erosion. He was turned into a landless person. To make a living for a family consisting of 4 members he looked the job of a day labour. For quite sometime he earned his living working as a day labourer. But during rainy season it was very difficult for him to find a job of a day labourer. Motaleb, along with his family, had to starve the day he could not manage a job for himself. So he was thinking of some other profession which would at least keep him employed more or less throughout the year. Other than fishing he could not find any other. So he decided to take up fishing as a profession. Moreover, from his boyhood he was very fond of fishing which was a hobby then. He purchased a Jhaki net with Tk. 185 and started fishing in different channels close to the Chars.

Now Motaleb maintains his family from the money he gets by selling fish. His daily average catch varies from season to season. During the monsoon he catches on average of 2 Kgs. of fishes and in winter the catch falls to 1½ Kg. He uses different types of nets (Jaal) in different seasons which he purchased in the course of time. During the monsoon he uses Koi Jaal, Fash Jaal, Jhaki Jaal and in the winter Dharnsa Jaal and Jhaki Jaal. He sells fish in the local market and sometimes goes as far as Kazipur (Thana headquarters) market. It is noted that if any day Abdul Motaleb fails to catch fish, the family had to go without food on that day. Again if he failed to sell his catch, then the family used to consume them.

Abdul Motaleb suffers from water borne diseases because most of the time he stays in water. But the cash money he earns from fishing is not sufficient to provide him with the opportunity for treatment. These odds of life do not make Abdul Motaleb pessimistic. He looks forward for the accretion of his lost land. He firmly believes that someday he will be able to go back to his native village of Aditpur.

Case Study: Experiences With Flood

Monitaz Munshi lives in a village Neej Bohail under Bohail Union of Sariakandi Thana in Bogra Zila. He is around 75. By profession he is a share cropper. Since long ago the homesteads of the locality used to

be inundated by flood. This was a regular feature during the monsoon. Flood caused damage to crops and livestock.

In the 1960's an embankment was constructed on the right bank of the Jamuna. Momtaz Munshi's dwelling house fell inside the embankment, while most of his cultivable land fell outside. As a result his homestead was safe from the flood water, but cultivable land remained exposed to flood and erosion. He noted that during flood, erosion becomes devastating due to intense water pressure. When there was no embankment, pressure used to be less because rushing water could spill over a large area. Over the next 10 years after the erection of embankment he lost all his cultivable land.

Mumtaz Munshi recalls his experience about flood before and after the construction of embankment. When there was no embankment, crops were grown too though there were chances of damages. Houses were built above flood level. Most of the families had country boats which served the purpose of communication.

But the embankment has changed the scenario. Now he felt that the flood levels have gone higher. So he has made a high and strong earthen platform. During flood he used to bring all his belongings on to the platform, while the family cooked food there. But during 1988 flood things were completely different. His homestead including the raised platform went under water and his heads of cattle were lost. He, along with his family, took shelter on the embankment. He received a little amount of wheat and flour as relief assistance. Mumtaz Munshi thinks that 1988 flood was the most devastating.

3.2 Group Discussion

During group discussion problems relating to the following aspects of Char life were discussed in great detail. The picture with regard to specific issues as emerged from the discussion are presented in the following sections:

Land Ownership

Widespread erosion and accretion take place in the Jamuna. The land ownership pattern in the Char land is a peculiar phenomenon. People at large continue to pay the rent for land even if these go into the river. They are well aware of the law relating to erosion and accretion. According to the existing law if any portion of land is lost in the river the landowner is exempted from the payment of rent of that particular portion of land, but if such land emerges due to accretion it would become state property or Khas land. The Char inhabitants do not want that their land to be declared as Khas land. Thus they continue to pay the rent for the eroded land with a view to continuing their right of ownership. When accretion takes place they just take possession of the land with the support of their legal documents. From the discussion it was learnt that the owners get back possession of the eroded land even

if accession takes place after 10/15 years later. This phenomenon and established local practices lead them to pay rent for eroded land. The owners of the land are not interested to inform the revenue collecting authority about erosion as well as accretion. People themselves manage the job. The local practice is that only the owners of the eroded land can lay claim over the land. The accreted lands are distributed on the basis of Mauza maps. If anybody's land are not accreted according to Mauza maps he can not put any claim for the accreted land. The participants of group discussions stated that only very few among them do not pay rent for their eroded land. Financial constraint was assigned as the only reason for such non-payment. They also added that the persons concerned would pay the arrears of rent if financial conditions improved.

Land Settlement

Regarding allotment of Khas land in the Char, the people during group discussion opined that they have not heard of any khas land in their area. They felt that for any future plan for allotment of Khas lands in Chars, persons whose land has gone into the river should get preference over others. Local people apprehend that all Khas lands might be allotted to local influential people in fake names because these people are in a position to influence government machinery.

Land Disputes

It was also gathered from group discussion that disputes over ownership and occupation of newly accreted land are very rare in the Char study area.

Communication

No formally government provided communication system is available overland in the Chars. The widespread means of communication is by boat. Two types of boats, engine and country boat are found. Within the Chars no paved road exist, while non-metalled roads are used for covering distances within Chars. During group discussion people feel that lack of communications very much hampers transportation of goods. They suggested that some sort of riverine communication system should be developed for the Char people so that they can easily travel within Chars and also to the mainland.

Education

Very few educational institutions are found in the Char land. It was learnt from people during group discussion that there are some places in the Chars where literacy rates are very low. The reasons they assigned were:

- With erosion of land on which educational institutions stand, they fall into the river, while school houses are shifted to other place. As a result students drop out from these institutions.
- Non-availability of teachers for the educational institution was also cited as a reason for the poor state of education in the Char lands. Teachers who generally do not belong to the Char hardly get accommodation facilities. Moreover, teachers from the mainland are least interested to come to Char lands.

To overcome the problem of education, people suggested certain measures:

- Low cost make shift school houses should be constructed so that these can be easily relocated.
- While relocating schools care should be taken that these are constructed at places close to the earlier sites.
- As teachers come from different places, accommodation facilities for them should be provided.
- Besides, a number of schools may be constructed for Char land students on either side of the Jamuna with hostel facilities.

Health Facilities

During group discussion the non-availability of proper health care facilities was cited as a major problem of the Char inhabitants. No qualified physician was found in the Char land. But a few doctors were available in the set back areas like Phuchari, Sariakandi and Islampur. Char people are solely dependent upon Quakes for treatment of their ailments. Another problem mentioned earlier was the non availability of medicines. For purchasing medicines people usually go to larger market centers like Gaibandha, Dewanganj, Sariakandi and Islampur. Though some health centers exist in the Chars, doctors and medicines are hardly available. Health and Family planning workers are assigned with their respective Chars but group discussion revealed that they rarely visit their areas of operation. They generally do not visit Char land during the whole of monsoon. It was learnt from the people of Jigatola under Islampur Thana that Health and Family Planning field worker have not visited the place even for a single day in the last 3/4 years.

Diseases

The Char inhabitants mentioned the following common diseases they suffer from: diarrhoea, dysentery and fever of different types. Recently quite a few old people are found suffering from paralysis. Goitre is another common disease found in the Char.

Health : Suggestions

The participants in the group discussion put forward some suggestions to improve the situation relating to health facilities/services in the Char land:

- Low cost, make shift rural health centers could be established in the Char. If threatened by erosion they can easily be moved.
- Qualified physicians be appointed to these health centres. If their appointment can not be given on permanent basis, at least their services should be made available twice a week.
- Adequate supply of medicines should be ensured to these health centers.
- Mobile health teams may also be organized so that they can provide health services to different Chars on regular basis.

Flood

Flood is a common phenomenon in the life of Char inhabitants. Especially the 1988 flood caused severe impacts. Almost all Char lands in the Jamuna were inundated. People lived on craft made of banana trees. In some places, raised homesteads were used as flood shelters. A large number of the flood victims took shelter on embankments on both sides of the Jamuna. But in most cases poultry, livestock and houses were destroyed as these could not be shifted to safe places. It was gathered that only one flood shelter exists in Zozira Char and no communication system functions to inform people about abnormal flood levels.

With regard to relief operations the people stated that most of the Char inhabitants did not receive relief material during 1987 and 1988 floods. However, in some Chars relief materials in the form of rice, old cloths, medicine, water purifier etc. were distributed by the Union Parishad under the supervision of military personnel. It was reported that NGOs like Save The Children Fund (U.K.) and Terre Des Homes distributed some medicines and food stuffs among the distressed, especially among the children in Sannyasir Char under Erendabari Union of Dewangonj Thana. Service Civil International (SCI) also undertook relief operations in Char Gabagachi Union under Bhuapur Thana. However, total relief was insufficient as compared to needs of the people.

The flood mitigatory measures as suggested by the people are:

Elevation of homestead and livestock platform

In every household, whenever possible, they try to elevate a small section of land for the cattle. Therefore, there is a strong feeling that individual measures are required to protect the livestock and themselves as soon as they can afford it.

In the light of a higher than normal flood level, it is suggested to provide an opportunity to raise the level of homestead, with specific emphasis to the poorest section of the population.

Construction of flood shelters

Raised earthen embankments should be constructed in Chars. During flood times these could be used as flood shelters for humans, poultry and livestock. Flood proofed educational centers, rural health centres and hat bazaars could be built on these raised platforms.

Other alternative measures of flood proofing suggested, included raised flood shelters to be constructed in the mainland on both sides of the Jamuna. When flood inundates the Char areas people, poultry and livestock from Chars could be shifted to these flood shelters.

Scattered homesteads may be rebuilt in cluster villages to be situated on the raised earth platforms well above the 1988 flood level.

3.3 Study Team Observations

Communication

Jamuna Char lands are one of the most poorly communicated areas in the country. Waterways serve as the only channel of communication. The whole area is criss-crossed by different channels of the Jamuna. The only mode of transport is the boat. The boats are of two types: country boat with and without diesel engine. These two types of boats are used for travelling from one Char to the other and also to the mainland. To travel from one place to the other within the Char one has to rely on foot. Roads are almost non-existent in Chars. Only one road had been built on an embankment in Rajbari Union of Kazipur Thana under Sirajganj zila. In the dry season the riverine communication network gets disrupted in many places as river beds are silted up.

Education

Provision of formal education in the Char land has been found to be poor, the number of educational institutions being very few. It has been observed that a number of primary schools have been lost to the river by erosion. Sometimes classes are even being held in private houses and attendance of teachers and students is very low. Most of the teachers belong to the mainland and show irregularity in their presence at the work place. They have to cross the Jamuna and travel a long way from the mainland to the Char land. Going back after school hours is also difficult for them. No accommodation is available for them in Chars. Informal education provision and particularly Madrassah education is however relatively more common than on the Mainland. This may be a response to the lack of state provided education facilities or their existence may itself feed to less incentive for Government provision.

Employment

Other than traditional sectors of employment like, agriculture, day labour and fishery no other avenues of employment are available in the Chars. A day labourer in the Char land gets Tk.10-12 with 3 meals as wages per diem.

Migration

It is observed that when lands get eroded into the river, Char inhabitants migrate from one Char to the other and sometimes they go to nearby mainland (Set Back Land) which lies between the river and the embankment. It is a customary practice to allow displaced to settle, regardless of where they come from. The settlers are free to choose the place where they want to settle or build their houses. Homestead lands are generally offered free of cost. In some places a little amount of money has to be paid as rent on a yearly basis. Moreover, while shifting and constructing houses, the inhabitants help each other voluntarily. During any natural calamity or disaster they help each other to overcome this.

As many Chars in the Jamuna are very unstable, migration is a common phenomenon. Generally, people migrate to nearby Chars, sometimes to the Set-Back land in the mainland. It was further observed that Char villages prefer to migrate to the same place each time they are displaced. They retain the name of their own village when they settle on newly emerged land.

Agriculture

Agriculture is the main occupation of the Char inhabitants. Chars are formed by sediments brought by the Jamuna. The soil formation contains sand and sandy loam. Newly accreted Chars contain mostly sandy soils. In relatively old Chars both sandy and loamy sandy soils exist. Cultivation of crops in newly accreted sandy soil is not possible. In newly accreted lands in some places Kaon (Millet) is grown, while in other areas having loamy sandy soil both Kaon and paddy are grown. In addition ground nuts, chili, China, pulses and onion etc are also cultivated. The inhabitants generally follow traditional methods of cultivation. Modern irrigational facilities are more or less non-existent in the Char land. However, in a few places low lift pumps and shallow tube wells are used for irrigation purposes part time only for boro paddy cultivation. The people stated that the fertility of the soil has diminished because of deposition of sand on the top soil during the devastating flood of 1988. But widespread use of chemical fertilizers for increasing productivity was not observed in the area covered under the study, possibly due to costs and difficulty in access although this may change as a result of the fertilizer factory commencing production.

Livestock

Large tracts of grazing land are available in the Chars. It was observed that people own herds of cattle, buffalo, sheep and goats. These serve as a source of income for the people. Char inhabitants earn a good amount of money by selling cattle and milk to buyers, most belonging to the mainland. The people reported that as no flood shelter exists in Chars cattle are sometimes washed away. During 1988 flood a significant number of cattle were lost in the river.

Poultry

Poultry is an important source of income for the Char dwellers. It was observed that people generally do not keep ducks because these move about from one Char to another and can not be traced. Migratory birds are also found in good number during winter. But floods pose a threat to the existence of poultry in the Char land.

Health

Modern health care facilities are virtually non-existent in the Char land. Only one Family Planning Health Clinic was found at Khas Rajbari Union in Kazipur Thana under Sirajganj Zila. Modern health care services depend solely on facilities that are available on the mainland. Generally, for treatment of diseases, Char inhabitants rely on local Quacks, paramedics and traditional medicines.

Marketing

Marketing facilities are not available in the Island Chars. However, there are a good number of Hats/Bazaars in the Set-Back land and in Attached Chars. Small shops were found in the study area. Char inhabitants mainly buy and sell their products in Set-Back and Attached Char markets. They travel to these places twice a week for this purpose.

Housing Pattern

Cluster and Linear type of housing layouts were observed in the Chars. Very few houses were found in isolated areas. Houses with tin roof constitute around 40% of the houses, the rest are thatched.

Flood

Inhabitants of the Char land and Set-Back lands live with flood. Their homes are built on high platforms. During "normal" floods homesteads are not generally badly inundated. People as well as poultry and livestock live together in these places. Country boats are used as transport, but during the devastating flood of 1988 almost all the houses/homesteads were inundated. People took shelter on roof tops, boats and on embankments in the nearby mainland. Almost all the houses were either partially or totally damaged. Poultry and livestock



were washed away in the river. People came back to their homes after the recession of flood water and began life again.

Effect of Embankment on Flood

The people of the study area are of the opinion that after the construction of embankments on both the sides of the Jamuna (this has happened at Bhuapur) the adverse effects of flood have already increased. Water has been confined to areas in between two embankments. As a result water level as well as pressure has increased which has consequently led to soil erosion.

Institutional Facilities

No institutional facilities other than Union Parishads and a few primary schools are available in Chars. In many Chars Union Parishad offices are housed in the houses of Parishad Chairmen. Most of the Union Parishads Chairmen were found to be staying in the mainland. Further, it is observed that many Unions have been lost to the Jamuna due to erosion and the victims have migrated to other Chars or to nearby set back areas and have retained the names of their eroded Unions and villages. In the same way school houses also have been rebuilt retaining old names and addresses. In Sannyasir char under Erandabari Union international NGO's like "Save the Children Fund (UK)" and "Terre Des Homes (France)" undertook some relief operations during and after the devastating flood of 1988.

Legal Rights on Land

The laws related to river erosion and accretion are not generally observed or practised in the Chars. It was observed that the people are more or less aware of different provisions of the law. The law prescribes for abatement of land revenue for eroded land and subsequently if the land appears due to accretion it becomes state property or khas land. However people continue to pay revenue even for the eroded lands because they do not want their lands to be declared as state property or khas lands. The inhabitants feel and are quite optimistic that eroded lands would soon be accreted. If such lands are made khas lands due to non payment of revenue it becomes very difficult to get back these lands.

Violence of any sort relating to ownership of accreted lands in the Chars was not reported by the interviewees during study. The usual practice is that when a Char is accreted local people themselves, with the help of the Mauza map distribute it among themselves on the basis of their preserved legal documents.

Fishery

It was observed that many landless poor people are engaged in fishing on full time basis. Almost all the people at times catch fish. Such catches are basically for their own consumption. Those who have taken up fishing as their main profession are extremely poor, usually they use traditional or age old fishing equipment. The fishermen sell their catches within the Char villages as well as mainland Hats.

3.4 Flood Impacts and People's Response

Field investigations conducted during the study reveal how the people respond to flood hazards. Given the scarce economic resource base, most of the affected people have developed coping strategies to minimise physical and economic damage.

Depending upon the severity of the flood, the location of the households with respect to the distance from elevated areas (embankments, flood shelters, high land) different kinds of responses are adopted. With respect to the protection of livelihoods, the measures taken by the households on emergency basis consist :

- the construction of a raised platform on the house floor where family members will cook, sleep and remain until flood water recedes.
- the evacuation of the family members to nearby elevated areas such as embankments and high land of the mainland, or to nearby flood shelters or flood proofed areas whenever they are available in the vicinity of the household settlement.

As shown in Table 9.3.1, an overwhelming majority (67.2%) of the Island Chars households stayed in their houses during 1988 either on the roof or on raised platforms while a minority (25%) took shelter on nearby embankments and/or on elevated areas of the mainland. The population in the Set Back land has easier access to embankments and the mainland although the proportion of families which remained in their houses was still significant at 49% , it is much lower than in the case of Island Char inhabitants.

Table 9.3.1 Household Responses During the 1988 Flood

Measures Taken	Island Char Land	Attached and Set Back land
	%	%
No Measures	3.0%	4.6%
Own House (roof/platform)	67.2%	49.8%
Neighbouring House	5.0%	2.3%
Boat	2.2%	0.9%
Flood Shelter	1.1%	0.9%
Embankment/Mainland	21.5%	41.5%
Total	100%	100%

Due to several reasons such as the prohibitive distance between their homesteads and flood proofed areas of the mainland, the lack of boats and the fear of losing belongings from unattended houses, around 33,000 families residing in Island Chars and Set-Back Land appear to have no other alternative than to devise "indigenous flood proofing" facilities within their homesteads.

For this portion of the population, the flood risks with respect to human life is probably higher since they do not seem to be in a position to reach secured flood proofed areas where their life will not be threaten to the same extent. As a result, they should be placed high on the agenda of any proposed flood proofing programme to be developed in the Char Land.

The population being displaced by flood water usually remain as a family unit, and if moving as a wider group, also remain together with their kith and kin. New neighbourhoods are generally established without too much difficulty on the embankments and on the mainland.

The evacuation of livestock is usually very difficult to secure due to the lack of boats. However, for households living near elevated flood proofed areas, it is a common practice to shift the livestock and poultry to secure places whenever flood waters peak up beyond the normal limits of regular monsoon flooding. Poor communication accentuate this problem and the situation of island chars inhabitants is much more critical since the availability of high land is virtually nonexistent. Because it is hardly possible for most of the households to evacuate their cattle and poultry stock by boat, some households have established, on a cluster wise basis, raised earth platforms where all the livestock of the local households could be accommodated.

However, whatever the strategies adopted to cope with flood hazards, the direct and indirect impacts of abnormal flood on the livelihood of the Char Land inhabitants is significant.

Direct impacts include loss of human lives, loss of livestock and poultry loss or damage to dwelling units and assets, loss or damages to standing crops and loss of employment opportunities until flood water recedes.

Indirect impacts are linked with the occurrence of water borne diseases and other flood related diseases due to starvation, malnutrition and an overall unsafe hygienic environment.

Another significant impact of flood disaster is that it tends to increase the dependency and indebtedness status of the poor household, which usually have no other alternatives than to borrow money from their landlords and patrons.

Based on the data collected from the household survey, estimates of the direct quantitative impacts of the 1988 and 1991 floods in the study area are reported in Table 9.3.2.

The livestock and poultry losses have been estimated. To assess the significance of house damage and crop losses the proportion of affected households against their total number has been shown.

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Livestock/poultry ratios indicate the frequency of occurrence of loss among the total population/stock. Because no data were available for 1988, the total population/stock is assumed to be equal to the level of 1991. Though this provides a bias with respect to the absolute value of the 1988 ratios, the relative differences existing between Set-Back land and Island Chars is unbiased and is significant enough to highlight that the extent of damage in Island Chars far exceeds the level reached in Set-Back land.

Table 9.3.2 Flood Impacts in 1988 and 1991

Flood Impact	Island Charland (Z1-Z2)		Attached and Set Back Land (Z3-Z6)	
	1988	1991	1988	1991
Livestock Loss				
- Estimated No	15,399	2,140	14,778	974
- Ratio	5	40	5	70
Poultry Loss				
- Estimated No	83,812	8,025	101,001	8,444
- Ratio	3	28	3	34
House Damages				
- % of HH	94.2%	37.7%	90.8%	27.2%
Crop Damages				
- % of HH	78.0%	46.8%	57.6%	21.7%

After the receding of flood waters, the re-establishment of dwelling houses is the major priority for the displacees because of the acute necessity for shelter during the monsoon. The dismantling of houses or at least the salvaging of roofs is one of the few loss-reduction strategies practised by the flood affected people.

For many, however, the re-establishment of homesteads is delayed while they live and recover on embankments, or become dependent upon accommodation offered by friends or kin on the mainland.

For the majority of flood and erosion displacees, livestock are the sole source of livelihood as they are primarily farmers. Once their assets are lost through displacement, few are able to rebuild their way of life without external assistance. It is common to sell livestock if any remains at the time of displacement.

At the community level, because of limited extent to which displacees are able to help themselves, they become wholly dependent upon informal assistance from immediate kin or the local wealthy landowners

and village leaders and formal assistance from local government official and non-government agencies.

Relatives and friends are seen as a major source of help in the event of displacement. Many also place faith in that Allah will provide them food. They also approach NGOs and relief agencies regarded as potential sources of help.

Contact between Local Government officials and temporary displacees is more of mistrust than of confidence. The most common, and often the only, available place for them is the embankment: there displacees are not happy as the BWDB officials do not wish to encourage this practice. Displacers migrating to nearby urban centres, where they establish unauthorized squatter settlements, live in a constant state of conflict with local authorities. After floods subside, or the chars emerge, displacees leave these temporary havens to go to the emerged Char homeland.

Since formal means to cope with the incoming flood disaster were extremely limited, people invented their own means of survival and coping strategies. These are:

- drinking coconut water till first relief arrives
- floating on bamboos, log, branches and craft made of banana tree
- living on rooftops

In the post disaster period, for lack of cash for purchase of agriculture inputs, the affected people approach NGOs, friends, relatives and finally money lenders to acquire capital needed to improve draught power and other agricultural input (seeds etc.). The big and medium farmers try to improve cropping intensity to recover their losses, while the landless go out for construction work (embankment, roads etc.).

The incidence of health hazards during the post-disaster period is severe. People are frequently attacked with diarrhoea and cholera. The most serious contributory factors to flood induced mortality is the forced use of polluted river flood water for drinking when normal safer sources are inaccessible or become polluted. They have no way of purifying the water or getting the safe water from tubewells which remain inoperative for at least 2 to 3 weeks after the flood water recedes.

3.5 Effects of Future Development Proposals

Section 1.1.4 has outlined the FAP land and water management interventions being considered which will have impacts on the FAP 3.1 Char lands study area. Mention was also made of the Jamuna Multipurpose Bridge Project.

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The Brahmaputra Right Embankment is already in place but its impacts will only be fully realised when combined with the proposed embankment on the left bank as part of the FAP 3.1 mainland intervention. The whole issue of how possible external project dis-benefits should be apportioned is difficult. The most logical approach would seem to be for each sub-regional project to address itself to the area adjacent to it, irrespective of the actual apportion of dis-benefits, affected local people are most likely to blame negative impacts on interventions carried out closest to them. Irrespective of the mainland intervention there is clearly a case for an intervention in the unprotectable land which has a very significant flood risk even without the additional effects of Mainland embankment.

The recently published revised results of the hydrological modelling supporting study FAP 25 (Ref: Figure 7.6 of their Main Report of June 1992 reproduced as Figure 3.3.4 in Annex 3) has revised slightly downwards the predicted rise in peak flood levels under embanked conditions. More details have also been given as to the assumed embankment locations used in this work (see their Table 9.1 for the range of scenarios to be modelled in future and the attached map for the embankment location). This work now indicates that under a peak flood condition (similar to 1988) with the existing Brahmaputra Right Bank and Jagannathganj to Bhuapur embankments in place, plus the proposed FAP 3.1 embankment and the possible extension to Jamuna Bridge and the left bank of the Dhaleswari (see Figure 2.3 for the locations), the flood levels in the confined area between the existing and proposed embankment are likely to rise. The figure at Bahadurabad at the northern end of the project area is only +0.07m, however the figure at Sirajganj is estimated to be +0.54m and +0.49m at Kazipur (opposite Jagannathganj at the southern end of the study area).

The influence of the proposed Jamuna Multipurpose Bridge, the approach roads for which are already under construction, has been discussed with members of the World Bank impact assessment team. This has indicated that as a result of hydrological modelling work (using the same model as FAP 25) they expect an additional increase during similar peak flood conditions of +0.5m at the bridge stretching back upstream for some 50km (see Figure 1.1). Apportioned by length of the river this would mean an additional +0.25m at the southern end of the study area totalling +0.74m for both impacts. However this needs to be verified as there may be different incremental effects in adding both of these impacts together.

Thus the total impact of the FAP 3.1 embankment and Jamuna Bridge would be 0.07m at the northern end of the study area and 0.74m at the southern end, a mean of some 0.40m. This would logically be apportioned to both FAP 1 (the right embankment) and Jamuna Bridge. Whilst this increased flood height is significant, it is only some 10-15% of the total rise needed to overcome the peak 1987 flood to which it applies. The conclusion is that although the increased flood risk is significant, of far greater significance is the existing flood risk. This would seem to add weight to the idea that a major flood proofing

initiative in the Charland and all other unprotectable land is required irrespective, and arguably as a higher priority, than the Mainland. Part of the costs of this (but it would only be a small part) could be apportioned to the FAP 3.1 intervention. However mitigation of this benefit will only be of use if carried out as part of a total programme.

There appears to be some uncertainty as to the implications of the previously reported datums difference of 0.2m from the left bank to the right bank given by FAP 18. This is therefore being discounted from consideration at the moment but will need to be borne in mind drawing up any detailed flood proofing programme, especially when using mapping with possible different datums. Further refinement is expected from FAP 25 in future but these figures give some idea of the scale of the problem and the basis for any mitigation proposals.

Of greatest significance are conditions of lower flood conditions which presently do flood cause flooding of agricultural land and homesteads but under the embanked conditions would do so. Until the FAP 25 simulation is run for a range of differing conditions and interfaced to digital evaluation data, it will be impossible to get an idea of the likely change in extent, depth, frequency and duration of occurrence of such flood events. Ideally it would be desirable to have synthesised dates that differing flood levels would have occurred using historical data. The relationship of the timing of these floods to the cropping calendar will be important in assessing possible increased crop damage. This will have to await future modelling but is of prime importance and a constraint to any on-going programme.

Of particular concern must be the "Set-Back" part of the mainland (i.e. that land on the unprotected side of the main Jamuna embankment) which would not expect to flood in a present normal year but under embanked conditions may. These areas are essentially unprotected mainland areas with high population densities.

The issue of likely changed erosion and sand carpeting risks as a result of embanking requires serious consideration, however it seems to be impossible to predict, let alone quantify this with present knowledge and data. It would need a major programme of river morphology studies over a long term period. Some result may be possible once the FAP 24 studies start to yield results, but this remains a cause for major concern. It would be unwise to embark upon a large flood proofing programme without some prediction of future patterns due to embanking.

The requirement for an Environmental Impact Assessment for the type of socially based development programme proposed as part of a strategy for the Char lands is likely to be of a low category under the World Bank Operational Directive 4.01. The likely requirements and nature of any EIA for the Char land work will be considered in the next stage pilot study of the area.

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4 PROPOSED INTERVENTION PROGRAMME FOR UNPROTECTABLE LAND

4.1 The General Approach: From Flood Mitigation to Integrated Development

4.1.1 The Range and Scope of Possible Interventions

The previous sections of the report have highlighted the fact that there are a wide range of hazard risks which occur in the Char lands and these can be particularly high, especially when compared to the mainland. The inventory work of FAP 16 has shown that the predominant hazard risk to human life, expressed by the number of human deaths, varies considerably from Mauza to Mauza. In addition there are hazards, such as bank edge erosion, which while not directly killing a significant number of people impoverish them, often in a relatively short space of time. Approximately 315 people are reported to have drowned in the 1988 flood where as 307 have died from attributable epidemic disease in the last 5 years. Whilst this is low compared to deaths from coastal cyclones in the south of the country it is significant in local terms, especially when compared to the mainland. However the distribution of mortality is very variable with the flood deaths being concentrated in a few isolated low Island Chars where as the epidemic disease outbreaks appear to be on the more densely populated permanent Island Chars.

This does however illustrate that although flooding is a problem in the Char lands, epidemic disease outbreaks can be even more serious in some places and the consequences of land loss due to bank edge erosion, particularly that which occurs in the low flow dry season situation, can effect even greater numbers of people with devastating consequences for economic livelihood and welfare.

This then raises the issue of what should be the range and scope of any proposed intervention in the Char lands? Whilst the study was initially driven by concerns as to the induced flood risk that would be posed to the area by the proposed intervention on the FAP 3.1 mainland and particularly when combined with the existing FAP 1 embankment and the proposed Jamuna Multipurpose Bridge, it is apparent that there are other significant factors which need to be taken into consideration. Rather than just seeing things from the narrow perspective of mitigation needs due to the increased flood risk created by the mainland intervention, (which is in any case a small proportion of the significant existing flood risk), it raises the issue of why the unprotectable land, which already has the highest flood risk, is not being considered for an intervention in its own right. The issue at the centre of human activity on the Char lands is economic livelihood and sustainable development of which flood risk is an important but variable part. This would thus seem to justify consideration of an intervention with a much wider focus than purely addressing the flooding problem. The public participation work done for the study has focused on the needs of the local people and

what they perceive to be their problems and how to overcome these. Whilst it is felt that the basis of a proposed intervention should be a flood proofing programme, this should just be the central component upon which can be built a range of household income generating and risk minimisation activities as part of a wider integrated development programme.

4.1.2 Hazard Risks and Needs

The range of issues raised by local people which they perceived to be of importance in the preservation of their livelihood included the frequent occurrence of flooding with "normal" years cited as being a serious problem in many places as well as widespread occurrences during peak floods like 1987 and 1988. However in some areas regular land erosion, the lack of basic social infrastructure, particularly schools and health centers, and poor income generation opportunities were all considered to be significant factors in making living conditions of the population in the study area particularly difficult and transient.

Flood is a perennial problem in Char land and poses a permanent threat to the livelihood of the Char dwellers. In the 1988 floods, which were the most severe in the living memory of inhabitants (although 1987 was almost as equally bad), one in 374 people in the Island Chars were drowned. In addition more than 90% of the housing units were damaged, about 70% of households had their crops affected to some degree, 20% of their large and small livestock perished and 30% of the poultry stock was lost. The flood of 1987 (see Figure 5.3 in the Main Volume of this Report) was almost as bad. Even in 1991, which was a year of "normal" to "high-normal" flooding, the extent of flood damage in the Char land was lower than in 1988, but still, 30% of housing units were damaged. However without flood risk mapping, analysis of this is limited and illustrates the need for Digital Elevation Data to be interfaced with the MIKE 11 hydraulic model to produce maps of flood extent, depth, duration and timing under a range of flow conditions, with and without the FAP 3.1 mainland embankments in place. For the moment the best data available is that from FAP 16, summarised in Table 9.2.1. The presently published results of the FAP 25 simulation of a with and without embankment condition were given in Section 3.5. The conclusion from this is that the increased flood risk is in the order of a mean rise of 0.30m in a 1988 peak flood condition. Whilst this is significant it is only some 10% of the estimated level that it is thought necessary to raise existing homesteads to make them flood free in a 1988 type situation.

However what is probably more important is to identify those times when previous to an intervention agricultural land and homesteads did not flood but would under similar inflow conditions in a post embankment construction situation. This is particularly likely to be an issue with agricultural land which may suffer periodic inundation during cropping seasons. Only detailed flood simulation modelling will shed any more light on this although in its absence it maybe worthwhile investigating

the use of time series radar satellite imagery on a rising flood to indicate extents of flooding and to calibrate this by relating it to river gauge levels. FAP 19 is studying this at present.

4.1.3 Intervention Justification

There would seem to be a justification on purely humanitarian grounds to implement an intervention programme in the Char lands irrespective of the proposed mainland project. It is a case of deciding priorities and needs and within the broad framework of the Flood Action Plan it would seem that the Char land and unprotectable mainland has a significantly higher flood risk than the mainland and should be of prime concern as far as tackling flooding is concerned, especially as there are almost as many people living in the unprotectable land as the protectable land. However the difficulty is justifying any intervention on economic grounds, especially within the context of the narrow perspective of the FAP GPA which is based upon quantifiable and financially valued benefits. This emphasises agricultural benefits on the mainland and discriminates against socially based programmes with high welfare increase levels which are difficult to justify as the benefits are notoriously hard to predict, harder still to value and virtually impossible to place an economic value against. It depends on policy aims and objectives, particularly national ones as applied to the local area. Such gains as better levels of health and nutrition will ultimately have economic benefits but showing these is impossible at the present.

Even if a Char land intervention were considered unjustifiable there would then be a serious political and equity problem in getting local people to accept a mainland intervention over any in the unprotectable land (which includes a significant area of densely populated unprotectable mainland with a lot of erosion displacees on it). This would be made worse by the fact that the mainland intervention would increase the flood risk to the unprotectable land still further. This raises very serious problems and issues of political acceptability and social divisiveness. It is likely that there would be serious opposition to the mainland intervention if it were planned to go ahead without a parallel programme in the unprotectable land. In any case there would then be a requirement under the FAP EIA Guidelines for mitigation of these negative impacts so that no person would be significantly worse off after the intervention than they were before it. This would require a flood proofing programme at the absolute minimum, to make homesteads and livestock subject to no increase in flood risk. Even so it would be impossible to mitigate for the increased flood risk to agricultural land. Because a partial flood proofing programme which would only raise homesteads to the incremental increase in flood level would be pointless, it seems logical to propose at the minimum, a full flood proofing programme for the unprotectable land, apportioning only the cost of the incremental increase in flood risk to the FAP 3.1 mainland intervention. However the basis and justification for this will need to rely upon humanitarian and social grounds, at least initially.



4.1.4 The Broad Nature of the Proposed Intervention

It is thus proposed to implement an intervention based upon flood proofing to address the issue of both existing and increased flooding of homesteads plus the preservation of human and livestock lives. However it also needs to be wide enough to tackle the issue of income generation and livelihood diversification to overcome to some degree the increased flood risk to agricultural land which will be difficult to mitigate for. This would initially be based at the household level, particularly in those locations, such as Island Chars where settlement is dispersed.

There may well also be significant gains in carrying out a communal flood proofing strategy, if local people wished, as this would be likely to show significant gains and allow the opportunity to provide communal service provision such as tubewells, latrines and perhaps a community meeting house cum school and store. This could also form the basis for permanent flood proofed places of residence in clusters. This approach has already been tried to the south of the study area by the NGO Service Civil International (SCI) with assistance from the Mennonite Central Committee (MCC) and proved successful and sustainable in social terms even though it has been instigated over a relatively limited area and in small numbers when compared to total FAP 3.1 adjacent unprotectable area. The proposed intervention also follows the basis of relevant ideas considered by FAP 23, the Flood Proofing Study. Of prime importance is that it requires to address peoples needs and that the detailed strategy is drawn up (down to individual household level if necessary) by the people concerned, guided by sound technical criteria.

In addition, a component which aims to incorporate the multi-purpose use of existing and planned embankments is proposed, linked with the mainland interventions. The aim is to specifically encourage the use of the embankments as both permanent but regulated places of residence for those already living on them, those displaced by future erosion and those who would chose to live in such flood proofed locations if this were encouraged and properly provisioned for. This is likely to lead to the development of linear flood proofed settlements which would be interlinked, even during a peak flood situation. In addition they could also be used as temporary places of flood proofed refuge during peak floods. This would require a major policy change and initiative in the management of embankments, but if well handled could prove to be a very major benefit to the programme. It would need to be tackled carefully and linked to the land expropriation, resettlement and compensation process in the case of new embankment alignments.

Based on these considerations, the objectives of the intervention are to achieve the following by order of priority:

- to save human lives
- to protect livestock and poultry

- to protect homesteads, houses and household amenities (water supply and sanitation facilities for instance)
- to protect and develop community infrastructure
- to support the diversification and strengthening of economic livelihoods through targeted agriculture production programs and income generation schemes

The program is ultimately designed to cover the entire adjacent unprotected study area of 114 038ha containing an estimated population of 602 600 people as shown in Figure 9.1.2 and listed by Thana in Table 9.1.1. This includes Island Chars, Attached Chars and also unprotectable mainland known as Set-Back land. However it is proposed to immediately instigate a pilot programme centred on five trial areas and covering some 5% of the population and at locations shown in Figure 9.4.1. These cover a wide range of different locations throughout the reach of the river and also on both banks as well as very differing land types. This will allow for consideration of differing types of intervention depending upon the requirements of local people which may well be linked to varieties in land type. Despite its modest size when compared to the total population of the area, it will allow a wide range of experience to be gained which can then be fed back into the subsequent main phase. It is proposed to follow the already established experience of using NGO's to instigate the work by establishing needs down to household level, within technical guidelines drawn up for the work. The Pilot Phase is planned to last for three years, with each NGO tackling a modest total of at least 6 000 people or 1 000 households in that time. It is then planned to tackle the remainder of the area in a further five year period.

4.2 Project Design

To meet the above stated objectives the proposed programme has five major components:

- Minor Structural Flood Proofing
- Community Infrastructure Development
- NGO Support to Char Land Dwellers
- Institutional Support
- Technical Assistance

The project has three different groups of components. The first group addresses the flood proofing objective of the project and comprises minor structural flood proofing and community infrastructure development. The NGO support programme to the Char lands tackles

the need for income generation and diversification and wider issues of integrated rural development.

The other group comprising Institutional Support and Technical Assistance provides the mechanism for insitutional building and ensuring that sound technical considerations and criteria are used in the implementation of the project. This will also minimise wastefull duplication, especially in the Pilot Phase, and allow close co-ordination.

The composition of the flood proofing components is very flexible, being a varied mix of different scales and types depending upon local conditions and peoples desires. Minor Structural Flood Proofing can be carried out at houshold level where as Community Infrastructure Provision is planned as micro projects. These vary in size through clustered communal refuges of different dimensions and elements (including major livestock refuge areas) up to the use of link embankments. For planning and bugetting purposes three different sizes and categories have been estimated, but they are completely variable and need to satisfy local requirements such as population and livestock numbers, ease of movement during a rising flood and area of catchment.

A strong emphasis has been placed upon individual household flood proofing, particularly in the pilot phase, as the socio-economic studies and the work of SCI/MCC has shown that Char Land households are often quite independant of each other and often widely spread with very scattered settlement patterns, particularly on the Island Chars. This will require a detailed household level intervention strategy, a situation where established NGO's in the area have a lot of experience. Conversely in areas of existing cluster settlement a communal level approach may be far more appropriate and sought after by local people. This could form the basis of a communal infrastructure provision programme. This will depend on the nature of existing social organisation and the willingness of people to work together. Again NGO's have significant experience in this, particularly in Attached Char land where settlement patterns tend to be more nucleated and suited to such an approach. However it may be that this could extend itself to the provision of more formalised infrastructureal provision such as schools, clinics, community centres, hand pumped tubewells and latrines. There is likely to come a point at which a more formalised structure is required or there exists an organisation which is already entrusted to provide such facilities, such as the Local Government Engineering Bureau. A clear division of duties would need to be made in such circumstances.

Structural Minor Flood Proofing involves the support of a minimum of 5,000 households at the end of the pilot phase (Project Year 3) with a maximum total of 114,000 households at the completion of the main phase (Project Year 8). Development of community infrastructure includes the financing of 250 packages (50 in PY3, 350 in PY8) to construct Multi-purpose Flood Proof Infrastructure.

In addition to providing the support to the Minor Flood Proofing Component, NGO involvement is needed to support agriculture production diversification/substitution programs and income generating activities. These will also help to raise social awareness and self-reliance (particularly for women), through group organization and training.

The Institutional Support programme encompasses the financing of the basic running facilities and operating costs of the implementing agencies. In the case of the Pilot Phase this will be five carefully selected NGO's who already have experience in the area and/or experience in this type of intervention.

The Technical Assistance programme includes the resources for provision of both foreign and local expertise to support the project implementation by setting the guidelines and criteria for intervention. This will work closely with the Project Management Unit (PMU) and the NGO's to guide the project forward. It would be advantageous if this could be a shared facility with the FAP 3.1 mainland Technical Assistance team.

4.3 Detailed Features of the Project Components

4.3.1 Minor Structural Flood Proofing

The initial main approach to flood proofing has been deliberately targeted at the lowest level possible, the household or small clusters of these. The reason for this is that it is likely to be the most effective approach as it overcomes the need for people to leave their homesteads and unguarded immovable assets during times of flooding. This is particularly important in Island Chars where population densities are lower, settlement patterns are scattered and households are out of necessity more independent of each other.

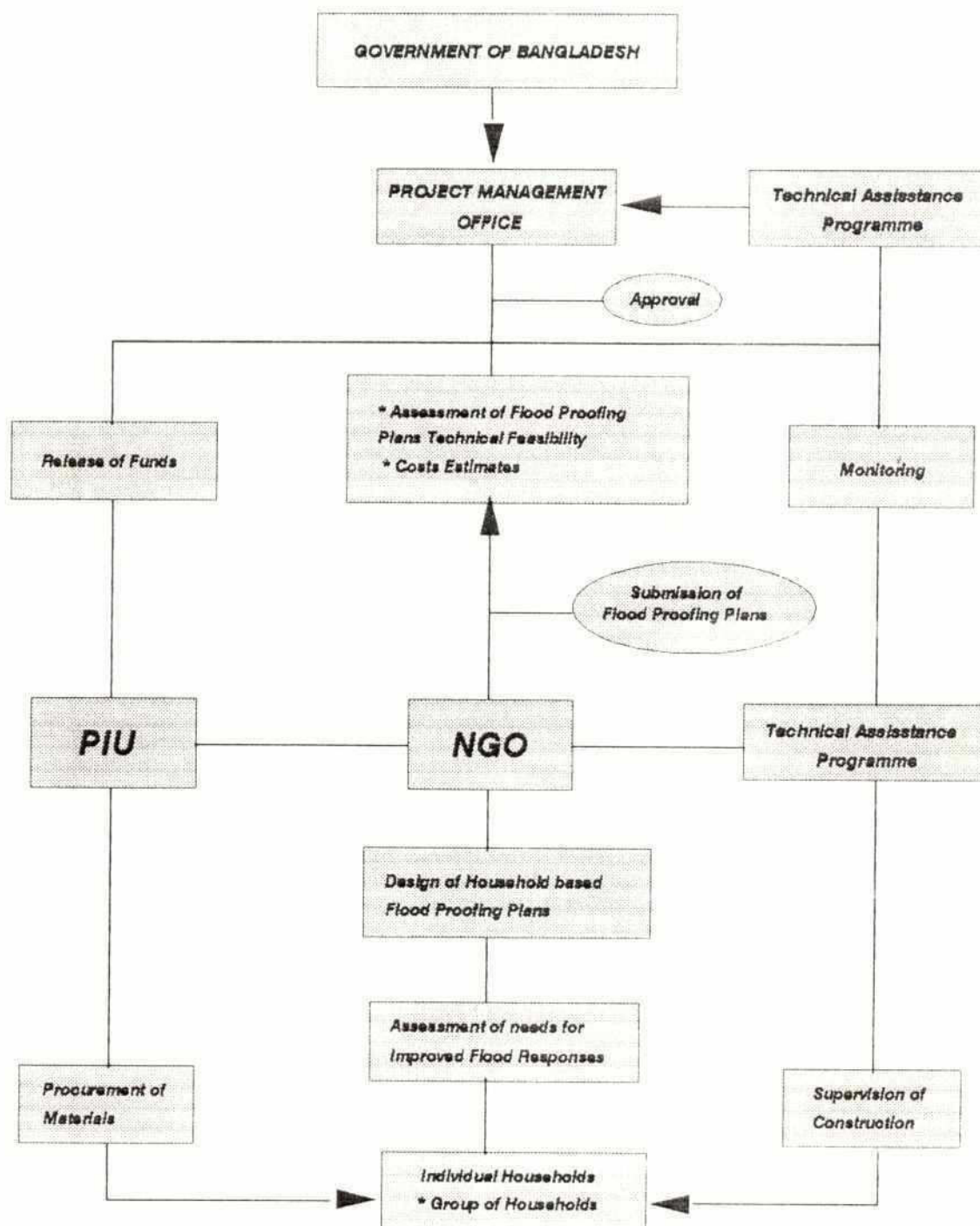
The basis of the approach is a needs led assessment and formation of a "Willing Group" for which a flood proofing plan can be drawn up. However this household approach does not exclude a here intervention with communal flood proofed refuges of various sizes also being implemented where appropriate and desired by local people.

The Minor Structural Flood Proofing programme places an emphasis on strengthening household capability to individually respond to flood hazards, without relying on collective measures which have in the past often proved to be ineffective and costly in terms of coordination and planning.

Because the flood proofing measures are to be designed at the household level in direct consultation with the beneficiaries, they will be specifically adapted to the people's needs and circumstances. This also falls well into the participatory approach being favoured by the FAP. As a result their usefulness in alleviating the stress on household

Fig. 9.4.1

MINOR STRUCTURAL FLOOD PROOFING



livelihoods caused by flooding will be optimized. The sustainability of this micro-approach is also expected to be much higher because it does not require a sophisticated institutional and co-ordination framework to be effective and also maintenance is self operating without any external recurring intervention or cost being required as these are privately owned assets with strong owner self interest.

Another positive aspect of such a household based flood proofing approach is that because it aims to secure the households in-situ amenities and assets, the degree of loss of economic livelihood caused by flooding is likely to be minimized. This should reduce the necessity for the poorest households to depend on the rural elite to provide the resources to recover from flood disasters. This increased self reliance and confidence is likely to provide the means and encouragement for people to further develop their household economic strength and promote increased investment in economic activities.

The household based flood proofing measures are aimed to:

- save human lives
- save livestock and poultry
- minimize damage to dwelling units and to household amenities and belongings
- prevent damage to food reserves and overcome the problems of starvation and famine. This would lessen the requirement for large scale relief efforts
- household property and immovable assets are adequately secured against theft
- there will be no costs incurred by the household with respect of the need for evacuation of household members, livestock and other movable assets
- the household does not need to rely on others for security during flood times. This promotes self help and confidence leading to a more sustainable programme

For each household or "willing-group" of households a flood proofing package will be prepared including the description of the strategies proposed by the household or group, the estimated cost of the intervention and the expected contribution that the household(s) will give towards this.

The basis of the intervention is the raising of existing housing or provision of new replacement housing on a newly built raised mound above the 1988 flood level plus any predicted induced increase in this. The first case requires dismantling of any existing house and its

subsequent reconstruction on a raised platform. In some cases this could be beyond the means of many households, as the salvaged materials from existing housing may be insufficient to rebuild it and they have insufficient cash liquidity to purchase the additional materials required. For this reason a loan and grant facility is proposed for such situations, based upon the supervised provision of subsidised house building materials.

However the findings of the study have shown that many housing units in Char land are often temporary facilities and are in dismantlable sections as they have to be frequently shifted due to flooding and erosion. From the perceptions of Char land people contacted during field work it would appear that there is a strong demand for more secure and improved permanent settlement in the Char lands. This view has been particularly especially expressed by those households who have no legal homestead land. This underlines the need for both a more secure basis for establishing a homestead which is linked to provision of a flood proofed housing program.

The NGO SCI has, with the help of the MCC, developed a housing program in the Char land to the south of the study area in Bhuapur Thana of Tangail Zila. This has proved to be successful and cost effective with very high levels of cost recovery for the loans, helped by the group formation concept which applies considerable social pressure to repay on time. It is therefore recommended that this be replicated in the project area. This program aims to:

1. Provide flood proofed housing facilities targeted to the most vulnerable sections of the population such as the homeless, the landless and the marginal landowners (those with less than 0.1 ha). It is estimated that around 50% of the households in the study area (about 57,000) could be eligible under this program. The project will support the construction of "flood free" houses (1 room, 17 feet x 10 feet) by providing the following building materials:

- 14 corrugated tin sheets 9 feet long
- 12 cubic feet of sized wood
- 8 RCC pillars 11 feet long
- 2 windows and 1 door
- Bamboo fences

The cost of the building materials for one house is estimated at 10,000 Tk. The breakdown of the costs is given in Table 9.4.1. The project will subsidize 70% (7,000 Tk) while the remaining 30% will be loaned to the beneficiaries. This loan will be "interest free" and will be paid back on a monthly instalment basis over a 2 year period.

Because the houses will need to be elevated above the 1988 flood risk level, the cost of earth filling will be partially supported

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(10%) by the FAP 3.1 mainland project. For each eligible household, the mean estimated quantity of fill required has been fixed at 201m³ for households owning <0.1ha of land. The cost of this will be Tk3300 (Tk550 per head) of which the FAP 3.1 mainland project will thus contribute Tk330.

In total, the average project contribution for the 50% of eligible households is 13,300 Tk, 10 000 Tk as a grant subsidy and 3,300Tk as a repayable loan over two years.

2. Providing earth fill to raise the house bases of the remaining 50% of the population (57 000 households) at the rate of 350m³ per household (750 Tk per members). The cost of this will be Tk5700 (Tk712 per head) of which the FAP 3.1 mainland project will contribute 10%.

The cost requirements for the minor structural flood proofing component are detailed in Table 9.4.1. and as part of the overall cost summary in Table 9.4.2.

The Minor Structural Flood Proofing measures could be extended to include flood proofed infrastructure at household level:

- construction of small-scale earthen platforms for livestock
- raising of tube wells, wells and latrines

The institutional sub-framework proposed for this component of the programme is given in Figure 9.4.1. The executing agency is proposed to be a Project Management Office which approves all proposals and is helped by a Technical Assistance Programme which sets the criteria for intervention and design. This aims to ensure unsound proposals (such as major flood proofing in high erosion risk prone areas) are modified and the TA Programme manages and monitors to project on a day to day basis. The main implementing units are NGO's which carry out the following operations under the guidance of the TA Programme and approval of the Project Management Office:

- NGO's organise Group Formation
- NGO's define flood proofing needs and strategies at the household/small group level
- NGO's formulate flood proofing packages with costings with help from the Technical Assistance Programme
- Project Management Office approves the proposed package and cost and releases funds to NGO's
- NGO's procure materials, organise construction with help from the TA Programme and arrange loan recovery

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- Technical Assistance programme supervises to works and monitors and evaluates the overall progress of the programme

4.3.2 Community Infrastructure Development

It is proposed to instigate a major programme for the provision of Community Infrastructure Development based around the construction of shared communal flood refuges. These could be of varying sizes and densities depending upon local needs, specifically the maximum time/distance of travel from people's homesteads during flood situations. In addition there would be various add-on components according to needs. These include livestock refuges, water supply and latrine provision, a building that could be used as a storehouse, school, health and community centre as well as linear connecting embankments, boat provision and a community forestation programme for land stabilisation. In time it is envisaged that these will develop into a network of clustered permanent settlements around the refuges interconnected by the linear refuges.

It is proposed to provide 400 of these to cover the total project area, with 50 of these in the three year pilot phase. The sizing will vary but it is expected that they will cater for between 250 to 300 households and be mainly concentrated in the heavier densely settled parts of the more stable Island Chars and the Attached char land away from existing or proposed embankment alignments. The numbers, locations, sizing and nature of these will be fixed as part of a specific needs-led assessment to be carried out by NGO's in the early part of the Pilot Phase. For the purposes of cost estimation the component has been split into three types and each costed:

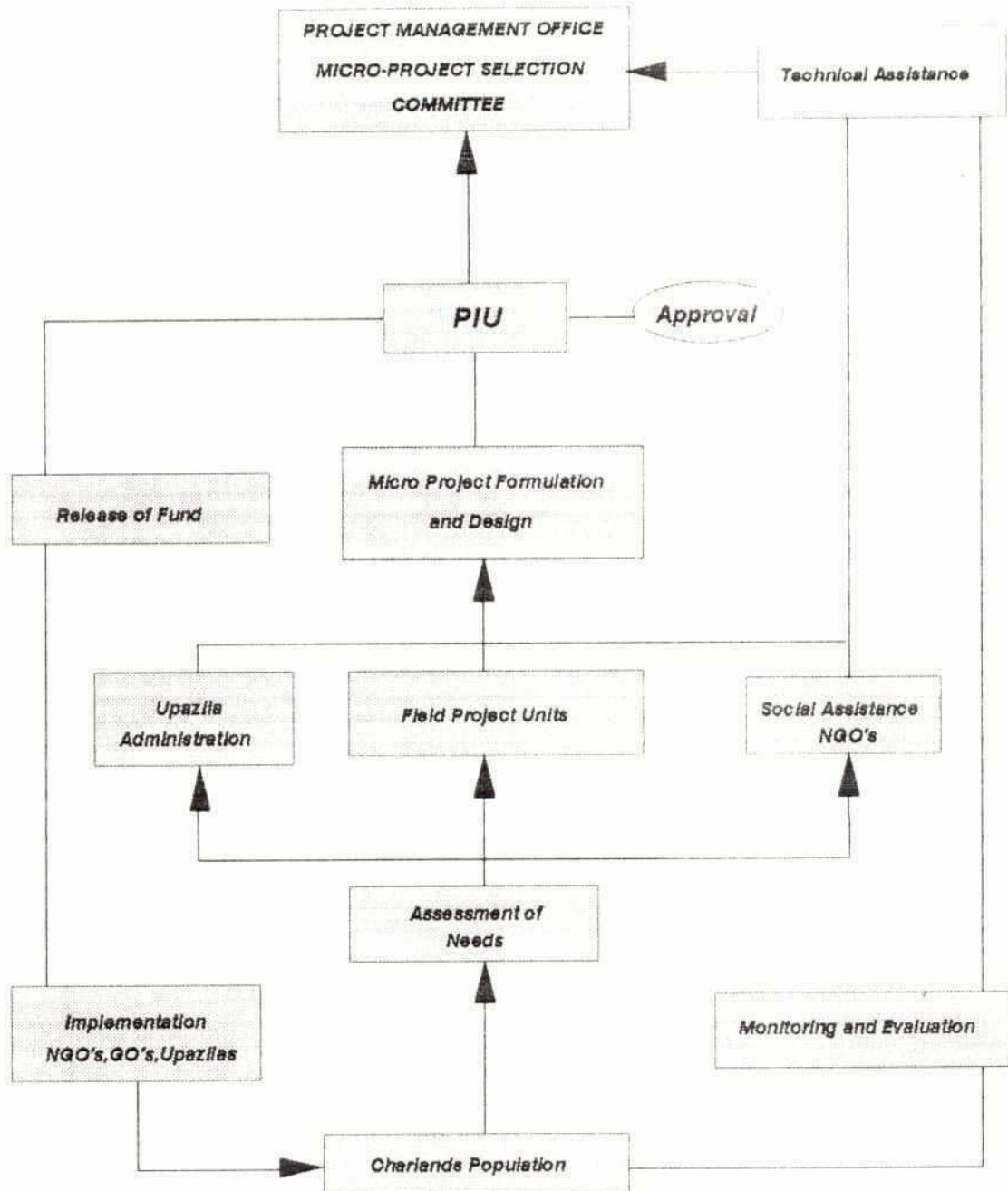
- Type 1: A clustered refuge area measuring 50mx80m, equipped with 2 raised handpumped tubewells, 2 raised latrine blocks and two community buildings, one doubling as a school, the other a health centre and store room. There is also provision for a tree planting programme.
- Type 2: As Type 1 but with a refuge area 60mx30m plus additional provision for livestock refuge on a linear embankment 5m wide and 5km long.
- Type 3: A linear refuge/road embankment linking villages and clustered refuges with 12 raised handpumped tubewells, a raised community building, a suitable engine ferry boat, a flood protected fishpond and a catkin grass nursery plantation.

The guidelines for drawing up these micro project will include the following criteria:

- address the infrastructure needs of the local Char land community as a whole

Fig. 9.4.2

ORGANOGRAM FOR THE COMMUNITY INFRASTRUCTURE DEVELOPMENT MICRO PROJECTS



- develop the community resource base to provide additional and/or improved livelihood opportunities
- be completed in less than 1 year
- be implementable through NGO's or relevant government agencies (Local Government Engineering Bureau for instance) having the appropriate technical capabilities
- cost less than Tk 1 million

It is envisaged that a wide range of items would be considered for construction as micro-project component community infrastructure. They could include any of the following:

- Multi-purpose flood shelters which can also be used as schools, movable valuable assets and seed grain storage and community welfare centres.

The shelters would provide a place of safety where people can flee and receive basic life support facilities during extreme floods. These refuge areas on which the centres would be built need to be located on existing higher land above flood levels and away from erosion prone areas. Technical guidelines will be established for these criteria using the work on erosion and flood risk developed by FAPs 19, 16, 23 and 14. Of particular use is the Char incidence mapping carried out by ISPAN using time series Landsat imagery. Attempts are being made to do a regression analysis on this to predict future erosion patterns. The refuges also need to be located where people can reach them quickly by land or boat during flood risk times. They should have support facilities to allow them to be temporally self-sufficient for at least 15 days. This should include non-perishable basic emergency food stuffs, cooking fuel, water treatment chemicals, life saving medicine and access to a paramedic or community health worker.

- Community livestock shelters created by constructing small scale elevated earth platforms at places safe from erosion where livestock may be given shelter and provided with fodder facilities.
- Safe drinking water supply and sanitation facilities raised above flood level
- Minor scale irrigation/drainage facilities
- Development of small roads/embankments

Suitable micro-projects would be identified by the Technical Department of the Thana Administration and Union Parishad members, in

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consultation with local leaders and residents representatives assisted by the staff of the NGO's working in the area.

The identification of the micro-projects, requires a "needs-led" approach, which aims to closely involve the target population in the identification and planning process. Based on local people's perceptions of the importance of each problem affecting their daily lives the community will be assessed and their needs prioritized. This will require a group formation programme in many cases to produce a "willing group" who have a consensus view as to what should be done and what commitment they are prepared to give to achieve this. This requires a catalyst for which NGO's are well suited and have experience in this type of work and in the study area and similar areas close by.

A micro-project proposal would then be formulated to address the most important community issue(s). Following this identification phase the micro-project proposals will be developed into a costed technical document for forwarding to a "Micro-Projects Selection Committee" under the PMO. the document will including a precise description of:

- the project background and objectives
- the project scope and timing
- the project organization and implementation arrangements
- the project justification
- the project cost
- the proposed work schedule

These proposals will be evaluated and approved or amended by the selection committee using the technical criteria and advice of the TA Programme team.

In order to evaluate the suitability of each micro project that has been identified, a set of indicators will need to be worked out to measure its effectiveness at meeting the overall project objectives. Indicators have to be developed to answer the following key-questions:

- is the project located in an area with a significant risk in terms of flood and/or erosion hazards?
- is the project easy to implement?
- is the local participation element significant enough and are people sufficiently committed to it?
- are there any elements of the proposal which may dis-benefit some people?

- are all of the target population likely to benefit from the project?
- is the distribution of project benefits equitable?
- is there any adverse effects on the natural environment and the use of it?
- is there any major technical difficulties that may prevent the project from achieving its objectives?

After approval from the committee, a contract will be signed between the project management office and the local implementing agencies. The agency concerned could be very variable depending upon the nature and location of the proposed intervention. There may already be existing Local Government obligations to provide some of the infrastructure, in which case the appropriate Thana, LGEB, or Union organisations may be the implementing organisation. However in other areas, particularly the remoter ones with simpler infrastructure proposals then NGO's will be best placed to do this work. Funds will be disbursed by the PMU according to an agreed schedule and under any Donor conditions. The work will be supervised by the PMO with the help of the Technical Assistance Team. The Institutional structure for this is given in Figure 9.4.2.

During the three year pilot phase, 50 micro-projects are proposed for implementation, 10 in each of the pilot phase areas, the needs assessment work for this falling within that to be carried out by NGO's as part of the Minor Structural Flood Proofing Programme. A further 350 additional packages would be financed during the main phase.

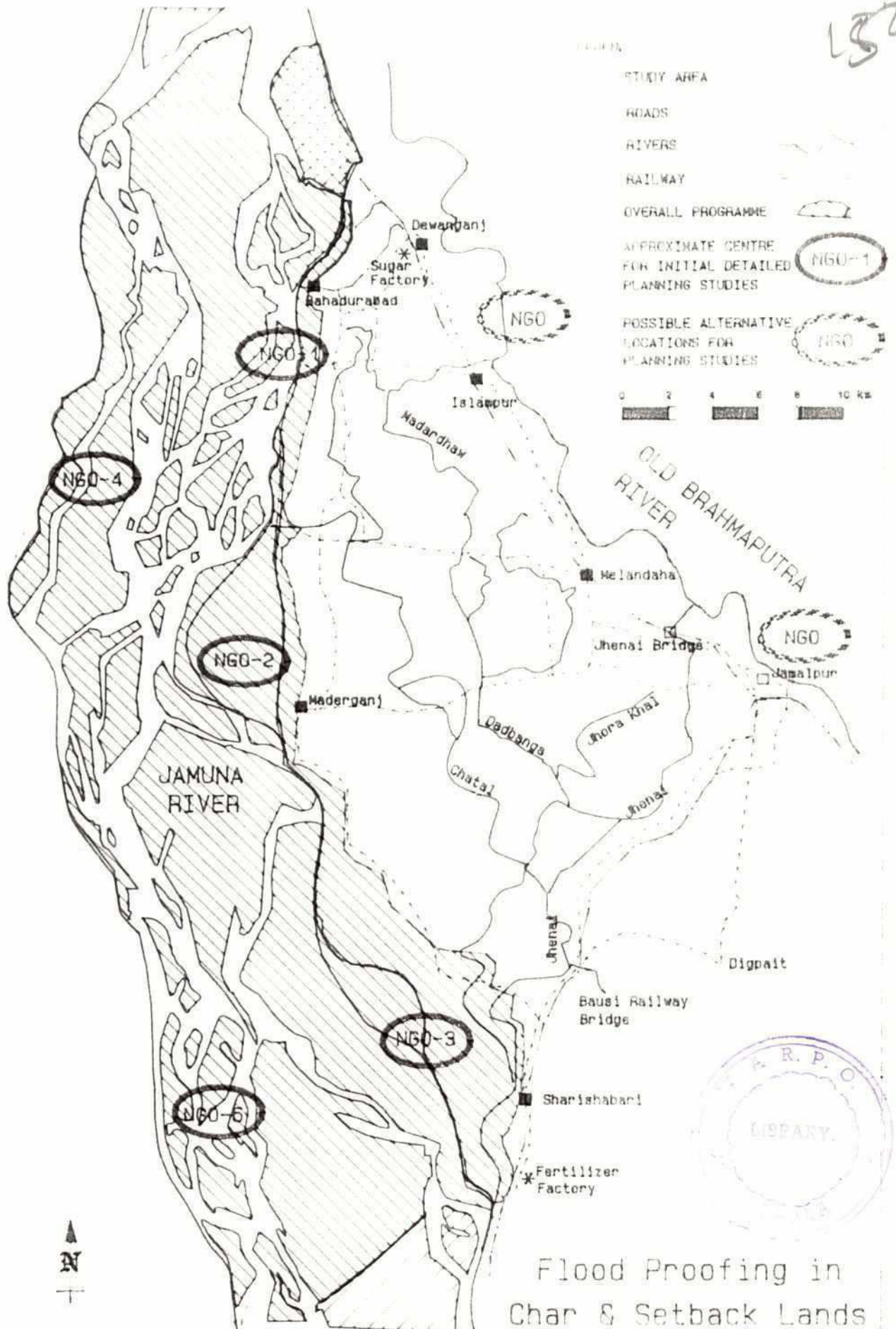
The cost estimates for this work are built up from the three type interventions outlined above and are broken down in Tables 9.4.3, 9.4.4 and 9.4.5. The numbers of each type required have been estimated by weighting them according to the population distribution in differing land types where each intervention type is likely to be most appropriate and this is shown in Table 9.4.6. However the aim is to provide an overall budget figure not to set a rigid format. A very flexible approach is required so that each individual intervention to be tailored to the community it is to serve. The weighted average cost of a micro-project is estimated to be TK500 000:00, some 5.5% of which has been apportioned against the FAP 3.1 Mainland Project as a mitigation cost. The total cost of micro- projects is thus estimated to be Tk200million with the three year pilot phase being Tk50million.

4.3.3 NGO Support to Char Land Dwellers

The identified roles of NGO's already described in the proposed intervention for Char land dwellers include:

- to identify and draw up relevant needs-led strategies for intervention, and after agreement with the PMO, implement the

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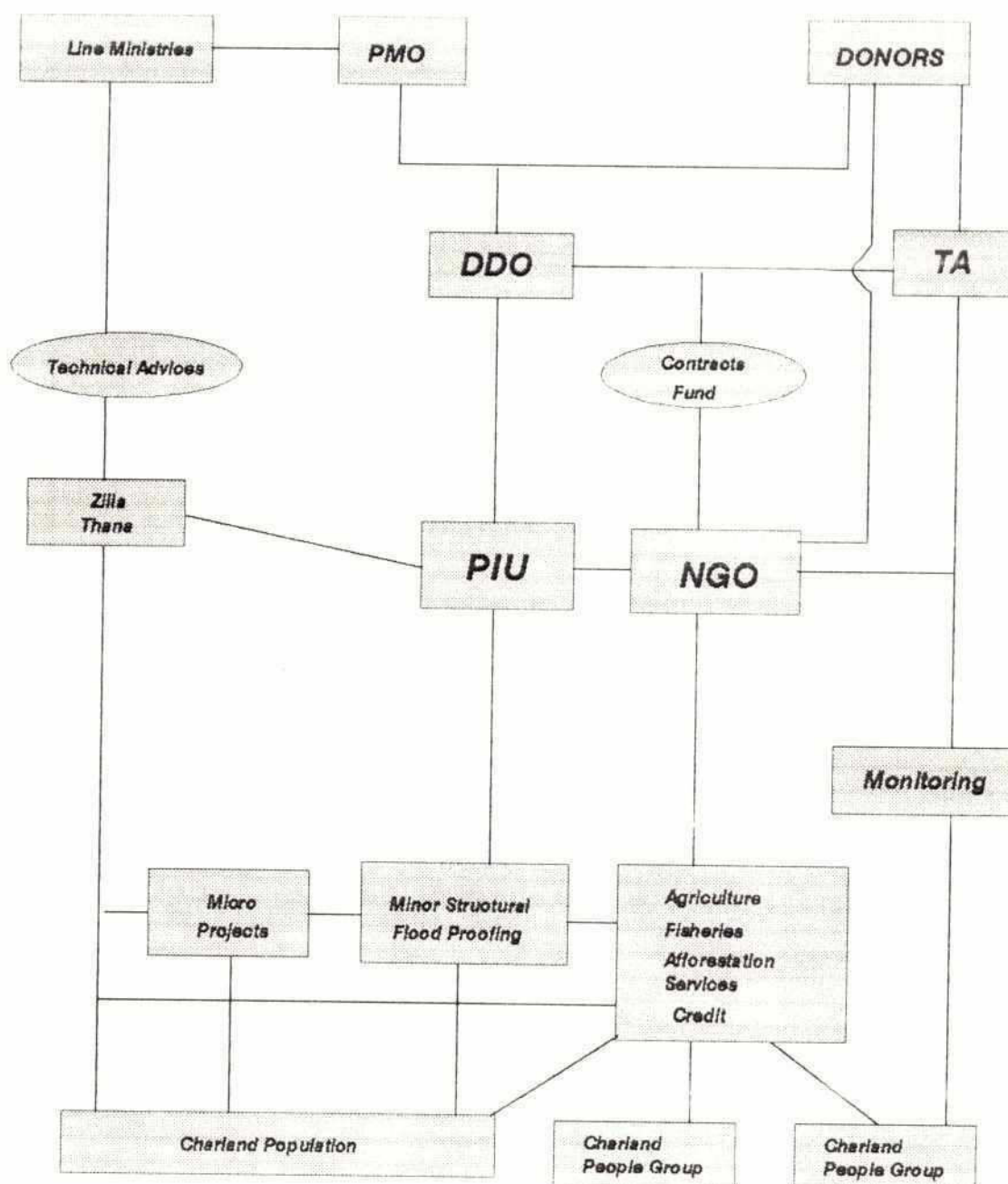


Flood Proofing in Char & Setback Lands

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Fig. 9.4.4

ORGANISATION OF NGO SUPPORT FOR THE FAP 3.1 CHARLAND PROGRAMME



Minor Structural Flood Proofing component including housing material provision

- to participate in the identification and also assist with the implementation of some components of the Community Infrastructure Micro-Projects.

In addition it is considered that an integrated programme of rural development support is required for the area. This aims to strengthen household economic livelihoods in the unprotectable land and diversify these in an attempt to reduce their present high levels of risk. An integrated programme is required and, if desired, could be completely self-standing and based upon self-help with revolving funds. It could include some or all of the following elements:

- support to agriculture production programs and income generating activities through credit provision
- provision of social support services to the population through group formation, community development, education, health and training programs

There are already three major international NGO's working in the study area or close by it, with relevant experience and proven operational capabilities. These are shown in locations 1,2 and 3 on Figure 9.4.3. They are best placed to provide the type of integrated rural development programmes that are felt to be most appropriate to the area. There is also a local NGO presently working in the Attached West bank Char land at Gaibanda and opportunities exist for a fifth on the west bank Set-back and small Island Chars in the south west part of the study area. A range of possible elements for a mixed programme are given below:

- **Agriculture Support and Income Generating Activities through Credit Provision**

In order to diversify the sources of livelihood income in the Char land a broad-based and sustainable programme for income generating activities needs to be promoted. Where appropriate these need to cover the following elements:

- Agriculture
- Fisheries
- Cash Income Generation
- Afforestation
- Credit Provision
- **Agriculture**

The majority of households in the Char land depend on agriculture for their livelihood and a greater proportion of the Island Chars do when compared to the residents of the Attached Chars and Set-Back land.

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However as can be seen from the household budget data many of them live a very marginalised existence, aggravated by the unpredictable and dynamic nature of the natural environment. Many are forced to fall back on secondary economic activities, many seasonal and outside the study area.

A programme aimed at increasing agricultural activity and output in the area, is likely to have beneficial outcomes for the local economy, particularly if it requires more wage paid labour. However, due to the limited availability of flood free land and the fact that when it is available water is a constrain dry land farming systems are likely to be of far greater use than irrigated farming. Agricultural production would seem to be best developed by placing an emphasis on winter crops. The inventory work of FAP 16 has shown the degree to which dry land crops and particular crop associations are presently utilised. It is evident that in addition to the present emphasis on promoting Aman paddy and Kaon (millet) cultivation, other crops need targeted programmes. These include vegetables, groundnuts, pulses, sweet potato, potato, water melon, all of which have scope for further development in the project area, but care needs to be exercised over marketing possibilities due to the poor communications in the area.

With respect to intensification of existing agricultural production, the following measures could be taken to improve yields:

- early sowing for better moisture conservation
- timely weeding and pest control
- the use of fertilizer by split application of nitrogen in the rainy season, saving the remained for later application
- supply of improved seeds

Irrigation has started to be used in some Char land areas based upon treadle pumps and shallow tube wells. This should be further developed as groundwater conditions are very favourable, however care needs to be taken over soil infiltration constrains in many areas.

One possibility that has already been tried successfully by SCI/MCC is the intensive cultivation of Catkin Grass on large sandy areas before they are able to withstand conventional crop production. This stabilises land and particularly the mouths of inflow channels leading to accretion, at a surprisingly fast rate. It also supplies a valuable cash resource which can be sold as fuel, fodder and building material. A programme to promote the cultivation of Catkin Grass would seem to be an early high priority for many ares. It does however need an intensive organizational and financial support programme at the grass roots level to start it. However trial already carried out appear to be very successful.

- **Fisheries**

Surprisingly the importance of professional fisheries in household livelihoods in the Char lands (i.e those households whose primary occupation is fishing and who sell the fish they catch) and particularly the Island Chars is not as important as in some mainland areas and particularly flood plains. This requires further study, but the resource constraints to the study were such that this was not possible. However it would be worth considering assistance to capture fisheries and also an investigation into the possibilities for the promotion of pond fisheries in some of the more stable Char lands. This could take the form of assistance with boats and gears and most importantly marketing for the main river capture fisheries and a flood protected pond aquaculture promotion programme perhaps linked with the borrow pits produced by flood proofing construction work. NGO's would be perhaps best placed to tackle these approaches which require a very bottom-up approach, especially as the Department of Fisheries is especially weak in the Char land area.

- **Cash Income Generation**

The levels of cash income on the Char lands are very variable, however due to risky nature of agricultural activity and particularly subsistence food production it would seem a sound policy objective to diversify this by promoting cash income generation as an additional source of household livelihood economic activity. However this has to be targeted to specific activities that are sustainable and will not make livelihoods even more risky in the longer run. The easy of access and ability to trade in easily moved assets that are not prone to flood damage would seem basic requirements. Suitable activities would seem to be:

- poultry rearing
- egg production
- goat raising
- petty trade
- provision of services

Poultry rearing generates saleable goods that can both increase family income and also provide supplementary household food. This is particularly important to poorer households as it is a valuable source of animal protein which is generally in increasingly short supply and declining as fish production from main rivers falls. This would require a targeted extension programme, particularly addressing the question of animal health, but the costs of promoting informal poultry production are relatively low.

On the other hand the promotion of small stock rearing (sheep and goats) requires greater investment over a longer period of time and needs to tackle the issue of fodder availability which can be very variable in the Char lands, both seasonally and spatially.

The scope for petty trading and provision of services would seem mixed, depending upon the degree of access and is likely to be linked to existing ferry routes. There would be scope for assisting this in the provision of repayable loans for setting up such small trading operations.

- **Afforestation**

Much of the Char land area lacks tree cover, although the more stable **Island Chars do have some homestead vegetation**. There is considerable scope for a carefully managed afforestation programme, although great care will be needed in selection of appropriate species, both in terms of their environmental tolerance, particularly to flooding, and also human utilisation for both shade, fuel, timber and fruit. This should help the land stabilisation process including providing protection from the quite serious wind erosion and dune formation that particularly during the dry season period of northerly winds. A program is required to set up seedling nurseries to supplying saplings to plant along any elevated structure such as roads, embankment and flood refuges. This should provide a naturally renewable asset to local communities. The proposed multi-purpose use of mainland embankments should also include a very major community forestry planting programme. A framework for such community forestry programmes has been given by FAP 13 but implementation will require financial support and an organizational framework to target the programme to benefit those people who presently have little or no fuelwood and other forestry resources.

- **Credit Provision**

A major restriction on the present implementation of many of the suggested integrated rural development interventions is the lack of available credit to households. A wide range of activities including, crop intensification, diversification and substitution, agro forestry development, fisheries, livestock raising and navigation could be supported by a suitably formulated credit scheme.

Due to the nature of the Char land and the perceived high level of risk involved, formal credit support through the institutional banking system (NCB's, private banks etc) is virtually non existent at the moment and is unlikely to be attractive in the future to such institutions, even if collateral were provided by the project through a guarantee fund.

It is therefore suggested that credit support to Char land households should be streamlined through NGO's which have much experience in working with such risk prone populations. The over all picture is that detailed care is needed at individual household level when judging requests for such loans, and the past NGO record with cost recovery in

such conditions is surprisingly good being well above normally acceptable mainland levels.

In order to start up such a programme it is proposed that the project will allocate a specific initial amount of money to each of the five NGO's to start a credit scheme for approved purposes. The NGO's will use these allocated funds in a revolving basis to provide credit and will apply its own methodology with respect to credit disbursement and recovery procedures. However, it is recommended that the loans extended by NGO's be interest free and that their terms be less than 2 years.

● **Social Support Services**

In addition to their main activities linked with the support to the Minor Flood Proofing component, needs assistance to the Community Infrastructure Development and with the support to agriculture and income generating activities, NGO's would provide specific social services to the population, including, health, education, training and awareness raising.

This would include the training and mobilisation of health workers to provide primary care for the children and the women as a first priority. Vocational training would help unemployed or under-employed people to acquire new skills and hence assist them to find alternative sources of income during the off-farm season without having to invest in a capital and cash credit demanding activity. The objective of the training is to assist low income groups in the project area to embark upon paid economic activities more easily and carry them out more effectively.

The initial step in all intervention work at this level of household activity is generating an awareness to people of what opportunities are available to them. This includes the process of group formation to identify people with likely common aims and enable them to see how perhaps they might most easily achieve these. NGO's have valuable experience in doing this and can play a vital role in organizing people into self-help groups for drawing up a needs led assessment, providing motivation leading eventually into a more formal structure for intervention implementation by the people themselves. These will be tailored self-help packages appropriate to specific local conditions.

Contractual Links and Responsibilities of NGO's

The proposed institutional relationship between the NGO's, the Technical Assistant Programme and how these report to the PMO executing unit are shown in Figure 9.4.4. Each of the five NGO's identified for the Pilot Phase will be bound to the PMO, either directly or through the supervising foreign consultant, by a contract clearly spelling out the scope of work, the staffing and the budget allocation. Within the budget, NGO's would be allocated funds to support their credit provision and social support services.

In this respect, the PMO with the help of the Technical Assistance Programme would be in charge of preparing and administering the NGO's contracts but these contracts would have to be endorsed by the International Aid Donors prior to them become effective.

Programming and Staffing of NGO Activities

During the Pilot Phase of the project, five NGO's are proposed to be involved in five different geographical areas of the project area including large and small Island Chars, Attached Chars and Set-Back land on both banks of the river as shown in Figure 9.4.3. Four of these have already been tentively identified and are already working in the vicinity of the identified areas. Preliminary informal discussions have been held with three of them who have expressed a willingness to be part of the programme. One has practically demonstrated such an approach to be possible close by the study area, another has been working in the set-back land on broad programmes and has been planning to move its operations into the Char land near Bahadurabad and the third is a very large organisation which is working on the mainland at the moment and has in the past worked in the small Island Chars.

It is planned that during the Pilot Phase each NGO will commence with a set of approximately 5 clustered pilot programmes in differing land types and conditions. Each NGO will eventually cover 500 flood proofed houses and a further 500 raised homesteads along with 10 Community Infrastructure Micro-Projects. In the subsequent main phase the work will be extended and modified in the light of the pilot Phase experiences, to cover the remainder of the study area.

The project costs will require to cover the financial support required for NGO staffing, offices/community houses, transportation, credit and income generating activities, and for health, education, community development and training activities. At the end of the implementation period the residual facilities will be handed over to the local community for their continued use.

In the pilot phase, the field staff of one NGO should comprise 1 coordinator, 2 field supervisors and 15 field workers. The field workers would all be recruited locally as far as is possible and each would be in charge of approximately 60 households and will be assisted by local link workers. Each NGO should establish 2 flood proofed community houses in their respective areas. These premises would also be used as office space by the field supervisors and field coordinator. Transportation facilities will include 3 engine boats, 3 motorbikes for the field coordinator and the field supervisors.

During the main phase, these facilities would be increased to enable the NGO to extend their coverage of the project area. In this period, one NGO would have 4 field supervisors and 40 field workers. Each NGO would establish 4 additional flood proofed community houses in their respective areas. Incremental transportation facilities including 3 engine boats, 3 motorbikes for the 3 additional field supervisors.

An estimate of the manpower requirement for the 5 NGO's under the Social Assistance component of the project is given in Table 9.4.7 and the total NGO support costs in Table 9.4.8.

4.3.4 Institutional Support

This component will provide the skilled technical advice services required to support the FAP 3.1 Char land project implementation and also some institutional assistance for the Project Management Organisation in charge of executing the project as required to attain sustainable development. The issue of the on-going role of Char land development in Bangladesh will need to be addressed at some point in the future. Whilst for the first intervention a more ad-hoc institutional arrangement may be adequate this will need to be addressed to ensure the programme is properly focused in the longer term.

Due to the nature of the Char land areas and the complexity and inter-related nature of the issues and problems to be addressed by the project, several ministries will need to be involved in the project:

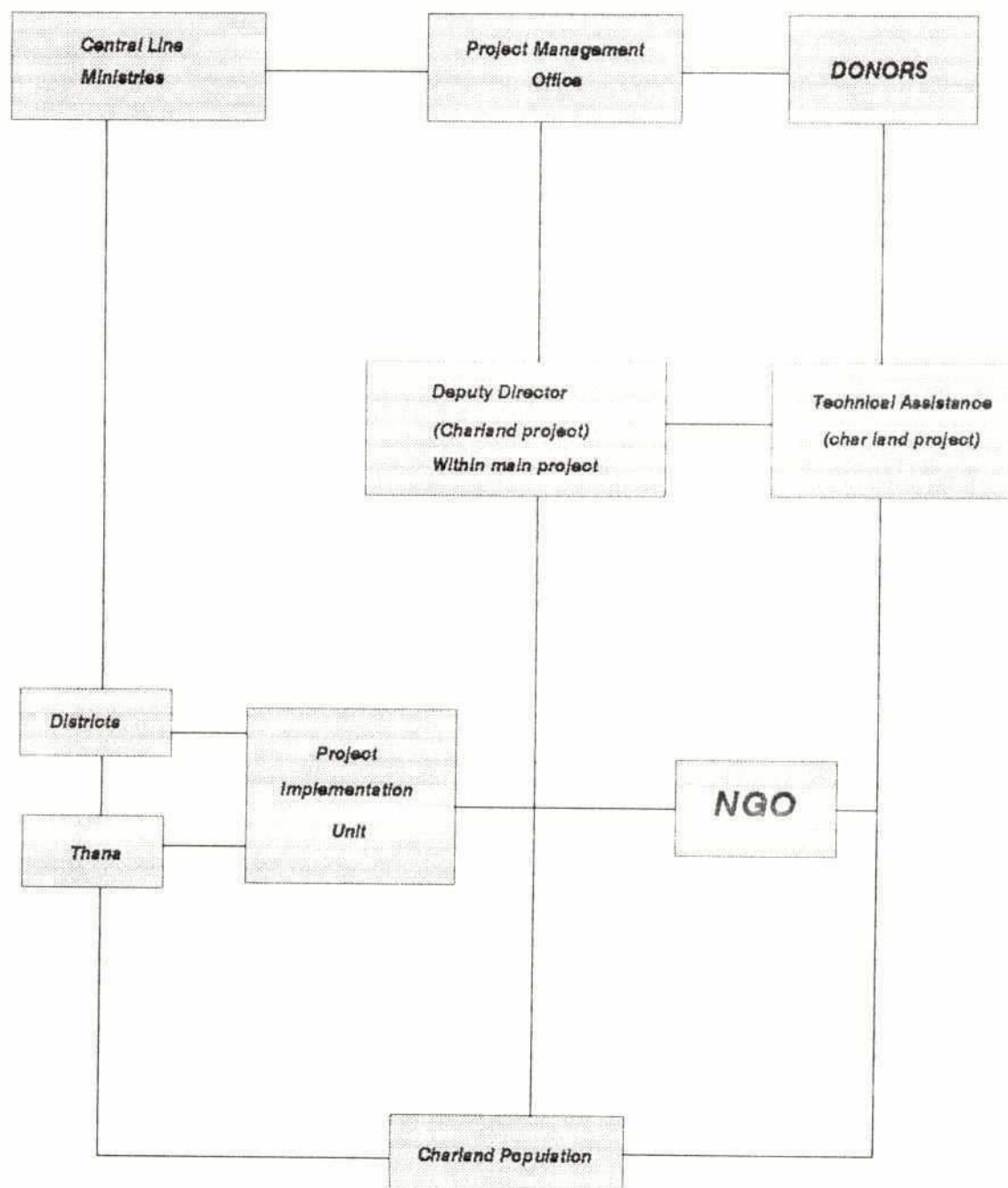
- Ministry of Irrigation Water Development and Flood Control (MIWDFC)
- Ministry of Land
- Ministry of Social Affairs and the NGO Bureau
- Ministry of Local Government and Rural Development
- Ministry of Agriculture
- Ministry of Fisheries
- Ministry Environment and Forestry
- Ministry of Relief and Rehabilitation

Because the project aims to follow an integrated approach, no Ministry alone seems to be an appropriate one to be in sole charge of the project implementation. Following the experience gained from the development of Chittagong Hill Tracts, it is recommended that an independent body, the Char Land Development Board (CDB), be established under the Cabinet Secretariat. The CDB could be chaired by the Cabinet Secretary and would be evenly composed of the secretaries of the main ministries concerned in the development of Char land, representatives from NGO's and also those from the Char land population. The CDB could act as a coordinating and policy making body and would be responsible to ensure the enforcement of its decisions by the respective central line ministries. It would not just confine itself to the FAP 3.1 area, but following on from the FAP 16 National Char Land Inventory programme cover the chars of the main rivers of Bangladesh.

However, because the establishment of a new authority could take time it is recommended that the FAP 3.1 Char land project be implemented through the institutional framework to be set up under the FAP 3.1 main

Fig. 9.4.5

ORGANOGRAM FOR FAP 3.1 CHARLAND PROJECT IMPLEMENTATION



land project. This would thus require a temporary or interim institutional structure. It is suggested that a Deputy Director be put in charge of the project will be appointed by the Project Management Office (PMO) to be established for the FAP 3.1 main project. Under the Deputy Director Office, one Project Implementation Unit (PIU) would be located for a specific Char land reach (such as FAP 3.1 or FAP 3.2). This structure is shown in Figure 9.4.5. Concern has been expressed as to why there is a need to set up yet another central government organisation on the lines of an Area Development Authority when a previous one for the Haour areas failed so badly. It is seen by some to be a wasteful use of resources. The FAP 3.1 Char land study will act as a one-off trial without such an Authority and the requirements for any subsequent work (such as FAP 3.2 Char lands) can then be assessed.

For the longer term National Char Land programmes the Deputy Director's Office (DDO) will be responsible for the following items, but in the case of the FAP 3.1 area these will be handled directly by the PMO with advice given by staff from the Technical Assistance Programme:

- Overall Project Management which includes:
 - administration of NGO's contracts
 - approval of the household based Minor Structural Flood Proofing packages
 - disbursement of project contributions to NGO's implementing the Minor Structural Flood Proofing
 - approval of Community Infrastructure Micro-projects, preparation of contracts with the relevant organizations for implementation, disbursement of funds, supervision.
 - preparation of progress and policy advisory reports for the PMO
- Monitoring and Evaluation
 - The management related monitoring could be handled by a monitoring unit to be established under the PMO. At the field level, the head of the PIU would be responsible to ensure that data are adequately collected, analyzed, stored and transmitted to the PMO Dhaka. For this purpose, one computer unit could be established in the field office.
 - Specific monitoring should also be undertaken in order to assess the impact of the project on the living conditions and socio-economic status of the Char land population. This monitoring would also provide socio-economic and technical information to use in fine-tuning the key concepts of the

project, including the household based flood proofing package, the credit scheme and the infrastructure micro-projects.

- procurement of funding and provision for the Technical Assistance Programme and also NGO's in addition to project equipment and vehicles.
- administration and finance

The field PIU will be in charge of the following activities:

- preparation of Minor Flood Proofing packages for households (technical and engineering aspects) in close cooperation with the NGO concerned
- identification and design of Community Infrastructure Micro-projects in close cooperation with NGO's, Thana Administration and representatives of the Char land population
- supervision of the implementation of the Minor Flood Proofing packages and Community Infrastructure Micro- projects
- multi-disciplinary technical assistance, advice and training (e.g. agriculture, fisheries, forestry, women affairs etc) to NGO's for income generation activities
- data collection for the monitoring and evaluation component of the project

During the Pilot Phase, the Deputy Directors Office should be staffed as follows:

- 1 Deputy Director
- 4 Administrative Officers

The field PIU should comprise:

- 1 Coordinator
- 2 Social/Welfare Officers
- 2 Civil Engineers
- 2 Agriculture Officers
- 1 Fisheries Officer
- 2 Women Officers

During the main phase, incremental increased staffing will need to be provided, possibly covering wider disciplines (health and nutrition for instance) since the project coverage will expand.

Another major institutional improvement that would be a very valuable outcome of the project is the design and formulation of a comprehensive

multi-purpose master plan for the development Char land at the national level learning from the experiences of the first pilot Study and intervention on the FAP 3.1 Char lands area.

In this regard, a set of supporting studies would be implemented under the Technical Assistance component of the Project with respect to land allocation procedures, resettlement of erosion victims, agriculture development, fisheries development, poverty alleviation, education, health and women issues.

Based on the findings of these specific studies and of other FAP studies, a master plan for the development of Char land will be formulated and policy measures would be recommended.

4.3.5 Technical Assistance

The main objective of the Technical Assistance (TA) programme is to assist in the project implementation and to prepare a comprehensive master plan for the development of Char land. For this purpose, the TA would carry out specific studies and will make a full use of all the information collected by the other FAP components as well as of the experience gained from the implementation of the first phase of the project.

It is expected that the Char lands Technical Assistance programme will be provided and directly funded by the donors for the FAP 3.1 Mainland study and be a shared resource. It will require staff with specific expertise in the fields of rural development, rural engineering, agriculture, land/legal aspects and women issues.

An estimate of the TA inputs which could be required during the project, split by phases, is presented in Table 9.4.9. and costs given in Table 9.4.10. Expertise in project management, civil/structural engineering, environment, modelling, hydrology, river morphology and hydraulics, has not been included as it is assumed that these would be provided for the mainland work and the project would be able to draw from the FAP 3.1 main land project to obtain specialist expertise in these fields.

A brief description of the proposed terms of reference of the individual consultants is presented below.

- Rural Development Specialist (Deputy Team Leader)
 - preparation of detailed Terms of Reference for NGO's, including scope of work, methodology, staffing and budgets
 - supervision and participation in NGO activities with respect to the credit scheme and Minor Structural Flood proofing package implementation

- identification of Community Infrastructure Micro-projects following a "needs led" approach
- preparation of technical/advisory reports to the PMO
- monitoring and evaluation of the project impacts on the socio-economic status of the beneficiaries
- progress report to the Team Leader of FAP 3.1 main project
- Rural Engineers
 - prepare technical assessments and cost estimates of the Minor Structural Flood Proofing packages proposed by NGO's
 - supervision of the procurement of materials for the Minor Structural Flood Proofing programme
 - supervision of construction activities
 - identification, technical assessment and cost estimate for the Community Infrastructure Micro- projects
 - supervision of the Community Infrastructure Micro-project implementation
 - preparation of technical/advisory reports to the PMO
- Agriculturists
 - study of existing agriculture practices
 - design of strategies to increase agriculture production in the Char land
 - advisory services to NGO's for agriculture related income generation activities (crop substitution, increase of yields through fertilizer use etc.)
 - preparation of technical/advisory reports to the PMO
- Land/Legal Aspects
 - review of existing procedures for land allocation/reallocation/resettlement, especially for eroded and emergent land
 - design of strategies to improve land allocation, with special attention to erosion victims.

- preparation of technical/advisory reports to the PMO
- Women's Development Specialists
 - review of specific women's issues at the household level
 - proposals for a comprehensive strategy to improve the living conditions of women
 - advisory services to NGO's concerning women's income generation activities (handicrafts, poultry raising, homestead garden, fish net making etc.)
 - preparation of technical/advisory reports to the PMO

4.4 Project Cost Estimates

The estimated total costs of the project are given in Tables 9.4.2 and 9.4.11 and are Tk 1460m (US \$ 36.5 million) with the Pilot Phase being Tk1460m. Of this some 12% is recoverable loans and 4.2% (Tk 62.3m) of the total cost can be attributable to the effects of the FAP 3.1 embankment. In all the cost per head of population is estimated to be Tk2140 compared to Tk2212 for the mainland controlled flooding intervention which has the additional advantage of securing agricultural land from peak river flooding. The cost of the pilot phase is estimated to be Tk 128m (US\$ 3.2million) over a three year period.

The structure of the project base cost is consistent with the emphasis given on the flood proofing objectives of the project. In this respect, about 74% of the resources are proposed to be allocated to support household or community investment for Minor Structural Flood Proofing.

The NGO support, which is also expected to significantly contribute to uplift the socio-economic status of the population, accounts for 12% of the project base cost. In total more than 88% of the resources are aimed to directly support the social objectives of the project.



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APPENDICES

Appendix - A
Tables

Table A 1.1 : List of Villages under the Char Land Study

Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
1	10	Bogra	38	Dhunat	9	Bhandarbari	306	Choubar	Choubar	2	1
2	10	Bogra	81	Sariakandi	12	Bohail	501	Uttar Majhira	Uttar Majhira	2	1
3	10	Bogra	81	Sariakandi	12	Bohail	644	Mashbari	Mashbari	2	
4	10	Bogra	81	Sariakandi	12	Bohail	25	Aolakandi	Sonaidhanga	2	
5	10	Bogra	81	Sariakandi	12	Bohail	25	Aolakandi	Char Aolakandi	2	
6	10	Bogra	81	Sariakandi	12	Bohail	510	Kalian	Daskhin Kalian	2	
7	10	Bogra	81	Sariakandi	12	Bohail	510	Kalian	Uttar Kalian	2	
8	10	Bogra	81	Sariakandi	12	Bohail	886	Shenkarpur	Shenkarpur	2	
9	10	Bogra	81	Sariakandi	12	Bohail	172	Chandbari	Chandbari	2	
10	10	Bogra	81	Sariakandi	12	Bohail	25	Aolakandi	Purba Aolakandi	2	
11	10	Bogra	81	Sariakandi	12	Bohail	344	Daskhin Kalaihatta	Daskhin Kalaiha	2	
12	10	Bogra	81	Sariakandi	12	Bohail	535	Kestia	Kestia	2	
13	10	Bogra	81	Sariakandi	12	Bohail	650	Mazira	D.Mazira	2	
14	10	Bogra	81	Sariakandi	12	Bohail	401	Dharabarsha	Dharabarsha	2	
15	10	Bogra	81	Sariakandi	12	Bohail	25	Aolakandi	Paschim Aolakan	2	
16	10	Bogra	81	Sariakandi	12	Bohail	133	Bohali	Bohali	2	
17	10	Bogra	81	Sariakandi	12	Bohail	580	Komarpur	Komarpur	2	
18	10	Bogra	81	Sariakandi	12	Bohail	25	Aolakandi	Bhangarchar	2	
19	10	Bogra	81	Sariakandi	12	Bohail	612	Lakshmikola	Lakshmikola	2	
20	10	Bogra	81	Sariakandi	12	Bohail	452	Hatiabari	Hatiabari	2	
21	10	Bogra	81	Sariakandi	12	Bohail	797	Pautbari	Pautbari	2	
22	10	Bogra	81	Sariakandi	19	Chaluabari	493	Kalaspara	Kalaspara	2	
23	10	Bogra	81	Sariakandi	19	Chaluabari	4	Bahuladanga	Bahuladanga	2	1
24	10	Bogra	81	Sariakandi	19	Chaluabari	174	Char Beleswar	Char Beleswar	2	
25	10	Bogra	81	Sariakandi	19	Chaluabari	903	Simultair	Simultair	2	1
26	10	Bogra	81	Sariakandi	19	Chaluabari	31	Ausherpara	Ausherpara	2	
27	10	Bogra	81	Sariakandi	19	Chaluabari	432	Hanrampur	Taka Magura	2	
28	10	Bogra	81	Sariakandi	19	Chaluabari	113	Biramer Pachgachi	Biramer Pachgachi	2	1
29	10	Bogra	81	Sariakandi	19	Chaluabari	691	Nandina	Nandina	2	
30	10	Bogra	81	Sariakandi	19	Chaluabari	820	R.karPanchgachi	Radhikar Pancha	2	
31	10	Bogra	81	Sariakandi	19	Chaluabari	303	Dharabarsha	Dharabarsha	2	
32	10	Bogra	81	Sariakandi	19	Chaluabari	919	Sujanerpara	Sujanerpara	2	
33	10	Bogra	81	Sariakandi	19	Chaluabari	341	Fazilpur	Fazilpur	2	
34	10	Bogra	81	Sariakandi	19	Chaluabari	934	Teligari	Teligari	2	
35	10	Bogra	81	Sariakandi	19	Chaluabari	144	Chaluabari	Chaluabari	2	
36	10	Bogra	81	Sariakandi	19	Chaluabari	197	Char Dalika	Char Dalika	2	
37	10	Bogra	81	Sariakandi	19	Chaluabari	220	Char Manikdair	Char Manikdair	2	
38	10	Bogra	81	Sariakandi	19	Chaluabari	91	Bhangargacha	Bhangargacha	2	1
39	10	Bogra	81	Sariakandi	19	Chaluabari	478	Kakalihata	Kakalihata	2	0
40	10	Bogra	81	Sariakandi	19	Chaluabari	129	Char Kasirpara	Char Kasirpara	2	
41	10	Bogra	81	Sariakandi	19	Chaluabari	340	H. baria H. jam	Hatbaria Hatina	2	
42	10	Bogra	81	Sariakandi	25	Chandanbaia	361	Sakdaha	Sakdaha	2	
43	10	Bogra	81	Sariakandi	25	Chandanbaia	57	Beniapara	Shenkarpur	2	
44	10	Bogra	81	Sariakandi	25	Chandanbaia	12	Adbaria	Adbaria	2	
45	10	Bogra	81	Sariakandi	37	Hatserpur	459	Hatserpur	Dhangapara	2	

Table A 1.1 : List of Villages under the Char Land Study

Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
46	10	Bogra	81	Sariakandi	37	Hatserpur	146	Chak Rathinath	Chak Rathinath	2	1
47	10	Bogra	81	Sariakandi	37	Hatserpur	561	Khoribadi	Khoribadi	2	
48	10	Bogra	81	Sariakandi	37	Hatserpur	727	Nizbalali	Nizbalali	2	
49	10	Bogra	81	Sariakandi	37	Hatserpur	854	Sahanbands	Sahanbands	2	
50	10	Bogra	81	Sariakandi	37	Hatserpur	912	Shimulbari	Shimulbari	2	1
51	10	Bogra	81	Sariakandi	37	Hatserpur	459	Hatserpur	Hatserpur	2	
52	10	Bogra	81	Sariakandi	37	Hatserpur	532	Karnibari	Karnibari	2	1
53	10	Bogra	81	Sariakandi	37	Hatserpur	382	Dhanarpara	Dhanarpara	2	1
54	10	Bogra	81	Sariakandi	37	Hatserpur	70	Baraipara	Baraipara	2	
55	10	Bogra	81	Sariakandi	56	Karnibari	293	Chandpacha	Purba Charchand	2	
56	10	Bogra	81	Sariakandi	56	Karnibari	274	Charpara	Pichanpara	2	
57	10	Bogra	81	Sariakandi	56	Karnibari	235	Char Kumarpara	Ulladanga	2	
58	10	Bogra	81	Sariakandi	56	Karnibari	695	Nandinarchar	Nandinarchar	2	
59	10	Bogra	81	Sariakandi	56	Karnibari	701	Narapala	Narapala	2	
60	10	Bogra	81	Sariakandi	56	Karnibari	235	Char Kumarpara	Mathurapara	2	
61	10	Bogra	81	Sariakandi	56	Karnibari	529	Kornibari	Kashiyahata	2	
62	10	Bogra	81	Sariakandi	56	Karnibari	274	Charpara	Uttar Charpara	2	
63	10	Bogra	81	Sariakandi	56	Karnibari	663	Milonpura	Milonpura	2	
64	10	Bogra	81	Sariakandi	56	Karnibari	956	Taltala	Taltala	2	
65	10	Bogra	81	Sariakandi	56	Karnibari	682	Mulbari	Mulbari	2	1
66	10	Bogra	81	Sariakandi	56	Karnibari	235	Char Kumarpara	Uttar Fatikiyam	2	
67	10	Bogra	81	Sariakandi	56	Karnibari	529	Kornibari	Daskhin Nandiar	2	
68	10	Bogra	81	Sariakandi	56	Karnibari	235	Char Kumarpara	Daskhin Fatikiy	2	
69	10	Bogra	81	Sariakandi	56	Karnibari	274	Charpara	Maddaya Charpar	2	
70	10	Bogra	81	Sariakandi	56	Karnibari	529	Kornibari	Sheoratala	2	
71	10	Bogra	81	Sariakandi	56	Karnibari	274	Charpara	Paschim Charpar	2	
72	10	Bogra	81	Sariakandi	56	Karnibari	529	Kornibari	Paschim Chilapa	2	
73	10	Bogra	81	Sariakandi	56	Karnibari	529	Kornibari	Purba Chilapara	2	
74	10	Bogra	81	Sariakandi	56	Karnibari	529	Kornibari	Uttar Nandiarpa	2	
75	10	Bogra	81	Sariakandi	56	Karnibari	235	Char Kumarpara	Uttar Char Kuma	2	
76	10	Bogra	81	Sariakandi	56	Karnibari	274	Charpara	Udmari	2	
77	10	Bogra	81	Sariakandi	56	Karnibari	235	Char Kumarpara	Daskhin Kumarpa	2	
78	10	Bogra	81	Sariakandi	56	Karnibari	293	Chandpacha	Paschim Chandpa	2	
79	10	Bogra	81	Sariakandi	56	Karnibari	778	Panthapara	Panthapara	2	
80	10	Bogra	81	Sariakandi	56	Karnibari	637	Maithan	Char Maithan	2	1
81	10	Bogra	81	Sariakandi	55	Kazla	669	Mithanerpara	Mithanerpara	2	
82	10	Bogra	81	Sariakandi	55	Kazla	765	Pakuria	Pakuria	2	1
83	10	Bogra	81	Sariakandi	55	Kazla	975	Tengrakura	Tengrakura	2	1
84	10	Bogra	81	Sariakandi	55	Kazla	210	Char Ghagua	Char Ghagua	2	1
85	10	Bogra	81	Sariakandi	55	Kazla	95	Bera Panchbaria	Bera Panchbaria	2	
86	10	Bogra	81	Sariakandi	55	Kazla	963	Teka Maguria	Teka Maguria	2	
87	10	Bogra	81	Sariakandi	55	Kazla	478	Jamthal	Jamthal	2	
88	10	Bogra	81	Sariakandi	55	Kazla	491	Kazla	Mayurer Char	2	
89	10	Bogra	81	Sariakandi	55	Kazla	502	Sener Char	Sener Char	2	1
90	10	Bogra	81	Sariakandi	55	Kazla	89	Benipur	Benipur	2	1

Table A 1.1 : List of Villages under the Char Land Study

Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
91	10	Bogra	81	Sariakandi	55	Kazla	491	Kazla	Kazla	2	1
92	10	Bogra	81	Sariakandi	55	Kazla	752	Pakerdaha	Pakerdaha	2	
93	10	Bogra	81	Sariakandi	88	Sariakandi	357	Daruna	Daruna	2	
94	10	Bogra	81	Shariakandi	56	Bohail	344	Kalahata	Kalahata	2	1
95	24	Gaibandha	61	Phulchari	11	Erendabari	664	Kismatdhali	Kismatdhali	1	
96	24	Gaibandha	61	Phulchari	11	Erendabari	721	Magrihat	Magrihat	1	
97	24	Gaibandha	61	Phulchari	11	Erendabari	186	Char Harichandi	Char Harichandi	1	
98	24	Gaibandha	61	Phulchari	11	Erendabari	783	Pagarchar	Pagarchar	1	
99	24	Gaibandha	61	Phulchari	11	Erendabari	273	Dakatar Char	Dakatar Char	1	
100	24	Gaibandha	61	Phulchari	11	Erendabari	522	Gigabari	Gigabari	1	
101	24	Gaibandha	61	Phulchari	11	Erendabari	957	Tintopha	Tintopha	1	
102	24	Gaibandha	61	Phulchari	11	Erendabari	808	Pata Dhowadhali	Pata Dhowadhali	1	
103	24	Gaibandha	61	Phulchari	11	Erendabari	111	Bhatapara	Bhatapara	1	
104	24	Gaibandha	61	Phulchari	11	Erendabari	24	Anadabari	Anadabari	1	
105	24	Gaibandha	61	Phulchari	11	Erendabari	907	Sannasir Char	Sannasir Char	1	1
106	24	Gaibandha	61	Phulchari	11	Erendabari	124	Bulbuliar Char	Bulbuliar Char	1	
107	24	Gaibandha	61	Phulchari	11	Erendabari	422	Harichandi	Harichandi	1	
108	24	Gaibandha	61	Phulchari	11	Erendabari	12	Algarchar	Algarchar	1	
109	24	Gaibandha	61	Phulchari	11	Erendabari	174	Char Chowmahan	Char Chowmahan	1	
110	24	Gaibandha	61	Phulchari	23	Fazlupur	199	Char Krishnamoni	Krishnamoni	1	1
111	24	Gaibandha	61	Phulchari	23	Fazlupur	733	Manikar	Manikar	1	
112	24	Gaibandha	61	Phulchari	23	Fazlupur	746	Manoharpur	Manoharpur	1	
113	24	Gaibandha	61	Phulchari	23	Fazlupur	771	Nischintapur	Nischintapur	1	1
114	24	Gaibandha	61	Phulchari	23	Fazlupur	634	Kawabadha	Kawabadha	1	
115	24	Gaibandha	61	Phulchari	23	Fazlupur	659	Khatiamari	Khatiamari	1	1
116	24	Gaibandha	61	Phulchari	23	Fazlupur	223	Chowmahan	Chowmahan	1	
117	24	Gaibandha	61	Phulchari	23	Fazlupur	447	Halencha	Halencha	1	
118	24	Gaibandha	61	Phulchari	23	Fazlupur	858	Rahmatpur	Rahmatpur	1	
119	24	Gaibandha	61	Phulchari	23	Fazlupur	982	Ujaler Danga	Ujaler Danga	1	
120	24	Gaibandha	61	Phulchari	23	Fazlupur	149	Chandenerchar	Chandenerchar	1	1
121	24	Gaibandha	61	Phulchari	47	Gajaria	348	Galna	Bir Galna	1	
122	24	Gaibandha	61	Phulchari	47	Gajaria	62	Baraikandi	Baraikandi	1	
123	24	Gaibandha	61	Phulchari	47	Gajaria	335	Janhair	Janhair	1	
124	24	Gaibandha	61	Phulchari	47	Gajaria	7	Bhanjandanga	Bhanjandanga	1	1
125	24	Gaibandha	61	Phulchari	47	Gajaria	597	Katakgacha	Katakgacha	1	1
126	24	Gaibandha	61	Phulchari	47	Gajaria	348	Galna	Char Galna	1	
127	24	Gaibandha	61	Phulchari	47	Gajaria	509	Ziadanga	Ziadanga	1	
128	24	Gaibandha	61	Phulchari	35	Phulchari	49	Baje Phulchhari	Baje Phulchhari	1	1
129	24	Gaibandha	61	Phulchari	35	Phulchari	796	Parul	Ahen Aligram	1	
130	24	Gaibandha	61	Phulchari	35	Phulchari	572	Kalurpara	Kalurpara	1	
131	24	Gaibandha	61	Phulchari	35	Phulchari	211	Chowbhaghia	Chowbhaghia	1	
132	24	Gaibandha	61	Phulchari	35	Phulchari	472	Jamira	Jamira	1	
133	24	Gaibandha	61	Phulchari	35	Phulchari	323	Gabgachi	Gabgachhi	1	1
134	24	Gaibandha	61	Phulchari	35	Phulchari	572	Kalurpara	Sekhpura	1	
135	24	Gaibandha	61	Phulchari	35	Phulchari	796	Parul	Parul	1	1

Table A 1.1 : List of Villages under the Char Land Study

Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
136	24	Gaibandha	61	Phulchhari	35	Phulchhari	497	Jhaphhapia	Jhaphhapia	1	
137	24	Gaibandha	61	Phulchhari	35	Phulchhari	945	Tengrakandi	Tengrakandi	1	
138	24	Gaibandha	61	Phulchhari	35	Phulchhari	820	Phulchhari	Phulchhari	1	1
139	24	Gaibandha	61	Phulchhari	35	Phulchhari	37	Bagbari	Bagbari	1	
140	24	Gaibandha	61	Phulchhari	35	Phulchhari	833	Papulia	Papulia	1	
141	24	Gaibandha	61	Phulchhari	35	Phulchhari	360	Ghar Bhanga	Ghar Bhanga	1	
142	24	Gaibandha	61	Phulchhari	35	Phulchhari	211	Chaubhagia	Chaubhagia	1	
143	24	Gaibandha	61	Phulchhari	35	Phulchhari	298	Deluabari	Deluabari	1	
144	24	Gaibandha	61	Phulchhari	35	Phulchhari	646	Khanchapara	Khanchapara	1	1
145	24	Gaibandha	61	Phulchhari	83	Uria	883	Ratanpur	Ratanpur	1	
146	24	Gaibandha	61	Phulchhari	83	Uria	547	Kabilpur	Kabilpur	1	
147	24	Gaibandha	88	Suggatta	85	Suggatta	646	Koalikandi	Koalikandi	1	
148	24	Gaibandha	88	Suggatta	85	Suggatta	178	Bogirchau	Bagir Chau	1	1
149	42	Jamalpur	15	Dewangonj	7	Bahadurabad	264	Char Haricandi	Char Haricandi	1	
150	42	Jamalpur	15	Dewangonj	7	Bahadurabad	93	Char Bahadurabad	Char Bahadurabad	1	
151	42	Jamalpur	15	Dewangonj	7	Bahadurabad	839	Rampura	Barkhal	1	
152	42	Jamalpur	15	Dewangonj	36	Chikajani	404	Char Daskhinpara	Shakua	1	
153	42	Jamalpur	15	Dewangonj	36	Chikajani	917	Sinai	Sinai	1	
154	42	Jamalpur	15	Dewangonj	36	Chikajani	404	Char Daskhinpara	Char Daskhinpara	1	
155	42	Jamalpur	15	Dewangonj	36	Chikajani	233	Char Dakatiarpara	Char Dakatiarpara	1	
156	42	Jamalpur	15	Dewangonj	36	Chikajani	357	Chikajani	Paschim Chikaja	1	
157	42	Jamalpur	15	Dewangonj	36	Chikajani	342	Char Magrihat	Char Magrihat	1	
158	42	Jamalpur	15	Dewangonj	43	Chukaibari	248	Charhalkaharabari	Charhalkaharaba	1	
159	42	Jamalpur	15	Dewangonj	65	Hatibhanga	559	Hati Bhanga	Hati Bhanga	1	
160	42	Jamalpur	15	Dewangonj	65	Hatibhanga	279	Char Hatibhanga	Char Hatibhanga	1	
161	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Miahpara	2	1
162	42	Jamalpur	29	Islampur	7	Belgacha	713	Munnia	Munnia	1	
163	42	Jamalpur	29	Islampur	7	Belgacha	129	Char Belgacha	Char Belgacha	1	
164	42	Jamalpur	29	Islampur	7	Belgacha	497	Char Munia	Char Munia	1	1
165	42	Jamalpur	29	Islampur	7	Belgacha	367	Dharpara	Dharpara	1	
166	42	Jamalpur	29	Islampur	7	Belgacha	64	Barul	Barul	1	
167	42	Jamalpur	29	Islampur	7	Belgacha	930	Shindurtali	Shindurtali	1	
168	42	Jamalpur	29	Islampur	7	Belgacha	919	Shuldaha	Shuldaha	1	
169	42	Jamalpur	29	Islampur	63	Kulkandi	529	Jigatoli	Jigatola	1	1
170	42	Jamalpur	29	Islampur	71	Noarpara	698	Maijbari	Bir Maijbari	1	1
171	42	Jamalpur	29	Islampur	71	Noarpara	86	Bhangbari	Bhangbari	1	
172	42	Jamalpur	29	Islampur	71	Noarpara	698	Maijbari	Maijbari	1	
173	42	Jamalpur	29	Islampur	71	Noarpara	188	Char Dhalika	Char Dhalika	1	
174	42	Jamalpur	29	Islampur	71	Noarpara	151	Char Bhangbari	Char Bhangbari	1	
175	42	Jamalpur	29	Islampur	71	Noarpara	292	Char Toga	Char Toga	1	
176	42	Jamalpur	29	Islampur	71	Noarpara	584	Katma Krishnanagar	Katma Krishnanag	1	
177	42	Jamalpur	29	Islampur	71	Noarpara	248	Char Majbari	Char Majbari	1	
178	42	Jamalpur	29	Islampur	71	Noarpara	692	Toga	Toga	1	
179	42	Jamalpur	29	Islampur	94	Shapdhari	281	Char Shishua	Thikader Para	1	
180	42	Jamalpur	29	Islampur	94	Shapdhari	281	Char Shishua	Poramanik Para	1	

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Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
181	42	Jamalpur	29	Islampur	94	Shapdhar	821	Progonpali	Progonpali	1	1
182	42	Jamalpur	29	Islampur	94	Shapdhar	824	Chengania	Chengania	1	
183	42	Jamalpur	29	Islampur	94	Shapdhar	951	Shishua	Arstali	1	
184	42	Jamalpur	29	Islampur	94	Shapdhar	540	Joknai	Joknai	1	
185	42	Jamalpur	58	Madargonj	23	Bailjuri	204	Chandpur	Chandpur	2	
186	42	Jamalpur	58	Madargonj	23	Bailjuri	351	Char Shuvagachs	Char Shuvagachs	2	
187	42	Jamalpur	58	Madargonj	35	Char Pakerdaha	541	Hidagari	Hidagari	2	
188	42	Jamalpur	58	Madargonj	35	Char Pakerdaha	821	Char Pakerdaha	Nalshandha	2	
189	42	Jamalpur	58	Madargonj	35	Char Pakerdaha	826	Pakrui	Pakrui	2	
190	42	Jamalpur	58	Madargonj	59	Jarekhali	256	Char Kamarpara	Kamarpara	2	
191	42	Jamalpur	58	Madargonj	59	Jarekhali	695	Kulkumari	Kulkumari	2	
192	42	Jamalpur	58	Madargonj	59	Jarekhali	329	Char Fuljair	Stamari	2	
193	42	Jamalpur	58	Madargonj	59	Jarekhali	673	Khilkati	Khilkati	2	
194	42	Jamalpur	58	Madargonj	59	Jarekhali	256	Char Kamarpara	Char Kamarpara	2	
195	42	Jamalpur	58	Madargonj	59	Jarekhali	621	Kamarpara	Kamarpara	2	
196	42	Jamalpur	58	Madargonj	59	Jarekhali	329	Char Fuljair	Fuljair	2	
197	42	Jamalpur	58	Madargonj	59	Jarekhali	665	Khamar Magura	Khamar Magura	2	
198	42	Jamalpur	58	Madargonj	59	Jarekhali	329	Char Fuljair	Jamdaha	2	
199	42	Jamalpur	58	Madargonj	59	Jarekhali	263	Char Kukurmani	Char Kukurmani	2	
200	42	Jamalpur	58	Madargonj	59	Jarekhali	329	Char Fuljair	Char Fuljair	2	
201	42	Jamalpur	58	Madargonj	59	Jarekhali	863	Kholarpara	Kholarpara	2	
202	42	Jamalpur	58	Madargonj	59	Jarekhali	256	Char Kamarpara	Char Kamarpara	2	
203	42	Jamalpur	58	Madargonj	83	Shidhul	270	Lotabor	Char Lotabor(Nor	2	
204	42	Jamalpur	58	Madargonj	83	Shidhul	270	Lotabor	Char Lotabor(Sou	2	
205	42	Jamalpur	85	Sharishabari	10	Aona	13	Aona	Aona	2	1
206	42	Jamalpur	85	Sharishabari	10	Aona	392	Guincha	Guincha	2	
207	42	Jamalpur	85	Sharishabari	10	Aona	13	Baraikandi	Baraikandi	2	
208	42	Jamalpur	85	Sharishabari	10	Aona	209	Chandanpur	Chandanpur	2	
209	42	Jamalpur	85	Sharishabari	63	Pigna	693	Nalshandha	Nalshandha	2	
210	42	Jamalpur	85	Sharishabari	63	Pigna	562	Khas Bariabandha	Khas Bariabandha	2	
211	42	Jamalpur	85	Sharishabari	63	Pigna	693	Nalshandha	Baliamenda	2	
212	42	Jamalpur	85	Sharishabari	63	Pigna	739	Panibari	Panibari	2	
213	42	Jamalpur	85	Sharishabari	73	Pogaldighe	614	Manikpatal	Manikpatal	2	
214	42	Jamalpur	85	Sharishabari	73	Pogaldighe	955	Takuria	Takuria	2	
215	42	Jamalpur	85	Sharishabari	73	Pogaldighe	189	Brammanjani	Brammanjani	2	
216	42	Jamalpur	85	Sharishabari	73	Pogaldighe	183	Binnafair	Shimultair	2	
217	42	Jamalpur	85	Sharishabari	73	Pogaldighe	634	Malipara	Malipara	2	
218	42	Jamalpur	85	Sharishabari	84	Satpoa	6	Adra	Adra	2	
219	42	Jamalpur	85	Sharishabari	84	Satpoa	706	Nandia	Nandia	2	
220	42	Jamalpur	85	Sharishabari	84	Satpoa	314	Dasherbari	Dasherbari	2	
221	42	Jamalpur	85	Sharishabari	84	Satpoa	811	Rouha	Khalishakuri	2	
222	42	Jamalpur	85	Sharishabari	84	Satpoa	281	Chataria	Chataria	2	
223	42	Jamalpur	85	Sharishabari	84	Satpoa	235	Charjamira	Charjamira	2	
224	42	Jamalpur	85	Sharishabari	84	Satpoa	811	Rouha	Rouha	2	
225	42	Jamalpur	85	Sharishabari	84	Satpoa	306	Dighalkandi	Dighalkandi	2	

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Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
226	42	Jamalpur	85	Sharishabari	84	Satpoa	264	Char Sharishabari	Char Sharishabari	2	
227	42	Jamalpur	85	Sharishabari	84	Satpoa	602	Kunairpara	Kunairpara	2	
228	42	Jamalpur	85	Sharishabari	84	Satpoa	294	Chuniapata	Chuniapatal	2	
229	42	Jamalpur	85	Sharishabari	84	Satpoa	936	Shishua	Shishua	2	
230	42	Jamalpur	85	Sharishabari	84	Satpoa	929	Singaria	Singaria	2	
231	42	Jamalpur	85	Sharishabari	84	Satpoa	19	Baghmara	Baghmara	2	
232	42	Jamalpur	85	Sharishabari	84	Satpoa	680	Nordha	Nordha	2	
233	42	Jamalpur	85	Sharishabari	84	Satpoa	144	Burarbari	Burarbari	2	
234	70	Seraigonj	50	Kazipur	8	Char Girish	137	Bhitua JN pur	Bhitua Jagannat	2	1
235	70	Seraigonj	50	Kazipur	8	Char Girish	83	Baoramari	Baoramari	2	
236	70	Seraigonj	50	Kazipur	8	Char Girish	246	Char Natipara	Char Natipara	2	
237	70	Seraigonj	50	Kazipur	8	Char Girish	216	Char Girish	Char Girish	2	
238	70	Seraigonj	50	Kazipur	8	Char Girish	912	Shaldaha	Shaldaha	2	
239	70	Seraigonj	50	Kazipur	8	Char Girish	275	Chinna	Chinna	2	
240	70	Seraigonj	50	Kazipur	8	Char Girish	197	Bhitua JN pur	Char Daglus	2	
241	70	Seraigonj	50	Kazipur	8	Char Girish	616	Kumarbari	Kumarbari	2	
242	70	Seraigonj	50	Kazipur	8	Char Girish	389	Gugabari	Gugabari	2	
243	70	Seraigonj	50	Kazipur	8	Char Girish	685	Majnabari	Majnabari	2	
244	70	Seraigonj	50	Kazipur	8	Char Girish	271	Sulal	Salal	2	
245	70	Seraigonj	50	Kazipur	8	Char Girish	852	Raghunathpur	Raghunathpur	2	
246	70	Seraigonj	50	Kazipur	8	Char Girish	449	Jorebari	Jorebari	2	
247	70	Seraigonj	50	Kazipur	8	Char Girish	914	Char Shalgram	Char Shalgram	2	
248	70	Seraigonj	50	Kazipur	8	Char Girish	581	Konabari	Konabari	2	
249	70	Seraigonj	50	Kazipur	8	Char Girish	871	Rajnathpur	Rajnathpur	2	
250	70	Seraigonj	50	Kazipur	43	Khas Rajbari	512	Kalikapur	Kalikapur	2	1
251	70	Seraigonj	50	Kazipur	43	Khas Rajbari	866	Rajbari	Rajbari	2	1
252	70	Seraigonj	50	Kazipur	43	Khas Rajbari	297	Dadbura	Dadbura	2	
253	70	Seraigonj	50	Kazipur	43	Khas Rajbari	463	Jukligacha	Jukligacha	2	
254	70	Seraigonj	50	Kazipur	43	Khas Rajbari	443	Jiol	Jiol	2	
255	70	Seraigonj	50	Kazipur	43	Khas Rajbari	994	Ujan Meukhola	Ujan Meukhola	2	
256	70	Seraigonj	50	Kazipur	43	Khas Rajbari	177	Bishuri gacha	Bishuri gacha	2	
257	70	Seraigonj	50	Kazipur	43	Khas Rajbari	384	Gudharbagh	Gudharbagh	2	
258	70	Seraigonj	50	Kazipur	51	Majbari	975	Sutanara	Mallikpara	2	1
259	70	Seraigonj	50	Kazipur	51	Majbari	128	Bhatimiakhola	Bhatimiakhola	2	1
260	70	Seraigonj	50	Kazipur	60	Natoarpara	748	Panagari	Panagari	2	
261	70	Seraigonj	50	Kazipur	60	Natoarpara	985	Uttar Tekani	Uttar Tekani	2	
262	70	Seraigonj	50	Kazipur	60	Natoarpara	541	Khas Suriber	Khas Suriber	2	
263	70	Seraigonj	50	Kazipur	60	Natoarpara	817	Fuljhur	Fuljhur	2	1
264	70	Seraigonj	50	Kazipur	60	Natoarpara	896	Rehai Suriber	Rehai Suriber	2	
265	70	Seraigonj	50	Kazipur	69	Nischintapur	778	Pardorota	Char Jajira	2	
266	70	Seraigonj	50	Kazipur	69	Nischintapur	226	Char Jagannathpur	Char Jagannathpur	2	
267	70	Seraigonj	50	Kazipur	69	Nischintapur	778	Pardorota	Pardorota	2	
268	70	Seraigonj	50	Kazipur	69	Nischintapur	374	Goalbathan	Goalbathan	2	
269	70	Seraigonj	50	Kazipur	69	Nischintapur	522	Kazalgram	Kazalgram	2	
270	70	Seraigonj	50	Kazipur	69	Nischintapur	857	Raghu purba Ramna	Raghu purba Ramna	2	
271	70	Seraigonj	50	Kazipur	69	Nischintapur	206	Char Dorta	Degree Dorta	2	1

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Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
272	70	Serajgonj	50	Kazipur	86	Subagacha	305	Doyel	Afania	2	
273	70	Serajgonj	50	Kazipur	86	Subagacha	305	Doyel	Doyel	2	
274	70	Serajgonj	50	Kazipur	94	Tekani	758	Parkhoksha	Parkhoksha	2	
275	70	Serajgonj	50	Kazipur	94	Tekani	472	Jumar Khoksha	Jumar Khoksha	2	
276	70	Serajgonj	50	Kazipur	94	Tekani	315	Daskhin Tekani	Daskhin Tekani	2	
277	70	Serajgonj	50	Kazipur	94	Tekani	9	Aditapur	Aditapur	2	1
278	70	Serajgonj	50	Kazipur	94	Tekani	571	Kinarber	Kinarber	2	1
279	70	Serajgonj	50	Kazipur	94	Tekani	660	Manikdair	Manikdair	2	1
280	85	Sirajgonj	21	Kazipur	23	Niechitpur	771	Jagannathpur	Jagannathpur	2	1
281	10	Bogra	38	Dhunat	9	Bhandarbari	306	Choubar	Baishakhi	6	1
282	10	Bogra	38	Dhunat	9	Bhandarbari	109	Baraitali	Baraitali	6	
283	10	Bogra	38	Dhunat	9	Bhandarbari	306	Choubar	Bathuar Bhita	6	
284	10	Bogra	38	Dhunat	9	Bhandarbari	586	Kaighari	Kaighari	6	
285	10	Bogra	38	Dhunat	9	Bhandarbari	907	Sarikandi	Pakhuria	6	
286	10	Bogra	81	Sariakandi	12	Bohail	133	Bahail	Nyabahail	6	1
287	10	Bogra	81	Sariakandi	25	Chandanbaisa	12	Adbaria	Uttar Adbaria	6	
288	10	Bogra	81	Sariakandi	25	Chandanbaisa	165	Chandanbaisa	Char Chandanbai	6	
289	10	Bogra	81	Sariakandi	25	Chandanbaisa	12	Adbaria	Chandanbaisa Ba	6	
290	10	Bogra	81	Sariakandi	25	Chandanbaisa	165	Chandanbaisa	Uttar Ghugumari	6	
291	10	Bogra	81	Sariakandi	25	Chandanbaisa	165	Chandanbaisa	Daskhin Ghuguma	6	
292	10	Bogra	81	Sariakandi	25	Chandanbaisa	165	Chandanbaisa	Nair Chandanbai	6	
293	10	Bogra	81	Sariakandi	81	Pakulla	7	Acharerpara	Acharerpara	6	
294	10	Bogra	81	Sariakandi	81	Pakulla	539	Khamari Rd. pur	Khatirman	6	
295	10	Bogra	81	Sariakandi	81	Pakulla	744	Pakulla	Charalkandi	6	
296	10	Bogra	81	Sariakandi	81	Pakulla	744	Pakulla	Pakulla Uttarpa	6	
297	10	Bogra	81	Sariakandi	81	Pakulla	539	Khamari Rdk. pur	Radha Kantapur	6	
298	10	Bogra	81	Sariakandi	81	Pakulla	812	Purba Sujatpur	Purba Sujatpur	6	
299	10	Bogra	81	Sariakandi	81	Pakulla	744	Pakulla	Mirjapur	6	
300	10	Bogra	81	Sariakandi	81	Pakulla	744	Pakulla	Pakulla	6	
301	10	Bogra	81	Sariakandi	88	Sariakandi	376	Deluabari	Deluabari	6	
302	10	Bogra	95	Sonatala	84	TekaniChu.Naga	273	Chukainagar	Bhegairtair	6	
303	10	Bogra	95	Sonatala	84	TekaniChu.Naga	273	Chukainagar	Chukainagar	6	
304	10	Bogra	95	Sonatala	84	TekaniChu.Naga	463	Jointiarpur	Jointiarpur	6	1
305	10	Bogra	95	Sonatala	84	TekaniChu.Naga	531	Khubulia	Khubulia	6	1
306	10	Bogra	95	Sonatala	84	TekaniChu.Naga	797	Purba Tekani	Purba Tekani	6	
307	24	Gaibandha	61	Phulchhari	23	Fazlupur	74	Baje Telkupi	Baje Telkupi	5	
308	24	Gaibandha	61	Phulchhari	47	Gajaria	335	Gajaria	Baushipara	5	
309	24	Gaibandha	61	Phulchhari	47	Gajaria	621	Katiamari	East Katiamari	5	
310	24	Gaibandha	61	Phulchhari	47	Gajaria	621	Katiamari	West Katiamari	5	
311	24	Gaibandha	61	Phulchhari	59	Kanchipara	970	Rasulpur	Rasulpur	5	
312	24	Gaibandha	61	Phulchhari	35	Phulchhari	671	Kholabari	Kholabari	3	
313	24	Gaibandha	61	Phulchhari	71	Udiakandi	920	Singra	Singra	5	
314	24	Gaibandha	61	Phulchhari	71	Udiakandi	609	Kathur	South Kathur	5	
315	24	Gaibandha	61	Phulchhari	71	Udiakandi	609	Kathur	North Kathur	5	
316	24	Gaibandha	61	Phulchhari	83	Uria	559	Kalasona	Kalasona	5	

Table A 1.1 : List of Villages under the Char Land Study

Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
317	24	Gaibandha	61	Phulohari	83	Uria	995	Uria	Uria	5	
318	24	Gaibandha	61	Saghutta	85	Saghutta	0	Sathalia	Sathalia	5	1
319	24	Gaibandha	88	Suggatta	85	Suggatta	614	Gobindi	Gobindi	5	0
320	24	Gaibandha	88	Suggatta	85	Suggatta	476	Hatbari	Hatbari	5	1
321	24	Gaibandha	88	Suggatta	85	Suggatta	212	Bugar Patal	Bugar Patal	5	
322	24	Gaibandha	88	Sughutta	85	Shaghutta	0	Haselkandi	Naukerchar	5	1
323	42	Jamalpur	15	Dewanganj	0	Char Amkhaon	886	Sanandabari	P. Sanandabari	3	1
324	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Belgacha	3	
325	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Berergram	3	
326	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Paschimpara	3	
327	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Ghonapur	3	
328	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Fakirpur	3	
329	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Goaldoba	3	1
330	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Kachima	3	
331	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Chakhar Char	3	
332	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Akandapara	3	
333	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Sardarpara	3	
334	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Parul	3	
335	42	Jamalpur	29	Islampur	63	Kulkandi	497	Harindhara	Harindhara	3	
336	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Purbapara	3	
337	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Nayapara	3	
338	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Beparipara	3	
339	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Maddyapara	3	
340	42	Jamalpur	29	Islampur	63	Kulkandi	497	Harindhara	Murgachar	3	1
341	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Booterchar	3	
342	42	Jamalpur	29	Islampur	63	Kulkandi	659	Kulkandi	Joddarpara	3	
343	42	Jamalpur	29	Islampur	71	Noarpara	86	Bhangbari	Bir Bhangbari	3	
344	42	Jamalpur	29	Islampur	71	Noarpara	584	Katma Krishnagram	Katma Krishnagar	3	
345	42	Jamalpur	29	Islampur	71	Noarpara	594	Kazla	Uttar Kazla	3	
346	42	Jamalpur	29	Islampur	71	Noarpara	692	Majbari	Majbari	3	
347	42	Jamalpur	29	Islampur	94	Shapdhari	886	Shapdhari	Namapara	3	
348	42	Jamalpur	29	Islampur	94	Shapdhari	886	Shapdhari	Nayapara	3	
349	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Indalmari	3	
350	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Illamari	3	1
351	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Jigatali	3	
352	42	Jamalpur	29	Islampur	94	Shapdhari	886	Shapdhari	Kasaridoba	3	
353	42	Jamalpur	29	Islampur	94	Shapdhari	886	Shapdhari	Fakirpara	3	
354	42	Jamalpur	29	Islampur	94	Shapdhari	854	Rajapur	Rajapur	3	
355	42	Jamalpur	29	Islampur	94	Shapdhari	886	Shapdhari	Daskhin Jotdoba	3	
356	42	Jamalpur	29	Islampur	94	Shapdhari	886	Shapdhari	Chitapara	3	
357	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Mandalpara	3	
358	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Akondapara	3	
359	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Kodaldahe	3	
360	42	Jamalpur	29	Islampur	94	Shapdhari	886	Shapdhari	Thonthonia Para	3	
361	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Poramanik Para	3	

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Table A 1.1 : List of Villages under the Char Land Study

Sl No	District Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	Smpl Vill
362	42	Jamalpur	29	Islampur	94	Shapdhari	886	Shapdhari	Uttar Jotdoba	3	
363	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Royerpara	3	
364	42	Jamalpur	58	Madargonj	23	Bailjuri	965	Shuknagari	Shuknagari	4	
365	42	Jamalpur	58	Madargonj	23	Bailjuri	731	Mirjapur	Mirjapur	4	1
366	42	Jamalpur	58	Madargonj	23	Bailjuri	958	Shubhagacha	Shubhagacha	4	1
367	42	Jamalpur	58	Madargonj	59	Jarekhali	91	Baraipara	Baraipara	4	
368	42	Jamalpur	85	Sharishabari	10	Aona	988	Sehabullah	Sehabullah	4	
369	42	Jamalpur	85	Sharishabari	10	Aona	320	Dayalpur	Dayalpur	4	
370	42	Jamalpur	85	Sharishabari	10	Aona	595	Kumarpara	Kumarpara	4	
371	42	Jamalpur	85	Sharishabari	63	Pigna	98	Basuria	Basuria	4	
372	42	Jamalpur	85	Sharishabari	63	Pigna	222	Char Basuria	Char Basuria	4	
373	42	Jamalpur	85	Sharishabari	73	Pogaldigha	765	Pogaldigha	Gobidapatal	4	
374	42	Jamalpur	85	Sharishabari	73	Pogaldigha	301	Damodarpara	Damodarpara	4	
375	42	Jamalpur	85	Sharishabari	73	Pogaldigha	765	Pogaldigha	Kandarpara	4	
376	42	Jamalpur	85	Sharishabari	73	Pogaldigha	818	Rudrabaria	Rudrabaria	4	
377	70	Serajgonj	50	Kazipur	34	Kazipur	689	Maghai	Natun Maghai	6	
378	70	Serajgonj	50	Kazipur	34	Kazipur	689	Maghai	Manikpatal	6	
379	70	Serajgonj	50	Kazipur	34	Kazipur	689	Maghai	Maghai	6	
380	70	Serajgonj	50	Kazipur	34	Kazipur	551	Khudbandi	Machukandi	6	
381	70	Serajgonj	50	Kazipur	34	Kazipur	689	Maghai	Palashtali	6	
382	70	Serajgonj	50	Kazipur	34	Kazipur	827	Parajerpara	Parajerpara	6	
383	70	Serajgonj	50	Kazipur	34	Kazipur	531	Kazipur	Projapara	6	
384	70	Serajgonj	50	Kazipur	34	Kazipur	551	Khudbandi	Khudbandi Fakir	6	
385	70	Serajgonj	50	Kazipur	34	Kazipur	551	Khudbandi	Khudbandi	6	
386	70	Serajgonj	50	Kazipur	34	Kazipur	847	Purbabetgari	Purbabetgari	6	
387	70	Serajgonj	50	Kazipur	34	Kazipur	689	Maghai	Southtala	6	
388	70	Serajgonj	50	Kazipur	51	Maijbari	650	Maijbari	Hatgacha	6	
389	70	Serajgonj	50	Kazipur	51	Maijbari	650	Maijbari	Porabari	6	
390	70	Serajgonj	50	Kazipur	51	Maijbari	325	Dhekuria	Dekhuria	6	
391	70	Serajgonj	50	Kazipur	51	Maijbari	650	Maijbari	Badiarpara	6	
392	70	Serajgonj	50	Kazipur	51	Maijbari	650	Maijbari	Sreepur	6	
393	70	Serajgonj	50	Kazipur	51	Maijbari	650	Maijbari	Dakuria	6	
394	70	Serajgonj	50	Kazipur	51	Maijbari	650	Maijbari	Bul Chatol	6	
395	70	Serajgonj	50	Kazipur	51	Maijbari	650	Maijbari	Natun Maijbari	6	
396	70	Serajgonj	50	Kazipur	69	Nischintapur	206	Char Dorota	Char Dorota	6	
397	70	Serajgonj	50	Kazipur	69	Nischintapur	256	Char Pangari	Char Pangari	6	
398	70	Serajgonj	50	Kazipur	86	Subagacha	433	Junkail	Junkail	6	
399	70	Serajgonj	50	Kazipur	86	Subagacha		Terakandi	Terakandi	6	

Legend : Smpl Vill = Sample Village, Upz = Upazila.

MCODE

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Table A 1.2 : List of Sample Villages

Sl No	Dist. Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	H.H. No.	Population
1	10	Bogra	38	Dhunat	9	Bhandarbari	306	Choubar	Choubar	2	213	966
2	10	Bogra	81	Sariakandi	12	Bohail	501	Uttar Majhira	Uttar Majhira	2	36	205
3	10	Bogra	81	Sariakandi	19	Chaluabari	4	Bahuladanga	Bahuladanga	2	144	921
4	10	Bogra	81	Sariakandi	19	Chaluabari	903	Simultair	Simultair	2	122	813
5	10	Bogra	81	Sariakandi	19	Chaluabari	113	Biramer Pachgachi	Biramer Pachgachi	2	71	415
6	10	Bogra	81	Sariakandi	19	Chaluabari	91	Bhangargacha	Bhangargacha	2	37	236
7	10	Bogra	81	Sariakandi	37	Hatserpur	146	Chak Rathinath	Chak Rathinath	2	79	471
8	10	Bogra	81	Sariakandi	37	Hatserpur	912	Shimulbari	Shimulbari	2	46	266
9	10	Bogra	81	Sariakandi	37	Hatserpur	532	Karnibari	Karnibari	2	30	172
10	10	Bogra	81	Sariakandi	37	Hatserpur	382	Dhanarpara	Dhanarpara	2	50	288
11	10	Bogra	81	Sariakandi	56	Karnibari	682	Mulbari	Mulbari	2	161	987
12	10	Bogra	81	Sariakandi	56	Karnibari	637	Maitthan	Char Maitthan	2	58	318
13	10	Bogra	81	Sariakandi	55	Kazla	765	Pakuria	Pakuria	2	81	450
14	10	Bogra	81	Sariakandi	55	Kazla	975	Tengrakura	Tengrakura	2	104	629
15	10	Bogra	81	Sariakandi	55	Kazla	210	Char Ghagua	Char Ghagua	2	129	799
16	10	Bogra	81	Sariakandi	55	Kazla	502	Sener Char	Sener Char	2	63	380
17	10	Bogra	81	Sariakandi	55	Kazla	89	Benipur	Benipur	2	39	233
18	10	Bogra	81	Sariakandi	55	Kazla	491	Kazla	Kazla	2	80	454
19	10	Bogra	81	Sariakandi	56	Bohail	344	Kalaihata	Kalaihata	2	67	379
20	24	Gaibandha	61	Phulchhari	11	Erendabari	907	Sannasir Char	Sannasir Char	1	164	1054
21	24	Gaibandha	61	Phulchhari	23	Fazlupur	199	Char Krishnamoni	Krishnamoni	1	102	637
22	24	Gaibandha	61	Phulchhari	23	Fazlupur	771	Nischintapur	Nischintapur	1	88	634
23	24	Gaibandha	61	Phulchhari	23	Fazlupur	659	Khatiamari	Khatiamari	1	137	835
24	24	Gaibandha	61	Phulchhari	23	Fazlupur	149	Chandenershar	Chandenershar	1	76	509
25	24	Gaibandha	61	Phulchhari	47	Gajaria	7	Bhanjandanga	Bhanjandanga	1	12	52
26	24	Gaibandha	61	Phulchhari	47	Gajaria	597	Katakagacha	Katakagacha	1	52	277
27	24	Gaibandha	61	Phulchhari	35	Phulchhari	49	Baje Phulchhari	Baje Phulchhari	1	94	615
28	24	Gaibandha	61	Phulchhari	35	Phulchhari	323	Gabgachi	Gabgachhi	1	138	964
29	24	Gaibandha	61	Phulchhari	35	Phulchhari	796	Parul	Parul	1	66	473
30	24	Gaibandha	61	Phulchhari	35	Phulchhari	820	Phulchhari	Phulchhari	1	65	453
31	24	Gaibandha	61	Phulchhari	35	Phulchhari	646	Khanchapara	Khanchapara	1	20	139
32	24	Gaibandha	88	Suggatta	85	Suggatta	178	Bogirchau	Bagir Chau	1	50	299
33	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Miahpara	2	126	620
34	42	Jamalpur	29	Islampur	7	Belgacha	497	Char Munia	Char Munia	1	25	149
35	42	Jamalpur	29	Islampur	63	Kulkandi	529	Jigatoli	Jigatola	1	40	264
36	42	Jamalpur	29	Islampur	71	Noarpara	698	Maijbari	Bir Maijbari	1	115	583
37	42	Jamalpur	29	Islampur	94	Shapdhari	821	Projapati	Projapati	1	77	495
38	42	Jamalpur	85	Sharishabar	10	Aona	13	Aona	Aona	2	33	245
39	70	Serajgonj	50	Kazipur	8	Char Girish	137	Bhitua JN pur	Bhitua Jagannat	2	108	654
40	70	Serajgonj	50	Kazipur	43	Khas Rajbari	512	Kalikapur	Kalikapur	2	98	635
41	70	Serajgonj	50	Kazipur	43	Khas Rajbari	866	Rajbari	Rajbari	2	44	244
42	70	Serajgonj	50	Kazipur	51	Maijbari	975	Sutanara	Mallikpara	2	59	328
43	70	Serajgonj	50	Kazipur	51	Maijbari	128	Bhatimiakhola	Bhatimiakhola	2	116	670
44	70	Serajgonj	50	Kazipur	60	Natoarpara	817	Fuljhur	Fuljhur	2	75	432
45	70	Serajgonj	50	Kazipur	69	Nischintapur	206	Char Dorta	Degree Dorta	2	160	902
46	70	Serajgonj	50	Kazipur	94	Tekani	9	Aditapur	Aditapur	2	20	112
47	70	Serajgonj	50	Kazipur	94	Tekani	571	Kinarber	Kinarber	2	26	139
48	70	Serajgonj	50	Kazipur	94	Tekani	660	Manikdair	Manikdair	2	40	291
49	85	Sirajgonj	21	Kazipur	23	Nischitpur	771	Jagannathpur	Jagannathpur	2	62	432

Table A 1.2 : List of Sample Villages

Sl No	Dist. Code	Name	Upz Code	Name	Union Code	Name	Mauza Code	Name	Village Name	Zone Code	H.H. No.	Population
50	10	Bogra	38	Dhunat	9	Bhandarbari	306	Choubar	Baishakhi	6	92	496
51	10	Bogra	81	Sariakandi	12	Bohail	133	Bahail	Nijbahail	6	205	1067
52	10	Bogra	95	Sonatala	84	TekaniChu.Nagar	463	Jointiarpara	Jointiarpara	6	34	158
53	10	Bogra	95	Sonatala	84	TekaniChu.Nagar	531	Khabulia	Khabulia	6	144	697
54	24	Gaibandha	61	Phulchhari	35	Phulchhari	671	Kholabari	Kholabari	3	131	737
55	24	Gaibandha	61	Saghutta	0	Saghutta	0	Sathalia	Sathalia	5	153	780
56	24	Gaibandha	88	Suggatta	85	Suggatta	476	Hatbari	Hatbari	5	125	682
57	24	Gaibandha	88	Sughutta	85	Shaghutta	0	Haselkandi	Naukerohar	5	115	551
58	42	Jamalpur	15	Dewangonj	0	Char Amkhaoa	886	Sanandabari	P. Sanandabari	3	219	1060
59	42	Jamalpur	29	Islampur	7	Belgacha	75	Belgacha	Goaldoba	3	255	1182
60	42	Jamalpur	29	Islampur	63	Kulkandi	497	Harindhara	Murgarchar	3	161	865
61	42	Jamalpur	29	Islampur	94	Shapdhari	389	Dighair	Illamari	3	127	661
62	42	Jamalpur	58	Madargonj	23	Bailjuri	731	Mirjapur	Mirjapur	4	103	626
63	42	Jamalpur	58	Madargonj	23	Bailjuri	958	Shubhagacha	Shubhagacha	4	160	887
											5922	33967

Legend: Dist. = District, Upz. = Upazila, H.H. = Household

Table A 1.3

Distribution of Villages by size

Population Number	Char land (Z1 - Z2)		Set Back land (Z3 - Z6)	
	(Z1)	(Z2)	(Z3 - Z4)	(Z5 - Z6)
0 - 200	6	12.2%	1	7.1%
201 - 400	15	30.6%	0	0.0%
401 - 600	12	24.5%	1	7.1%
601 - 800	9	18.4%	6	42.9%
801 - 1000	6	12.2%	3	21.4%
1001 - 1200	1	2.0%	3	21.4%
Total	49	100%	14	100%
Mean Value	470.37		779.93	
Standard deviation	252.36		249.45	
Skewness (Fisher G)	0.54		-0.65	
Sample size for normal approximation	> 7		> 10	

Table A 1.4

Mean No of Households per Village

	Charland (Z1 - Z2)			Set Back (Z3 - Z6)		
	(Z1)	(Z2)	Total	(Z3 - Z4)	(Z5 - Z6)	Total
No of Villages	17	32	49	7	7	14
(%)	34.7%	65.3%	100.0%	50.0%	50.0%	100.0%
No of Households	1321	2456	3777	1156	989	2145
(%)	35.0%	65.0%	100.0%	53.9%	46.1%	100.0%
Sample Mean	78	77	77	165	141	153
Std Error of the Mean	10.6	7.1	5.8	20.4	22.8	15.1
t-statistic (95%)			1.96			1.96
Upper Mean Value			89			183
Lower Mean Value			66			124
Sampling Error			14.8%			19.3%

Table A 1.5

Mean Population per Village

	Charsland (Z1 - Z2)			Set Back (Z3 - Z6)		
	Z1	Z2	Total	(Z3 - Z4)	(Z5 - Z6)	Total
No of Villages	17	32	49	7	7	14
(%)	34.7%	65.3%	100.0%	50.0%	50.0%	100.0%
Population	8432	14616	23048	6018	4901	10919
(%)	36.6%	63.4%	100.0%	55.1%	44.9%	100.0%
Sample Mean	496	457	470.4	860	700	780
Std Error of the Mean	69.0	42.7	36.4	77.8	112.1	69.2
t-statistic (95%)			1.96			1.96
Upper Mean Value			542			916
Lower Mean Value			399			644
Sampling Error			15.2%			17.4%

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Table A 1.6

Estimate of the Total Population in the Study Area

	Charland (Z1 - Z2)			Set Back (Z3 - Z6)			Study Area
	(Z1)	(Z2)	Total	(Z3 - Z4)	(Z5 - Z6)	Total	
No of Villages	89	191	280	110	120	230	510
No of Households							
Upper Estimate	7878	16908	24786	20102	21929	42031	66817
Medium Estimate	6860	14723	21583	16854	18386	35240	56823
Lower Estimate	5842	12538	18380	13606	14842	28448	46828
Population							
Upper Estimate	48217	103476	151693	100709	109864	210573	362266
Medium Estimate	41863	89840	131703	85792	93591	179383	311086
Lower Estimate	35509	76204	111712	70876	77319	148195	259907

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Table A2.1 No. of the Households by Family Size and by Land Ownership Status.

No. of Family Members	LL	MR	SM	ME	LR	Total
1-2	17 6.2	3 5.3	2 1.3	0 0.0	0 0.0	22 3.8
3-4	99.0 35.9	18.0 31.6	32.0 21.3	6.0 7.8	0.0 0.0	155.0 26.7
5-6	102.0 37.0	19.0 33.3	63.0 42.0	26.0 33.8	3.0 15.0	213.0 36.7
7-8	49.0 17.8	13.0 22.8	32.0 21.3	20.0 26.0	5.0 25.0	119.0 20.5
9-10	8.0 2.9	4.0 7.0	17.0 11.3	16.0 20.8	2.0 10.0	47.0 8.1
11+	1.0 0.4	-	4.0 2.7	9.0 11.7	10.0 50.0	24.0 4.1
Column Total	276 100.0	57 100.0	150 100.0	77 100.0	20 100.0	580 100.0
Row %	47.6	9.8	25.9	13.3	3.4	100.0

Table A2.2 Average Family Size by Zones and Land Ownership Status.

Area	LL	MR	SM	ME	LR	Total
Zone 1	5.0345	5.3077	6.2444	8.9444	12.8333	6.2857
Zone 2	5.0933	5.1818	6.1389	7.3636	9.8000	6.0966
Zone 3	5.1228	5.5000	6.0714	6.7143	7.0000	5.4750
Zone 4	4.9000	0.0000	6.3333	6.6667	0.0000	3.8056
Zone 5	4.7778	5.5000	6.1250	6.6667	19.0000	5.7250
Zone 6	4.8958	5.5000	4.2500	7.5000	6.0000	4.9344
Total	5.0181	5.3333	6.0667	7.6234	10.7000	5.8621



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Table A2.3 Age Group Wise Distribution of the Population by Zone for Both Sex.

Age (Year)	Zone1	Zone2	Zone3	Zone4	Zone5	Zone6	Total
0-4	140 15.9	175 12.9	70 14.2	17 12.4	19 8.3	26 8.6	447 13.1
5-9	165 18.8	229 16.8	90 18.3	18 13.1	45 19.7	44 14.6	591 17.4
10-14	122 13.9	187 13.8	60 12.2	21 15.3	38 16.6	42 14.0	470 13.8
15-19	82 9.3	116 8.5	33 6.7	14 10.2	24 10.5	28 9.3	297 8.7
20-24	68 7.7	125 9.2	43 8.7	14 10.2	13 5.7	25 8.3	288 8.5
25-29	64 7.3	119 8.8	47 9.5	10 7.3	9 3.9	30 10.0	279 8.2
30-34	57 6.5	94 6.9	27 5.5	8 5.8	16 7.0	18 6.0	220 6.3
35-39	45 5.1	87 6.4	36 7.3	5 3.6	13 5.7	20 6.6	206 6.1
40-44	43 4.9	55 4.0	22 4.5	11 8.0	14 6.1	12 4.0	157 4.6
45-49	22 2.5	50 3.7	17 3.4	5 3.6	9 3.9	15 5.0	118 3.5
50-54	31 3.5	39 2.9	18 3.7	8 5.8	6 2.6	11 3.7	113 3.3
55-59	14 1.6	21 1.5	5 1.0	2 1.5	8 3.5	4 1.3	54 1.6
60-64	11 1.3	23 1.7	10 2.0	3 2.2	5 2.2	9 3.0	61 1.8
65 +	16 1.8	40 2.9	15 3.0	1 0.7	10 4.4	17 5.6	99 2.9
Total	890	1360	493	137	229	301	3400
Row %	25.9	40.0	14.5	4.0	6.7	8.9	100

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Table A2.4 Age Group Wise Distribution of the
Population by Zones for Male only.

Age (Year)	Zone1	Zone2	Zone3	Zone4	Zone5	Zone6	Total
0-4	63 14.0	91 12.4	32 12.9	7 8.8	13 10.5	12 7.6	218 12.2
5-9	81 18.0	127 17.3	45 18.1	9 11.3	24 19.4	27 17.2	313 17.5
10-14	70 15.6	97 13.2	29 11.6	16 20.0	19 15.3	24 15.3	255 16.2
15-19	42 9.4	60 8.2	15 6.0	10 12.5	15 12.1	10 6.4	152 8.5
20-24	32 7.1	60 8.2	20 8.0	8 10.0	7 5.6	13 8.3	140 7.8
25-29	34 7.6	70 9.5	21 8.4	7 8.8	4 3.2	13 8.3	149 8.3
30-34	27 6.0	46 6.3	17 6.8	3 3.8	6 4.8	10 6.4	109 6.1
35-39	24 5.3	57 7.8	21 8.4	2 2.5	7 5.6	14 8.9	125 7.6
40-44	26 5.8	29 4.0	11 4.4	5 6.3	7 5.6	9 5.7	87 4.9
45-49	11 2.4	23 3.1	11 4.4	3 3.8	7 5.6	5 3.2	60 3.3
50-54	16 3.6	25 3.4	12 4.8	5 6.3	3 2.4	4 2.5	65 3.6
55-59	9 2.0	14 1.9	3 1.2	2 2.5	4 3.2		22 1.8
60-64	7 1.6	11 1.5	5 2.0	2 2.5	1 .8	5 3.8	32 1.8
65 +	7 1.6	24 3.3	7 2.8	1 1.3	7 5.6	10 6.4	56 3.1
Total	449	734	249	80	124	157	1793
Row %	25.0	40.9	13.9	4.5	6.9	8.8	100.0

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Table A2.5 Age Groupwise Distribution of the Population by Zone for Female only.

Age (Year)	Zone1	Zone2	Zone3	Zone4	Zone5	Zone6	Total
0-4	77 17.9	84 13.4	38 15.6	10 17.5	6 5.7	14 9.7	229 14.3
5-9	84 19.5	102 16.3	45 18.4	9 15.8	21 20.0	17 11.8	278 17.3
10-14	52 12.1	90 14.4	31 12.7	5 8.6	19 18.1	18 12.5	215 13.4
15-19	40 9.3	56 8.9	18 7.4	4 7.0	9 8.6	18 12.5	145 9.0
20-24	36 8.4	65 10.4	23 9.4	6 10.5	6 5.7	12 8.3	148 9.2
25-29	30 7.0	49 7.8	26 10.7	3 5.3	5 4.8	17 11.8	130 8.1
30-34	30 7.0	48 7.7	10 4.1	5 8.8	10 9.5	8 5.6	111 6.9
35-39	21 4.9	30 4.8	15 6.1	3 5.3	6 5.7	6 4.2	81 5.0
40-44	17 3.9	26 4.2	11 4.5	6 10.5	7 6.7	3 2.1	70 4.4
45-49	11 2.6	27 4.3	6 2.5	2 3.5	2 1.9	10 6.9	58 3.6
50-54	15 3.5	14 2.2	6 2.5	3 5.3	3 2.9	7 4.9	48 3.0
55-59	5 1.2	7 1.1	2 .8		4 3.8	4 2.8	22 1.4
60-64	4 .9	12 1.9	5 2.0	1 1.8	4 3.8	3 2.1	29 1.8
65 +	9 2.1	16 2.6	8 3.3		3 2.9	7 4.9	43 2.7
Total	431	626	244	57	105	144	1607
Row %	26.8	39.0	15.2	3.5	6.5	9.0	100.0

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Table A2.6 Population Distribution by Sex and Sex Ratio by Land Ownership Status.

Land Ownership	Total	Male	Female	Sex Ratio
Landless	1385 40.7	707 39.4	678 42.2	104.3
Marginal	304 8.9	154 8.6	150 9.3	102.7
Small	910 26.8	493 27.5	417 25.9	118.2
Medium	587 17.3	319 17.8	268 16.7	119.0
Large	214 6.3	120 6.7	94 5.8	127.7
Total	3400 100.0	1793 100.0	1607 100.0	115.6
Row %	100.0	52.7	47.3	

Table A2.7 Zone wise Distribution of Population by Sex and Sex Ratio.

Zone	Total	Male	Female	Sex Ratio
Zone 1	880 25.9	449 25.0	431 26.8	104.2
Zone 2	1360 40.0	734 40.9	626 39.0	117.3
Zone 3	493 14.5	249 13.9	244 15.2	102.0
Zone 4	137 4.0	80 4.5	57 3.5	140.4
Zone 5	229 6.7	124 6.9	105 6.5	118.1
Zone 6	301 8.9	157 8.8	144 9.0	109.0
Total	3400	1793	1607	111.6
Row %	100	52.7	47.3	

Table A2.8 Marital Status of the Study Population over
14 years of age by Land Ownership Status and Sex.

Land Owner- ship Status	Unmar- ried	Married	Widow/ Widower	Seperated	Total
Landless					
Total	115	594	46	7	762
%	32.2	41.7	46.0	63.6	40.3
Male	83	300	3	-	386
Female	32	294	43	7	376
Marginal					
Total	28	130	10	0	168
%	7.8	9.1	10.0	0.0	8.9
Male	23	65			88
Female	5	65	10		80
Small					
Total	94	368	28	2	492
%	26.3	25.8	28.0	18.2	26.0
Male	76	184	4		264
Female	18	184	24	2	228
Medium					
Total	81	241	11	2	335
%	22.7	16.9	11.0	18.2	17.7
Male	68	122			190
Female	13	119	11	2	145
Large					
Total	39	91	5	0	135
%	10.9	6.4	5.0	0.0	7.1
Male	34	45			79
Female	5	46	5		56
All Groups					
Total Pop.	357	1424	100	11	1892
%	100.0	100.0	100.0	100.0	100.0
Male	284	716	7		1007
Female	73	708	93	11	885
Row%	18.9	75.3	5.3	0.6	100

Table A2.9 Marital Status of the Study Population
Over 14 Years of Age by Zone and Sex.

Zone	Unmar- ried	Married	Widow/ Widower	Separat- ed	Total
Zone 1					
Total	85	343	22	3	453
%	18.7	75.7	4.9	0.7	100.0
Male	65	170	-	-	235
Female	20	173	22	3	218
Zone 2					
Total	150	578	36	5	769
%	19.5	75.1	4.7	0.7	100.0
Male	122	292	5	-	419
Female	28	286	31	5	350
Zone 3					
Total	49	209	15	-	273
%	17.9	76.6	5.50	-	100.0
Male	38	104	1	-	143
Female	11	105	14	-	130
Zone 4					
Total	20	58	2	1	81
%	24.7	71.6	2.5	1.2	100.0
Male	18	30	-	-	48
Female	2	28	2	1	33
Zone 5					
Total	25	95	7	-	127
%	19.7	74.8	5.5	-	6.7
Male	19	49	-	-	68
Female	6	46	7	-	59
Zone 6					
Total	28	141	18	2	189
%	14.8	74.6	9.5	1.1	10.0
Male	22	71	1	-	94
Female	6	70	17	2	95
All Zones					
Total	357	1424	100	11	1892
%	18.8	75.3	5.3	0.6	100.0
Male	284	716	7	-	1007
Female	73	708	93	11	885
Row %	18.9	75.3	5.3	0.6	100

Table A3.1 No. of Households by Type of Settlers and Zone.

Zone	Original Settlers	Migrated Settlers	Temporary Settlers	Total
1	69 23.6	53 24.7	18 24.7	140 24.1
2	112 38.4	99 46.0	12 16.4	223 38.4
3	50 17.1	25 11.6	15 20.5	90 15.5
4	4 1.4	21 9.8	1 1.4	26 4.5
5	30 10.3	9 4.2	1 1.4	40 6.9
6	27 9.2	8 3.7	26 35.6	61 10.5
Total	292 50.3	215 37.1	73 12.6	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. > 5
131.47717	15	.0000	.403	7 OF 24 (29.2%)

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Table A3.2 No. of Households by Frequency of Migration and Zone.

Frequency Migration after 1971	Z O N E						All Zones
	1	2	3	4	5	6	
0	25	17	40	2	23	17	124
1	33	30	18	9	11	26	127
2	35	45	12	1	4	5	102
3	47	131	20	14	2	13	227
Total	140	223	90	26	40	61	580

Table A3.3 No. of Households by Causes of Their 1st Migration Since 1971.

Causes of Migration	Z O N E						Total
	1	2	3	4	5	6	
Did not Migrate	25 17.9	17 7.6	40 44.4	2 7.7	23 57.5	17 27.9	124 21.4
Due to River Erosion	111 79.3	202 90.6	49 54.4	24 92.3	15 37.5	44 72.1	445 76.7
Due to Flood		3 1.3			1 2.5		4 .7
Due to Poverty	4 2.9	1 .4			1 2.5		6 1.0
Others			1 1.1				1 .2
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
110.19190	20	.0000	.045	18 OF 30 (60.0%)

Table A3.4 No. of Households by Causes of Their 2nd Migration Since 1971 by Zone.

Causes of Migration	Z O N E						Total
	1	2	3	4	5	6	
Did not Migrate	57 40.7	47 21.1	58 64.4	11 42.3	34 85.0	43 70.5	250 43.1
Due to River Erosion	61 57.9	165 74.0	31 34.4	15 57.7	6 15.0	16 26.2	314 54.1
Due to Flood	1 .7	3 1.3				1 1.6	5 .9
Due to Poverty						1 1.6	1 .2
Others	1 .7	8 3.6	1 1.1				10 1.7
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
123.52530	20	.0000	.045	18 OF 30 (60.0%)

Table A3.5 No. of Households by Causes of Their 3rd Migration Since 1971.

Causes of Migration	Z O N E						Total
	1	2	3	4	5	6	
Did not Migrate	93 66.4	92 41.3	70 77.8	12 46.2	38 95.0	48 78.7	353 60.9
Due to River Erosion	46 32.9	129 57.8	18 20.0	14 53.8	1 2.5	11 18.0	219 37.8
Due to Flood	1 .7	2 .9	1 1.1		1 2.5	2 3.3	7 1.2
Others			1 1.1				1 .2
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
93.22533	15	.0000	.045	12 OF 24 (50.0%)

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Table A3.6 No. of Households by Place of Origin of Their 1st Migration Since 1971.

Places of Migration	Z O N E						Total
	1	2	3	4	5	6	
Did not Migrate	25 17.9	17 7.6	40 44.4	2 7.7	23 57.5	17 27.9	124 21.4
Other Chars	96 68.6	180 80.7	36 40.0	24 92.3	6 15.0	7 11.5	349 60.3
Main Land	6 4.3	18 8.1	8 8.9		6 15.0	14 23.0	52 9.0
Others	13 9.3	8 3.6	6 6.7		5 12.5	23 36.7	54 9.3
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Chi-Square D.F. Significance Min E.F. Cells with E.F. < 5
 214.57757 15 .0000 2.331 4 OF 24 (16.7%)

Table A3.7 No. of Households by Place of Origin of Their 2nd Migration Since 1971.

Places of Migration	Z O N E						Total
	1	2	3	4	5	6	
Did no Migrate	57 40.7	47 21.1	58 64.4	11 42.3	34 85.0	43 70.5	250 43.1
Other Chars	64 45.7	139 62.3	21 23.3	15 57.7	5 12.5	7 11.5	251 43.3
Main Lands	8 5.7	20 9.0	6 6.7			1 1.6	35 6.0
Others	11 7.9	17 7.6	5 5.6		1 2.5	10 16.4	44 7.6
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Chi-Square D.F. Significance Min E.F. Cells with E.F. < 5
 132.17759 15 .0000 1.569 6 OF 24 (25.0%)

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Table A3.8 No. of Households by Place of Origin of Their 3rd Migration Since 1971.

Places of Migration	Z O N E						Total
	1	2	3	4	5	6	
Did not Migrate	93 66.4	92 41.3	70 77.6	12 46.2	38 95.0	46 78.7	353 60.9
Other Chars	38 27.1	103 46.2	15 16.7	13 50.0	1 2.5	2 3.3	172 29.6
Main Lands	4 2.9	19 8.5	1 1.1				24 4.1
Others	5 3.6	9 4.0	4 4.4	1 3.8	1 2.5	11 18.0	31 5.3
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
125.88153	15	.0000	1.076	8 OF 24 (33.3%)

Table A3.9 No. of Households by Type of Migration and Zone for Their Last Migration.

TYPE	Z O N E						Total
	1	2	3	4	5	6	
Did not migrate	25 17.9	17 8.1	40 44.4	2 7.7	23 57.5	17 27.9	124 21.6
Permanent	55 39.3	69 39.9	21 23.3	12 46.2	8 20.0	3 13.1	193 33.3
Temporary	60 42.9	117 52.0	29 32.2	12 46.2	9 22.5	36 59.0	263 45.2
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Table A3.10 No. of Households Shifted Dwelling Houses by No. of Shifting in Their Life time due to River Erosion and by Zone.

No. of Shifting of Dwelling Units due to River Erosion	Z O N E						Total
	1	2	3	4	5	6	
0	17 12.1	13 5.8	35 38.9	1 3.8	20 50.0	9	95 16.4
1-2	19 13.6	22 9.9	17 18.9	9 34.6	14 35.0	26 42.6	107 18.1
3-4	34 24.3	57 25.6	27 30.0	6 23.1	1 2.5	10 16.4	135 23.3
5-6	37 26.4	46 20.6	6 6.7	5 19.2	2 5.0	11 18.0	107 18.4
7-8	16 11.4	43 19.3	3 3.3	2 7.7	1 2.5	4 6.6	69 11.9
9 +	17 5.0	42 5.8	2 1.1	3 11.5	2 5.0	1 1.6	67 11.6
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
199.98378	40	.0000	.314	25 DF 54 (46.3%)

Table A3.11 No. of Migrations in the Surveyed Household by Causes of Migration.

Zone	Causes				All Causes
	Due to Erosion	Due to Flood	Poverty	Others	
1	238	2	4	1	245
2	496	8	1	8	513
3	98	1	0	3	102
4	53	0	0	0	53
5	22	2	1	0	25
6	71	3	1	0	75
Total	978	16	7	12	1013

Table A3.12 No. of Migrations by Place of Origin.

Zone	Place of Origins			All Zones
	Other Chars	Mainland	Others	
1	198	18	29	245
2	422	57	34	513
3	72	15	15	102
4	52	-	1	53
5	12	6	7	25
6	16	15	44	75
Total	772	111	130	1013

Table A4.1 Education Level of the Population with Aged Over 4 Years for Both Sex and by Zone.

Level of Education	Location (Zones)						Total
	1	2	3	4	5	6	
Illiterate %	618 83.5	888 74.9	334 79.0	106 88.3	151 71.9	205 74.5	2302 78.0
Non-Formal %	23 3.1	54 4.6	12 2.8	5 4.2	15 7.1	11 4.0	119 4.0
Primary %	60 8.1	131 11.1	50 11.8	4 3.3	27 12.9	36 13.4	308 10.4
Upto Class X %	49 2.6	59 5.0	11 2.6	1 .8	10 4.8	15 5.5	115 3.9
S.S.C %	8 1.1	24 2.0	8 1.9	2 1.7	1 .5	4 1.5	47 1.6
H.S.C + %	7 .9	16 1.4	6 1.4	2 1.7	6 2.9	3 1.1	40 1.3
Madrasha %	5 .7	13 1.1	2 .5	-	-	1 .4	21 .7
Total %	740 25.1	1185 40.1	423 14.3	120 4.1	210 7.1	275 9.3	2953 100.0

Chi-Square 74.87147 D.F. 45 Significance .0034 Min E.F. .041 Cells with E.F. < 5 31 OF 60 (51.7%)

Table A4.2 Education Level of Male Population Aged over 4 Years by Zones.

Level of Education	Location (Zones)						Total
	1	2	3	4	5	6	
Illiterate %	300 77.7	451 70.2	155 71.4	61 83.6	73 65.8	98 67.6	1138 72.3
Non-Formal %	13 3.4	26 4.0	6 2.8	5 6.8	7 5.3	8 5.5	65 4.1
Primary %	44 11.4	81 12.6	33 15.2	2 2.7	18 16.2	23 15.8	201 12.8
Upto Class X %	14 3.6	46 7.2	9 4.1	1 1.4	6 5.4	10 6.9	86 5.5
S.S.C %	6 1.6	20 3.1	7 3.2	2 2.7	1 .9	4 2.8	40 2.5
H.S.C + %	6 1.6	13 2.0	5 2.3	2 2.7	6 5.4	2 1.4	34 2.1
Madrasha %	3 .8	6 .9	2 .9	-	-	-	11 .7
Total %	386 24.5	643 40.8	217 13.8	73 4.6	111 7.0	145 9.2	1575 100.0

Chi-Square 57.31396 D.F. 40 Significance .0373 Min E.F. .139 Cell with E.F. < 5 28 OF 54 (51.9%)



Table A4.3 Education Level of Female Population Aged over 4 Years by Zone.

Level of Education	Location (Zones)						Total
	1	2	3	4	5	6	
Illiterate %	318 89.8	437 80.6	179 86.9	45 95.7	78 78.8	107 82.7	1164 84.5
Non-formal %	10 2.8	28 5.2	6 2.9	-	8 8.1	3 2.3	55 4.0
Primary %	16 4.5	50 9.2	17 8.3	2 4.3	9 9.1	13 10.0	107 7.8
Upto Class X %	5 1.4	13 2.4	2 1.0	-	4 4.0	5 3.8	29 2.1
S.S.C %	1 .3	4 .7	1 .5	-	-	-	5 .3
H.S.C + %	1 .3	3 .6	1 .5	-	-	1 .8	5 .4
Madrasha %	2 .6	7 1.3	-	-	-	1 .8	10 .7
Total %	354 25.7	542 39.3	206 14.9	47 3.4	99 7.2	130 9.4	1378 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
46.72470	40	.2156	.034	37 OF 54 (68.5%)

Table A5.1 Information on Immunisation by Sex.

Sex	Immunized	Not Immunized	Total Eligible HH member for Immunization
Male	201 (79)	52 (21)	253 (100)
Female	182 (74)	63 (26)	245 (100)

Note : Figures in parenthesis indicate percentage

Table A5.2 Information on Immunization by Sex and Zone.

Location	Male		Female		Total
	Immunized	Not-Immunized	Immunized	Not-Immunized	
1	56	25	47	32	160
2	86	14	81	20	201
3	34	1	31	7	72
4	2	8	8	1	19
5	13	-	6	2	21
6	10	4	9	1	24

Table A5.3 Total Number of Households,
where Different Diseases
Occurred for the Male
Members by Type of
Diseases and Location

Type of Diseases	Location		Total
	Char	Setback	
Not applicable	94 25.9	63 29.0	157 27.1
Cholera/Diarrhoea	24 6.6	12 5.5	36 6.2
Tetanus	1 .3		1 .2
Phthisis	2 .6		2 .3
Pox	2 .6	2 .9	4 .7
Cough	46 12.7	32 14.7	78 13.4
Typhoid Fever	16 4.4		16 2.8
Dysentery	40 11.0	33 15.2	73 12.6
Jaundice	5 1.4	3 1.4	8 1.4
Malaria	6 1.7	1 .5	7 1.2
Kalaraz	9 2.5	3 1.4	12 2.1
Fever from Cold	82 22.6	48 22.1	130 22.4
Gastric/Ulcer	15 4.1	9 4.1	24 4.1
Scabies	1 .3	1 .5	2 .3
Stomach Pain	9 2.5	2 .9	11 1.9
Goiter	1 .3	1 .5	2 .3
Others	10 2.8	7 3.2	17 2.9
Total	363 62.6	217 37.4	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
19.21885	16	.2575	.374	15 OF 34 (44.1%)

Table A5.4 Total Number of Households, where Different Diseases Occurred for the Male Members by Type of Treatment Received and Location.

Male Treatment	Locationwise		Total
	Chaj	Setback	
Not Applicable	94 25.9	63 29.0	157 27.1
Without Treatment	21 5.8	7 3.2	28 4.8
Exorcising/Tabiz	3 .8	6 2.8	9 1.6
Kaviraj/Hekim	12 3.3	5 2.3	17 2.9
Homeopathy	1 .3	1 .5	2 .3
Quack Doctor	180 49.6	99 45.6	279 48.1
Trained/MBBS	31 8.5	17 7.8	48 8.3
Hospital/Clinic	21 5.8	19 8.8	40 6.9
Total	363 62.6	217 37.4	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
8.48902	7	.2915	.748	2 OF 16 (18.8%)

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Table A5.5 Total Number of Households, where Different Diseases Occurred for the Female Members by Type of Diseases and Location.

Type of Diseases	Locationwise		Total
	Char	Setback	
Not applicable	153 43.5	83 38.2	241 41.6
Cholera/Diarrhoea	10 2.8	9 4.1	19 3.3
Tetanus	1 .3		1 .2
Phthisis	1 .3		1 .2
Pox	3 .8	3 1.4	6 1.0
Cough	16 4.4	8 3.7	24 4.1
Typhoid Fever	7 1.9	6 2.8	13 2.2
Dysentery	33 9.1	32 14.7	65 11.2
Jaundice	3 .8	2 .9	5 .9
Malaria	2 .6	5 2.3	7 1.2
Kalazar	6 1.7	2 .9	8 1.4
Fever from Cold	52 14.3	32 14.7	84 14.5
Gastric/Ulcer	13 3.6	3 1.4	16 2.8
Scabies	2 .6	2 .9	4 .7
Stomach Pain	49 13.5	25 11.5	74 12.8
Goiter	1 .3	1 .5	2 .3
Others	6 1.7	4 1.8	10 1.7
Total	363 62.6	217 37.4	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. ≥ 5
15.03417	16	.5221	.374	17 OF 34 (50.0%)

Table A5.6 Total Number of Households, where Different Diseases Occurred for the Female Members by Type of Treatment Received and Location.

Female Treatment	Locationwise		Total
	Char	Setback	
Not Applicable	157 43.3	84 38.7	241 41.0
Without Treatment	17 4.7	9 4.1	26 4.5
Exorcising/Tabiz	4 1.1	1 .5	5 .9
Kaviraj/Hekim	7 1.9	7 3.2	14 2.4
Homeopathy	1 .3	1 .5	2 .3
Quack Doctor	132 36.4	86 39.6	218 37.6
Trained/MBBS	26 7.2	14 6.5	40 6.9
Hospital/Clinic	19 5.2	15 6.9	34 5.9
Total	363 62.6	217 37.4	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
3.62880	7	.8214	.748	4 OF 16 (25.0%)

Table A5.7 Total Number of Households, where Different Diseases Occurred for the Children by Type of Diseases and Location

Type of Diseases	Locationwise		Total
	Char	Setback	
Not applicable	175 48.2	121 55.8	296 51.0
Cholera/Diarrhoea	21 5.8	18 8.3	39 6.7
Tetanus	2 .6		2 .3
Pox	1 .3	1 .5	2 .3
Cough	35 9.6	16 7.4	51 8.8
Typhoid Fever	3 .8		3 .5
Dysentery	22 6.1	17 7.8	39 6.7
Jaundice	1 .3		1 .2
Malaria	1 .3		1 .2
Kalazar	1 .3		1 .2
Fever from Cold	88 24.2	42 19.4	130 22.4
Scabies	7 1.9	2 .9	9 1.6
Stomach Pain	2 .6		2 .3
Goiter	1 .3		1 .2
Others	3 .8		3 .5
Total	363 62.6	217 37.4	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
15.05875	14	.3742	.374	19 OF 30 (63.3%)

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Table A5.8 Total Number of Households, where Different Diseases Occurred for the Children by Type of Treatment Received and Location.

Child Treatment	Locationwise		Total
	Char	Setback	
Not Applicable	175 48.2	122 56.2	297 51.2
Without Treatment	29 8.0	9 4.1	38 6.8
Exorcising/Tabiz	5 1.4	1 .5	6 1.0
Kaviraj/Hekim	8 2.2	4 1.8	12 2.1
Homeopathy	1 .3	2 .9	3 .5
Quack Doctor	126 34.7	65 30.0	191 32.9
Trained/MBBS	12 3.3	6 2.8	18 3.1
Hospital/Clinic	7 1.9	8 3.7	15 2.6
Total	363 62.6	217 37.4	580 100.0

Chi-Square 9.73077 D.F. 7 Significance .2044 Min E.F. 1.122 Cells with E.F. < 5 5.00 (8.6 31.3%)

Table A6.1 No. of Households having Living Rooms by Zones.

No. of Living Rooms	LOCATION						Total
	1	2	3	4	5	6	
None							
1	95 67.8	140 62.8	68 75.6	23 88.5	26 65.0	54 88.5	406 70.0
2	35 25.0	60 26.9	17 18.9	3 11.5	12 30.0	6 9.8	133 22.9
3	9 6.4	18 8.1	5 5.6		1 2.5	1 1.6	34 5.9
4+	1 .7	5 2.1			1 2.5		7 1.2
Total	140	223	90	26	40	61	580
%	100	100	100	100	100	100	100
Row%	24.1	38.4	15.5	4.5	6.9	10.5	100

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Table A6.2 No. of Households having Banglow Rooms by Zones.

No. of Living Rooms	LOCATION						Total
	1	2	3	4	5	6	
None	129 92.1	200 89.7	34 93.3	26 100	17 92.5	58 95.1	534 92.1
1	11 7.9	22 9.9	6 6.7		3 7.5	3 4.9	45 7.8
2		1 .4					1 .2
Total	140	223	90	26	40	61	580
%	100	100	100	100	100	100	100
Row%	24.1	38.4	15.5	4.5	6.9	10.5	100

Table A6.3 Living Room Construction type by Zone.

Construction Type	LOCATION						Total
	1	2	3	4	5	6	
Bamboo/Leaves/Straw	93 66.4	98 43.9	53 58.9	17 62.2	22 55.0	29 47.5	312 53.8
Tin Shed	45 32.1	124 55.6	34 37.8	10 38.5	17 42.5	29 47.5	259 44.7
Semi-Pucca	1 .7	1 .4	3 3.3		1 2.5	3 4.9	9 1.6
Total	140	223	90	26	40	61	580
%	100	100	100	100	100	100	100
Row%	24.1	38.4	15.5	4.5	6.9	10.5	100

Table A6.4 Banglow Room Construction type by Zone.

Construction Type	LOCATION						Total
	1	2	3	4	5	6	
Bamboo/Leaves/Straw	4 2.9	6 2.7	2 2.2		3 7.5	1 1.6	16 2.8
Tin Shed	7 5.0	17 7.6	4 4.4			1 1.6	29 5.0
Semi-Pucca						1 1.6	1 .2
Total	140	223	90	26	40	61	580
%	100	100	100	100	100	100	100
Row%	24.1	38.4	15.5	4.5	6.9	10.5	100

Table A7.1 No. of Households using Water for Different Purposes by Type of Sources for All Zones.

Water Use	No. of Households			
	Tubewell	Well	Ponds	Canal/River
Drinking	573	3	-	4
Cooking	571	3	1	5
Cleaning/Washing	500	4	3	73
Bathing	205	4	2	146
Washing of Cattle	3	-	3	395

Table A7.2 No. of Households Using Tubewell Water for Different Purposes by Zone.

Water Use	Z O N E						Total
	1	2	3	4	5	6	
Drinking	136 97.1	222 99.6	90 100.0	26 100.0	39 97.5	60 98.4	573 98.9
Cooking	136 97.1	222 99.6	89 98.9	26 100.0	39 97.5	59 96.7	571 96.4
Cleaning/washing	112 80.0	203 91.0	77 85.6	26 100.0	30 87.5	47 77.0	500 86.2
Bathing	50 35.7	85 38.1	35 38.9	6 30.8	12 30.6	15 24.6	205 35.3
Washing of Cattle		1 .4	2 2.2				3 .5
All Household	140	223	90	26	40	61	580

Table A7.3 No. of Households Using Well Water for Different Purposes by Zone.

Water Use	Z O N E						Total
	1	2	3	4	5	6	
Drinking	1 .7				1 2.5	1 1.6	3 .5
Cooking	1 .7				1 2.5	1 1.6	3 .5
Cleaning/Washing	1 .7		1 1.1		1 2.5	1 1.6	4 .7
Bathing			1 1.1		1 2.5	2 3.3	4 .7
All Household	140	223	90	26	40	61	580

Table 7.4 No. of Households Using Pond Water for Different Purposes by Zone.

Water Use	Z O N E						Total
	1	2	3	4	5	6	
Cooking			1 1.1				1 1.1
Cleaning/Washing			3 3.3				3 3.3
Bathing			5 5.6				5 5.6
Washing of Cattle			3 3.3				3 3.3
All Household	140	223	90	26	40	61	580

Table A7.5 No. of Households Using Canal/River Water for Different Purposes by Zone

Water Use	Z O N E						Total
	1	2	3	4	5	6	
Drinking	3 2.1	1 .4					4 .7
Cooking	3 2.1	1 .4				1 1.6	5 .9
Cleaning/Washing	27 19.3	20 9.0	9 10.0		4 10.0	13 21.3	73 12.6
Bathing	89 63.6	138 61.9	49 54.4	18 69.2	27 67.5	43 70.5	364 62.8
Washing of Cattle	92 65.7	179 80.3	44 48.9	15 57.7	19 47.5	25 41.0	374 64.5
All Household	140	223	90	26	40	61	580

Table A7.6 Zone Wise Availability of Latrine in the Households.

Location	Household No.		
	Yes	No	Total
1	74	66	140
2	113	110	223
3	37	53	90
4	5	21	26
5	18	22	40
6	25	36	61
Total	272	308	580
%	(46.9)	(53.1)	(100)

Table A7.7 No. of Households Using Latrine by Type of Latrine and Zone

Type	Z O N E						Total
	1	2	3	4	5	6	
No Latrine	54 38.6	99 44.4	51 56.7	21 30.8	20 57.5	34 55.7	280 48.6
Septic	1 .7	4 1.8	2 2.2		2 5.0	2 3.3	11 1.9
Pit	15 10.7	43 19.3	7 7.8	3 11.5	4 10.0	10 16.4	82 14.1
Well Latrine	15 10.7	26 11.7	7 7.8	1 3.8	3 7.5	4 6.6	56 9.7
Tana Latrine	15 10.7	9 4.0	8 8.9	1 3.8	1 2.5	2 3.3	36 6.2
On Water Body	7 5.0	10 4.5	2 2.2		2 5.0	2 3.3	23 4.0
Bush	33 23.6	32 14.3	13 14.4		5 12.5	7 11.5	90 15.5
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
50.57222	30	.0108	.493	17 OF 42 (40.5%)

Table A8.1 No. of Households by Ownership of Land (in decimal) and Zone

Land Use = 1 Homestead 2 Pond 3 Sandy 4 Merged 5 Cultivable

Area (Dec.)	Z O N E						Total
	1	2	3	4	5	6	
No Land %	21 15.0	28 12.6	16 17.8	8 30.8	4 10.0	9 14.8	86 14.8
001-050	19 13.6	16 7.2	27 30.8	2 7.7	14 35.0	15 24.6	93 16.0
051-100	8 5.7	13 5.8	3 3.3	-	1 7.5	10 16.4	37 6.4
101-200	18 12.9	32 14.3	13 14.4	1 3.8	6 15.0	10 16.4	70 12.6
201-300	17 12.6	21 9.4	6 6.7	5 18.2	4 10.0	7 11.5	65 11.5
301-400	11 7.9	22 9.9	10 11.1	5 18.2	4 10.0	3 4.9	55 9.5
401-500	8 5.7	13 5.8	4 4.4	1 3.8	1 2.5	1 1.6	28 4.8
501-600	6 4.3	18 8.1	1 1.1	1 3.8	2 5.0	-	28 4.8
601-700	6 4.3	12 5.4	1 1.1	2 7.7	-	-	21 3.6
701-800	4 2.9	-	1 1.1	-	-	-	5 .9
801 +	27 19.3	48 21.5	8 8.9	1 3.8	3 7.5	6 9.8	93 16.0
Total	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Table A8.2 Total Area (in decimal) Owned by the Households by Land Use and Zone.

Land Use	Z O N E						Total
	1	2	3	4	5	6	
Cultivable	20911 25.8	40145 35.4	7075 27.0	1595 23.5	4050 33.9	4622 20.2	78398 29.9
Sandy	9439 11.6	14825 13.1	2195 8.4	0 0.0	989 8.3	2150 9.4	29548 11.3
Merged	48696 60.0	55313 48.8	15950 61.0	5024 73.8	6400 53.6	15436 67.6	146819 56.0
Homestead	2016 2.5	2941 2.6	923 3.5	175 2.6	462 3.9	396 1.7	6913 2.6
Pond	69 0.1	125 0.1	15 0.1	0 0.0	50 0.4	244 1.1	503 0.2
Total	81131 100.0	113349 100.0	26158 100.0	6794 100.0	11951 100.0	28369 100.0	262231 100.0

Table A8.3 Average Land Area (in decimal) Distribution Per Household by Land Use

Land Use	Z O N E						Total N=580
	1 N=140	2 N=223	3 N=90	4 N=26	5 N=40	6 N=11	
Cultivable	149.36	180.02	78.61	61.35	101.25	75.72	135.17
Sandy	67.42	66.48	24.79	0.00	24.77	5.00	58.41
Merged	347.83	248.04	177.22	193.23	160.00	253.05	253.14
Homestead	14.40	13.19	10.28	8.73	11.55	6.49	11.92
Pond	0.49	0.56	0.17	0.00	1.26	1.00	0.97
Total	579.51	508.29	290.64	261.31	298.78	374.56	452.12

N is the total number of Households for each Zone

Table A8.4 No. of Households by Homestead Area (in decimal) Ownership and by Zone.

Homestead Area (in dec.)	Z O N E					
	1	2	3	4	5	6
0	37 26.4	62 27.8	34 37.8	17 65.4	7 17.5	42 68.9
01 - 05	11 7.9	10 4.5	9 10.0	-	8 20.0	4 6.6
06 - 10	20 14.3	39 17.5	16 17.8	4 15.4	11 27.5	3 4.9
11 - 15	13 9.3	26 11.7	9 10.0	2 7.7	5 12.5	3 4.9
16 - 20	32 22.9	43 19.3	11 12.2	1 3.8	4 10.0	5 8.2
21 - 30	7 5.0	19 8.5	6 6.7	-	2 5.0	1 1.6
31 - 40	14 10.0	20 9.0	3 3.3	1 3.8	1 2.5	1 1.6
41 - 50	2 1.4	2 .9	1 1.1	-	-	-
51 - 60	1 .7	-	-	1 3.8	1 2.5	-
61 +	3 2.1	2 .9	1 1.1	-	1 2.5	2 3.3

Table A8.6 Ownership of Cultivable Land by of the Households by Land Status and Zone.

Area (Decimal)		Char	Non-Char	
		1	2	Total
No Land	0	133	143	276
%		36.6	65.9	47.6
001-050	1	35	22	57
		9.6	10.1	9.8
051-100	2	52	21	73
		14.1	9.7	16.6
101-200	3	54	10	64
		14.9	4.6	11.0
201-300	4	33	4	37
		9.1	1.8	6.4
301-400	5	18	7	25
		5.0	3.2	4.3
401-500	6	12	3	15
		3.3	1.4	2.6
501-600	7	7	2	9
		1.9	.9	1.6
601-700	8	3	1	4
		.8	.5	.7
701-800	9	3		3
		.8		.5
801+	10	13	4	17
		3.6	1.8	2.9
Total	Column	363	217	580
	%	100.0	100.0	100.0
	Row %	62.6	37.4	100.0

Table No. 7 Ownership of Merged Land
by of the Households by
Land Status and Zone.

Area (Decimal)		Char	Non-Char	
		1	2	Total
No Land	0	113	98	211
%		31.1	45.2	36.4
001-050	1	18	25	43
		5.0	11.5	7.4
051-100	2	47	20	67
		12.9	9.2	11.6
101-200	3	59	23	82
		16.3	10.6	14.1
201-300	4	40	20	60
		11.0	9.2	10.3
301-400	5	27	11	38
		7.4	5.1	6.6
401-500	6	11	6	17
		3.0	2.8	2.9
501-600	7	6	2	8
		1.7	.9	1.4
601-700	8	10	1	11
		2.8	.5	1.9
701-800	9	6	2	8
		1.7	.9	1.4
801+	10	26	9	35
		7.2	4.1	6.0
Total	Column	363	217	580
	%	100.0	100.0	100.0
	Row %	62.6	37.4	100.0

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Table A8.8 Ownership of Sandy Land
by of the Households by
Land Status and Zone.

Area (Decimal)		Char	Non-Char	
		1	2	Total
No Land	0	256	198	454
%		70.5	91.2	78.3
001-050	1	21	5	26
		5.8	2.3	4.5
051-100	2	30	4	34
		8.3	1.8	5.9
101-200	3	25	6	31
		6.9	2.8	5.3
201-300	4	10		10
		2.8		1.7
301-400	5	11		11
		3.0		1.9
401-500	6		1	1
			.5	.2
601-700	8	3	1	4
		.8	.5	.7
701-800	9	1		1
		.3		.2
801+	10	6	2	8
		1.7	.9	1.4
Total	Column	363	217	580
	%	100.0	100.0	100.0
	Row %	62.6	37.4	100.0

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Table AB.9 No. of Households by Area (in Decimal) of Net Operated Land by Zone.

Area (Decimal)		Zone						Total
		1	2	3	4	5	6	
No Land	0	51	53	51	15	18	48	236
%		36.4	23.8	56.7	57.7	45.0	28.1	40.7
001-050	1	16	22	14	1	10	3	66
		11.4	9.9	15.6	3.8	25.0	4.9	11.4
051-100	2	17	40	10	2	4	5	78
		12.1	17.9	11.1	7.7	10.0	8.2	13.4
101-200	3	24	40	6	3	4	4	81
		17.1	17.9	6.7	11.5	10.0	6.6	14.0
201-300	4	15	28	1	2	1		47
		10.7	12.6	1.1	7.7	2.5		8.1
301-400	5	4	14	3	2	1	1	25
		2.9	6.3	3.3	7.7	2.5	1.6	4.3
401-500	6	5	9	1				15
		3.6	4.0	1.1				2.6
501-600	7	2	4	1				7
		1.4	1.8	1.1				1.2
601-700	8		3	2		1		6
			1.3	2.2		2.5		1.0
701-800	9		3					3
			1.3					.5
801+	10	6	7	1	1	1		16
		4.3	3.1	1.1	3.8	2.5		2.8
Total	Column	140	223	90	26	40	61	580
%		100.0	100.0	100.0	100.0	100.0	100.0	100.0
Row	%	24.1	38.4	15.5	4.5	6.9	10.5	100.0

Table A8.10 No. of Households by Area of Operated Lands Under Mortgage In/Out and Share Cropped In/Out.

Area (in dec.)	Mortgage In	Mortgage Out	Share In	Share Out
001 - 020	555 (95.7)	564 (97.2)	516 (89.0)	565 (97.4)
021 - 050	10 (1.7)	8 (1.4)	14 (2.4)	1 (.2)
051 - 100	8 (1.4)	6 (1.0)	27 (4.7)	4 (.7)
101 - 200	5 (.9)	1 (.2)	17 (2.9)	4 (.7)
201 - 400	2 (.3)	1 (.2)	4 (.7)	3 (.5)
401 - 600	-	-	1 (.2)	1 (.2)
601 - 800	-	-	1 (.2)	1 (.2)
801 +	-	-	-	1 (.2)
Total	580(100.0)	580(100.0)	580(100.0)	580(100.0)

Note : Figures in parenthesis indicate percentages out of total households

Table A8.11 No. of Share Cropper Households Under Different Terms of Share Cropping (% of Crop given to the Land Owner) by Zone.

Terms of Sharing % of Crop	Z O N E					
	1	2	3	4	5	6
< 25	129 92.1	178 79.8	79 87.8	19 73.1	38 95.0	55 90.2
26 - 49	-	-	-	-	-	-
50 - 74	11 7.9	45 20.2	11 12.2	7 26.9	2 5.0	6 9.8
75 +	-	-	-	-	-	-

Table A8.12 Type of Mortgage by Zone.

Category of Mortgage	Z O N E						Total
	1	2	3	4	5	6	
Bandhak	3 25.0	-	1 20.0	-	1 33.3	-	5 10.4
Bhograihan	8 66.7	17 73.9	4 80.0	1 100.0	2 66.7	3 75.0	35 72.9
Medi	1 8.3	4 17.4	-	-	-	-	5 10.4
Others	-	2 8.7	-	-	-	1 25.0	3 6.3

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Table AB.13 Zone wise Land Transfer in Decimal and Average Value Per Decimal in Taka.

Zone	1989				1990				1991			
	Land Purc.	Av. Val.	Land Sold	Av. Val.	Land Purc.	Av. Val.	Land Sold	Av. Val.	Land Purc.	Av. Val.	Land Sold	Av. Val.
1	0.36 3	68 3	1.9 3	179 3	79 2	0.71 2	1.9 2	81 2	1 2	50 2	2.75 5	141 5
2	1.08 3	67 3	0.63 4	77 4	372 1	7.02 1	0.1 2	9.87 2	3.92 18	463 18	0.49 4	55 4
3	-	-	-	-	67 1	0.17 1	0.5 2	122 2	0.3 1	67 1	-	-
4	-	-	-	-	-	-	-	-	2.54 1	231 1	-	-
5	1.28 1	750 1	-	-	800 2	1.38 2	1 1	300 1	3.30 2	1300 2	0.2 1	100 1
6	-	-	-	-	-	-	0.49 1	98 1	-	-	0.54 1	49 1

Table AB.14 Average Area (in decimal) of Land holding and Tenure Per Households by Zone.

Zone	Taken in	Taken out	Net Operated Land
1	12.35	4.95	156.76
2	25.00	9.58	195.45
3	7.17	9.88	75.69
4	82.88	3.84	140.38
5	6.65	7.33	100.57
6	3.39	54.10	25.06
All Zones	18.24	12.78	140.62

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Table A9.1 Per Household Availability of Agricultural Assets by Zone.

Zone	No. of HH	Plough	Ladder	Weeder	Power Tiller	Thresher	Hand TW	STW	LLP	Don/ Seuty	Spray Machine	Other Agro Assets
1	140	0.6950	0.6170	2.2411	0.0213	0.0426	0.0709	0.0000	0.0000	0.0071	0.0000	0.9645
2	223	0.8649	0.6937	2.0721	0.0000	0.0135	0.1847	0.0676	0.0045	0.0000	0.0045	1.0045
3	89	0.4045	0.3146	1.7079	0.0000	0.0000	0.0674	0.0225	0.0000	0.0000	0.0000	1.2247
4	26	0.6538	0.4615	1.5769	0.0000	0.0000	0.1154	0.0000	0.0000	0.0000	0.0000	2.0000
5	40	0.3500	0.2500	1.5500	0.0000	0.0000	0.1500	0.0750	0.0000	0.0000	0.0000	0.9250
6	62	0.2097	0.1935	1.3065	0.0161	0.0000	0.0968	0.0161	0.0000	0.0000	0.0000	1.2419
All Zone	580	0.6379	0.5224	1.9172	0.0069	0.0155	0.1241	0.0362	0.0017	0.0017	0.0017	1.0931

Table A9.2 No. of Households with Availability of Agricultural Assets by Zone.

Zone	No. of HH	Plough	Ladder	Weeder	Power Tiller	Thresher	Hand TW	STW	LLP	Don/ Seuty	Spray Machine	Other Agro Assets
1	140	79	78	131	2	1	10	0	0	1	0	45
	100.0	56.4	55.7	93.6	1.4	0.7	7.1	0.0	0.0	0.7	0.0	32.1
2	223	150	142	200	0	2	41	14	1	0	1	65
	100.0	67.3	63.7	89.7	0.0	0.9	18.4	6.3	0.4	0.0	0.4	29.1
3	89	32	28	74	0	0	6	2	0	0	0	34
	100.0	36.0	31.5	83.1	0.0	0.0	6.7	2.2	0.0	0.0	0.0	38.2
4	26	9	8	22	0	0	3	0	0	0	0	14
	100.0	34.6	30.8	84.6	0.0	0.0	11.5	0.0	0.0	0.0	0.0	53.8
5	40	10	9	33	0	0	6	2	0	0	0	12
	100.0	25.0	22.5	82.5	0.0	0.0	15.0	5.0	0.0	0.0	0.0	30.0
6	62	13	12	46	1	0	6	1	0	0	0	24
	100.0	21.0	19.4	74.2	1.6	0.0	9.7	1.6	0.0	0.0	0.0	38.7
Total	580	293	277	506	3	3	72	19	1	1	1	194
	100.0	50.5	47.8	87.2	0.5	0.5	12.4	3.3	0.2	0.2	0.2	33.4



Table A9.3 Per Household Availability of Transport Assets by Zone.

Zone	Total HH	Push Cart	Boat	Bi-cycle	Rickshaw /Van	Motor Cycle
1	140	0.0000	0.1418	0.0355	0.0000	0.0000
2	223	0.0000	0.1892	0.0360	0.0045	0.0000
3	89	0.0337	0.0225	0.0787	0.0000	0.0000
4	26	0.0000	0.0385	0.0000	0.0000	0.0000
5	40	0.0000	0.0500	0.1000	0.0250	0.0250
6	62	0.0000	0.0161	0.1613	0.0000	0.0161
All Zone	580	0.0052	0.1172	0.0586	0.0034	0.0034

Table A9.4 No. of Households with Availability of Transport Assets by Zone.

Zone	Total HH	Push Cart	Boat	Bi-cycle	Rickshaw /Van	Motor Cycle
1	140 100.0	0 0.0	19 13.6	5 3.6	0 0.0	0 0.0
2	223 100.0	0 0.0	40 17.9	8 3.6	1 0.4	0 0.0
3	89 100.0	1 1.1	2 2.2	7 7.9	0 0.0	0 0.0
4	26 100.0	0 0.0	1 3.8	0 0.0	0 0.0	0 0.0
5	40 100.0	0 0.0	2 5.0	4 10.0	1 2.5	1 2.5
6	62 100.0	0 0.0	1 1.6	10 16.1	0 0.0	1 1.6
Total	580 100.0	1 0.2	65 11.2	34 5.9	2 0.3	2 0.3

Table A9.5 Per Household Availability of Furniture by Zone.

Zone	Total HH	Khat/ Chowki	Chair/ Table	Almira	Other Furniture
1	140	1.3333	0.6879	0.1206	1.2270
2	223	1.7297	1.4910	0.1532	0.9144
3	89	1.4607	1.0000	0.1573	1.0337
4	26	1.4231	0.5385	0.1154	1.2692
5	40	1.5000	1.0750	0.2250	1.6750
6	62	1.4194	1.4194	0.1935	0.8065
All Zone	580	1.5293	1.1414	0.1534	1.0655

Table A9.6 No. of Households with Availability of Furniture by Zone.

Zone	Total HH	Khat/ Chowki	Chair/ Table	Almira	Other Furniture
1	140 100.0	102 72.9	33 23.6	10 7.1	67 47.9
2	223 100.0	199 89.2	105 47.1	23 10.3	78 35.0
3	89 100.0	75 84.3	27 30.3	5 6.7	44 49.4
4	26 100.0	23 88.5	6 23.1	1 3.8	13 50.0
5	40 100.0	36 90.0	14 35.0	4 10.0	27 67.5
6	62 100.0	54 87.1	23 37.1	8 12.9	16 25.8
Total	580 100.0	489 84.3	208 35.9	52 9.0	245 42.2

Table A9.7 Per Household Availability of Fishing Nets by Zone.

Zone	Total HH	Khara Net	Ber Net	Kurrent Net	Tana Net	Kai Net	Jhaki Net	Dharma Net	Thela Net	Other Nets	Total Nets
1	140	0.0017	0.0276	0.0431	0.0259	0.0103	0.1121	0.0448	0.2500	0.0741	0.5896
2	223	0.0000	0.0142	0.0284	0.0284	0.0071	0.0709	0.0355	0.3333	0.0922	0.6100
3	89	0.0000	0.0045	0.0586	0.0270	0.0180	0.1396	0.0495	0.2703	0.0586	0.6261
4	26	0.0000	0.0000	0.0674	0.0337	0.0000	0.0674	0.0449	0.2584	0.0562	0.5280
5	40	0.0000	0.0000	0.0769	0.0000	0.0000	0.0000	0.0000	0.1923	0.0000	0.2692
6	62	0.0250	0.2500	0.0000	0.0500	0.0250	0.2000	0.1250	0.1250	0.0750	0.8750
All Zone	580	0.0000	0.0484	0.0000	0.0000	0.0000	0.1613	0.0161	0.0806	0.1452	0.4516

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Table A9.8 No. of Households with Availability of Fishing Nets by Zone.

Zone	Total HH	Khara Net	Ber Net	Kurrent Net	Tana Net	Kai Net	Jhaki Net	Dharma Net	Thela Net	Other Nets	Total Nets
1	140	0	2	4	3	1	10	5	47	10	26
	100.0	0.0	1.4	2.9	2.1	0.7	7.1	3.6	33.6	7.1	0.18
2	223	0	1	10	6	4	31	11	60	11	46
	100.0	0.0	0.4	4.5	2.7	1.8	13.9	4.9	26.9	4.9	0.20
3	90	0	0	6	3	0	6	4	23	4	19
	100.0	0.0	0.0	6.7	3.4	0.0	6.7	4.5	25.8	4.5	0.21
4	26	0	0	2	0	0	0	0	5	0	4
	100.0	0.0	0.0	7.7	0.0	0.0	0.0	0.0	19.2	0.0	0.15
5	40	1	2	0	2	1	8	5	5	1	9
	100.0	2.5	5.0	0.0	5.0	2.5	20.0	12.5	12.5	2.5	0.22
6	61	0	3	0	0	0	10	1	5	1	5
	100.0	0.0	4.8	0.0	0.0	0.0	16.1	1.6	8.1	1.6	0.08
Total	580	1	8	22	14	6	65	26	145	27	109
	100.0	0.2	1.4	3.8	2.4	1.0	11.2	4.5	25.0	4.7	0.18

Table A9.9 Per Household Availability of Other Assets by Zone.

Zone HH	Trap	Harp	Radio		House	Shop	Dekhi	Other Assets	
1	140	0.1207	0.0897	0.1810	0.2121	2.2897	0.0466	0.5034	0.2931
2	223	0.2199	0.1348	0.1135	0.2199	2.5390	0.0355	0.5248	0.3121
3	89	0.1622	0.1171	0.2162	0.2342	2.4144	0.0360	0.5901	0.2252
4	26	0.0000	0.0562	0.2022	0.2247	2.0000	0.0674	0.4382	0.3708
5	40	0.0000	0.0000	0.1154	0.0769	2.1923	0.0385	0.4615	0.0769
6	62	0.0000	0.0500	0.1500	0.2250	2.4000	0.0500	0.3000	0.2250
All Zone	580	0.0000	0.0000	0.2258	0.1452	1.6613	0.0806	0.3871	0.5161

Table A9.10 No. of Households with Availability of Other Assets by Zone.

Zone HH	Trap	Harp	Radio	House	Shop	Dekhi	Other		
1	140 100.0	6 4.3	6 4.3	16 11.4	19 13.6	139 99.3	4 2.9	73 52.1	20 14.3
2	223 100.0	10 4.5	14 6.3	46 20.6	35 15.7	214 96.0	7 3.1	130 58.3	28 12.6
3	89 100.0	1 1.1	2 2.2	18 20.2	13 14.6	88 98.9	6 6.7	38 42.7	14 15.7
4	26 100.0	0 0.0	0 0.0	3 11.5	1 3.8	26 100.0	1 3.8	12 46.2	1 3.8
5	40 100.0	0 0.0	1 2.5	6 15.0	5 12.5	40 100.0	2 5.0	12 30.0	4 10.0
6	62 100.0	0 0.0	0 0.0	12 19.4	6 9.7	62 100.0	3 4.8	18 29.0	8 12.9
Total	580 100.0	17 2.9	23 4.0	101 17.4	79 13.6	569 98.1	23 4.0	283 48.8	75 12.9

Table A9.11 Average Assets Value by Zone and by type of Physical Assets (in Taka).

Kind of Assets	Location						Average over entire Households
	1	2	3	4	5	6	
Agricultural	524	1444	910	390	2450	384	1048
Transport	1111	943	224	38	1220	1121	871
Furniture	1077	1308	1198	669	1500	1719	1265
Cottage Industry	-	-	-	-	-	-	-
Fishing Nets	205	233	112	37	406	516	241
Electrical Goods	228	263	172	63	212	210	223
Other assets	9150	11665	9299	6676	7863	10905	10123

N.B Other Assets include items like Houses etc.

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Table A10.1 No. of Head of Households by Their Main Occupation and Zone.

Main Occupation	Zone 1	Zone2	Zone3	Zone4	Zone5	Zone6	All Zones
Farming	62 44.3	135 60.5	29 32.2	9 34.6	10 25.0	11 18.0	256 44.1
Fishing	2 1.4	6 2.7	2 2.2	1 3.8	3 7.5	3 4.9	17 2.9
Trading	5 3.6	2 0.9	6 6.7	2 7.7	4 10.0	9 14.8	28 4.8
Service	5 3.6	4 1.8	7 7.8	1 3.8	3 7.5	1 1.6	21 3.6
Artisan	0 0.0	9 4.0	2 2.2	1 3.8	1 2.5	4 6.6	17 2.9
Day Labour	59 42.1	64 28.7	39 43.3	11 42.3	15 37.5	26 42.6	214 36.9
Household Activities	4 2.9	1 0.4	1 1.1	0 0.0	0 0.0	1 1.6	7 1.2
Other (IGA)	3 2.1	0 0.0	1 1.1	1 3.8	3 7.5	4 6.6	12 2.1
All Others	0 0.0	2 0.9	3 3.3	0 0.0	1 2.5	2 3.3	8 1.4
Total	140 100.0	223 100.0	90 100.0	26 100.0	40 100.0	61 100.0	580 100.0
Row %	24.1	38.4	15.5	4.5	6.9	10.5	100

Table A10.2 No. of Head of Households by their Secondary Occupations and Zone.

Secondary Occupation	Zone1	Zone2	Zone3	Zone4	Zone5	Zone6	Total
No Secondary Occupation	78 55.7	136 61.0	62 66.9	22 64.6	27 67.5	47 77.0	372 64.1
Farming	19 13.6	20 9.0	11 12.2	3 11.5	6 15.0	3 4.9	62 10.7
Fishing	7 5.0	15 6.7	4 4.4	0 0.0	0 0.0	0 3.3	26 4.8
Trading	8 5.7	19 8.5	3 3.3	0 0.0	2 5.0	2 3.3	34 5.9
Service	0 0.0	2 0.9	0 0.0	0 0.0	0 0.0	0 0.0	2 0.3
Artisan	0 0.0	1 0.4	1 1.1	0 0.0	1 2.5	1 1.6	4 0.7
Day Labour	27 19.3	22 9.9	7 7.8	1 3.8	3 7.1	5 8.2	65 11.2
Other (IGA)	0 0.0	4 1.8	2 2.2	0 0.0	1 2.5	1 1.6	8 1.4
All Others	1 0.7	4 1.8	0 0.0	0 0.0	0 0.0	0 0.0	5 0.9
Total	140 100.0	223 100.0	90 100.0	26 100.0	40 100.0	61 100.0	580 100.0

Table A10.3 Number of Primary Activities.

AGE GROUPS (Years)	LOCATION						Total
	1	2	3	4	5	6	
Upto 15	30 11.7	29 7.3	18 12.2	7 13.5	7 10.4	13 12.7	104 10.2
15 to 29	97 37.9	147 37.1	42 28.4	21 40.4	19 26.4	33 32.4	359 35.2
30 to 44	80 31.3	132 33.3	52 35.1	10 19.2	20 29.9	34 33.3	328 32.1
45 to 59	36 14.1	63 15.9	25 16.9	11 21.2	15 22.4	10 9.6	160 15.7
60 Plus	13 5.1	25 6.3	11 7.4	3 5.8	6 9.0	12 11.6	70 6.9
Total	256	396	148	52	67	102	1021
%	100	100	100	100	100	100	100
Row %	25.1	38.8	14.5	5.1	6.6	10.0	100.0

Table A10.4 Number of Secondary Activities.

AGE GROUPS (Years)	LOCATION						Total
	1	2	3	4	5	6	
Upto 15	1 1.3	4 2.9	2 4.2	3 2.5			10 5.3
15 to 29	24 30.0	52 37.1	12 27.9	3 27.3		3 10.6	94 30.6
30 to 44	32 40.0	57 40.7	16 37.2	1 27.4	21.4	10 5.6	1.1 39.4
45 to 59	17 21.3	22 15.7	10 23.3	2 18.2	10 71.4	5 26.3	66 21.5
60 Plus	6 7.5	5 3.6	3 7.0		1 7.1	1 5.3	16 5.2
Total	80	140	43	11	14	19	307
%	100	100	100	100	100	100	100
Row %	26.1	45.6	14.0	3.6	4.6	6.2	100.0

Table A11.1 Zone-wise Average Annual (last one year) Income in Tk. per Household from Different Sources.

Zone HH No. No	Crop Live- sale stock/ poultry Sale	Dairy prod. sale	Land/ pond Mortg- age	Inter- est of Invest- ment	Shop rental	Irri- ga- tion Equip. Rental	Hiring Draught Animal	Cott. Day Ind. Labor Wage	Salary From Wage Abroad	Gift	Salary	Other	Total
1 140	7 1150	422	130 29	-	136	98	20	3343	679	25	241	673	11138
2 223	969 1536	533	64 22	-	83	46	-	1875	1292	54	76	580	12931
3 90	846 497	498	256 67	193	200	87	28	3024	849	94	71	2053	12464
4 26	914 945	732	269 -	-	77	-	-	2502	1954	-	-	-	11602
5 40	34 159	187	654 -	90	650	362	-	2084	1468	-	63	2270	18805
6 61	690 382	195	66 74	-	-	8	57	2905	1469	-	59	438	11480
All 580	766 1039	450	160 34	36	141	84	15	2558	1136	41	109	907	12619

Table A11.2

Zone-wise Average Annual (last one year) Expenditure
in Tk. per Household Under Different Heads.

Zone No.	HH No.	Purchases of Food grains				Others Expenditure							
		Rice/ flour	Fish/ meat	Vege- tables	Others	Cloth	Medi- cine	Educa- tion	Relig. Funct.	Rent/ litiga- tion	Dowry	Loan repay- ment	Others
1	140	5364	458	157	453	1370	205	154	742	82	84	33	183
2	223	4711	477	212	493	1386	309	328	834	72	17	171	175
3	90	5165	609	199	519	1146	284	284	662	64	-	367	178
4	26	4640	398	179	342	1109	176	472	755	23	223	264	122
5	40	5656	647	189	608	1333	389	412	700	28	225	376	340
6	61	6255	373	276	330	1021	203	197	495	46	-	352	321
All	580	5163	490	200	472	1291	268	278	737	65	52	206	202

(Continuation of Table A11.2)

Zone No.	HH No.	Investment						Total Expendi- ture
		P/R of of Agri. Equipmt	C/R of Houses	P/R of Furni- ture	Release of pro- perty	Purchase of Live- stock	Others	
1	140	118	582	57	104	108	407	10661
2	223	165	552	84	14	269	446	10713
3	90	115	230	68	6	12	233	10142
4	26	44	309	25	0	238	108	9428
5	40	482	1131	155	4	362	1935	14971
6	61	37	383	43	38	13	177	10562
All	580	149	521	73	35	168	463	10832

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Table A11.3 Frequency of Households having Income from Different Sources by Zones:

DIFFERENT INCOME SOURCES	Z O N E S						Total
	1	2	3	4	5	6	
Sale of crops	72	140	38	10	21	12	293
Sale of livestock poultry	92	148	46	16	18	26	346
Sale of diary products	110	167	57	21	24	33	412
Land/pond lease mortgage	7	6	1	1	3	1	19
Interest of capital	1	1	1			1	4
Rent of house/ shop			1		1		2
Rent of irrigat- ion equipment	1	4	1		2		8
Hiring out of draft animal	10	13	3	2	2	1	31
Cottage industry	2		1			1	4
Day labourer wage	87	96	53	13	19	32	300
Remittance from outside	23	53	18	9	14	11	128
Remittance from abroad	2	1	1				4
Gift	8	4	5		3	2	22
Salary	7	15	9		5	4	40
Others income	61	108	43	8	20	39	279
Total Income	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

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Table A11.4 Frequency of Households Having Expenditure Under Different Heads by Zones.

EXPENDITURE	Z O N E						Total
	1	2	3	4	5	6	
Rice/Paddy/Flour	125	187	78	22	34	58	506
Fish/Meat	131	201	78	21	39	56	526
Vegetables	87	167	69	19	25	52	409
Others Food	130	196	86	26	39	57	534
Cloths	139	220	90	26	40	60	575
Medicine	128	206	111	21	41	54	534
Education	28	80	31	5	11	18	173
Religious/Social	131	209	78	25	39	58	540
Rent/Fee/Taxes	59	121	35	8	16	15	254
Dowry	7	11		3	2		23
Loan Repayment	7	26	8	2	4	6	53
Others Expenditu.	64	100	51	13	23	28	279
Agri.Equip. Purch	47	83	27	6	8	12	183
House Construc.	101	175	49	24	34	44	427
Furnitures Purch.	28	57	19	4	13	17	138
Property Release	4	5	3		1	3	16
Livestock Purcha.	8	19	3	2	3	1	36
Others Invest.	35	82	38	2	17	17	191
Total Expenditure	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

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Table A11.5 Distribution of the Households by Zone and Income Group.

Income Group	Zone						Total
	1	2	3	4	5	6	
2000 <=	2 1.4	1 .4		1 3.8	1 2.5		5 .9
2001 - 4000	5 3.6	7 3.1	1 1.1		2 5.0	1 1.6	16 2.8
4001 - 6000	25 17.9	30 13.5	23 25.6	3 11.5	2 5.0	9 14.8	92 15.9
6001 - 8000	34 24.3	48 21.5	15 16.7	7 26.9	10 25.0	15 24.6	129 22.2
8001 - 10000	20 14.3	41 18.4	16 17.8	3 11.5	7 17.5	9 14.8	96 16.6
10001 - 12000	15 10.7	20 9.0	5 5.6	3 11.5	2 5.0	10 16.4	55 9.5
12001 - 14000	10 7.1	17 7.6	8 8.9	2 7.7	3 7.5	6 9.8	46 7.9
14001 - 16000	6 4.3	7 3.1	4 4.4	1 2.8	2 5.0	4 6.6	24 4.1
16001 - 18000	2 1.4	10 4.5	3 3.3	1 3.8	1 2.5		17 2.9
18001 - 20000	6 4.3	9 4.0	4 4.4	2 7.7	2 5.0		23 4.0
20001 - 22000	3 2.1	4 1.8	5 5.6	1 3.8	1 2.5	1 1.6	15 2.6
22001 - 24000	2 1.4	3 1.3		1 3.8	1 2.5	3 4.9	10 1.7
24001 - 26000		2 .9	1 1.1		1 2.5		4 .7
26001 - 28000	3 2.1	6 2.7			2 5.0	1 1.6	12 2.1
28001 - 30000	1 .7	2 .9				1 1.6	4 .7
30001 - 32000	2 1.4	3 1.3					5 .9
32001 - 34000		4 1.8	1 1.1				5 .9
38001 - 40000	1 .7	1 .4		1 3.8	1 2.5		4 .7
40001 +	3 2.1	8 3.6	4 4.4		2 5.0	1 1.6	18 3.1
Total	140	223	90	26	40	61	580
%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Row %	24.1	38.4	15.5	4.5	6.9	10.5	100.0

Table A11.6 Distribution of the Households by Expenditure on Food Items and Zone.

Expenditure on Food Items		Zone						Total
		1	2	3	4	5	6	
2000 <=	1	8 5.7	29 13.0	10 11.1	6 23.1	1 2.5	3 4.9	57 9.8
2001 - 4000	2	30 21.4	50 22.4	16 17.8	6 23.1	13 32.5	8 13.1	123 21.2
4001 - 6000	3	41 30.7	65 29.1	26 27.0	11 40.0	10 24.0	14 24.8	164 29.6
6001 - 8000	4	26 18.6	37 16.6	11 12.2		6 15.0	14 23.0	94 16.2
8001 - 10000	5	7 5.0	18 8.1	10 11.1	1 3.8	1 2.5	10 16.4	47 8.1
10001 - 12000	6	14 10.0	9 4.0	10 11.1	3 11.5	2 5.0	5 8.2	43 7.4
12001 - 14000	7	7 5.0	6 2.7	3 3.3		1 2.5	3 4.9	20 3.4
14001 - 16000	8	3 2.1	2 .9	2 2.2		3 7.5	1 1.6	11 1.9
16001 - 18000	9	1 .7	2 .9	3 3.3	1 3.8	1 2.5		8 1.4
18001 - 20000	10		3 1.3		1 3.8	1 2.5	1 1.6	6 1.0
20001 - 22000	11	1 .7	1 .4			1 2.5	1 1.6	4 .7
40001 +	21		1 .4					1 .2
Total		140	223	90	26	40	61	580
%		100.0	100.0	100.0	100.0	100.0	100.0	100.0
Row %		24.1	38.4	15.5	4.5	6.9	10.5	100.0

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Table A11.7 Distribution of the Households by Income Expenditure Balance (except Investment) by Zone.

Income-Expenditure	Zone						Total
	1	2	3	4	5	6	
-10000 <=	2 1.4	1 .4					3 .8
-9999 -8000						1 1.6	1 .2
-5999 -4000	1 .7	1 .4				2 3.3	4 .7
-3999 -2000	1 .7	5 2.2	1 1.1			3 4.9	10 1.7
-1999 - 0	32 22.9	41 18.4	17 18.9	1 3.8	10 25.0	12 19.7	113 19.5
1 - 2000	66 47.1	89 39.9	43 47.8	14 53.8	17 42.5	28 45.9	257 44.3
2001 - 4000	17 12.1	33 14.8	9 10.0	5 19.2	2 5.0	9 14.8	75 12.9
4001 - 6000	6 4.3	15 6.7	8 8.9	3 11.5	2 5.0	3 4.9	37 6.4
6001 - 8000	4 2.9	8 3.6	5 5.6	1 3.8	3 7.5		21 3.6
8001 - 10000	1 .7	5 2.2	2 2.2		2 5.0	1 1.6	11 1.9
10001 - 12000	4 2.9	4 1.8					8 1.4
12001 - 14000	2 1.4		1 1.1	1 3.8			4 .7
14001 - 16000	1 .7	5 2.2		1 3.8	1 2.5	1 1.6	9 1.6
16001 - 18000		4 1.8					4 .7
18001 - 20000	1 .7		1 1.1				2 .3
20001 - 22000	1 .7	1 .4	1 1.1		1 2.5		4 .7
22001 - 24000		1 .4					1 .2
24001 - 26000		2 .9					2 .3
26001 +	1 .7	8 3.6	2 2.2		2 5.0	1 1.6	14 2.4
Total	140	223	90	26	40	61	580
%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Row %	24.1	38.4	15.5	4.5	6.9	10.5	100.0

Table A12.1 Average amount of Institutional and Non-institutional loan by Zone

Location	Average Amount of Credit by Location Per Household (T.)			
	Non-institutional		Institutional	
1	1464	(30)	1000	(3)
2	1668	(53)	3813	(8)
3	2280	(15)	1750	(2)
4	1833	(3)	-	-
5	1911	(9)	4767	(3)
6	2281	(21)	-	-
Average	1810	(131)	3206	(16)

N.B. Averages are over those who took loan and Figures in Bracket indicates number of HHs who took Loan.

Table A12.2 Credit Distribution by Type and by Interest Rate.

Rate of Interest	NON-INST TUTIONAL		INSTITUTIONAL		Total
	No. of HH	% of HH	No. of HH	% of HH	
010 - 015	4	2.8	4	25	8
016 - 020	8	5.4	12	75	20
021 - 030					
031 - 040					
041 - 050	1	.7			1
051 - 060					
061 - 070					
071 - 080					
081 - 090					
091 - 100	-	-			
101 +	88	59.9			88
Total	101	100.0	16	100.00	117

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Table A12.3 Distribution of Non-Institutional Credit by Location and by Objectives Figures Indicates Number of HHs Who Took Loan.

Objectives	LOCATION						Total
	1	2	3	4	5	6	
Objective/raw materials collection	6 (18.2)	9 (14.8)	1 (5.9)		1 (3.3)		(17) 11.6
Animal Collection	3 (9.1)				1 (3.3)		4 (2.7)
Food Collection	16 (48.5)	36 (59.0)	10 (58.8)	2 (66.7)	6 (50.0)	17 (81.0)	87 (59.2)
Social need/Social obligations	1 (3.0)			1 (33.3)			2 (1.4)
Dept. Repayment	1 (3.0)	1 (1.6)	2 (11.8)				4 (2.7)
Land Purchase			1 (5.9)				1 (.7)
Business Capital		1 (1.6)			1 (3.3)	4 (19.0)	6 (4.1)
Dowry		1 (1.6)					1 (.7)
Fishing gears and Equipment Collection	1 (3.0)	2 (3.2)					3 (0.02)
Others	2 (15)	3 (17.6)	1 (17.7)		0		6 (0.04)
Total	30	53	15	3	9	21	131

N.B. Figures in Bracket indicates Percentages

Table A12.4 Distribution of Institutional Credit by Location and by Objectives Figures indicates number of HHs who took Loan.

Objectives	LOCATION						Total
	1	2	3	4	5	6	
Objective/raw materials Collection		2 3.3					2 (12.5)
Implement/equipment Collection					1 6.3		1 (6.3)
Animal Collection	1 3.0	2 3.3	1 5.9				4 (25)
Food Collection	1 3.0	4 6.6			1 6.3		6 (37.5)
Business Capital	1 3.0		1 5.9		1 6.3		3 (18.8)
Total	3 (18.8)	6 (50)	2 (12.5)	-	3 (18.8)	-	16 (100)

N.B. Figures in Bracket indicates Percentages

Table A13.1 Cropping Intensity in Charland and Set Backland (Sample Data)

	Char Land (Z1 - Z2)		Set Back (Z3 - Z6)	
	Area	% of NCA	Area	% of NCA
1- Cultivated Land	65538		16029	
2- NCA				
- Kharif I	56897	43.7%	12118	38.0%
- Kharif II	32433	24.9%	9070	28.4%
- Rabi	40990	31.5%	10702	33.6%
Total NCA	130320	100.0%	31890	100.0%
Cropping Intensity	1.99		1.99	

Table A13.2a Cropping Patterns in Char and Set Backland

Crop	Char Land (Z1 - Z2)		Set Back (Z3 - Z6)		JPPS	
	Area (ha)	% of NCA	Area (ha)	% of NCA	Area (ha)	% of NCA
Aman LV	6,838	21.8%	5,414	25.8%	16006	11.1%
Aus LV	2,304	7.3%	868	4.1%	15268	10.5%
Aus-Aman	1,903	6.1%	384	1.8%	3097	2.1%
Aman HYV	317	1.0%	591	2.8%	20262	14.0%
Boro HYV	186	0.6%	1,201	5.7%	25716	17.8%
Boro LV	82	0.3%	125	0.6%	3196	2.2%
Aus HYV	16	0.1%	152	0.7%	3550	2.5%
Coon	6,564	20.9%	2,652	12.6%	Neg.	0.0%
Whest	2,591	8.3%	2,710	12.9%	6576	4.6%
Jute	3,908	12.5%	3,332	15.9%	11294	7.8%
Sugarcane	56	0.2%	646	3.1%	2155	1.5%
Pulses	2,364	7.5%	736	3.5%	7519	5.2%
Spices	1,495	4.8%	532	2.5%	n.a.	0.0%
Ground Nut	1,127	3.6%	717	3.4%	1712	1.2%
Sweet Potato	560	1.8%	380	1.8%	1801	1.2%
Cheena	460	1.5%	206	1.0%	Neg	0.0%
Mustard	223	0.7%	151	0.7%	4776	3.3%
Til (Oil seeds)	112	0.4%	0	0.0%	Neg	0.0%
Potato	52	0.2%	7	0.0%	1957	1.4%
Vegetables	41	0.1%	60	0.3%	10547	7.3%
Others	172	0.5%	104	0.5%	9359	6.5%

Table A13.2 Cropping Patterns in Char and Set Backland (Sample Data)

Crop	Char Land (Z1 - Z2)		Set Back (Z3 - Z6)		Variation
	Area (dec)	% of NCA	Area (dec)	% of NCA	
Aman LV	28407	21.8%	8234	25.8%	-4.0%
Caon	27267	20.9%	4033	12.6%	8.3%
Jute	16235	12.5%	5068	15.9%	-3.4%
Wheat	10763	8.3%	4122	12.9%	-4.7%
Pulses	9821	7.5%	1120	3.5%	4.0%
Aus LV	9573	7.3%	1320	4.1%	3.2%
Aus-Aman	7907	6.1%	584	1.8%	4.2%
Spices	6209	4.8%	809	2.5%	2.2%
Ground Nut	4680	3.6%	1091	3.4%	0.2%
Sweet Potato	2325	1.8%	578	1.8%	0.0%
Cheena	1911	1.5%	314	1.0%	0.5%
Aman HYV	1318	1.0%	899	2.8%	-1.8%
Mustard	928	0.7%	229	0.7%	0.0%
Boro HYV	773	0.6%	1827	5.7%	-5.1%
Others	715	0.5%	158	0.5%	0.1%
Til (Oil seeds)	466	0.4%	0	0.0%	0.4%
Boro LV	340	0.3%	190	0.6%	-0.3%
Sugarcane	231	0.2%	982	3.1%	-2.9%
Potato	214	0.2%	10	0.0%	0.1%
Vegetables	169	0.1%	91	0.3%	-0.2%
Aus HYV	68	0.1%	231	0.7%	-0.7%
Net Cultivated Area	130320	100.0%	31890	100.0%	
Cultivated Land	65538		16029		
Cropping Intensity	1.99		1.99		

Table A13.3a Agriculture Production in the Study Area

Crop	Char Land (Z1 - Z2)		Set Back (Z3 - Z6)	
	Prod (mt)	Value	Prod (mt)	Value
Aman LV	10,189	65.6	10,042	64.7
Aus LV	2,201	13.4	1,090	6.6
Aus-Aman	2,002	12.5	524	3.3
Aman HYV	660	4.2	1,267	8.2
Boro HYV	604	3.8	5,864	36.4
Boro LV	167	1.0	274	1.7
Aus HYV	33	0.2	499	3.0
Caon	6,707	16.8	2,972	7.4
Wheat	4,094	25.8	3,928	24.8
Jute	4,515	36.2	4,987	40.0
Sugarcane	1,177	1.1	8,733	8.3
Pulses	1,982	29.6	572	8.5
Spices	2,749	27.5	932	9.3
Ground Nut	1,507	15.1	810	8.1
Sweet Potato	5,081	20.3	2,954	11.8
Cheena	441	1.1	256	0.6
Mustard	154	2.1	128	1.7
Til (Oil seeds)	89	1.2	0	0.0
Potato	290	1.3	24	0.1
Vegetables	366	1.1	609	1.8
Others	176	0.6	280	0.8

Table A13.3 Average Yield (Kg/Ha) of Crops in Char and Set Backland (Sample Data)

Crop	Char Land (Z1 - Z2)		Set Back (Z3 - Z6)		Variation	Price by (*)
	% of NCA	Yield	% of NCA	Yield		
Aman LV		1,490		1,855	200	6.438
Caon		1,022		1,121		2.500
Jute		1,155		1,497	170	8.012
Wheat		1,580		1,449	240	6.312
Pulses		838		777	70	14.920
Aus LV		955		1,256	140	6.074
Aus-Aman		1,052		1,364	120	6.256
Spices		1,839		1,752		10.000
Ground Nut		1,338		1,129	130	10.000
Sweet Potato		9,079		7,772	250	4.000
Cheena		960		1,239		2.500
Aman HYV		2,080		2,143	320	6.438
Mustard		689		849	70	13.466
Boro HYV		3,247		4,882	450	6.212
Others		1,023		2,697		3.000
Til (Oil seeds)		795				13.466
Boro LV		2,043		2,194	300	6.212
Sugarcane		21,171		13,526	4500	0.950
Potato		5,627		3,705	1000	4.580
Vegetables		8,988		10,179		3.000
Aus HYV		2,043		3,288	250	6.074

(*) FAP-3.1 Interim Report Annex 5

Table A13.4 Production Cropwise and Seasonwise in Char and Set Backland (In Maunds)

Crop	Char Land (Z1 - Z2)				Set Back (Z3 - Z6)			
	Karif I	Kharif II	Rabi	Total	Karif I	Kharif II	Rabi	Total
Aus LV	939	48		987	137	42	0	179
Aus HYV		15		15	64	0	18	82
Jute	1991	24	10	2025	817	2	0	819
Til (Oil seeds)	40			40	0	0	0	0
Caon	2731	15	261	3008	488	0	0	488
Aman LV	114	4383	73	4570	58	1591	0	1649
Aman HYV		276	20	296	0	190	18	208
Aus-Aman	441	439	18	898	45	41	0	86
Mustard			69	69	0	0	21	21
Boro LV		3	72	75	0	0	45	45
Boro HYV	68		203	271	426	0	537	963
Wheat		2	1834	1836	12	0	633	645
Potato			130	130	0	0	4	4
Sweet Potato	6		2273	2279	0	0	485	485
Ground Nut	19		657	676	10	0	123	133
Pulses			889	889	0	2	92	94
Spices		39	1194	1233	0	0	153	153
Vegetables			164	164	0	0	100	100
Sugarcane			528	528	0	0	1434	1434
Cheena	51		147	198	0	0	42	42
Others	36		43	79	4	0	42	46

Table A13.5

Cropping Pattern in Charland by Season (Area in Decimal)

Crop	Char Land (Z1 - Z2)							
	Kharif I		Kharif II		Rabi		Total	
Aus LV	9310	16.4%	263	0.8%	0.0%	0.0%	9573	7.3%
	97.3%		2.7%		0.0%			
Aus HYV		0.0%	68	0.2%	0.0%	0.0%	68	0.1%
	0.0%		100.0%		0.0%			
Jute	16030	28.2%	172	0.5%	33	0.1%	16235	12.5%
	98.7%		1.1%		0.2%			
Til (Oil seeds)	466	0.8%		0.0%		0.0%	466	0.4%
	100.0%		0.0%		0.0%			
Caon	24652	43.3%	200	0.6%	2415	5.9%	27267	20.9%
	90.4%		0.7%		8.9%			
Aman LV	773	1.4%	26904	83.0%	730	1.8%	28407	21.8%
	2.7%		94.7%		2.6%			
Aman HYV		0.0%	1194	3.7%	124	0.3%	1318	1.0%
	0.0%		90.6%		9.4%			
Aus-Aman	4453	7.8%	3440	10.6%	14	0.0%	7907	6.1%
	56.3%		43.5%		0.2%			
Mustard		0.0%		0.0%	928	2.3%	928	0.7%
	0.0%		0.0%		100.0%			
Boro LV		0.0%	66	0.2%	274	0.7%	340	0.3%
	0.0%		19.4%		80.6%			
Boro HYV	108	0.2%		0.0%	665	1.6%	773	0.6%
	14.0%		0.0%		86.0%			
Wheat		0.0%	16	0.0%	10747	26.2%	10763	8.3%
	0.0%		0.1%		99.9%			
Potato		0.0%		0.0%	214	0.5%	214	0.2%
	0.0%		0.0%		100.0%			
Sweet Potato	9	0.0%		0.0%	2316	5.7%	2325	1.8%
	0.4%		0.0%		99.6%			
Ground Nut	165	0.3%		0.0%	4515	11.0%	4680	3.6%
	3.6%		0.0%		96.6%			
Pulses		0.0%		0.0%	9821	24.0%	9821	7.5%
	0.0%		0.0%		100.0%			
Spices		0.0%	110	0.3%	6099	14.9%	6209	4.8%
	0.0%		1.8%		98.2%			
Vegetables		0.0%		0.0%	169	0.4%	169	0.1%
	0.0%		0.0%		100.0%			
Sugarcane		0.0%		0.0%	231	0.6%	231	0.2%
	0.0%		0.0%		100.0%			
Cheens	657	1.2%		0.0%	1254	3.1%	1911	1.5%
	34.4%		0.0%		65.6%			
Others	274	0.5%		0.0%	441	1.1%	715	0.5%
	38.3%		0.0%		61.7%			
	56897	100.0%	32433	100.0%	40990	100.0%	130320	100.0%
	43.7%		24.9%		31.5%		100.0%	

Table A13.6

Cropping Patterns in Set Backland by Season (Area in Decimals)

Crop	Set Back (Z3 - Z6)							
	Kharif I		Kharif II		Rabi		Total	
Aus LV	1151	9.5%	169	1.9%	0	0.0%	1320	4.1%
	87.2%		12.8%		0.0%			
Aus HYV	132	1.1%	0	0.0%	99	0.9%	231	0.7%
	57.1%		0.0%		42.9%			
Jute	5058	41.7%	10	0.1%	0	0.0%	5068	15.9%
	99.8%		0.2%		0.0%			
Til (Oil seeds)	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Coon	4033	33.3%	0	0.0%	0	0.0%	4033	12.6%
	100.0%		0.0%		0.0%			
Aman LV	380	3.1%	7854	86.6%	0	0.0%	8234	25.8%
	4.6%		96.4%		0.0%			
Aman HYV	0	0.0%	767	8.5%	132	1.2%	899	2.8%
	0.0%		85.3%		14.7%			
Aus-Aman	347	2.9%	237	2.6%	0	0.0%	584	1.8%
	59.4%		40.6%		0.0%			
Mustard	0	0.0%	0	0.0%	229	2.1%	229	0.7%
	0.0%		0.0%		100.0%			
Boro LV	0	0.0%	0	0.0%	190	1.8%	190	0.6%
	0.0%		0.0%		100.0%			
Boro HYV	819	6.8%	0	0.0%	1008	9.4%	1827	5.7%
	44.8%		0.0%		55.2%			
Wheat	100	0.8%	0	0.0%	4032	37.6%	4132	12.9%
	2.4%		0.0%		97.6%			
Potato	0	0.0%	0	0.0%	10	0.1%	10	0.0%
	0.0%		0.0%		100.0%			
Sweet Potato	0	0.0%	0	0.0%	578	5.4%	578	1.8%
	0.0%		0.0%		100.0%			
Ground Nut	82	0.7%	0	0.0%	1009	9.4%	1091	3.4%
	7.5%		0.0%		92.5%			
Pulses	0	0.0%	33	0.4%	1087	10.2%	1120	3.5%
	0.0%		2.9%		97.1%			
Spices	0	0.0%	0	0.0%	809	7.6%	809	2.5%
	0.0%		0.0%		100.0%			
Vegetables	0	0.0%	0	0.0%	91	0.9%	91	0.3%
	0.0%		0.0%		100.0%			
Sugarcane	0	0.0%	0	0.0%	982	9.2%	982	3.1%
	0.0%		0.0%		100.0%			
Cheena	0	0.0%	0	0.0%	314	2.9%	314	1.0%
	0.0%		0.0%		100.0%			
Others	16	0.1%	0	0.0%	142	1.3%	158	0.5%
	10.1%		0.0%		89.9%			
Total	12118	100.0%	9070	100.0%	10702	100.0%	31890	100.0%
	38.0%		28.4%		33.6%		100.0%	

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Table A13.7 Net and gross cultivable land (in decimal) and Cropping Intensity by Zone.

LAND AREA	Z ₁	Z ₂	Z ₃	Z ₄	Z ₅	Z ₆	TOTAL
1. Gross Cultiva Area	22065	43473	62130	3650	4021	1526	81567
2. CA Kharif I	17867	39030	5120	2791	2807	1400	69015
3. CA Kharif II	9505	22928	3335	2870	2123	854	41567
4. CA Rabi	13443	27547	4051	3086	3002	643	51692
5. NCA (2+3+4)	40815	89505	12944	7875	8172	2897	142210
6. Cropping Intensity (5+1)	1.35	2.06	1.90	2.16	2.03	1.90	1.99

Table A13.8 Areas in decimal of Karif 2 Season by Crop type and by Zone.

Crop Type	ZONE						Total
	1	2	3	4	5	6	
T. Aus (LV)	0	263	165	0	0	4	432
T. Aus (HYV)	0	68	0	0	0	0	68
Jute	0	172	10	0	0	0	182
Caon	0	200	0	0	0	0	200
B. Aman	378	4666	839	247	53	66	6249
T. Aman (LV)	7319	14541	2010	1678	2210	751	28509
T. Aman (HYV)	687	507	717	50	0	0	1961
Mixed Aus-Ama	1105	2335	34	70	100	33	3677
Boro (LV)	0	66	0	0	0	0	66
Wheat	16	0	0	0	0	0	16
Pulses	0	0	0	33	0	0	33
Spices	0	110	0	0	0	0	110
Total	9505	22928	3775	2078	2363	854	41503

Table A13.9 Production in maunds of Karif 2 Season by Crop type and by Zone.

Crop Type	ZONE						Total
	1	2	3	4	5	6	
T. Aus (LV)	0	48	38	0	0	4	90
T. Aus (HYV)	0	15	0	0	0	0	15
Jute	0	24	2	0	0	0	26
Caon	0	16	0	0	0	0	16
B. Aman	66	660	115	22	15	12	890
T. Aman (LV)	1296	2361	389	202	704	132	5084
T. Aman (HYV)	139	137	180	10	0	0	466
Mixed Aus-Ama	146	293	7	8	19	7	480
Boro (LV)	0	3	0	0	0	0	3
Wheat	2	0	0	0	0	0	2
Pulses	0	0	0	2	0	0	2
Spices	0	39	0	0	0	0	39

Table A13.10 Yields of Crops per acre of Karif 2 Season by Crop Type and Zone.

CROP TYPE	ZONE						Total
	1	2	3	4	5	6	
T. Aus (LV)	0.00	18.25	23.03	0.00	0.00	100.00	20.83
T. Aus (HYV)	0.00	22.06	0.00	0.00	0.00	0.00	22.06
Jute	0.00	13.95	20.00	0.00	0.00	0.00	14.29
Caon	0.00	8.00	0.00	0.00	0.00	0.00	8.00
B. Aman	17.46	14.14	13.71	8.91	26.30	18.18	14.24
T. Aman (LV)	17.71	16.24	19.35	12.04	31.86	17.58	17.83
T. Aman (HYV)	20.23	27.02	25.10	20.00	0.00	0.00	23.76
Mixed Aus-Aman	13.21	12.55	20.59	11.43	19.00	21.21	13.05
Boro (LV)	0.00	4.55	0.00	0.00	0.00	0.00	4.55
Wheat	12.50	0.00	0.00	0.00	0.00	0.00	12.50
Pulses	0.00	0.00	0.00	6.06	0.00	0.00	6.06
Spices	0.00	35.45	0.00	0.00	0.00	0.00	35.45

Table A13.11 Areas in decimal of Karif 1 Season by Crop type and by Zone.

Crop Type	ZONE						Total
	1	2	3	4	5	6	
B. Aus	2406	6669	340	563	192	66	10226
T. Aus (LV)	66	169	0	0	0	0	235
T. Aus (HYV)	0	0	132	0	0	0	132
Jute	5378	10652	2157	1160	1410	331	21088
Til (Oil Seed)	51	415	0	0	0	0	466
Caon	7849	16803	1268	998	1068	699	23685
B. Aman	200	238	390	0	0	0	818
T. Aman (LV)	0	335	0	0	0	0	335
Mixed Aus-Ama	1249	3204	94	70	100	83	4800
Boro (HYV)	0	106	749	0	37	77	927
Wheat	0	0	0	0	0	100	100
Sweet Potato	0	9	0	0	0	0	9
Ground Nut	61	104	0	0	0	82	247
Water Menon	0	0	0	0	0	16	16
Cheena	591	66	0	0	0	0	657
Others	16	258	0	0	0	0	274
Total	17867	39030	5120	2791	2807	1400	69015

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Table A13.12 Production in maunds of Karif 1 Season by Crop type and by Zone.

Crop Type	ZONE						Total
	1	2	3	4	5	6	
B. Aus	243	679	30	75	28	6	1059
T. Aus (LV)	7	10	0	0	0	0	17
T. Aus (HYV)	0	0	64	0	0	0	64
Jute	665	1326	318	134	255	60	2808
Til (Oil Seed)	6	34	0	0	0	0	40
Caon	898	1833	203	94	131	60	3219
B. Aman	40	27	58	0	0	0	125
T. Aman (LV)	0	47	0	0	0	0	47
Mixed Aus-Ama	124	317	19	6	10	10	486
Boro (HYV)	0	68	400	0	18	8	494
Wheat	0	0	0	0	0	12	12
Sweet Potato	0	6	0	0	0	0	6
Ground Nut	7	12	0	0	0	10	29
Water Menon	0	0	0	0	0	4	4
Cheena	37	14	0	0	0	0	51
Others	1	35	0	0	0	0	36

Table A13.13 Yields of Crops per acre of Karif 1 Season by Crop Type and Zone.

Crop Type	Zone						Total
	1	2	3	4	5	6	
B. Aus	10.10	10.18	8.82	13.32	13.54	10.71	10.36
T. Aus (LV)	10.61	5.92	0.00	0.00	0.00	0.00	7.23
T. Aus (HYV)	0.00	0.00	48.48	0.00	0.00	0.00	48.48
Jute	12.37	12.45	14.74	15.86	18.09	13.13	15.32
Til (Oil Seeds)	11.76	8.19	0.00	0.00	0.00	0.00	8.58
Caon	11.44	10.91	16.01	9.42	12.27	8.58	11.22
B. Aman	20.00	11.34	15.26	0.00	0.00	0.00	15.26
T. Aman (LV)	0.00	14.03	0.00	0.00	0.00	0.00	14.03
Mixed Aus-Aman	9.93	9.89	20.21	8.57	10.00	12.05	10.13
Boro (HYV)	0.00	62.96	53.40	0.00	48.65	24.24	53.29
Wheat	0.00	0.00	0.00	0.00	0.00	12.00	12.00
Sweet Potato	0.00	66.67	0.00	0.00	0.00	0.00	66.67
Ground Nut	11.48	11.54	0.00	0.00	0.00	12.20	11.74
Water Menon	0.00	0.00	0.00	0.00	0.00	25.00	25.00
Cheena	6.26	21.21	0.00	0.00	0.00	0.00	7.76
Others	6.25	13.57	0.00	0.00	0.00	0.00	13.14

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Table A13.14 Areas in decimal of Rabi Season by Crop type and by Zone.

Crop Type	ZONE						Total
	1	2	3	4	5	6	
T. Aus (HYV)	0	0	99	0	0	0	99
Jute	33	0	0	0	0	0	33
Caon	1133	1282	0	0	0	0	2415
B. Aman	0	465	0	0	0	0	465
T. Aman (LV)	0	265	0	0	0	0	265
T. Aman (HYV)	66	58	0	50	0	82	256
Mixed Aus-Ama	0	14	0	0	0	0	14
Mustard	110	818	166	0	30	33	1157
Boro (LV)	30	244	0	0	190	0	464
Boro (HYV)	352	313	223	0	735	0	1673
Wheat	2509	8238	1348	1054	1238	382	14769
Potato	193	21	0	0	10	0	224
Sweet Potato	946	1370	469	0	109	0	2894
Ground Nut	2419	2096	50	359	100	0	5524
Pulses	2722	7099	128	810	119	30	10908
Spices	1931	4168	364	150	295	0	6908
Vegetables	103	66	25	0	60	0	260
Sugercane	231	0	919	0	0	53	1213
Cheena	338	916	128	33	40	47	1562
Babana	30	15	0	0	0	0	45
Linseed	160	0	0	0	0	0	160
Others	137	99	132	0	10	0	378
Total	13443	27547	4051	3006	3002	643	51692

Table A13.15 Production in maunds of Rabi Season by Crop type and by Zone.

Crop Type	ZONE						Total
	1	2	3	4	5	6	
T. Aus (HYV)	0	0	18	0	0	0	18
Jute	10	0	0	0	0	0	10
Caon	105	156	0	0	0	0	261
B. Aman	0	36	0	0	0	0	36
T. Aman (LV)	0	37	0	0	0	0	37
T. Aman (HYV)	8	12	0	5	0	13	38
Mixed Aus-Ama	0	18	0	0	0	0	18
Mustard	8	61	16	0	0	3	90
Boro (LV)	8	64	0	0	45	0	117
Boro (HYV)	80	123	86	0	451	0	740
Wheat	448	1386	231	163	157	82	2467
Potato	125	5	0	0	4	0	134
Sweet Potato	700	1573	355	0	130	0	2758
Ground Nut	385	272	5	94	24	0	780
Pulses	228	661	11	64	13	4	981
Spices	337	857	72	43	38	0	1347
Vegetables	44	120	15	0	85	0	264
Sugercane	528	0	1370	0	0	64	1962
Cheena	34	113	20	12	6	4	189
Babana	3	4	0	0	0	0	7
Linseed	10	0	0	0	0	0	10
Others	23	3	41	0	1	0	68

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Table A13.16 Yields of Crops per acre of Rabi Season by Crop Type and Zone.

Crop Type	Zone						Total
	1	2	3	4	5	6	
T. Aus (HYV)	0.00	0.00	18.18	0.00	0.00	0.00	18.18
Jute	30.30	0.00	0.00	0.00	0.00	0.00	30.30
Caon	9.27	12.17	0.00	0.00	0.00	0.00	10.81
B. Aman	0.00	7.74	0.00	0.00	0.00	0.00	7.74
T. Aman (LV)	0.00	13.96	0.00	0.00	0.00	0.00	13.96
T. Aman (HYV)	12.12	20.69	0.00	10.00	0.00	15.85	14.84
Mixed Aus-Aman	0.00	128.57	0.00	0.00	0.00	0.00	128.57
Mustard	7.27	7.46	9.64	0.00	6.57	9.09	7.78
Boro (LV)	26.67	26.23	0.00	0.00	23.68	0.00	25.22
Boro (HYV)	22.73	39.30	38.57	0.00	57.45	0.00	44.23
Wheat	17.86	16.82	17.14	15.46	12.68	21.47	16.70
Potato	64.77	23.81	0.00	0.00	40.00	0.00	59.82
Sweet Potato	74.00	114.82	75.69	0.00	119.27	0.00	95.30
Ground Nut	15.92	12.98	10.00	10.94	24.08	0.00	14.12
Pulses	8.38	9.31	8.59	7.90	10.92	13.33	8.99
Spices	17.45	20.56	19.78	28.67	12.88	0.00	19.50
Vegetables	42.72	181.82	60.00	0.00	128.80	0.00	101.50
Sugercane	228.57	0.00	149.08	0.00	0.00	101.59	161.75
Cheena	10.06	12.34	15.63	14.46	12.00	7.55	12.05
Babaria	10.00	26.67	0.00	0.00	0.00	0.00	15.56
Linseed	6.25	0.00	0.00	0.00	0.00	0.00	6.25
Others	16.79	3.03	31.06	0.00	10.00	0.00	17.99

Table A14.1 Locationwise Fish Catch by Household in Open water (No. of HHs).

Fishing Ground	Location(zones)						Total
	1	2	3	4	5	6	
No. Not involved In Fishing	114 (60.9)	177 (79.7)	71 (79.8)	22 (84.6)	31 (77.5)	56 (90.3)	471 (81.2)
River	26 (19.1)	44 (19.8)	17 (19.1)	4 (15.4)	7 (17.5)	5 (9.7)	103 (17.9)
Canal		2 (.5)			2 (5.0)		4 (.7)
Beel			2 (1.1)				1 (.2)
Total	140 (24.3)	223 (38.3)	90 (15.3)	26 (4.5)	40 (6.9)	61 (10.7)	580 (100.0)

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F. < 5
21.50560	15	.1214	.045	13 OF 24 (54.2%)

Table A14.2 Mean daily Quantity of Fish Caught,
by Zone per Household (Caught over 3 days)

	Locations					
	1	2	3	4	5	6
Mean Daily catch/hh (kg)	3(24)	2(39)	3(10)	1(3)	6(8)	10(6)
% Fish catch for own Consumption/hh	68(24)	55(39)	78(10)	83(3)	66(8)	57(6)
Mean Value of Fish Sales//hh (tk)	415(6)	122(12)	90(21)	30(1)	562(3)	-

Note : Figures in Parenthesis indicate no. of Households

Table A15.1 No. of Households having Livestock by Types and Zone.

Zone	No. of HH	Bullock	Draught Cow	Milk Cow	Bullock	Buffalo	Calv	Sheep	Goat	Horse
1	140 100.0	35 25.0	47 33.6	44 31.4	26 18.6	1 0.7	51 36.4	6 4.3	59 42.1	1 0.7
2	223 100.0	77 34.5	91 40.8	95 42.6	28 12.6	4 1.8	119 53.4	8 3.6	113 50.7	0 0.0
3	89 100.0	14 15.7	13 14.6	19 21.3	1 1.1	1 1.1	24 27.0	3 3.4	33 37.1	1 1.1
4	26 100.0	5 19.2	10 38.5	12 46.2	3 11.5	0 0.0	14 53.8	0 0.0	9 34.6	0 0.0
5	40 100.0	4 10.0	9 22.5	7 17.5	2 5.0	0 0.0	10 25.0	1 2.5	13 32.5	0 0.0
6	62 100.0	2 3.2	7 11.3	5 8.1	1 1.6	1 1.6	13 21.0	1 1.6	14 22.6	0 0.0
Total	580 100.0	137 23.6	177 30.5	182 31.4	61 10.5	7 1.2	231 39.8	19 3.3	241 41.6	2 0.3
1+2	363 100.0	112 30.9	138 38.0	139 38.3	54 14.9	5 1.4	170 46.8	14 3.9	172 47.4	1 0.3
3+4+5+6	217 100.0	25 11.5	39 18.0	43 19.8	7 3.2	2 0.9	61 28.1	5 2.3	69 31.8	1 0.5

Table A15.2

Average Livestock Availability Per Households by Zone.

Zone	No. of HH	Bullock	Draught Cow	Milk Cow	Bull *	Buffalo	Calv	Sheep	Goat	Horse	Total	Total Livestock in the Area
1	140	0.5248	0.5390	0.4255	0.2270	0.0496	0.5674	0.0993	1.0709	0.0071	3.5106	491.48
2	223	0.6532	0.5631	0.5090	0.1577	0.0586	0.7477	0.0676	1.4144	0.0000	4.1713	930.20
3	89	0.2472	0.2247	0.2360	0.0449	0.0112	0.3483	0.0787	0.6629	0.0225	1.8764	167.00
4	26	0.2692	0.8846	0.6923	0.1154	0.0000	0.8467	0.0000	0.9477	0.0000	1.6539	75.00
5	40	0.2000	0.3250	0.1750	0.0500	0.0000	0.2500	0.0250	0.7250	0.0000	1.7500	70.00
6	62	0.0484	0.1613	0.0963	0.0323	0.0323	0.2742	0.0323	0.7097	0.0000	1.3873	86.01
Total	580	0.4466	0.4603	0.3879	0.1345	0.0397	0.5621	0.0672	1.0672	0.0052	3.1707	1839.01
1+2	363	0.6037	0.5538	0.4768	0.1844	0.0551	0.6782	0.0798	1.2819	0.0027	3.9165	
3+4+5+6	217	0.1843	0.3041	0.2397	0.0507	0.0138	0.3687	0.0461	0.7097	0.0092	1.9263	

Table A15.3

Average Value of Available Livestock Per Households by Zone.

Zone	No. of HH	Bullock	Draught Cow	Milk Cow	Bull *	Buffalo	Calv	Sheep	Goat	Horse	Total
1	140	1841.13	1752.48	1819.86	848.94	354.60	847.87	44.26	439.92	56.73	8005.79
2	223	2370.72	1932.43	2202.48	653.15	315.31	1011.04	32.43	714.55	0.00	9232.11
3	89	1073.03	713.48	1111.24	157.30	89.89	453.37	37.08	314.04	0.00	3949.43
4	26	1176.92	3380.77	3146.15	615.38	0.00	1323.08	0.00	426.92	0.00	10069.22
5	40	925.00	1057.50	737.50	140.00	0.00	335.00	8.75	292.50	0.00	3496.25
6	62	209.68	475.80	483.87	96.77	161.29	366.13	9.68	359.68	0.00	2162.90
Total	580	1658.62	1550.51	1699.57	528.10	237.93	784.22	30.50	506.40	13.80	7009.65
1+2	363	2166.47	1863.03	2054.91	728.66	330.46	948.11	36.99	608.63	21.38	8759.15
3+4+5+6	217	811.52	1029.57	1106.91	191.70	82.95	510.83	19.59	336.63	0.00	4088.70

Table A15.4 No. of Households Which have Poultry by Zone.

Zone	No. of HH	Duck	Hen	Pegion
1	140 100.0	28 20.0	132 94.3	9 6.4
2	223 100.0	59 26.5	205 91.9	23 10.3
3	89 100.0	28 31.5	83 93.3	1 1.1
4	26 100.0	3 11.5	23 88.5	2 7.7
5	40 100.0	15 37.5	36 90.0	1 2.5
6	62 100.0	19 30.6	52 83.9	1 1.6
Total	580 100.0	152 26.2	531 91.6	37 6.4
1+2	363 100.0	87 24.0	337 92.8	32 8.8
3+4+ 5+6	217 100.0	65 30.0	194 89.4	5 2.3

Table A15.5 Average Availability of Poultry Birds Per Households by Zone.

Zone	No. of HH	Duck	Hen	Pegion	Total	Total Poultry Birds in the Area
1	140	0.9362	8.2411	0.6667	9.8440	1378.16
2	223	1.3378	8.8514	0.8559	11.0451	2463.06
3	89	1.2022	6.5169	0.1124	7.8315	697.00
4	26	0.5769	6.5385	2.8077	9.9231	258.00
5	40	1.7250	6.1750	0.0500	7.9500	318.00
6	62	1.3387	6.4194	0.1129	7.8710	483.00
Total	580	1.2121	7.7966	0.6483	9.6570	5601.06
1+2	363	1.18	8.62	0.78	10.58	
3+4+ 5+6	217	1.26	6.43	0.42	8.12	

Table A15.6 Average Value (in Taka) of Available Poultry/Birds Per Households by Zone

Zone	No. of HH	Duck	Hen	Poulet	Total
1	140	38.40	316.74	23.72	378.87
2	223	51.69	331.73	19.27	402.69
3	89	80.96	245.96	2.81	329.72
4	26	20.00	257.69	111.54	389.23
5	40	63.33	240.18	2.00	310.50
6	62	56.94	244.52	5.65	307.10
Total	580	53.24	295.97	19.30	368.51
1+2	363	46.57	325.95	20.97	393.48
3+4+5+6	217	64.46	245.88	16.50	326.84

Table A16.1 1988 and 1991 Years Flood Affected Records on Homestead Innundation, Houses Innundation, Kitchen Garden Damage and Crops Damage.

Type of Innundation/Damage	% of Affected Household No.	
	1988	1991
Homestead Innundation	557 (96.0)	175 (30.0)
Houses Innundation	543 (93.6)	94 (16.2)
Kitchen Garden Damage	539 (92.9)	196 (33.8)
Crops Damage	408 (70.3)	217 (37.4)

Table A16.2 Locationwise 1988 and 1991 Years Flood Affected Records on Homestead Innundation, House Innundation, Kitchen Garden Damage and Crops Damage.

Type of Innundation/Damage	% of Affected Household No.											
	1		2		3		4		5		6	
	1988	1991	1988	1991	1988	1991	1988	1991	1988	1991	1988	1991
Homestead Innundation	135 96.4	33 23.6	217 97.3	85 38.1	88 97.8	12 13.3	18 69.2	13 50.0	38 95.0	12 30.0	61 100	20 32.8
Houses Innundation	135 96.4	15 10.7	213 95.5	46 20.6	82 91.1	9 10.0	17 65.4	9 34.6	37 92.5	6 15.0	59 96.7	9 14.8
Kitchen Garden Damage	129 92.1	35 25.0	213 95.5	102 45.7	86 95.6	15 14.4	18 69.2	13 50.0	36 90.0	12 30.0	57 93.4	21 34.4
Crops Damage	102 72.9	51 36.4	181 81.2	119 53.4	62 68.9	19 21.1	9 34.6	10 38.5	23 57.5	6 15.0	31 50.8	12 19.7

Table A16.3 Locationwise 1988 and 1991 Years Flooding Information by Human Death, Livestock Loss and Poultry Loss by Number.

Zone	1988			1991		
	Human Death	Livestock Loss	Poultry Loss	Human Death	Livestock Loss	Poultry Loss
1	7	73	463	2	5	23
2	46	186	947	33	31	112
3	11	69	252	1	2	8
4	-	5	67	-	2	11
5	1	1	78	-	-	4
6	5	16	225	6	2	36
Total	70	350	2032	42	42	187

Table A16.4 Effects of 1988 and 1991 Floods on Service, Trade and others, Drinking water Supply, Price High of Essentials and Scarcity of Daily Necessities.

Damage Type	% of Household (N)	
	1988	1991
Service, Trade and others	552 95.2	221 38.1
Drinking water Supply	518 89.3	225 38.4
Price High of Essentials	561 96.7	370 63.8
Scarcity of Daily Necessities	526 91.0	395 68.1

Table A16.5 Different measures and taken for 1988 and 1991 Years Flood.

Different Measures	No. of Households	
	1988	1991
Remained in the house	52	456
Stayed on raised platform in the house	283 (48.8)	68 (11.7)
Remained on the roof of the house	38 (6.6)	3 (0.5)
To the neighbouring house	23 (4.0)	2 (0.3)
On the Boat/Vela	10 (1.7)	-
Institutions-Schools, Cyclone Shelters etc.	6 (1.0)	-
On the Embankment	159 (27.4)	9 (1.6)
To the Nearby mainland	7 (1.2)	-
To the Distant mainland	1 (0.2)	-
Others	1 (0.2)	-

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Table A16.6 Effects of 1988 and 1991 Floods on Service, Trade and Others, Drinking Water Supply, Price Hike of Essentials and Scarcity of Daily Necessities by Zone.

DAMAGE TYPE	LOCATION TYPE							
	1	2	3	4	5	6	Total	
Effects of Flood on Service, Trade and Others	1988	135 96.4	213 95.5	87 96.7	18 69.2	39 97.5	60 98.4	562 95.2
	1991	53 37.9	95 42.6	18 20.0	10 39.5	16 40.0	29 77.1	221 38.1
	1988	128 91.4	193 86.5	86 95.6	17 68.4	39 97.5	65 90.2	518 89.3
Drinking Water Scarcity	1991	56 40.0	93 41.7	21 23.3	11 42.3	12 30.0	30 49.2	223 38.4
	Price Hike of Essentials	1988	135 96.4	218 97.8	89 98.9	18 69.2	40 100.0	61 100.0
1991		93 66.4	138 61.9	58 64.4	17 65.4	30 75.0	34 55.7	370 63.8
Scarcity of Daily Necessities		1988	128 91.4	204 91.5	83 92.2	16 69.2	40 100.0	65 90.2
	1991	99 70.7	151 67.7	57 63.3	18 69.2	31 77.5	39 63.9	395 68.1

Figures represents number of respondents answering positively.
Figures below represents percentages.



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Table A16.7 Measures Taken during 1988 Flood by Zone.

Type of Measures Taken	Z O N E						Total
	1	2	3	4	5	6	
No Measures taken	5 3.6	6 2.7	2 2.2	8 30.8			21 3.6
Remained in the house	1 .7	8 3.6	14 15.6		3 7.5	5 8.2	31 5.3
Stayed on raised platform in house	95 67.9	113 50.7	33 36.7	3 11.5	16 40.0	23 37.7	263 48.8
Remained on roof of the house	12 8.6	15 6.7	4 4.4	1 3.8	3 7.5	~ 4.9	38 6.6
To the neighbouring house	12 8.6	6 2.7	2 2.2	2 7.7	1 2.5		23 4.0
On the boat/vela	2 1.4	6 2.7	1 1.1			1 1.6	10 1.7
School/cyclone shelter	2 1.4	2 .9		2 7.7			6 1.0
On the embankment	9 6.4	64 28.7	33 36.7	7 26.9	17 42.5	29 47.5	159 27.4
To the nearby mainland	2 1.4	2 .9		3 11.5			7 1.2
To the distant mainland		1 .4					1 .2
Others			1 1.1				1 .2
Total for all types of measures	140 24.1	223 38.4	90 15.5	26 4.5	40 6.9	61 10.5	580 100.0

Table A16.8 Measures Taken during 1988 Flood by Zone.

Type of Measures Taken	Zone						All Zone
	1	2	3	4	5	6	
No Measures taken	78 55.7	99 44.4	37 41.1	8 30.8	9 22.5	30 49.2	261 45.0
Remained in the house	53 37.9	84 37.7	48 53.3	9 34.6	25 62.5	14 29.5	237 40.9
Stayed on raised platform in house	9 6.4	37 16.6	4 4.4	8 30.8	5 12.5	5 13.2	68 11.7
Remained on roof of the house		2 .9		1 3.8			3 .5
To the neighbouring house		1 .4			1 2.5		2 .3
On the boat/vela			1 1.1			8 19.5	9 1.5
School/cyclone shelter	140 24.1	221 38.4	90 19.9	26 4.9	49 6.9	71 19.5	500 100.0

Table A16.9 No. of Human Death, Livestock and Poultry Loss Due to Flood in 1981 and 1991 (Nos.) Against per Population Loss by Zone.

Zone	1988			1991		
	Human Death	Livestock Loss	Poultry Loss	Human Death	Livestock Loss	Poultry Loss
1	7 -	73 -	63 -	2 1 Loss Per 440	5 98	23 60
2	46 -	186 -	47 -	33 1 Loss Per 41	31 30	112 2
3	11 -	69 -	252 -	1 1 Loss Per 493	2 34	8 87
4	- -	5 -	67 -	- 1 Loss Per	2 48	14 18
5	1 -	1 -	78 -	- 1 Loss Per	-	4 30
6	5 -	16 -	225 -	6 1 Loss Per 50	2 43	26 19
All Zones	70 -	350 -	732 -	42 Loss Per 81	42 44	187 30

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Table A16.10 No. of Households were Effected (Loss of Human Death, Livestock and Poultry Loss) by Flood in 1981 and 1991 and Total Households per Households Effected

Zone	1988			1991			
	Human Death	Livestock Loss	Poultry Loss	Human Death	Livestock Loss	Poultry Loss	Total HHs
1	4	36	88	1	3	10	140
2	26	96	160	17	15	39	223
3	7	16	47	1	1	4	90
4	-	4	12	-	1	6	26
5	1	1	22	-	-	3	40
6	5	11	69	3	1	11	61
All Zone	43	164	388	22	21	73	580

Appendix - B

Legal Rights in Charland

BENGAL ALLUVION AND DILUVION REGULATION
(XI of 1825)

Annex B

The first attempt to formalise the alluvion and diluvion aspects of land was done by the Bengal Regulation XI of 1825. The Bengal Alluvion and Diluvion Regulation, 1825 came into force as law on May 26, 1825. This aspect of law provided the basis for determining claims to lands gained by alluvion, or by dereliction of a river or the sea. During the last 150 years up to 1975 the regulation has been expanded and changed many times. For clarity and understanding the relevant sections of the Regulation are cited below.

Objective and policy of the regulation:

- In consequence of the frequent changes which take place in the channels of the principal rivers which intersect Bengal and the shifting of sands which lie in the beds of these rivers, chars or small islands are often thrown up by alluvion in the midst of the stream or near one of the banks and large portions of land are carried away by an encroachment of the river on one side, whilst accession of lands are at the same time or in subsequent years gained by dereliction of the water on the opposite side. Similar instances of alluvion, encroachment and dereliction also sometimes occur on the sea coast which borders the southern and south-eastern limits of Bengal. The lands gained from the rivers or sea by the means mentioned above are a frequent source of contention and although the law and the courts of the country have established rules applicable to such cases, these rules not being generally known, the courts of justice have sometimes found it difficult to determine the rights of litigant parties claiming chars or other lands gained in the manner described above. With a view to removing this difficulty following rules have been enacted for the general information of the public as well as for the guidance of the courts of justice determining claims to lands gained by alluvion or by dereliction of river or the sea.

Rules for determination of claims and disputes relating to alluvial lands of:

- Whenever Shikast Paiwast respecting the disjunction and junction of land by the encroachment or recess of a river may have been immemorially established, for determining the rights of the proprietors of two or more contiguous estates divided by a river (such as that the main channel of the river dividing the estates shall be the constant boundary between them, whatever changes may take place in the course of the river, by encroachment on one

side and accession on the other), the usage so established shall govern the decision of all claims and disputes relative to alluvial land between the parties whose estates may be liable to such usage.

- Where there may be no local usage of the nature referred to in the preceding section, the general rules stated in the following section shall be applied to the determination of all claims and disputes relative to lands gained by alluvion or by dereliction either of a river or the sea.
- When land may be gained by gradual accession, whether from the recess of a river or of the sea, it shall be considered an increment in the tenure of the person to whose land or estate it is thus annexed, whether land or estate be held immediately from (the crown) by a Zamindar or other superior land holder, or as a sub-ordinate tenure by any description of under-tenant whatever:
 - Provided that the increment of land thus obtained shall not entitle the person in possession of the estate or tenure to which the land may be annexed to a right of property or permanent interest therein beyond that possessed by him in the estate or tenure to which the land may be annexed and shall not in any case be understood to exempt the holder of it from the payment to (the crown) of any assessment for the public revenue to which it may be liable under the provision of Regulation II, 1819, or of any other Regulation in force. Nor, if annexed to a subordinate tenure held under a superior landholder at a fixed rent per Bigha, to an increase of rent for the land annexed to his tenure by alluvion, be considered except from the payment of any increase of rent to which he may be justly liable.
- The above rule shall not be considered applicable to cases in which a river, by a sudden change of its course, may break through and intersect an estate, without any gradual encroachment, or may by the violence of stream separate a considerable piece of land from one estate and join it to another estate, without destroying the identity and preventing the recognition of the land so removed. In such cases the land, on being clearly recognised shall remain the property of its original owner.
- When a char or island may be thrown up in a large navigable river (the bed of which is not the property of an individual or sea between such island and the shore may not be fordable, it shall, according to established usage, be at the disposal of the Crown.

But if the channel between such island and the shore be fordable at any season of the year, it shall be considered an accession to the land tenure, or tenures of the person or persons whose estate

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or estates may be most contiguous to it, subject to several provisions specified in the first clause of this section with respect to increment of land by gradual accession.

The Bengal Alluvion Act 1868

The Bengal Alluvion Act came into effect on 8th July, 1868. The Act was promulgated in reference to the Bengal Regulation XI of 1825. The act made provisions for transforming certain categories of alluvion and diluvion land as khas (state land). Three relevant sections of the Act are cited below:

- (Repeal of S.7 of the Act IX of 1847) Rep. by the Repealing Act, 1873 (XII of 1873)
- It is hereby declared that when any islands shall, under the provisions of clause 3, section 4, of Regulation XI of 1825, be at the disposal of Government, all lands gained by gradual accession to such islands, whether from a recess of the river or of the sea, shall be considered an increment to such island, and shall be equally at the disposal of Government.
- Whenever it shall appear to the local revenue authorities that an island has been thrown up is a large and navigable river liable to be taken possession by Government under Clause 3, Section 4, of Regulation XI of 1825, the local revenue authorities shall take immediate possession of the same for Government, and shall assess and settle the land according to the rules in force in that behalf, reporting their proceedings forthwith for the approval of the Government whose order thereupon, in regard to the assessment, shall be final:

Provided, however, any party aggrieved by the act of the revenue authorities in taking possession of any island as aforesaid shall be at liberty to contest the same by a regular suit in the Civil Court.

State Acquisition and Tenancy Act 1950

The state Acquisition and Tenancy Act 1950 was passed by the East Bengal Legislative Assembly and became a law on the 16th May 1951. The Act primarily aimed at acquisition by the Government of certain interests described in the Act as rent receiving interests enjoyed by a class of persons called rent receivers. Among these rent receivers were the Zamindars, Talukdars and tenure holders who in their own right used to collect rents from the tenants within their respective estates, tenures, Taluks and Tenancies. The Act aimed at the total abolition of such rent receiving interests of this body of rent receivers created by the British East India Company through the Permanent Settlement Act of 1793.

Sections 86 and 87 of This Act Particularly deals with Right on Alluvion and Diluvion Lands

Section: 86

- Abatement of rent on account of diluvion and re-entry into lands which reappear - If the lands of a holding or a portion of such lands are lost by diluvion, the rent of the holding shall, on application made by fair and equitable in accordance with the rules made in this behalf by the Provincial Government.
- Notwithstanding anything contained in any other law, tenant or his successors-in-interest shall subsist in such lands or portion thereof during the period of loss by diluvion, not exceeding 20 years, whether partly before and partly after or wholly after the commencement of this Part; and the tenant or his successors-in-interest shall have the right to immediate repossession on the reappearance of such lands or portion thereof within 20 years of their loss by diluvion, and be liable to pay arrears of rent without interest or damage in respect of the land which has reappeared for the period which it was lost or for 4 years whichever is less.

Provided that, the lands or portion thereof which have so reappeared added to the total area of land already in possession of such tenant or his successors-in-interest exceed the area of land which the tenant was allowed to retain in his possession under section 20, or the limit laid down in section 90, whichever be greater, such tenant or his successors-in-interest shall not have the right to re-possession of such excess area of land; and such excess area shall rest in and be at the disposal of the Provincial Government.

Provided further that allotment of lands, of which such tenant or his successors-in-interest are entitled to re-possession under the above Provision shall be made according to the choice of such tenant or his successors-in-interest.

Section: 87

- Notwithstanding anything contained in any other law for the time being in force, when any land has been gained by gradual accession, whether from the recess of a river or of the sea, it shall, subject to the provisions of sub-section (2), be considered an increment to the holding of the Raiyat to whose land it is thus annexed; and such Raiyat shall be entitled to hold such land subject to the payment of such fair and equitable rent as may be determined for such land by the revenue officer
- If when the whole or any part of the land which has been gained by such gradual accession is added to the total area of land, if

any, held at the time by the Raiyat to whose land it is so annexed, the aggregate of the areas of land held by him exceeds the limit laid down in section 90, then such excess shall not be considered as an increment to the holding of such Raiyat but shall be at the disposal of the Provincial Government

Provided that the limitation in respect of the area of the land in this sub-section shall not apply to a Raiyat who has been certified in the prescribed manner by the prescribed Revenue Authority to be a person who has undertaken large scale farming on a co-operative basis or otherwise by the use of power driven mechanical appliances or to any land which is held for the purpose of cultivation and manufacture of tea or any land held by a company for the cultivation of sugarcane for the purpose of manufacture of sugar by that company.

- In dealing with any such excess at the disposal of the provincial government, the Revenue Officer shall decide, in such manner as he may deem fair and equitable, after giving any parties interested an opportunity of being heard, which portion, being equal to such excess, of the land so annexed shall be at the disposal of the provincial government and serve a notice on the Raiyat in the prescribed form and number stating the boundaries of the land so decided as being at the disposal of the provincial government and thereupon such land shall vest in the Provincial Government absolutely.

Amendments were made in 1972 and 1975 also. Section 86 and 87 of the State Acquisition and Tenancy Act as ammended by the President's Order and Ordinance LXI of 1975 are cited here. Since then, these laws remained unchanged. Section 86 deals with abatement of rent on account of diluvion and extinguishment of right on diluviated land. Section 87 corresponds to the right on alluvion land.

President's Order and Ordinance LXI of 1975

Section: 86

- If the lands of a holding or a portion of such lands are lost by diluvion, the next of the holding shall be abated by such amount as may be considered by the Revenue Officer to be fair and equitable in accordance with the rules made in this behalf by the government.
- Notwithstanding anything contained in any other law for the time being in force, the right, title and interest of the tenant or his successors-in-interest shall be extinguished in such lands or portion thereof, whether the loss of such lands or portion by diluvion took or takes place before or after the commencement of the State Acquisition and Tenancy (Fourth Amendment) Order, 1972.

- All lands, so lost by diluvion under sub-section (2) which reappeared before the date of commencement of the said order, but in respect of which the right of the tenant, whose land was so lost, or his successors-in-interest, to repassession was not finally recognised or declared by a competent authority or court under any law for the time being in force and also all lands, so lost by diluvion under the said sub-section, which may reappear on or after the said date, shall vest absolutely in the Government free from all encumbrances and shall be at its disposal.
- Notwithstanding anything contained elsewhere in this Act, in making settlement of any land vested in government under sub-section (3), preference shall be given to the person or his successors-in-interest who immediately before loss by diluvion, was owner of such land, subject to the condition that such land or portion thereof re-appears within twenty years from the date of such loss:
provided that the quantity of land to be so settled shall be such as, added to the quantity of land, if any, already held by such person or his family does not exceed one hundred (presently 60) Bighas or the total quantity of land hold by such person or his family before loss by diluvion, whichever is less:
Provided further that the provision of this sub-section shall not apply to cases of re-appearance of land caused or accelerated by any artificial or mechanical process as a result of development works undertaken by government or any authority empowered or authorised by or under any law to undertake such development works.
- All suits, applications, appeals or other proceedings in respect of any claim to the re-possession of any land lost by diluvion which has reappeared or is alleged to have re-appeared pending before any court or authority on the date of commencement of the said order shall not be further proceeded with and shall abate and no court shall entertain any suit, application or other legal proceedings in respect of any such claim.

Section: 87

- Notwithstanding anything contained in any other law for the time being in force, when any land gained by gradual accession, whether from the recess of a river or of the sea, it shall not be considered as an increment to the holding and tenancy to which it may thus annexed, but shall vest absolutely in the Government of the People's Republic of Bangladesh and shall be at their disposal.
- The provision of sub-section (1), shall apply to all lands so gained whether before or after the 28th June, 1972, but shall not apply to any land so gained before the said date if the right of

a Malik to hold such land as an increment to his holding was finally recognised or declared by a competent authority or court before the date of commencement of the State Acquisition and Tenancy (Sixth Amendment) Order, 1971 (P.O. No. 137 of 1971) under the law then in force.

- All suits, applications, appeals or other proceedings for the assertion of any claim to hold, as an increment to any holding, and land gained or alleged to have been gained from the recess of a river or of the sea, pending before any court or authority on the date of commencement of the said order shall not be further proceeded with and shall abate and no court shall entertain any suit, application or other legal proceedings in respect of any such claim.

Appendix – C
Questionnaires

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Signature of the Supervisor _____
with date _____

Signature of the Investigator _____
with date _____

JAMALPUR PRIORITY PROJECT (FAP-3.1) CHARLAND STUDY

SOCIO-ECONOMIC SURVEY QUESTIONNAIRE

1. Identification									
1.1 Name of Char	<input type="text"/>								
1.2 Name of Household Head	<input type="text"/>								
1.3 Father's/Husband's Name	<input type="text"/>								
1.4 Name of Respondent	<input type="text"/>								
1.5 Relationship with Head of Household (3)	<input type="text"/>								
1.6 Strata (1)	<input type="text"/>								
1.7 Settlers Type (2)	<input type="text"/>								
1.8 Sample No.	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>								
1.9 Clusters Name	<input type="text"/>								
1.10 Para	<input type="text"/>								
1.11 Village	<input type="text"/>								
1.12 Mauza	<input type="text"/>								
1.13 Union	<input type="text"/>								
1.14 Upazila	<input type="text"/>								
1.15 District	<input type="text"/>								
<table border="0"> <tr> <td>Signature of Interviewer</td> <td><input type="text"/></td> <td>Date of Interview</td> <td><input type="text"/><input type="text"/><input type="text"/><input type="text"/> 9 2</td> </tr> <tr> <td>Checked by</td> <td><input type="text"/></td> <td>Date of Checking</td> <td><input type="text"/><input type="text"/><input type="text"/><input type="text"/> 9 2</td> </tr> </table>		Signature of Interviewer	<input type="text"/>	Date of Interview	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> 9 2	Checked by	<input type="text"/>	Date of Checking	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> 9 2
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2. Demographic Characteristics

Serial No.		Number of the Household Members																	
Subject	(3)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Relationship with Head of Household																			
Age (Year)																			
Sex (1 = Male ; 2 = Female)																			
Marital Status	(4)																		
Education Level	(5)																		
Occupation																			
— Primary	(6)																		
— Secondary	(6)																		
Working Place	(7)																		

3. Land Holding and Tenure

3.1 Land Holding Size and Its Use

[illegible]

3.2 Terms of Share Cropping	% Crop received by Share Cropper

3.3 Type of Mortgage (if land mortgage in/out) (8)

4. Cropping Pattern and Production by Land Type and Use (Last 1 Year)

[illegible]

* M = 1. Baishak, 2. Jaistha, 3. Ashar, 4. Shraban, 5. Bhadra, 6. Ashwin, 7. Kartick, 8. Agrahayan, 9. Poush, 10. Magh, 11. Falgun, 12. Chaitra

5. Land Transfer (Last 3 Years)

Year	Land Purchased		Land Sold	
	(Area in Dec.)	Value (Tk.)	(Area in Dec.)	Value (Tk.)
1991				
1990				
1989				

6. Credit (Last One Year)

6.1 Did you receive any loan last year? (Y/N) ☐

6.2 If yes, mention in detail :

Source (Specify)	Amount	Purpose	Rate of Interest
	(Tk.)	(10)	(%)
Non-Institutional			
Institutional			

7. Physical Assets

Assets/Kinds	No.	TK.	Assets/Kinds	No.	TK.
<u>Agricultural Implements</u>			<u>Cottage Industry</u>		
Plough			Hand Loom		
Ladder			Ghani (Traditional Oil Machine)		
Weeder			<u>Fishing Nets</u>		
Power Tiller			Vesal Net		
Thresher			Seen Net		
Rower/Padle Pump/HTW			Karrent Net		
SPW			Drag Net		
LLP			Gill Net		
Don/Sewti			Cast Net		
DTW			Lift Net		
Spray Machine			Push Net		
Others			Other Net		
<u>Transport</u>			Trap		
Animal Cart			Harpoons		
Push Cart			<u>Electronic</u>		
Boat			TV		
Bi-cycle			Radio		
Rickshaw/Van			Wrist Watch		
Motor Byke			<u>Other Assets</u>		
<u>Furniture</u>			Houses		
Khat/Chouki			Shops		
Chair/Table			Dheki		
Almirah			Others		
Others					

8. Livestock & Poultry (Last One Year)

	Variety	Present	Present Value
		No.	(Tk.)
1.	Bullock		
2.	Dry Cow		
3.	Milch Cow		
4.	Bull		
5.	Buffalo		
6.	Calves		
7.	Sheep		
8.	Goat		
9.	Horse		
10.	Others		
11.	Duck		
12.	Hen		
13.	Pigeon		

9. Fishery (Open Water Fishery)

	Fishing Ground (11)	Last 3 days Information		
		Yesterday	Day before Yesterday	Day day before Yesterday
Total Catch (Kg)				
Own Consumption (Kg)				
Sale (Tk.)				

10. Migration

10.1 How long you/your family are residing in this Char? yrs.

10.2 Since 1971 (after liberation) Information on Migration

Year	Type of Migration (12)	Causes of Migration (13)	Places of Migration (14)

10.3 In your lifetime how many times your dwelling units were shifted due to river erosion ?

11. Dwelling House Information

Type of House	No.	Construction Type (15)
Living Room		
Bangla Ghar (out house)		
Kitchen		
Livestock Shed		
Others		

12. Water Supply

Water use	Water Source (16)
Drinking	
Cooking	
Cleaning/Washing	
Bathing	
Washing of Cattle	

13. Sanitation

13.1 Is there any latrine in the household? Yes/No

13.2 If yes, type of latrine (17)

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14. Cooking Fuel Consumption (Last One Week)

Fuel Type	Quantity	
	Unit	Volume
Hey		
Leaf		
Rice Bran		
Jute Stick		
Cow Dung		
Bamboo/Wood		
Kerosine		
Dhaincha		
Kash Bottom		
Others (Specify)		

15. Health Aspects

15.1 Diseases (Last One Year)

Member	Member	Disease	Treatment Received
	(No.)	(18)	(19)
Male			
Female			
Children			

15.2 Immunization

Sex	Eligible HH Member for Immunization (No)	Immunized (No)
Male		
Female		

16. Flood (1988 and 1991)

Items	1988	1991
Flood Occured (Y/N)		
Homestead Inundated (Y/N)		
If Yes, Duration (Days)		
Maximum Height on Courtyard (Ft.)		
House's Floor Inundated (Y/N)		
If Yes, Duration (Days)		
Maximum Height on Floor (Ft.)		
Measures Taken (20)		
Kitchen Garden Damage (Y/N)		
Tree Damage (Y/N)		
Houses Damage (21)		
Crop Damage (Y/N)		
Human Death (No.)		
Livestock Loss (No.)		
Poultry Loss (No.)		
Effects of Flood on Service, Trade and Others (Y/N)		
Drinking Water Scarcity (Y/N)		
Price Hike of Essentials (Y/N)		
Scarcity of Daily Necessities (Y/N)		

17. Yearly Income and Expenditure (Last 1 Year)

A. <u>Income</u>	Total Taka
1. Sale of Crop and By-product	
2. Sale of Livestock/Poultry	
3. Sale of Dairy Products (Milk/Egg)	
4. <u>Rent and Sale of Assets</u>	
4.1 Land/Pond Lease and Mortgage	
4.2 Interest of Capital	
4.3 Rent of House/Shop	
4.4 Rent of Irrigation Equipment	
5. Hiring out of Draft Animal	
6. Cottage Industries	
7. Day Labourer Wage	
8. Remittances from Outside (Salary, wages etc.)	
9. Remittances from Abroad	
10. Gift	
11. Salary	
12. Others	
TOTAL INCOME :	
B. <u>Expenditure</u>	
1. <u>Purchase of Food Grains</u>	
1.1 Rice/Paddy/Wheat/Flour	
1.2 Fish/Meat	
1.3 Vegetables	
1.4 Others	
2. <u>Other Expenditure</u>	
2.1 Cloths	
2.2 Medicine/Treatment	
2.3 Education	
2.4 Religious and Social Function	
2.5 Rent, Fee, Taxes, and Litigation	
2.6 Dowry	
2.7 Loan Repayment	
2.8 Others	
3. <u>Investment</u>	
3.1 Purchase & Repair of Agri. Equip/Implements	
3.2 Construction and Repair of Houses	
3.3 Purchase and Repair of Furnitures	
3.4 Release of Property from Lease/Mortgage	
3.5 Purchase of Livestock	
3.6 Others	
TOTAL EXPENDITURE :	

18. Expenditure relating to Land rent

1. Your annual amount of rent. Tk. _____

2. When did you last pay rent ? Year _____

3. Expenditures incurred in addition to rent payment—

Items of Expenditure	Amount (Tk.)
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____

4. State reasons in case of non-payment of rent—

1.

2

3.

JAMALPUR PRIORITY PROJECT (FAP-3.1)

CHARLAND STUDY

SOCIO-ECONOMIC SURVEY QUESTIONNAIRE

(Code Sheet)

Always Yes = 1, No = 2

1. Strata :
1. Landless (owned less than 0.5 acre of land and mainly cultivate others lands or day labourers), 2. Marginal Farmer (owned 0.51- 1.0 acre cult. land), 3. Small Farmer (owned 1.01 - 2.50 acres cult. land), 4. Medium Farmer (owned 2.51 - 5.0 acres cult. land), 5. Large Farmer (owned 5.01 + culti. land), 6. Traders & Professionals
2. Settlers Type
1. Original Settler, 2. Migrated in from other chars, 3. Temporary Sheltered
3. Relationship with :
1. Household Head, 2. Father, 3. Mother, 4. Brother, 5. Sister, 6. Wife, 7. Son, 8. Daughter, 9. Daughter-in-law, 10. Grand Son/ Daughter, 11. Sister-in-law, 12. Brother-in-law, 13. Nephew/ Niece, 14. Lodging, 15. Adopted/Sheltered, 16. Others (specify)
4. Marital Status :
1. Unmarried, 2. Married, 3. Widow/Widower, 4. Divorced/Separated
5. Education :
1. Illiterate, 2. Non-formal, 3. Upto Primary, 4. Upto Class X, 5. SSC/HSC, 6. HSC, 7. Graduate/Post Graduate, 8. Madrasa, 9. Others (specify).
6. Occupation :
0. Not Applicable (Infant/child, mad, retarded, blind, long time sick, old man, etc.), 1. Agriculture, 2. Fishery, 3. Trading, 4. Service, 5. Artisan, 6. Day Labour, 7. Agro-Forestry, 8. Housewife, 9. Student, 10. Unemployed, 11. Child-labour, 12. Others (Specify)
7. Working Place :
1. Within Char, 2. Other Char, 3. Nearby rural area in the mainland, 4. Nearby urban area in the mainland, 5. Both char & mainland, 6. Other (Specify)
8. Mortgage Type :
1. Bandhak (Loan to be repayed after a fixed period), 2. Bhograihaan (To be enjoyed till the loan is repaid), 3. Medi (Settled for a fixed period but need not to repay), 4. Others.
9. Crop :
1. B. Aus, 2. T. Aus (LV), 3. T. Aus (HYV), 4. Jute, 5. Til (oil seeds), 6. Caon, 7. B. Aman, 8. T. Aman (LV), 9. T. Aman (HYV), 10. Mixed Aus-Aman, 11. Mustard, 12. Boro (LV), 13. Boro (HYV), 14. Wheat, 15. Potato, 16. Sweet Potato, 17. Ground Nut, 18. Pulses, 19. Spices, 20. Vegetables, 21. Water Melon, 22. Sugercane, 23. Cheena, 24. Banana, 25. Maize, 26. Linseed, 27. Others (Specify)

10. Purpose of Credit : 1. Input for Crops, 2. Implements/Equipment, 3. Animals, 4. Food, 5. Social Obligations, 6. Children's Education, 7. Debt Repayment, 8. Land Purchase, 9. Trade, 10. Dowry, 11. Boat Purchase, 12. Net Purchase, 13. For Lease of Pond/ Water Tract, 14. Purchase of Fishing inputs, 15. For Fish Trading, 16. Others (Specify)
11. Fishing Ground : 1. River, 2. Canal, 3. Beel, 4. Flood Plain, 5. Pond/Ditch, 6. Other (Specify)
12. Type of Migration : 1. Permanent, 2. Temporary
13. Causes of Migration : 1. Due to Erosion, 2. Due to flood, 3. Poverty, 4. Other (Specify)
14. Places of Migration : 1. Other Char, 2. Main Land (Rural), 3. Main Land (Urban), 4. Others (Specify)
15. Construction Type : 1. Bamboo/Leaf/Hay/Sungrass/Kash, 2. Tin Roof, 3. Semi Pucca, 4. Pucca
16. Sources of Water : 1. Tube Well, 2. Dug Well, 3. Pond, 4. Canal/River, 5. Others (Specify)
17. Type of Latrine : 1. Septic, 2. Pit, 3. Well, 4. Service, 5. On Water Body, 6. Bushes/Orchard Latrine.
18. Disease : 1. Cholera/Diarrhoea, 2. Tetanus, 3. Phthisis, 4. Pox, 5. Cough, 6. Typhoid Fever, 7. Dysentery, 8. Jaundice, 9. Malaria, 10. Kala-azar, 11. Fever from Cold, 12. Gastric/Ulcer, 13. Scabbies, 14. Stomach Pain, 15. Goitre, 16. Others (Specify)
19. Treatment Type : 1. Without Treatment, 2. Exorcising/Tabiz, 3. Kaviraj/Hekim, 4. Homeopathy, 5. Quack Doctor, 6. Trained/MBBS, 7. Hospital/Clinic
20. Measures Taken : 1. Remained in the house, 2. Stayed on raised platform in the house, 3. Remained on the roof of the house, 4. To the neighbouring house, 5. On the Boat/Vela, 6. Institutions - Schools, Cyclone Shelters etc. 7. On the Embankment, 8. To the Nearby mainland, 9. To the Distant mainland, 10. Other (Specify)
21. Houses Damaged : 1. No Damage, 2. Fully, 3. Partially

JAMALPUR PRIORITY PROJECT STUDIES

METHODOLOGY FOR CHARLAND STUDY

GUIDELINE FOR GROUP DISCUSSIONS :

I Land

- a) Land ownership pattern/tenure systems
- b) Dispute (if any) in land ownership
- c) Land revenue system
- d) Any others special factor, if any.
- e) Problems associated with soil erosion
- f) Suggestions

II Land Legal Rights

- a) Existence of disputes over Char land occupation
- b) Rights establishment procedures of newly accreted Char lands
- c) Distribution/occupation procedures for Khas lands (not private owned land)
- d) Cooperation and help from the local level concerned Govt. offices
- e) Awareness on laws relating to newly accreted and eroded lands (Nadi Poyasti and Sikasti Ayne)

III Communications

- a) Mode of Communications in system chars and mainland
- b) Problems faced by there
- c) Suggestions

IV Marketing

- a) Identification of existing marketing facilities with is char land in the mainland.
- b) Pattern of trade among char inhabitants
- c) Suggestions

V Problems Caused by Flood

- a) Flood experiences of the char inhabitants
- b) Local facilities available
- c) Govt. interventions
- d) Non-government interventions
- e) Specific problems of any, fund by the char lands during floods
- f) Suggestions

VI Effect of embankment

- a) Identification of probable effect flood embankments.
- b) Suggestions

VII Commitments of the char inhabitants to face the inherent problem of char location and flood

- a) Trend in migration pattern
- b) Experiences during flood
- c) Identification of indigenous flood protection measures
- d) Suggestions

VIII Specific suggestions for improving their socio-economic conditions

JAMALPUR PRIORITY PROJECT (FAP 3.1) CHARLAND STUDY

Legal/Institutional Checklist

(The following information would be collected from discussion with the key informants in sample villages. The group of key informants will be selected from different section of people in the village including representatives from local level Govt. and Non-govt. institutions.)

1. Respondents Identity

Name	Father's Name	Social Identity/ Strata	Sex	Age	Education

2. Location :

- | | |
|--|-----------------------------------|
| 2.1 Name of Village : _____ | 2.2 Name of Char : _____ |
| 2.3 Name of Mauza : _____ | 2.4 Name of Union: _____ |
| 2.5 Name of Upazila : _____ | 2.6 District : _____ |
| 2.7 Bank Location : _____
(1. Left Bank, 2. Right Bank) | 2.8 Distance From Bank (Km) _____ |

3. Physiographic Background of the Village :

- | | |
|---|-------|
| 3.1 When the Char Accreted : | _____ |
| 3.2 When Vegetation Started : | _____ |
| 3.3 When Settlement Started in the Village : | _____ |
| 3.4 When Cultivation Started in the Village : | _____ |



4. Institutions, Services, Facilities, Cottage & Rural Industries

Type	No.	Type	No.
Primary School		Bridge	
Madrassa		Culvert	
Jr. High School		Launch Ghat	
High School		Kheya (Ferry) Ghat	
College		KSS	
Daily Market/Hat		BSS	
Bi-weekly Market		MSS	
Weekly Market		MBSS	
Post Office		Other Cooperatives	
Bank		NGO Group	
Health/FP Center		Govt. Godown	
Killa		Private Godown	
NGO		DTW	
Club (Registered)		STW	
Husking Mill		LLP	
Flour Mill		Power Tiller	
Ghani		Boat (Machanized)	
Pottery Unit		Boat (Non-Machanized)	
Black Smith Unit		Others	
Handloom Unit			

5. Roads and Embankments

Type	No.	Milage (Km.)
Halat		
Earthen Road (Bad Condition)		
Earthen Road (Good Condition)		
Brick (Soling/HBB) Road		
Paved Road		
Embankment		

6. Flood Relief/Assistance by Govt. & Non-Govt. Institutions

Name of Institutions	Type of Relief/Assistance	
	1988	1991
A. Govt. Institutions		
B. Non-Govt. Institutions		

7. Conflict/Litigation Regarding Lands in villages (Last 3 years)

Type of Conflict/Litigation	Year	No.	No. of Conflict/litigation Settled

8. Price of Land

Maximum and Minimum Present Value Per Bigha of Land in Your Area

Maximum : Tk. _____

Minimum : Tk. _____

9. Observation of Investigators on Important Specific Issues (Issues not Mentioned in the Checklist but which Draws Attention in the Survey Areas)

Signature of Investigator : _____ Date : _____

Signature of Supervisor : _____ Date : _____

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Appendix – D

TOR of the Charland Study

PROPOSAL FOR STUDY

1 OBJECTIVES AND INTENTIONS

The intention of the proposed subsidiary study is to extend the geographical area of the Jamalpur Priority Project Study (FAP 3.1) westward to include all the chars up to the right bank of the Jamuna River adjacent to the present Project Area, as shown on the attached map. The objective is to incorporate the chars area into the study, culminating in the development of a full flood proofing strategy for these islands and low lying areas it would seem sensible to integrate the results of this study into the final FAP 3.1 project documentation, treating the area as one. The reason that the Jamuna chars area has previously been omitted from the Flood Action Plan work is that it falls between the boundaries of the Regional Studies. However, it is the most risk prone area in terms of economic livelihoods and a major element in land dispossession resulting in rural to urban migration. Its omission has prompted comment as to the inequity of the present FAP approach and also that it is socially divisive. The proposed work could also form a pilot study for the suggested National char study that has been proposed to be carried out within the framework of FAP 16.

The objectives of the study should be:

- to estimate the total population living on Jamuna chars,
- to get information on social stratification, land tenure and major occupations,
- to ascertain the socio-economic conditions of char inhabitants,
- to identify the constraints faced due to flood, erosion and other environmental hazards,
- to identify the people's responses to such constraints,
- to identify the effects of the FAP on the flooding and erosion patterns,
- to identify the people's perception of such effects,
- to propose strategies to improve the living conditions of char inhabitants,
- to identify the people's perception of such strategies.

2 METHODOLOGY

• Definition of the Present Situation

It is proposed to carry out the following tasks:

- Mapping, defining and categorising chars, to include island chars, presently attached chars and older chars, some of which may now lie within the mainland. This will require enquiries as to their length of existence and stability. All available data sources will be used to investigate this, particularly time series digital satellite imagery held by FAP 19, although production of hard copy from this could be a problem. A map of the present situation will be constructed using the 1/50,000 enhanced SPOT imagery of 20th November 1990 assisted by study of available air photography.
- Study of the hydrological stability of the chars and the implications for the nature of flood proofing strategies caused by present development proposals, particularly the building of embankments. This will require liaison and a simple review of existing data of the area held by FAP 1 (the Jamuna Right Bank Embankment Study), FAP 25 (National hydrology modelling), the Jamuna Bridge impact study and the Chinese Study.

• The Present Socio-Economic Situation

Field investigations are proposed to determine the present situation with regard to the following issues:

- The number and locations of people presently living on the chars and an indication of how long they have been there and where they came from before that,
- The area of land that is cultivated and under what crops at which times of the year and how this is affected by flooding,
- The situation with regard to land allocation and tenure, specifically security and the system for reallocation due to land loss from erosion or gain from accretion,
- Indications as to the degree of household livelihood risk due to erosion and flooding,
- The degree of dependence on other economic activities, particularly fishing,
- The present administrative structure of the area, specifically which Districts, Upazilas and Unions do people reside in. The situation is extremely complex as most of the administrative boundaries were fixed in 1950s relative to the then centre line

of the river which are in theory administered from the west bank,

- People's perceptions, awareness, aspirations and commitment to do something about the issues that they themselves define as being important in their livelihood. This would lead to the determination of a "needs led" development approach, probably involving some form of in situ flood proofing and an integrated development approach. Close working links would be maintained with Service Civil International (SCI) and NGO who have already developed this approach in an area of chars just to the south of the proposed extended study areas.

3 REPORTING

The timing of this study will depend upon how quickly it is set up. The present hope is that will take place from the latter part of March 1992 until late May. In that case, the draft report can be issued three months after beginning of the study.



Appendix – E

TOR of Service Civil International

ANNEX-E TOR of Service Civil International

1 INTRODUCTION

The intention of the proposed subsidiary study is to extend the geographical area of the Jamalpur Priority Study (FAP 3.1) westward to include all the chars up to the right bank of the Jamuna River adjacent to the present project area, as shown on the attached map. The objective is to incorporate the char areas into the study, culminating with the development of a full flood proofing strategy for char islands and low lying areas. It would seem sensible to integrate the results of this study into the final FAP 3.1 Feasibility Study Report (R6), treating the area as one. The main reason why the Jamuna chars have previously been omitted from the Flood Action Plan work is that they fall between the boundaries of the Regional Studies. However, it is the most risk prone area in terms of economic livelihoods and a major element in land dispossession resulting in migration from rural to urban areas. Its omission has prompted comment as to the inequity of the present FAP approach and also that it is socially divisive. The proposed work could also form a pilot study for the suggested National chars study which has been proposed to be carried out within the framework of FAP 16.

2 OBJECTIVES

The objectives of the study are:

- to estimate the total population living on Jamuna chars
- to get information on social stratification, land tenure and major occupations
- to ascertain the socio-economic conditions of char inhabitants
- to appraise the land holding legal rights
- to identify the constraints faced due to flood, erosion and other environmental hazards
- to identify the people's perception to such effects
- to propose strategies to improve the living conditions of char inhabitants
- to identify the people's perception of such strategies
- to propose solution's to minimize the flood-adverse effect
- to propose practical steps to minimize adverse effect of flood.

3 SCOPE OF WORK

The following describes the scope of work of the 1st and 2nd parties.

3.1 Description of the Physical Situation

The work to be done under this component will be carried out by the first party. However, the 2nd party will provide its support and assistance if required.

- Mapping, defining and categorising charlands to include island chars, presently attached chars and older charlands, some of which may now lie within the mainland. This will require enquiries as to their length of existence and stability. All available data sources will be used to investigate this, particularly time series digital satellite imagery held by FAP 19, although production of hard copy from this could be a problem. A map of the present situation will be constructed using the 1:50 000 enhanced SPOT imagery of 20th November 1990 assisted by study of available air photography.
- Study of the hydrological stability of the charlands and the implications for the nature of flood proofing strategies caused by present development proposals, particularly the building of embankments. This will require liaison and a simple review of existing data of the area held by FAP 1 (Jamuna Right Bank Embankment Study), FAP 25 (National Hydrology Modelling), the Jamuna Bridge impact study and the Chinese Study.

3.2 Population/Institution

In close cooperation with the experts of the 1st party, the 2nd party will carry out following activities:

- A full enumeration of the villages through physical identification and plotting on the produced maps. The list of villages will then be grouped as per different types of char. The listing of villages will serve for selecting the villages of the HH census which will include information about gender, age, main activity, settlement period, land owned etc for each enumerated household.
- The listing and census will determine the social groups, profession and land tenure which will be presented in the Interim Report. On the basis of these findings, relationship between the parameters will be analysed and will determine the sample size for socio-economic survey.
- The listing of villages will include inventory of the administrative structure. The identification of the existing institutions (health, education, credit facilities, markets, Government and Non-government Offices) will be done and presented on the supplied map which will be included in the Interim Report.

- The HH census conducted on a maximum of 50 villages will enable to determine the number of HH in the study area with 20% sampling error (ref. to "Working paper, Jamuna char, initial findings", page 15, table 7)

The first party will be responsible for conducting the field investigations whereas supervision work, design of questionnaires and analysis will be performed by the experts of both parties.

3.3 Socio-Economic Survey

In close cooperation with the experts of the 1st party, the 2nd party will carry out a socio-economic survey, as follows:

- The bases of the livelihood of the randomly selected HH will be investigated. The survey will focus essentially on the land, cropping pattern, income sources, fishing resources, consumption pattern and the assets of the households.
- Identification of the livelihood will provide a clear picture on the economic activities and determine added values and degrees of dependency.
- The sample size cannot be determined at this stage. However, it is envisaged that a maximum of six hundred HH will be surveyed.

The first party will be responsible for conducting the field investigations whereas supervision works, design of questionnaires and analysis will be performed by the experts of both parties.

3.4 Local Participation

- People's perception will extensively be achieved through group discussion of the different social strata concerned.
- The areas covered through informal approach will permit to address the issues regarding the major problem with land, communication, marketing, erosion, flood and specific problems due to effect of embankment.
- The discussion will take place among the different categories of people and will provide enlightenment about the pattern of life and the relation with the main land and flood consequences.
- The commitment of the people to face the inherent problem of char location and flood will be examined.
- Several case studies are envisaged to deepen the understanding of individual char inhabitants.
- The number of villages to be studied will depend upon the preliminary survey but will not be less than 30.
- This work will be performed at the village level by a combined

team of experts from both parties (including both local and expat specialists).

4 REPORTING

The study is expected to start by May 1st and to end by July 31st. Two reports will be produced in close collaboration with the selected NGO:

Interim Report : 15th June

This report will contain the following information:

- Presentation of the results of household census (2nd party)
- Presentation of the physical situation (1st party)
- Methodology of the socio-economic survey and the local participation component.(both parties)

Final report : 31st July

This report will contain the following information

- Conclusions of the socio-economic survey (2nd party)
- Views expressed from the local participants (Group discussion, case studies) (both parties)
- Presentation of flood response development strategies and practical steps to minimize impact of flood in the chars.(both parties)

5 PROPOSED STAFFING

To carry out these activities, 14.5 local and expatriate man-months are to be provided. They should be divided as follows:

	Expat. =====	Local =====
Environment	1	2
Socio-economics	2.5	4
Legal/Institution		1
Project specialist		2
Data processing (Computer)		2
Total (man-months)	3.5	11

Substantial manpower for field investigations and data costing inputting will be needed to carry out the following activities:

- Listing of villages
- Household census
- Socio-economic survey

Activities related to local participation (group discussion, cases studies) will be carried out by the experts of both parties.

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A summary of manpower requirement is given below:

1.	Enumeration	Mandays
	Listing of villages	150
	Household census (50 villages*10 mandays)	500
	Socio-Economic Survey (600 questionnaires x .5 man-day)	300
2.	Supervision	
	3 supervisors x 60 days	180
3.	Coding	
	(600 x .15 man-day)	90
4	Entry	60
Total		1280

The 2nd party will provide the following expertise and staff:

- (1) Expertise
 - Socio-economist (2 man-months)
 - Legal-Institution (1 man-month)
 - Data processing/computer expert (2 man-months)
 - Project specialist (2 man-months)
- (2) Manpower for field investigations and data inputting:
(1280 man-days)

The second party will recruit and mobilize the experts and the field staff according to the following schedule:

1- Experts	man-months	Period		
- Socio-economist	2	01/05 - 31/06		
- Legal/Institution	1	15/06 - 15/07		
- Project specialist	2	01/06 - 31/07		
- Computer/data proc.	2	15/05 - 15/07		
2- Staff	No staff	Period	No of days	Total mandays
Enumerators (listing)	20	01/05 - 08/05	7.5	150
Enumerators (census)	20	07/05 - 31/05	25	500
Enumerators (survey)	20	15/06 - 30/06	15	300
Supervisors	3	01/05 - 30/06	60	180
Coders (survey)	5	10/06 - 10/07	30	90
Data entry	2	05/06 - 05/07	30	60

6 IMPLEMENTATION ARRANGEMENT

The experts of the 2nd party will participate in the study right from the beginning (conceptualisation stage) up to the end (reporting). They will work in close collaboration with the experts of the 1st party with the aim to develop fruitful interactions.

A board will be formed including experts of the first and the second parties to monitor closely progress of work, time schedule, reporting and final output. The board will comprise 6 members, three representatives from each party. The representatives will be nominated at the time of signature of the agreement.

In order to enable a reliable and efficient processing of the data collected, a computer will be procured to SCI, Bhuapur development Project by the first party and will remain their property after completion of the study.

The NGO will operate from its own office premises in Dhaka and will arrange a liaison office in the study area.

7 WORK PLAN OF THE STUDY

The work plan of the study is presented below alongside with the mobilisation schedule of the 1st party experts:

MONTH	APRIL 92	MAY 92	JUNE 92	JULY 92
1- NGO contact/contract				
2- Physical Situation				
Liaison with FAP 16				
Base map/spot/air photo				
Time series mapping				
Char classification				
Location/land use map				
3- Population/Institutions				
Listing of villages				
Villages HH census				
Interim report				
Local participation				
S.E. survey/field work				
Data analysis				
Final reporting				

STAFFING OF THE 1st PARTY	APRIL 92	MAY 92	JUNE 92	JULY 92
A. Bird (Environment expat) (30)				
J.L. Leterme (Socio expat) (45)		(10)	(35)	
M. Juville (Socio-eco expat) (30)		(10)	(20)	
S.M. Latif (Environment local) (60)				
S.A. Naqi (Socio local) (30)				

8 BUDGET AND TERMS OF PAYMENTS

• Budget

The estimated expenditures has been established and agreed as follows:

(1)	Expert Fees	Unit	Qty	Rate(Tk)	Amount(Tk)
•	Socio-economist	month	2	40,000	80,000
•	Legal specialist	month	1	40,000	40,000
•	Computer Specialist	month	2	40,000	80,000
•	Specialist Bhuapur Project	month	2	40,000	80,000
(2)	Perdiem for Experts	days	60	150	9,000
(3)	Transport	lump sum			200,000
(4)	Auxiliary Staff	days	1280	200	256,000
(5)	Stationaries	lump sum			50,000
		TOTAL		Tk.	795,000

• Terms of payments

The parties have agreed that a cash advance amounting to 50% of the budget (3,97,500 Tk) will be received by the second party upon signature of the contract.

The actual expenditures will be reimbursed at cost by the first party on a monthly basis, on the basis of invoice presentation and approval of the FAP 3.1 Team Leader, with the deduction of the 50% paid in advance, and up to a maximum of 90% of the total budget. The remaining balance will be settled by the Team Leader upon his approval of the final report.

Appendix – F
Contacts and Liaisons

CONTACT PERSONS

Md. Aminullah
(Sector Head)
Education Programme
Action Aid,
Guthail
Islampur.

Md. Amzad Hossain
(Shallow Engine Boat Operator)
Vill: Jorbari
Union: Char Girish

Abdur Rahim Sona (Sonamiah)
Balizuri Bazar

Mr. Matiur Rahman
(Chairman)
BRDB
Madarganj

Md. Ismail
(Chairman)
Adarvita Union No. 6

Md. Lutfar Rahman
(Boatman, Agricultural Labour)
Char Dorota

Md. Fazlul Haque
Char Dorota

Dilshad Uddin
Vill: Zozira
Nischintapur Union

Abdur Rashid
Zozira

Md. Shirajul Islam
Zozira

Abdul Aziz
(Rickshaw Puller)
Brahman para
Fulkucha Union
Melandaha.

Md. Entaz Ali
(Grocery Shop Owner)
Vill: Maliparar Char
Union: Pogoldigha
Sarishabari

Arman Ali
(Fisherman)
Bhadurabad Ghat

Mr. Azmuddin
(Agricultural Labour)
Bahadurabad Ghat

Nurmuhammad
(Restaurant Worker)
Bahadurabad Ghat

Wahed Ali Shikdar
(Butcher)
Holkerchar
Chukaibari Union
Dewanganj

A.K. Fazlul Haque
(Teacher, Primary School)
Boroil.

Amzad Hossain
(Teacher)
Primary School
Boroil.

Chowdhury Muniruzzaman
(Assistant Resident Engineer)
Road # 13, LGEB
Jamalpur.

Md. Shahjahan
(Businessman)
Balijuri Bazar
Madarganj.

Mir Haroun-er-Rashid
(Businessman)
Balijuri Bazar
Madarganj.

Md. Wasim Miah
(Head Master)
Nalsandha Govt. Primery School
Nalsandha

Abdur Rahman
(Agriculturist)
Nalsandha

Md. Abdul Majid
(B.A. Student)
"Sarishabari College"
Nalsandha.

Mr. Mofazzal
Vill: Chandanpur
Union: Aona

K.M. Shahidul Hoque
(Area Manager)
Grameen Bank
Jamalpur Town

Tarun Kumar Chowdhury
(Programme Officer)
Grameen Bank
Jamalpur Town

Ahsanullah Miah
(Senior Officer)
Grameen Bank
Jamalpur Town

Tofazzal Hossain Tarafdar
(Assistant Chief)
Grameen Bank
Jamalpur Town

Moslemuddin
(Boatman)
Dandatpur Char

Mr. Shamsul Huda
(Executive Director)
Unnayan Sangha
College Road
Nayapara
Jamalpur

Mr. Rafiqul Islam
(Programme Officer)
Unnayan Sangha
College Road
Nayapara
Jamalpur.

Mr. Aminul
Action Aid Bangladesh
Guthail Bazar
Islampur
Jamalpur.

Mr. Altaf Hossain
(Statistical Officer)
Sarishabari Upazila
Jamalpur.

Mr. Rakhal Chandra Kansa Banik
(Senior Scientific Officer)
FRSS.

Sree Ashok Kumar Dhar
(Statistical Officer)
Madarganj Upazila
Jamalpur.

Appendix – G
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