Government of the People's Republic of Bangladesh
Bangladesh Water Development Board
Flood Plan Coordination Organisation

FLOOD ACTION PLAN

NORTHEAST REGIONAL WATER MANAGEMENT PROJECT (FAP 6)

FEAVDEP
FLOOD- AND EROSION-AFFECTED VILLAGES DEVELOPMENT PROJECT

PRE-FEASIBILITY STUDY
FINAL REPORT

November 1994

SNC ♦ LAVALIN International
Northwest Hydraulic Consultants

in association with

Engineering and Planning Consultants Ltd.
Bangladesh Engineering and Technological Services
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Nature Conservation Movement

Canadian International Development Agency

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

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Acronyms and Abbreviations

ASA	Association for Social Advancement
BRAC	Bangladesh Rural Advancement Committee
CIDA	Canadian International Development Agency
DC	Deputy Commissioner
DPHE	Department of Public Health Engineering
EIA	environmental impact assessment
FAP	Flood Action Plan
FFYP	Fourth Five Year Plan
FIVDB	Friends in Village Development, Bangladesh
IDEA	Institute for Development Education and Action
LGED	Local Government Engineering Department
NACOM	Nature Conservation Movement
NEMREP	Northeast Region Environment Management, Research, and Education Project
NERP	Northeast Regional Water Management Project
NGO	Non-governmental organization
ODA	overseas development assistance
SARA	Social Association for Rural Advancement
SLI/NHC	Shawinigan-Lavalin/Northwest Hydraulic Consultants
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VPIC	Village Project Implementation Committee

Executive Summary

About 25% of the region is deeply flooded during the monsoon months with flood depths varying from three to eight metres. Settlements in these deeply flooded areas are organized into small villages located on higher ground such as river levees and *kanda* (raised land within the *haor* basin areas). Raised platforms three to five metres in height are constructed on these higher lands and homes are clustered on these platforms.

The homesteads in these villages provide for essential needs such as sanitation, food storage, privacy, work, fuel, food, and drinking water. In addition, a well-maintained homestead promotes better health, ensures safety, and enhances the quality of life. The small homestead surface is highly productive and many of these productive functions are the responsibility of women, and in some cases are of direct benefit to them.

Historically, people had the resources (access to earth and labour time away from paid or other directly productive employment) to undertake annual earthwork maintenance of their homesteads. Homesteads were on average larger and located on higher land than today, because village populations were smaller. The area had significant swamp forest cover which served to lessen the rate of wave erosion.

As people gradually occupied lower lands and the swamp forest disappeared, village margins have come to be composed of small, low homesteads, exposed to increasing wave activity. These homesteads are typically occupied by the poorest people, who, in the face of increasing economic and environmental pressures, are unable to undertake maintenance homestead earthwork. Without this maintenance, they find themselves in a downward spiral of increasing flood and wave damage contributing to increasing poverty.

The Project described here would finance:

- Earthwork to enlarge previously wave-eroded homesteads and to raise homesteads above the danger of flooding;
- (Re)-establishment of strategic stands of swamp forest, reed swamp, and grass land habitats to protect villages from wave erosion and produce sustainable harvests of valued biomass products; and
- Settlement of new villages created from spoil by a number of the FCDI (dredging/channel re-excavation) projects put forward by NERP.

The Project would also address the following secondary objectives:

- Strengthen village-level and non-governmental organizations in the flood- and erosion-prone villages of the region;
- Improve village water supply and sanitation by helping NGOs to work with ongoing DPHE/UNICEF programmes; and
- Enhance homestead-based income generation in Project villages — so that families benefitting from the primary Project activities will become strong enough economically to undertake necessary maintenance earthwork in the future.

NERP DOCUMENTS

The Northeast Regional Water Management Plan is comprised of various documents prepared by the NERP study team including specialist studies, the outcome of a series of public seminars held in the region, and prefeasibility studies of the various initiatives. A complete set of the Northeast Regional Water Management Plan Documents consists of the following:

Northeast Regional Water Management Plan

Main Report
Appendix: Initial Environmental Evaluation

Specialist Studies

Participatory Development and the Role of NGOs
Population Characteristics and the State of Human Development
Fisheries Specialist Study
Wetland Resources Specialist Study
Agriculture in the Northeast Region
Ground Water Resources of the Northeast Region
Surface Water Resources of the Northeast Region
Regional Water Resources Development Status
River Sedimentation and Morphology
Study on Urbanization in the Northeast Region
Local Initiatives and People's Participation in the Management of Water Resources
Water Transport Study

Public Participation Documentation

Proceedings of the Moulvibazar Seminar
Proceedings of the Sylhet Seminar
Proceedings of the Sunamganj Seminar
Proceedings of the Sherpur Seminar
Proceedings of the Kishorganj Seminar
Proceedings of the Narsingdi Seminar
Proceedings of the Habiganj Seminar
Proceedings of the Netrokona Seminar
Proceedings of the Sylhet Fisheries Seminar

Pre-feasibility Studies

Jadukata/Rakti River Improvement Project
Baulai River Improvement
Mrigi River Drainage Improvement Project
Kalni/Kushiyara River Improvement
Fisheries Management Programme
Fisheries Engineering Measures
Habiganj-Khowai Area Development
Flood- and Erosion-Affected Villages Development Project
Pond Aquaculture
Applied Research for Improved Farming Systems
Manu River Improvement Project
Narayanganj-Narsingdi Project
Narsingdi District Development Project
Northeast Region Environment Management, Research, and Education Project (NEMREP)
Upper Kangsha River Basin Development
Upper Surma-Kushiyara Project
Surma Right Bank Project
Surma-Kushiyara-Baulai Basin Project
Kushiyara-Bijna Inter-Basin Development Project
Dharmapasha-Rui Beel Project
Updakhali River Project
Sarigoyain-Piyain Basin Development

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Bangla Terms

baithakkhana	Homestead building (house) used mainly by men.
basatbari	Homestead area.
boro	Rice grown in the winter dry season.
boro ghor	Main house.
bisra	Area adjacent to homestead and intermediate in height between homestead and rice fields, on which winter vegetables are grown
beel	Permanent shallow lake.
gusti	Lineage.
haor	River back swamp.
hat	Unit of length approximately equal to 46 cm.
jheel	Abandoned river course.
kanda	Ridges that are higher than the haor basin but lower than homestead land.
katha	Branches or bamboo piles place in the water to provide shelter for fish.
khas	Government-owned land.
khal	Small drainage channel.
lepa	Smearing a mixture of cow dung, soil, and water.
para	Contiguous group of homesteads occupied by a social group sharing lineage and/or other factors.
parishad	Council.
purdah	Seclusion.
ranna ghor	Kitchen.
thana	Smallest administrative unit; below district (formerly upazila).
uthan	Courtyard.

1. INTRODUCTION

1.1 PROJECT ORIGINS AND HISTORY

1.1.1 NERP initiatives

The project documented in this report is *Flood- and Erosion-Affected Villages Development Project* (FEAVDEP). It is composed of two of the initiatives proposed in the September 1993 Regional Water Management Plan produced by the Northeast Regional Water Management Plan Project (NERP). NERP is Item 6 of the Bangladesh Flood Action Plan (FAP). A map of the region is shown in Figure 1.

The two initiatives are:[1]

- *Improvement of Homestead Platforms*
- *Village Afforestation*

The Project also addresses:

- Settlement of new village platforms that would be constructed under FCDI projects from dredging and re-excavation spoil
- Institutional development of a network of NGOs working in the flood- and erosion-affected villages of the region, who would participate in the implementation of the above-mentioned initiatives
- Increasing homestead-based employment and production in these villages, by providing technical assistance and access to credit funds to the NGOs for village-level projects; this take advantage of and build directly on Project improvements to biophysical and institutional conditions
- Enhanced service delivery, through linkages to the NGOs strengthened under the project, from ongoing national DPHE/UNICEF tube wells and sanitary latrine programmes to the villages of the deeply flooded area and other flood-prone villages of the region. (This represents a link to the NERP potential initiative *Village Water Supply and Sanitation*, which is an endorsement of the DPHE/UNICEF approach.)

An important issue in the further development of this Project is whether all the above measures can and should be packaged together; in particular whether the settlement of new village platforms should rather be integrated within each of the FCDI projects that is to construct new villages.

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[1]A third initiative, *Jamuna Floodplain Floodproofing*, deals with flood proofing (including homestead platform raising) of Jamuna floodplain villages. This activity is to be pursued separately under the FAP.

1.1.2 NERP planning process

The portfolio of initiatives proposed by NERP were conceptualized and selected within the context of a regional strategic planning exercise focusing on water system development within the context of regional development. NERP planning proceeded as follows:

- Characterize present conditions in the Northeast Region through specialist studies of water resources, development, hydrology, river sedimentation and morphology, agriculture, fisheries, wetland resources, human resources development, and institutions (see NERP Report List, pp. ii and iii).

- Analyze international, national, and regional/local driving forces; regional development issues and strengths, weaknesses, opportunities, and threats; and the future without-Plan scenario. Each of these areas addressed the development system as a whole and the water system in particular, with the latter defined to include biological and other systems particularly dependent upon in-stream and floodplain water (fisheries, wetlands, navigation, etc.), in addition to the water resources themselves and measures to manage them (flood control, drainage, irrigation, and sediment management).

- Articulate a strategic plan for regional water management in terms of a set of strategic thrusts focusing on key system elements, based on information generated in the foregoing steps.

- Conceptualize initiatives addressing strategic thrusts. Note that strategising and project conceptualization are not sequential but rather complementary and parallel.

1.2 STUDY PREPARATION

This pre-feasibility study was prepared over a period of several months in late 1993, based on work of the NERP Social Anthropology Team during NERP Phase I (August 1991 to October 1993). The Team's findings so far, including data from the 1992/3 field season, are to be presented in a series of monographs:

The People of Kaliagota Haor
The People of Fulpur
The People of Shanir Haor

This report will be finalized in early or mid-1994 after receiving comments from the relevant agencies and other interested parties.

1.3 REPORT STRUCTURE

The report is organized as follows:

- Chapter 2, *Background and Rationale*, presents the policy context for the project; a brief description of the region; an overview of relevant institutional background; and the rationale for each element of the project, including a characterization of the future-without-project scenario.

- Chapter 3, *Project Description*, describes the goal and objectives of the project; its structure; content; costs; and phasing.

- Chapter 4, *Organization and Management*, presents the organization and management structure of the project.

- Chapter 5, *Impacts and Multi-Criteria Analysis*, summarizes the expected impacts of the project; discusses cost/benefit and sustainability considerations; and presents the multi-criteria analysis of the project as required for project studies prepared under the Flood Action Plan.

- Annex A presents the figures.

- Annex B presents the initial environmental evaluation of the project, as required for project studies prepared under the Flood Action Plan.

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2. BACKGROUND AND RATIONALE

2.1 POLICY CONTEXT

The Project targets households in the landless, small farmer, and rural informal socioeconomic groups are among those for whom ". . . it would be necessary to formulate special projects . . .for rapid alleviation of poverty." (Fourth Five Year Plan. 1991; p. I-7).

"The Fourth Plan suggests that the village should be the main focus of development" (I-16). NGO programmes "should aim at increasing the capability of the poor and the disadvantaged to save and invest over time so that an NGO can gradually withdraw its activities from the concerned area at an early date and shift its activities to another area not yet covered by such [a] programme of graduation to self-reliance." (FFYP, p. I-14). Also. "NGO activities should supplement the main thrust towards decentralized participatory planning with [the Thana] as the co-ordinating unit." In keeping with these principles, the Project would be implemented at village level through existing NGOs in co-ordination with thana-level administration. Participating NGOs would be strengthened through training in planning, management, and technical areas; funding for village-level institutional credit programmes; and other means.

More fundamentally, the Project would increase the capability of the poor to save and invest by helping them to secure and keep secure their homestead land and domestic assets — which represent all or the major part of their assets, since they are by definition landless or nearly so — from loss or damage from flooding and wave erosion.

In the area of gender, "The Plan recognizes the important role that women have been playing in the production process in Bangladesh and wants that this role be further enhanced" (II-8). The Project focuses on the homestead, the primary locus of most poor and disadvantaged women's lives.

2.2 THE REGION

2.2.1 Overview

The Northeast Region covers an area of approximately 24,500 sq km, bounded by the international border with India to the north and east, the Old Brahmaputra to the west, and the Nasir Nagar (to Madhabpur) and Meghna rivers to the south (Figure 1). The greater part of this region is taken up by the haor basin which comprises the floodplains of the Meghna tributaries, and is characterized by the presence of numerous large, deeply flooded depressions, known as haors, between the rivers. This vast alluvial plain possesses some 6,000 permanent shallow water bodies known as beels (usually in the lowest parts of the haors or in abandoned river channels), surrounded by large areas of seasonally flooded plains. The basin is bounded to the north by the hill ranges of Meghalaya, to the south by the hills of Tripura and Mizoram, and to the east by highlands of Manipur. The numerous rivers rising in these hills provide an abundant supply of water to the plains and cause extensive flooding during the monsoon season, with much of the region being flooded to a depth of up to six metres. The drainage is southwest via the Surma, Kushiyara, Baulai, and Kalni rivers into the Meghna River and Bay of Bengal. Almost all land

above the maximum flood level is under permanent cultivation and human settlement. There are extensive plantations and groves of trees around most villages and homesteads, and in many areas this creates an aspect of discontinuous forest.

The climate is subtropical monsoonal with an average annual rainfall of approximately 4,000 mm. Over 80% of the rain falls during the monsoon season from June to October. Temperatures normally vary between 26 and 31 C in the pre-monsoon period (Mar to May), 28 to 31 C in the rainy season, and 26 to 27 C in winter. Extreme temperatures at Sylhet in the ten-year period 1975-1984 were 6.4 and 39.3 C.

In its original form, the basin would have been a mosaic of permanent and seasonal water bodies with abundant aquatic vegetation, surrounded by vast areas of reed swamp, swamp forest, and floodplain grassland; higher ground would have been covered with scrub jungle and dense stands of bamboo.

Today, the landscape is dominated by rice cultivation (66% of the area) and human settlements (2.7%). Some perennial water bodies (beels and ponds, 3.6%) and strictly aquatic vegetation remain, though reduced in extent, but the other habitat types have all but disappeared. As a result, these systems no longer provide the products and services — such as biomass materials for fuel, fodder, village crafts, buildings, and erosion protection works; dissipation of wave energy; food and shelter for the fish of the openwater system, and so on — that once could be taken for granted by everyone.

The total population of the region is 17.5 million. As of 1991, the gender ratio (number of males to 100 females) is 105.9. As of 1981, almost half (46.7%) of the population was 14 years of age or younger (Table 2.1).

Over three-quarters of the population (81% or 14.2 million) lives in the 21,000 villages of the rural areas. The rest reside in the region's eight major urban centres (0.7 million or 4%) or in smaller urban areas (2.6 million or 15%).

By 2015, the rural population (farmers plus rural landless) is expected to be nearly stable or declining at a level of 17.4 million, 66% of a total population of 26.4 million. This scenario reflects rapid urbanization, perhaps at its fastest-ever rate in the region, and a gradual decline of regional population growth rates to 1.2% in 2015 (*Northeast Regional Water Management Plan*, pp. 77-80).

2.2.2 Village settlement: overall pattern, flooding, wave erosion

Overview

Villages are found mainly along river levees and road sides, where land levels are highest. In higher floodplain areas, villages may be built up on locations scattered about the fields; near hilly areas, higher land at the foot of the hills is favoured.

Most villages are never damaged by floods, or only in years of extraordinarily severe flooding, such as 1988. The exceptions to this are the villages of the low-lying haor areas of Sunamganj, Netrokona, Kishorganj, and Habiganj, plus a few villages on river banks where flash flood spills occur, and villages in some of the low pockets in the piedmont and floodplain areas. About half

Table 2.1: Population distribution by age cohort

	Age cohort (%)					
Sex	0-4	5-9	10-14	15-54	55-59	>60
M	16.6	15.8	13.6	45.7	2.0	6.3
F	17.4	16.6	12.3	46.9	1.6	5.2
Total	17.0	16.3	13.4	45.8	1.9	5.6

of these villages are also affected by wave erosion.

Careful investigation suggests that about 4500 villages (22% of the region's villages) are subjected to severe flooding; most (75%) are in the deeply flooded area. Wave erosion affects about 2,300 of the 4500; almost all of the villages so affected (98%) are in the deeply flooded area. The population of the 4500 villages is estimated to be 3.1 million or 22% of the region's rural population.

For families of all classes, the homestead provides space to live and work and to keep personal belongings and assets — particularly when water levels are high. A well-set up and maintained homestead enhances the quality of life in many ways: it promotes better sanitation, health, and education, provides space for family and social activities, and ensures safety. Quality of life and productivity suffer when the homestead space is too small for the number of inhabitants and the varied activities it must support.

Rural landless (agricultural day labourers, fishermen, those dependent upon the rural informal sector) and women suffer disproportionately from homestead flood and erosion damage. The only tangible asset of virtually all rural landless households is their homestead plot, plus the immovable and movable objects which must be kept there (houses, trees, large and small livestock, stored grain, domestic items). By contrast, landowners have land, and those involved in more formal non-farm activities have cash and other assets.

The lives and work of rural landless women take place mainly within the confines of the homestead, whereas rural landless men regularly leave the homestead and village for a variety of purposes. As a result, deterioration of homestead conditions constrains women's activities and limits women's options much more severely than it does men's.

Further, the small surface of the homestead is highly productive, and many of these productive functions are the responsibility of women. An average village homestead has a few fruit trees (mango, jackfruit, banana and so on), a place for growing perennial vegetables, a courtyard (uthan) for post-harvest rice processing (drying, winnowing and par-boiling, particularly for boro rice in years when the bisra and fields are wet during or after harvesting); and space to work, especially during monsoon months. All these assets and activities are the responsibility of women.

The annual cash income from a average homestead of 0.02 ha is an estimated Tk 2000 to 2700 (Tk 500 to 700 from fruits plus Tk 1500 to 2000 from vegetables), or US$4400 to 5900 per hectare.

To this should be added the annual value-added by the homestead/uthan from grain drying (i.e., returns to the homestead as distinct from returns to labour). This can be estimated only roughly, using indirect methods of calculation, to be between US$ 230 and US$ 3750 per hectare of homestead land. Farmers report renting drying access only rarely, when their own uthan are still wet and unusable from rain or flooding. At these extreme times, the rate is one-tenth of the amount of boro rice that can be dried on the rented space during the harvest period (about 30 days). For an average uthan (5m x 6m on a 0.02 ha plot), this has a value of Tk 3000 (10% of 6000 kg @ Tk 5/kg), which converts to US$3750 per hectare of homestead land. Since this is associated with very adverse conditions, it probably greatly overestimates the actual average value. Another way of estimating is from the value of grain spoilage averted by flood proofing existing homestead land. The project grain drying benefit (see Figure 10) of US$ 2.8 million divided by the floodproofed homestead area of 12,000 ha gives a value of US$230 per homestead hectare. This is in effect an estimate of marginal value product of the use of homestead land for grain drying.

The total annual benefits quantified above come to US$ 4630 to 9650 per hectare of homestead land.

Village types

The flood- and erosion-affected villages of the region are described below. The villages of the deeply flooded haor basin are described first, and then the ways in which the others differ are noted. Two types of information are provided: general descriptive information for overall orientation, and specific details of homestead orientation, physical maintenance, and so on, which are of direct relevance to the proposed project interventions. Figure 2 presents a map of the locations of the 4500 villages. Table 2.2 lists them by thana and type of damage (flood and erosion, or flood only).

A typical village would consist of about 700 people, in about 130 households, grouped into two or three para. A para is a contiguous group of homesteads which represents a social group defined by shared lineage (one or more gusti), time of original settlement, religion, and other factors. Physical boundaries between para are usually indicated by paths, canals, or vegetated lands.

Each village is made up of one or more distinct areas of higher land (units). The width of the unit and the settlement history determine the alignment of homestead plots. There are four basic types:

1. One-line unit — a single row of homestead plots occupies a narrow (30 to 150 m wide) levee;

2. Modified one-line unit — original single row of homestead plots has been subdivided, usually to accommodate sons' families.

3. Two-line unit — two rows of homestead plots occupy a wider (100 to 200 m) levee; and

Table 2.2: Flood- and wave erosion-prone villages in the Northeast Region

Thana	Villages		
	Total	Flood& erosion	Flood only
Nalitabari	178	0	21
Nakla	111	0	10
Sherpur	271	0	25
Haluaghat	178	0	24
Phulpur	425	0	64
Dhobaura	216	0	43
Durgapur	215	0	22
Purbadhala	360	0	36
Netrokona	328	0	28
Kalmakanda	342	91	165
Barthatta	220	73	94
Mohanganj	155	74	93
Atpara	168	21	42
Kendua	332	50	100
Madan	121	51	73
Kaliajuri	65	59	65
Itna	184	159	165
Mitamain	120	102	108
Astagram	67	47	67
Tarail	103	30	41
Karimganj	181	51	60
Nikli	167	94	125
Bajitpur	165	30	50
Bhairab	78	25	31
Kuliarchar	131	26	52
Raipur	280	10	56
Narsingdi	217	8	43

Thana	Villages		
	Total	Flood& erosion	Flood only
Araihazar	332	10	66
Baidyerbazar	290	5	29
Madhyanagar	153	104	122
Tahirpur	266	162	226
Dharmapasha	164	109	148
Jamalganj	159	106	149
Bishwamvarpur	145	22	44
Dowarabazar	286	13	129
Chhatak	524	7	131
Sunamganj	405	55	202
Derai	232	153	232
Sullah	106	104	106
Jagannathpur	333	103	167
Nabiganj	358	25	107
Baniachong	350	208	298
Lakhai	65	31	38
Ajmiriganj	129	85	109
Habiganj	282	0	58
Companiganj	101	0	19
Gowainghat	321	0	48
Kanaighat	283	0	42
Balaganj	479	0	192
Fenchuganj	78	0	25
Rajnagar	245	0	49
Moulvibazar	436	0	87
TOTALS	**11,790**	**2,303**	**4,526**
Percent	**100**	**19**	**38**

4. Cluster unit — homesteads are arranged in a patchwork pattern over a larger (width >200 m) area.

Each unit is occupied by one or several para.

Most of the Project villages (about 70%) consist of a single modified one-line unit. Of the remaining villages, more than 25% consist of several units, some with a cluster main unit; 5% consist of a single two-line unit.

Plans and sections of one-line and cluster units are shown in Figures 3 and 4.

Basatbari, bisra, and borrow pit

A typical household would have the use (and usually ownership) of 0.02 ha of homestead area (basatbari) which would be above the highest 'normal' flood level, plus the use (and usually ownership) of 0.01 ha of bisra, which is land somewhat below the 'normal' flood level. For most (say 90%) of households, basatbari ranges in size from less than 0.01 ha to 0.04 ha; bisra tends to be 20% to 50% of the size of basatbari.

The basatbari usually consists of a platform of earth built up by hand on top of the levee, whereas the bisra is usually at the level of the levee itself. Within the deeply flooded area, the basatbari platform is raised by three or four metres above the natural topography; in other areas, the platform would be on the order of one metre in height.

Basatbari is used for houses for cooking, eating, sleeping, and storage; the courtyard (uthan) where grain is dried; the homestead orchard, typically including banana, bamboo, papaya, mango, coconut, betel nut, and so on; the summer garden, where a few beans, summer squash, edible summer greens, and so on are grown; livestock sheds and pens; and stacks of rice straw.

Bisra is used for the winter garden, where a large variety of vegetables and spices can be grown, such as potato, brinjal, chilli, radish, and so on.

The earth for building up the platform is taken from the area adjacent to the bisra, or homestead if there is no bisra, which becomes a borrow pit. These typically fill in within five to ten years if no more earth is taken in subsequent years. During the early winter months, the water in the borrow pits is typically used for washing and other purposes.

Idealized homestead layout

The physical layout of homesteads in the deeply flooded area exhibits great variety in terms of size, and the type, number, and orientation of houses and other facilities (relative to each other, to compass direction, and to the dominant topographic/village axis). An idealized homestead layout (Figure 5) is described here simply as an aid to understanding aspects of the physical and social micro-geography of village and family life which are relevant to the proposed project interventions. The initial discussion concerns an idealized homestead in a one-line village; subsequent remarks will deal with the other predominant village types.

During most of the year (except for some weeks in January and February, the coldest months), a southeast wind predominates. The cooking fire is thus usually placed on the northern/western side of the homestead plot. This side of the village and of each homestead, then, is the 'inner'

or women's area, and is provided with a hanging latrine at the water's edge or at least some distance away from the other domestic facilities for their use. The opposite side of the homestead is the 'public' or men's area. The cow shed is sited here, as is the baithak khana, the house used to receive visitors other than close relations, and for other 'public' purposes such as adult unmarried son's and visiting men's sleeping accommodations and so on.

Between the baithak khana and the cooking fire would be a courtyard (uthan) and the main house (boro ghor), which are increasingly 'inner', private places. The boro ghor would include the sleeping area for the head of the household, the spouse, and their juvenile children, married sons and their families, and the main granary.

The people of the deeply-flooded area call the one-line village the 'village with one uthan', because successive uthans extend from one homestead to the next along the length of the village. Among villagers, this is an area in which social interactions can be close and cordial. Though women need to maintain decorum, the 'one uthan' facilitates social contacts between the women of para, within which purdah need not be so strictly observed as with 'outsiders' from other para and villages.

In a two-line village, the 'public' sides of the two lines would face inward, usually toward a path running down the boundary separating the lines; the 'private' sides would face the water on both sides of the levee.

In a cluster village, the same types of considerations would be taken into account in situating buildings and other domestic facilities. If sufficient space is available, satisfactory arrangements can be arrived at (adequate privacy and reasonable access to latrines for women, cooking fires and latrines at a reasonable remove from other living activities, and so forth). But this is rarely the case now in the cluster villages of the deeply flooded area; most of these villages are cramped and homestead layouts do not meet people's felt needs — for adequate private and public space, and for appropriate separation and access — very well.

Homestead subsidence and flooding

The *deeply flooded area* is characterized by monsoon flooding which typically begins in late May and persists for five to six months each year. In some years, the flood level is below the homestead platform level. In others, the water rises above the level of the plinth. Once this happens, high water levels tend to persist for several weeks, because of the great extent and thus large storage volume of the deeply flooded basin.

In a year without homestead flooding, a high (3 to 4 m) homestead platform of the deeply flooded area subsides about 15 cm. We estimate that about one-third is due to rainfall erosion at the surface, and the rest is due to compaction and relaxation (gradual slumping) of the platform back into the landscape. Each time the homestead (basatbari) is flooded for a few days, the homestead platform will subside an additional 5 cm mainly due to erosion, aggravated by any flow velocity, wave action, or movement of humans and animals on the platform. Flow velocity and wave action can be particularly destructive as the water is receding and the water surface decreases to the homestead level itself; then homesteads already weakened from long inundation can be severely damaged by even moderate water movement.

In addition to this, if the homestead platform stays under water for a longer period (more than a week), then the platform and related structures begin to disintegrate: the house starts to sink into the platform, kacha walls start to fall apart, bamboo poles start to rot, and the platform and plinth start to collapse; additional subsidence for each such occurrence would be on the order of 30 cm.

Flash-flood prone areas experience flooding in the pre-monsoon period characterized by a rapid rise in water level, several days duration of flooding, and usually relatively rapid drainage. The homestead platforms are lower here (1 m), so in the absence of flooding annual subsidence is only on the order of 5 cm, mostly due to surface erosion. Typical flooding would be of several days duration, possibly several times a year, but inundation for a week or more does occur. As in the deeply flooded area, each flood of several days duration adds 5 cm to subsidence, and after a week or so of flooding, the platform and structures start to fall apart, adding perhaps 30 cm to subsidence.

Wave erosion and natural vegetation

Many villages on the edges of the larger haors are affected by severe wave erosion. A particularly bad year can reduce the homestead (basatbari) area by 15 or 20%. Currently, an estimated 2300 villages have lost up to 25% of basatbari surface area.

Extensive areas of natural vegetation used to help shield these villages from wave action. Stands of swamp forest, reed swamp, and floodplain grassland — both on the periphery of the village and distributed within the haors — protected the villages by dissipating wave energy. Nearly all of this vegetation has disappeared.

In addition to exacerbating the village erosion problem, the extirpation of these natural habitats has serious implications in terms of fisheries production, biodiversity, water quality, and all those dependent upon natural wetland plants and animals for fuel, building materials, fodder, food, and other purposes. These aspects are dealt with in two other projects studied by NERP, *Northeast Region Environment Management, Research, and Education Project* (NEMREP), and *Fisheries Management*.

Homestead platform maintenance practices

Traditionally, homesteads were maintained in the following manner. Every two or three years (every year in parts of the deeply flooded area) during the winter slack period (in boro areas immediately after transplantation and weeding of boro in January/February), homestead platforms were raised by collecting baskets of earth from the adjacent borrow pits and piling them sideways against each other for an uncompacted depth of the width of the basket, about one hat (50 cm). This is then spaded with a kodal, compacted by beating with a heavy stick (mugur), further compacted using livestock, levelled with the kodal, and then polished with the hands by applying a mixture cow dung, clay, and water (an activity called lepa); this latter step helps to minimize rainfall erosion.

In poor households, earth filling is done jointly by men and women or by women alone, and the rest of the steps by women and children. In rich households, all the steps except lepa would be done by men of the family or by hired male labor. Lepa is always done only by women. When grain is being dried in the courtyard (uthan), cow dung and water is smeared every morning; this quickly forms a thin film that keeps sand, silt, and moisture from the platform out of the grain.

The poorest households are now unable to perform this type of maintenance. They cannot afford to skip any days of paying employment to work on their own homesteads. On days when no employment is available, food may be limited or absent as well; in this situation, people may have to rest simply to conserve energy. Also, many landless households lack access to areas from which earth fill can be taken. As a FAP 23 report puts it, 'though the raising of floor levels is technically straightforward, many of the rural and urban poor ~~to~~ do not have the resources (neither access to materials nor labour) to be able to carry out the work required, [and s]ome form of external intervention may be required to floodproof their homesteads' (ISPAN, December 1992; p. 15.)

In May, after the boro harvest, residents of villages prone to wave erosion construct erosion protection works of indigenous design, bari bandha and mati bandha, from locally available natural materials. Bari bandha is a wall constructed around the homestead platform from bamboo poles and bundles of a particular type of grass, *Hematheria protensa* chailla, which grows on higher land in the haors and is very resistant to rotting even when submerged. Mati bandh is similar but constructed from chailla and earth (mati). Supplies of chailla are decreasing rapidly as the traditional chailla areas are gradually being brought under rice cultivation, and earth is difficult to get during this period, as water levels have already risen. Increasingly, the grass *Echinochloa colonum* parua or pawra bon is used as a substitute for chailla, especially by the poor, but it is not very well suited for this purpose as it rots very quickly in water. Also, a very few well-off households use brick, and a few households with access to boulders use these.

2.2.3 Water supply and sanitation

Tube wells

One or more tube wells are present in almost all of the 4500 flood- and erosion-prone villages, but in only about 50% of all para. Even in these para, tube wells occur mostly in richer households, and villagers are not always aware whether a tube well is publicly or privately owned. Further, about 7% of tube wells are out of service on any given day: about 5% of tube wells are out of service indefinitely, 2% are out of service for two weeks to three months (nominally) until repaired, and another 0.5% are out of service for one or two weeks for routine maintenance (most commonly, a replacement washer is needed).

Thus access to safe drinking water supplies is constrained by several factors:

- During the monsoon when paths are submerged, movement between para is restricted to those who have access to boat transportation; this limits access from unserved para by the poor and by women who wish to limit their exposure to strangers;
- Social barriers to drawing water from wells located within the homesteads of richer families limit access by poorer, unrelated, and/or more distant households; and
- During the period when a tube well is out of service, the households dependent on it rarely have access to an alternative safe source (tube well) and must turn to surface water for drinking and other domestic water supplies.

Overall, the percentage of households drinking tube well water during the dry season is perhaps 80%, and this may fall during the monsoon season to as low as 40%. The least likely households to drink tube well water are poorer households in unserved para.[2]

Even in households where tube well water is used for drinking, haor or river water is used for other domestic purposes such as washing dishes and clothes and personal hygiene. Surface water fecal contamination levels are high enough that these practices can cancel much of the potential public health benefits of drinking tube well water.

Sanitation

Fecal contamination of surface water reflects the almost total lack of sanitary latrines. Only 1-2% of the richer and/or more educated households have sanitary water seal ring/slab latrines. Defecated material from both women and men of the remaining households is deposited on the open ground or into surface waters. Either agricultural fields or a screened latrine structure suspended above water when available and above ground in the dry season (katcha latrine) near the homestead are used. Men mostly use the fields in the dry season and katcha latrines during the monsoon (when the agricultural fields are flooded). Women, who rarely leave the homestead, mostly use the katcha latrines.

Water-seal low-cost ring and slab latrines are being promoted by DPHE with support from UNICEF and other donor. The DPHE has production and sales centres for these latrines in each thana and district headquarters in the region. A few village sanitation centres are also found in the region as promoted by the DPHE for selling low cost sanitary latrines.

The GOB has set 1995 and 2000 targets for sanitary latrine coverage of >35% and >80% of rural households. As it has been estimated that only 25% of rural households can afford the water-seal latrine (slab and three rings) even at Tk300, the subsidized price, plans have been revised to include promotion through advocacy and social mobilization of do-it-yourself pit latrines and low-cost water-seal latrines (slab and one ring).

[2]All the above estimates are indicative only, and based on NERP reconnaissance-level surveys.

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2.3 INSTITUTIONS

The purpose of this section is to establish the general institutional background for FEAVDEP.

2.3.1 Local government

The Ministry of Local Government, Rural Development, and Cooperatives has set up different institutions at thana level to implement various rural development programs. Among them, Local Government Engineering Department (LGED) is responsible to develop rural infrastructure and BRDB to organise farmers and destitute women and provide credit. LGED has little experience in mobilizing and training rural people, while BRDB has not been involved in rural infrastructure development.

The formally elected representative bodies closest to village level are the union parishads. Usually, they have direct contacts with many local people, good knowledge of their areas, and are felt to represent local people's interests well. Most rural development programs are implemented in close cooperation with the union parishad. Programs implemented through the union parishads are thought to achieve better participation of people at the grass roots level than programmes implemented through other government entities.

2.3.2 Non-governmental organizations (NGOs)

Non-governmental activity is not a new phenomenon in Bangladesh society, having its roots in traditional forms of voluntarism and charity. In recent years, NOGs receiving foreign funds are regulated by the Foreign Donation (Voluntary Activities) Regulation Ordinance (1978). The NGO Affairs Bureau within the Ministry of Establishment is responsible to coordinate and regulate NGO activities.

The main thrust of NGOs is social welfare and economic development. The target population of most NGOs programmes are men and women of the rural landless and other disadvantaged groups. NGOs generally work with groups of individuals from a homogeneous socio-economic background. Most NGOs pay special attention to poor and destitute women in rural areas.

A host of NGOs have been working in the Northeast Region in recent years. Among them about 15% are foreign (CARE, Concern, and others), 35% national (BRAC, Proshika-MUK, ASA, CARITAS) and 50% are local (Samaj Unnayan Sangstha, Unnayan Sangha, SARA, FIVDB, IDEA). Additionally, a number of organisations, (Swanirvar Bangladesh, Grameen Bank, Bangladesh Family Planning Association) have been established with government initiatives and working in close cooperation with the government as private and non-profit bodies (*Participatory Development and the Role of NGOs*; NERP, 1993).

2.3.3 NGO/government coordination

The GOB promulgates regulatory laws from time to time to regulate and coordinate NGO activities. The most recent one, in 1990, established the NGO Affairs Bureau under the Ministry of Establishment to coordinate NGO activities. NGOs require prior approval from the Bureau before implementing projects with foreign funds, and they remain accountable to the GOB during implementation: they must submit quarterly progress reports to the Bureau and to the Deputy Commissioners of the working districts; they must work in close cooperation with the thana nirbahi officers; and must attend quarterly review meetings with the DCs.

Overall, the GOB's attitude towards NGOs has been positive, as is manifested in the successive Five Year Plans. One of the strategies of the Fourth FYP is to facilitate community participation through NGOs: ". . . the NGO activities, therefore, should supplement the main thrust towards decentralized participatory planning with [thana] as the coordinating unit."

2.3.4 DPHE/NGO coordination

In each thana, DPHE has set up technical units responsible for tube well site assessment and selection, plus water-seal ring/slab sanitary latrine construction and sales centres. During recent years, many NGOs have begun working in close collaboration with UNICEF/DPHE. The NGO Forum for Drinking Water and Sanitation acts as a coordinating NGO, responsible for assessing the needs of potable water in rural areas and assisting local NGOs for installation of the tubewells. In addition, local NGOs mobilize and train the rural people in pit-latrine installation and in using water seal ring and slab latrines provided by DPHE/NGOs.

2.3.5 Previous project experience

Previous project experience in assisting people to raise their own homesteads appears to limited to a Mennonite Central Committee project to assist inhabitants of an (urban?) sweeper colony to raise homestead ground (ISPAN, 1992; p. 15).

2.4 RATIONALE

2.4.1 Introduction

The purpose of this section is to discuss why this project is deserving of priority attention. Opportunities and constraints are discussed. The approaches taken are discussed, and the technical, social, and economic reasons for choosing these in preference to others are presented. The scope and scale of the project is discussed (Gittinger, 1982, p. 414).

2.4.2 Project packaging

The *Village Afforestation* and *Improvement of Homestead Platforms* initiatives have been combined here because:

- The priority villages for afforestation/habitat restoration are those affected by wave-erosion;
- Earthwork in enlarging and raising wave-erosion affected homesteads will be more stable and long-lasting if it is combined and coordinated with afforestation/habitat restoration; and
- Both can and should be done through NGOs.

Settlement of new village platforms that would built by FCDI projects from dredging and re-excavation spoil was included here for two reasons. The first relates to a documentation problem: the pre-feasibility studies of the FCDI projects to include new village construction did not, as it turned out, cover the settlement process. To remedy this deficiency and incidentally to provide the documentation in a single place, rather than repetitive in each FCDI/new village report, the more obvious settlement issues are highlighted here.

The second reason relates to a concern about environmental management planning for FCDI projects, namely, that placing the settlement activity (an environmental management effort) within

the FCDI project is unlikely to result in its success, for several reasons. Institutionalization is one: FCDI projects are implemented under BWDB, which has no experience or mandate of settlement. The mismatches in the scale of funding required and phasing are others: new village construction would likely require relatively large funds and be completed in one construction season, whereas the settlement effort would involve much smaller expenditures over a number of years, beginning before land acquisition and continuing, initially at high intensity and subsequently tapering off, until new communities were functioning well. Experience from infrastructure/(re)settlement projects in many other countries suggests that these kinds of mismatches undermine the settlement effort because in context it seems 'too small' and 'too slow' to be very important.

2.4.3 Future without-project scenario

The future without-project scenario in the flood- and erosion-affected projects villages for families who are so poor as to be unable to maintain their homestead platforms, will be a downward spiral of increasing poverty. As platforms gradually settle and are eroded away, flood damage costs — in terms of damaged and destroyed homestead assets, reduced homestead productive capability, and grain spoilage, and higher incidence of water-borne disease — will gradually increase, driving these families into absolute poverty.

In addition, without the project, the remaining remnants of natural and semi-natural terrestrial vegetation would likely be further degraded, with continuing negative consequences for ecosystem services and products, threatened species survival, and so on.

2.4.4 Rationale

The Project aims to break the cycle described above by raising and enlarging existing homesteads belonging to vulnerable families, and by restoring vegetative cover to dissipate wave energy and provide materials for erosion protection works, as well as for other purposes. These improved homestead lands and conditions would then provide a basis for income generation, water supply, and sanitation improvements that would help these families to become gradual net asset accumulators, thereby achieving a level of prosperity and self-reliance, including performing recurrent homestead platform maintenance with their own resources.

The Project would significantly enhance the tangible and intangible benefits flowing from that part of the landscape ('waste') not used for rice, homesteads, and infrastructure. The afforestation/habitat restoration activity is strongly linked to the proposed *NEMREP* project, and if possible during implementation of the two projects close liaison should be maintained.

Flood proofing as a strategy is an integral part of the FAP. The terms of reference for the *J Pilot Project* (FAP 23) call for *inter alia* 'protection or raising of homestead mounds, refuge areas, roads, water supply and other health-related facilities, and commercial and industrial premises, as well as the provision of additional bridges/culverts in roads' (FPCO, 1990).

The socioeconomic equity of Project impacts would be highly progressive. This distribution would be highly robust (easy to achieve and difficult to subvert). Richer people tend to have homesteads on higher lands, in most cases in the centre of the village or para. Also, typically they have been able to keep up with maintenance over the years. Poorer people's homesteads tend to be on lower and more wave-erosion vulnerable lands around the edges of the village or

para. This pattern is self-reinforcing in that people on higher lands benefit from less flood damage, better conditions for drying grain, and so on.

The cooperation of richer people with the Project is not expected to be a problem. The inability of poorer families to maintain their own homesteads constrains the improvement (raising, extending) of richer households' plots. Project assistance to poorer families, in effect allowing them to participate in upgrading the village earthwork as a whole, would indirectly benefit and thus be welcomed by richer families.

The sanitation, water supply, and income-generation activities are included to ensure the sustainability of the improved homestead platforms. Unless these benefits are realized efficiently and effectively, families inhabiting these homesteads will continue to require outside assistance for recurrent earthwork maintenance.

To ensure local accountability and people's participation, the Project would be implemented in the field by existing NGOs, selected and developed by the Executing Agency, working with village project implementation committees.

2.4.5 Risks

The Project could change people's expectations such that the expenditure on homestead maintenance and repair of private funds and effort would decrease. This would echo experience with some BWDB projects: 'in [some] cases, BWDB is blamed for not attending to the needs which people used to look after themselves' (*Local Initiatives and People's Participation in the Management of Water Resources*). Will people respond similarly to receiving public funds as wages, through NGOs, to repair and improve their own flood- and erosion- damaged homesteads? Careful monitoring by neutral observers, and the flexibility to adapt the Project if necessary, will be needed.

Project earthwork, undertaken on the region's most vulnerable homestead and village sites, could erode away rapidly. Continuing assistance to villages should be made contingent upon adequate subsequent maintenance and repair of upgraded platforms.

3. PROJECT DESCRIPTION

3.1 INTRODUCTION

This chapter presents the project goal and objectives; work breakdown structure; content; cost estimates; and phasing.

3.2 GOAL AND OBJECTIVES

The overall goal addressed by the Project is to improve liveability of rural settlements where the majority of the region's residents (66% in 2015) live.

The primary objectives addressed by the Project are:

- *Earthwork to improve homestead platforms*

  — Reduce homestead flood damage and improve homestead liveability and productivity by:

  . raising (by 1.5 m) 275,000 homesteads in 2,100 villages

  . raising (1.5 m) and enlarging (by 20%) 300,000 eroded homestead platforms in 2,300 villages.[3]

- *(Re)-establish strategic stands of swamp forest, reed swamp, and grass land habitats*

  Protect 2,300 existing and up to 150 newly created villages from wave erosion through re-establishing strategic vegetation stands to dissipate wave energy and provide sustainable harvests of materials used in the construction of indigenous erosion protection works; as a secondary benefit, create employment and sustainable income for villagers.

- *Settlement of new villages created from spoil by dredging/channel re-excavation projects*

  — On new village sites in the deeply flooded area (as many as 140, consisting of up to 18,000 homesteads on 430 ha) to be constructed from spoil by channel dredging and re-excavation projects listed in Table 3.1, establish socially, economically, institutionally, and environmentally sustainable communities composed of up to 100,000 people. Settlement of homeless families, in particular the most affected victims of flooding and wave erosion, would be a priority.

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[3]An additional 14,800 homesteads (114 villages) are to be raised and expanded, using channel re-excavation spoil under five FCDI projects studied by NERP. These villages are not linked to FEAVDEP, at least not as it is documented here.

Table 3.1: Construction of new homestead platforms and improvement of existing platforms under NERP dredging and channel re-excavation projects

DREDGING

Kushiyara Dredging	15.0 Mm^3
Baulai Dredging	5.0
Jadukata-Rakti River Improvement	2.3
Subtotal	22.3 Mm^3
Less 25% wastage	(5.6)
Less 20% for public land	(4.5)
Subtotal	12.3 Mm^3
New area (5 m platform height)	**245. ha**
New homesteads (0.02 ha each)	**12,265.**
New villages (130 h/s each)	**94.**

CHANNEL RE-EXCAVATION

Khowai River	2.4 Mm^3
Kangsha River	2.0
Surma-Kushiyara-Baulai	13.5
Kushiyara-Bijna	0.2
Narsingdi	0.4
Subtotal	18.5 Mm^3
Less 20% wastage	(3.7)
Subtotal	14.8 Mm^3
Less earth for existing village improvement (50% of total)	7.4 Mm^3
Earth for new villages (50% of total)	7.4 Mm^3
Less 20% for public land	(1.5)
Subtotal	5.9 Mm^3
Area (5 m platform height)	**118. ha**
New homesteads (0.02 ha each)	**5900.**
New villages (130 h/s each)	**45.**
TOTAL NEW HOMESTEADS (VILLAGES)	**18,165. (139)**

The secondary objectives addressed by the Project are:

- *Strengthen village level and non-governmental organizations in the flood- and erosion-prone villages of the region.*

  While achieving the primary objectives of the project through the agency of village people and NGOs, to develop village and NGO institutional strength through training and proper access to credit.

- *Village water supply and sanitation.*

  — Devise and support workable linkages between the NGOs involved in this project and ongoing DPHE/UNICEF water supply and sanitation programmes, which are to provide enough tube wells so that each services not more than 100 persons on average, and fixed latrines to all rural households.

  — Through the NGOs involved in the project, increase village-level awareness of the need to use tube well water for all domestic purposes, and of other hygienic behaviours necessary to minimize water-borne disease.

- *Enhanced homestead-based income generation in flood- and erosion-rehabilitated villages.*

  As homesteads are improved, increase homestead productivity; mainly by giving the NGOs working with the Project access to credit, training, technical support, and other means to develop their own effective income-generation projects geared to the expressed needs of village people.

3.3 WORK BREAKDOWN STRUCTURE

A work breakdown structure for the project is shown in Figure 6. The Project has five components. These are discussed below

3.4 CONTENT

3.4.1 Management

Overall control of project.

3.4.2 Pilot Project

In one or a few pilot villages in need of raising, expansion, and vegetation, plan, implement, monitor, and evaluate methodologies for social/labour mobilization, earthwork, and vegetation. These sites once established would be used as platforms for training of NGO staff being brought into the project.

The pilot project should involve about 25 villages — enough to be seen as having general relevance — within one or several unions within one thana. Pilot villages should have physical characteristics representative of villages of the deeply flooded area; accessible location; outside

flood control embankments (so that these are not seen as the reason for reduced flood or erosion damage); experiencing a medium amount of damage (to work in the most heavily damaged areas first may be too difficult); where there is some familiarity working with an NGO or other outsiders on development projects.

3.4.3 NGO Liaison/Training

Develop and maintain liaison with, select, mobilize, train, and administer the NGOs through which Project village-level activities will be implemented.

3.4.4 Regional Implementation

Plan, mobilize for, implement, monitor, and evaluate earthwork and vegetation works in the flood- and erosion-affected villages of the region.

The first step in planning regional implementation would be regional reconnaissance. The preliminary list of flood/erosion affected villages (Table 2.2 and Figure 2) would be reviewed. Preliminary field visits would be made to check with local people about wave erosion and recent flood heights, interest in participating, etc. A working list of target villages would be generated based on this information. The list would be developed to characterize, categorize, and prioritize areas and individual villages.

A simple management information system would be set up, using a software package suitable for gradual development and expansion. This information system would be developed further during the course of the project into a regional database on project villages including necessary information such as flood level, severity of wave erosion, socioeconomic profile, people's perceptions about problems and programmes, and so on.

The earthwork and vegetation programmes would be implemented in a phased and accelerating fashion, starting with a few villages in the initial construction season, increasing to over 500 villages per year by the third construction season. This will allow time for NGO/staff development and training.

In each village, detailed surveys will be required to determine how many homesteads need to be raised and how many need to be enlarged to repair prior damage, and to assess the socioeconomic setting; and organizational/motivational efforts will be needed to engage and involve the community as a whole.

For the vegetation programme, studies of wave erosion will be needed. In each village, the benefits and operation of the programme need to be explained; the community as a whole needs to be involved and supportive. Nursery beds based on village-level organizations would be developed to supply villagers with transplantable stock at no cost. Tree caretakers to look after trees for up to three years would be identified and trained.

3.4.5 Ancillary Activities

(a) Enhance potable water and sanitation in flood-erosion affected villages, in part by developing links to ongoing DPHE/UNICEF programmes. Undertake a social mobilization programme to enhance awareness of the need for clean drinking and domestic water and the use of sanitation facilities. Train 80% of households in installation of slab and ring latrines. Train 20% of households in construction of pit latrines.

(b) Provide technical assistance and credit facilities to NGOs working with the project to undertake income generating projects in Project villages.

(c) Establish sustainable communities on new village platforms to be constructed from spoil by channel dredging and re-excavation projects (Table 3.1). Before this is done, several preparatory steps would be undertaken:

- Establish general guidelines for selection and characteristics of new village sites, relating to current land use and ownership (e.g. on less valuable agricultural land), technical constraints (e.g. close to dredging activity), local socioeconomic situation (e.g. local demand for additional homestead land), local consultations, size (e.g. new villages should be similar in size/shape to nearby villages), and so on. Guidelines should be developed with input from both the dredging/re-excavation project and FEAVDEP.

- Establish institutional, legal, financial, and reporting/accountability arrangements necessary for FEAVDEP NGOs to have authority over new villages sites during the transitional period between spoil deposition and private ownership/self-government.

Then, for new village sites:

- Select new village sites in keeping with guidelines. This should include public consultation efforts in neighboring communities, undertaken by NGOs working with FEAVDEP.

- BWDB acquires any private land on which spoil will be disposed. Ultimate ownership of any homestead plots on government-owned (khas) land is an issue that will need to be resolved; evidently, ownership of khas land cannot be transferred to a private party, but long-term leases are possible.

- Undertake physical site preparation by dredging/re-excavation projects.

- Dredging and channel re-excavation projects deposit spoil on previously prepared sites.

- FEAVDEP NGO takes temporary control of site. During this period, public amenities (roads, public tube wells and latrines, etc.) and homestead boundaries are established, in consultation with local people and local government (union parishad).

- A certain percentage (perhaps 20 to 25%) of the homestead land should be sold on the open market to local people for their own use. Permanent title to the remaining land would be given on a subsidized basis to local homeless people, including a target percentage of women-headed households. All new residents should be from nearby settlements. Proceeds from the sale of homestead land would be used to cover expenses incurred in the development of public amenities, and to subsidize the development of the homesteads of previously homeless families.

- The NGOs would continue to stay involved to facilitate village development. This could include community organization, technical assistance and credit for housing, income generation, water supply/sanitation, and so on.

3.5 LINKAGES

As has been mentioned, Project activities have linkages to a number of other proposed and ongoing projects:

- Dredging/channel re-excavation projects (NERP potential initiatives):

  — *Baulai Dredging*
  — *Kushiyara Dredging*
  — *Jadukata-Rakti River Improvement Project*
  — *Khowai River*
  — *Kangsha River*
  — *Surma-Kushiyara-Baulai Basin*
  — *Kushiyara-Bijna*
  — *Narsingdi River*

- *Northeast Environmental Management, Research, and Education Project* (NEMREP) (NERP potential initiatives)

- DPHE/UNICEF sanitation and water supply projects.

Table 3.2: Capital costs

Earthwork to raise 575,500 homesteads in 4426 villages	US$ 107.9 million
Earthwork to enlarge 300,000 in 2300 villages	37.4 million
Vegetation for wave erosion protection in 2300 villages	8.2 million
Management and administration	4.6 million
TOTAL CAPITAL COSTS	US$ 158.1 million
Funds for revolving credit facility for income-generation programme	US$ 11.6 million

3.6 COST ESTIMATES

A breakdown of capital costs by component and by source (public/private) is shown in Table 3.2. Total capital costs are US$ 158.1 million. In addition, there will be a need to provide US$ 11.6 million for credit facilities to support a revolving loan fund for NGO income-generation programmes.

The Project is not expected to incur any recurrent public costs.

3.7 PHASING

Ten years are required to implement the project (Figure 7).

4. ORGANIZATION AND MANAGEMENT

4.1 ORGANIZATIONAL STRUCTURE

The Project will be implemented jointly by (Figure 8):

- Executing agency
- Implementing NGOs
- Village project implementation committees

Implementation through local government, rather than NGOs, was discussed. The main problems were the unreasonably large number of officials that would have to be involved and difficulties in achieving adequate accountability and transparency without creating unreasonable bureaucratic burdens for institutions whose capabilities and resources are already stretched.

Implementation through NGOs will however require developing and maintaining good relationships with local government.

4.1.1 Executing Agency

The Executing Agency would be contracted by the donor agency. It would consist of foreign and Bangladeshi consultants, including individuals contracted through one or more lead NGOs.

The central authority for NGO project approval and oversight rests with the NGO Bureau, which relies upon the Deputy Commissioner's Office in each district for implementation monitoring information and other input. NGO projects are to maintain contact with thana administrations for coordination purposes.

4.1.2 Implementing NGOs

Region-wide implementation of the Project at village level would be through existing or new NGOs, selected by the EA. Each selected NGO would work under a contract and terms of reference and be subject to regular monitoring by the EA. Project inputs to the NGO would include training and funds for implementation of project measures, plus access to credit facilities to allow NGOs to set up village-level credit schemes to support homestead-based income-generating activities.

4.1.3 Village project implementation committees

A project implementation committee would be organized in each village (VPIC). Its responsibilities would be to mobilize villagers and form labour groups for earthwork; negotiate with richer people to contribute earth from borrow pits; facilitate selection of sites for nursery beds and afforestation/habitat restoration; select tree caretakers; monitor/supervise Project activities; and maintain liaison with EA.

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4.1.4 People's participation

People's participation would be both through the VPIC, and directly in Project activities such as earthwork, afforestation/habitat restoration, sanitation, water supply, and income generation. Local people would be involved as planners, implementors, monitors, and beneficiaries of Project activities. Efforts to achieve full participation of women in all of these activities will be key to the success of the project, given that they have the greatest involvement with and dependence upon homestead resources.

5. IMPACTS AND MULTI-CRITERIA ANALYSIS

5.1 INTRODUCTION

The material presented in this chapter is required for all project studies prepared under the Flood Action Plan. Additional documentation on the Initial Environmental Evaluations is included in Annex B.

5.2 BIOPHYSICAL IMPACTS

The intent of project is to improve the human environment of homesteads of the region, by rehabilitating eroded homesteads; building new homestead areas; flood-proofing (raising) flood-prone homesteads; providing, to homesteads vulnerable to wave erosion, protective vegetation and a sustainable harvest of biomass materials used for traditional protective works; and improving rural domestic water supply and sanitation. Thus, the principal biophysical impacts of the project are expected to be highly beneficial.

Localized adverse impacts are possible, however, given that micro-scale land use changes will be necessary with the conversion of current land uses to homestead land and to protective/harvestable biomass vegetation. As part of the local village-level planning process, these impacts should be identified and managed acceptably (mitigation, compensation, monitoring, and so on).

5.3 SOCIAL IMPACTS

Again, the intent of this project is to improve the environment for the benefit and largely through the agency of local people.

The socioeconomic and gender equity of impacts will be an important issue which should be carefully examined as interventions are planned and implemented. With regard to rehabilitation of eroded homesteads and flood-proofing, however, previous field investigations suggest that Project activities have a certain degree of progressive socioeconomic equity 'built in', in that families most affected by erosion and flooding tend to be poorer than those less affected. This may reflect the ability of richer families to purchase less vulnerable and therefore more costly land; or a natural tendency for families with less vulnerable homestead plots to accumulate and/or retain wealth more readily than those on more vulnerable sites.

It should be noted, however, that the Project bypasses those of the very poorest who are not 'landless' in the conventional sense of owning less than 0.2 ha of cultivable land, but also 'homestead-less', living either on homestead land owned by others or squatting on public or private land.

Socioeconomic and gender equity in the settlement of newly built homesteads, and in the rural domestic water supply and sanitation programme, will have to be designed into the methodology whereby these assets and services are allocated to families.

5.4 COST/BENEFIT CONSIDERATIONS

It has been argued (mainly in Section 2.4, Rationale) that the objectives to be achieved by this project are necessary, desirable, and of high priority. To achieve these objectives, technical options were evaluated and chosen based, in part, on cost-effectiveness. Thus, the project is intended to achieve certain tangible and intangible benefits of importance to the region at the lowest cost, given the biophysical, social, and technical constraints.

The tangible benefits which have been costed consist of homestead flood damage avoided (Figure 9); grain spoilage avoided (Figure 10). There are, in addition, tangible benefits which have not been costed here: increased homestead income generation and increased production of biomass products from afforested/restored areas.

Intangible benefits would include improved sanitation, water supply, public health and safety, and lower investment risk.

5.5 SUSTAINABILITY CONSIDERATIONS

Again, the intent of the project is to improve overall system sustainability, by slowing the marginalization of flood- and erosion-prone families; reducing the numbers of rural people experiencing rural-to-urban migration resulting from accumulated flood and erosion losses; improving rural health and receptivity to reduce birth rates by reducing the incidence of water-borne disease and the associated infant and child mortality; and improving the biodiversity and productivity of village's biological environment.

It is recognized that the current rate of population growth and the accompanying increase in poverty are a major obstacle to sustainable development. It is assumed that population control and poverty alleviation, two priority activities of GOB, would proceed simultaneously. The project would succeed over the long term, if population growth could be brought to a level such that there would be no attempt to occupy more and more hazardous land.

Social sustainability: The planning and implementation of interventions by the Executing Agency, NGOs, and local people in partnership is thought to address social sustainability aspects of the implementation itself. In the longer term, assisting people (i.e. paying them) to raise/enlarge their own homesteads is a sustainable approach only if it provides a basis for them to improve their economic condition enough to allow them to undertake necessary recurrent maintenance themselves.

Biophysical sustainability: The project will enhance the biophysical sustainability of natural/semi-natural vegetation. The earthwork input is not biophysically sustainable in itself (platforms will continue to settle and erode away); the intention is for earthwork in combination with the other development interventions to create a situation in which people can undertake adequate recurrent

Table 5.1: **Multi-criteria analysis**

Quantitative Impacts	
Number of homesteads raised and enlarged	300,000
Number of homesteads raised only	275,000
Number of villages benefitting from restored vegetation	2,000
Persons settled on new FCDI-built village platforms (number)	$\leq$ 100,000
Homestead flood damage averted (net present value, US$ millions)	42.7
Boro paddy spoilage averted (net present value, US$ millions)	11.0
Qualitative Impacts (ranked from -5 ...0... +5)	
Impact	**Rank**
Strengthen village-level institutions	+5
Rural water supply and sanitation	+5
Enhanced rural homestead-based income generation	+5
Regional biodiversity and openwater fisheries habitat	+5
Socioeconomic equity	+5
Gender equity	+5
Potential negative localized impacts associated with land use changes in the creation of new homestead land and new vegetation for erosion protection/ materials harvest	-1

See also discussion in text

maintenance with their own resources.

Financial sustainability: The intent is that at the end of the Project there would be no need for further recurrent or capital investment for earthwork or afforestation in any of the Project villages.

5.6 MULTI-CRITERIA ANALYSIS

The multi-criteria analysis of the Project is shown in Table 5.1. The Project is very attractive from this perspective. The main concerns relate not to Project impacts, but to the outstanding issues summarized in Chapter 6.

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6. OUTSTANDING ISSUES

6.1 PACKAGING

As mentioned in Section 1.1.1, the Project consists of several distinct measures. Whether a single project is the best packaging for these, and in particular whether the settlement activity should not be included in the various FCDI projects that will create new village platforms, deserves additional thought and discussion.

6.2 RISKS

The risks mentioned in Section 2.4.5 — creating dependency and erosion/settlement of physical works if ongoing (private) maintenance is inadequate, or the severity of flooding/erosion increases — require further investigation and evaluation.

6.3 COSTS AND SCALE

This Project is one of the largest, in terms of cost, in the Regional Plan portfolio; has a very large project area; and intends to work closely with villagers in a large number of communities. Clearly, full implementation would be a massive undertaking. As has been recognized here with the inclusion of a Pilot Project in the Work Breakdown Structure, it will be important to phase implementation carefully to allow for methodologies, staff capabilities, and experience with outcomes to develop.

6.4 INSTITUTIONS

As mentioned in Section 4.1.1, the Project would be implemented at field level by NGOs. We believe this is feasible and is the best approach, but NGO operations on this scale will not be easy. Also, cooperation with and support of local government will be very important.

6.5 POPULATION GROWTH

Population growth will continue to force people onto more and more hazardous land and exert pressure on individuals to exploit the planted vegetation of its immediate utility. The individuals targeted by the project at present would benefit, but the number requiring similar projects will continue to grow. Ancillary activities need to be explored to control population.

REFERENCES

Flood Plan Coordination Organization, 1990: Terms of reference - Flood Proofing Pilot Project.

Gittinger, J. Price, 1982: Economic analysis of agricultural projects. Johns Hopkins University Press, Baltimore. 505 pp.

ISPAN, 1992: Issues report, FAP 23 Flood Proofing Study. December, revised draft. 65 pp. + 5 appendices.

Planning Commission, 1990: Fourth Five Year Plan 1990-95. June.

ANNEX A

FIGURES

Figure 3A: One line unit
Plan

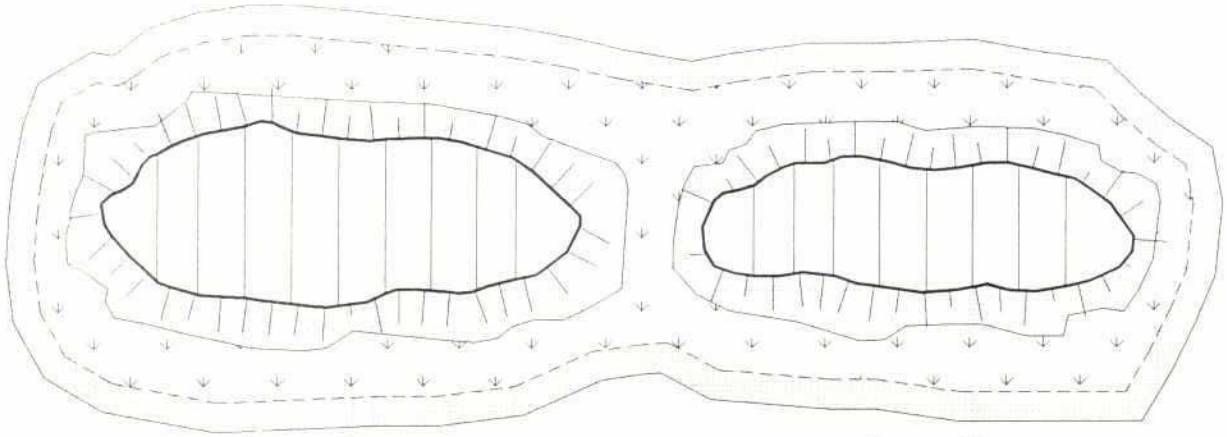


Figure 3B: Cluster unit
Plan

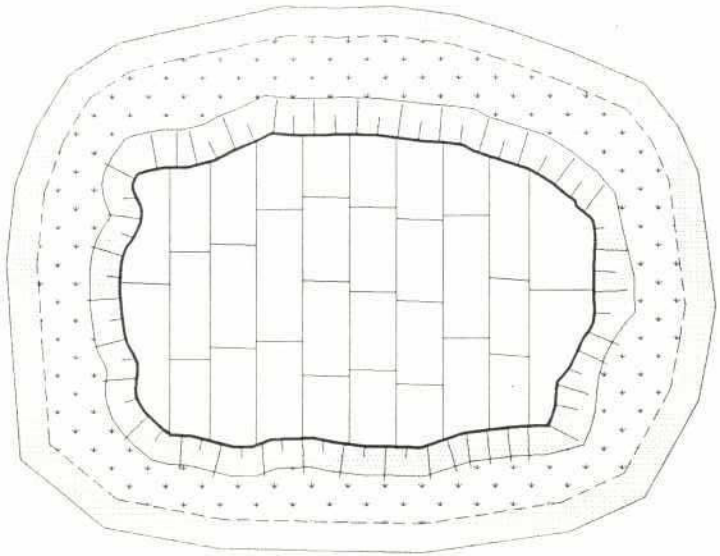
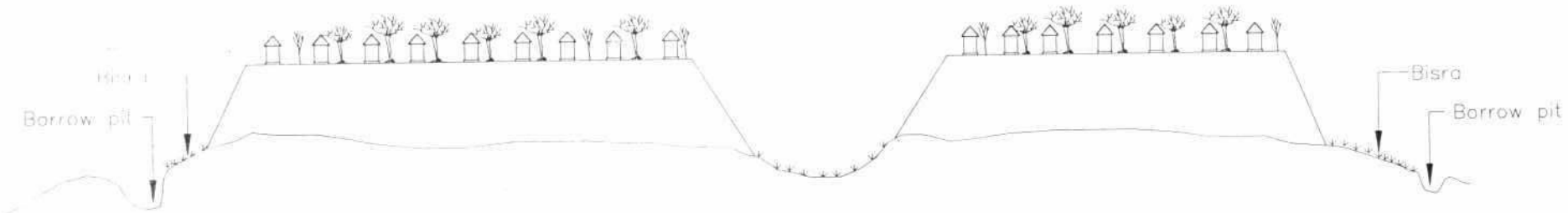
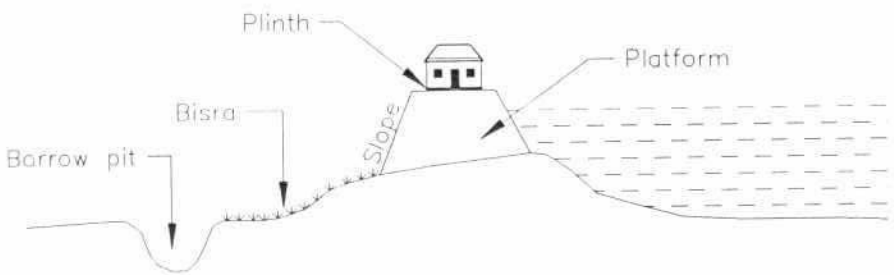


Figure 4: One line unit



Lengthwise section



Cross section

Figure 5: Idealized Homestead Layout

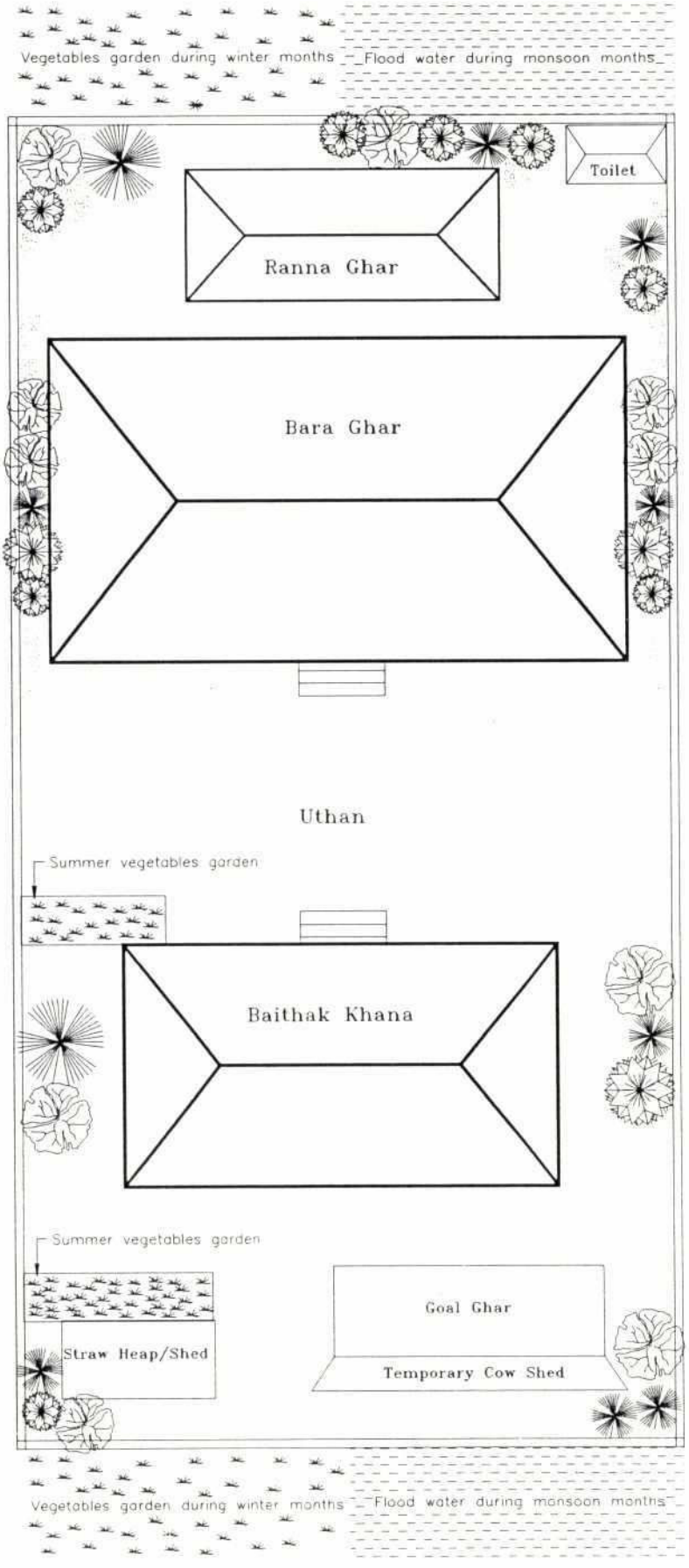


Figure 6: Work breakdown structure

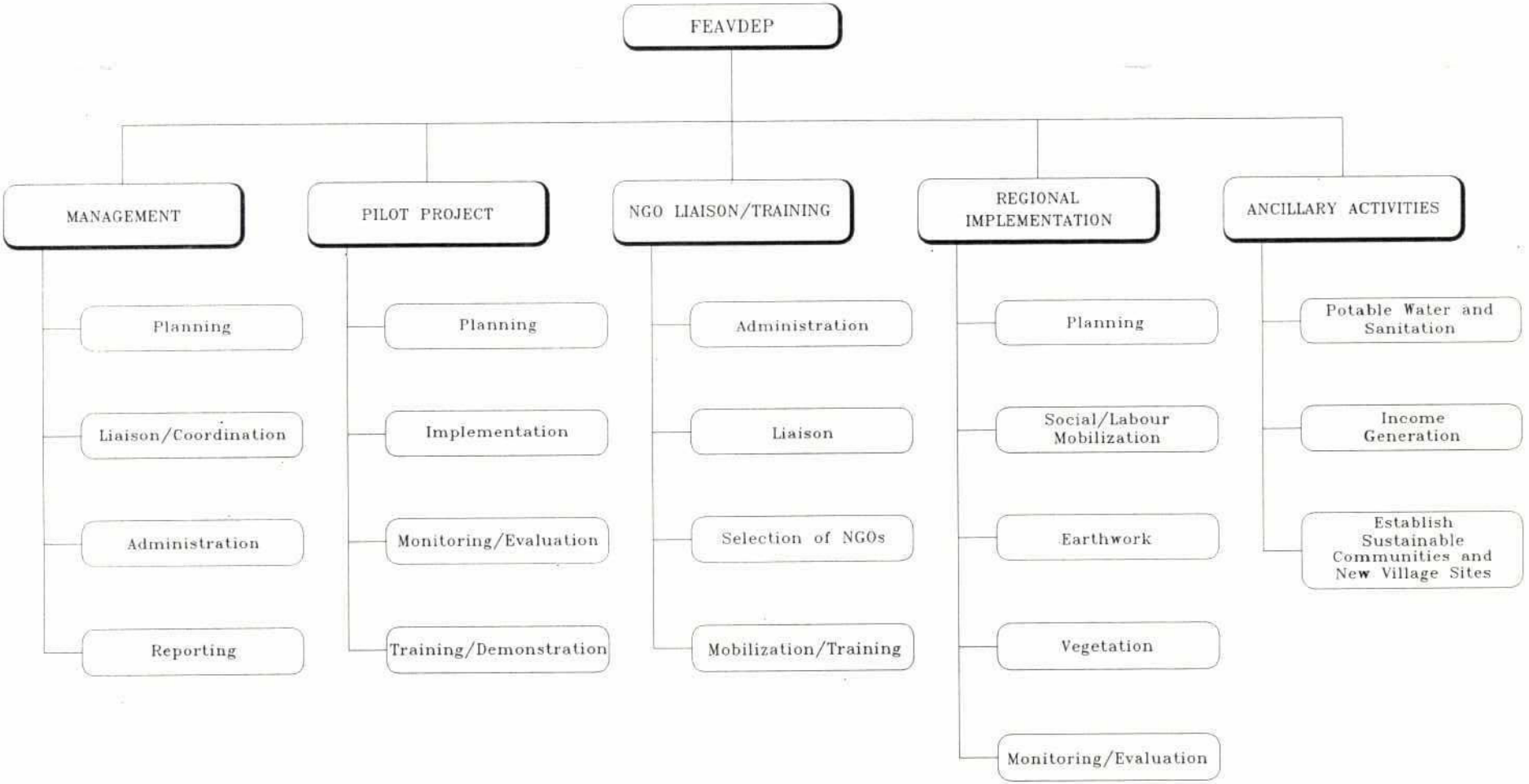


Figure 7: Phasing

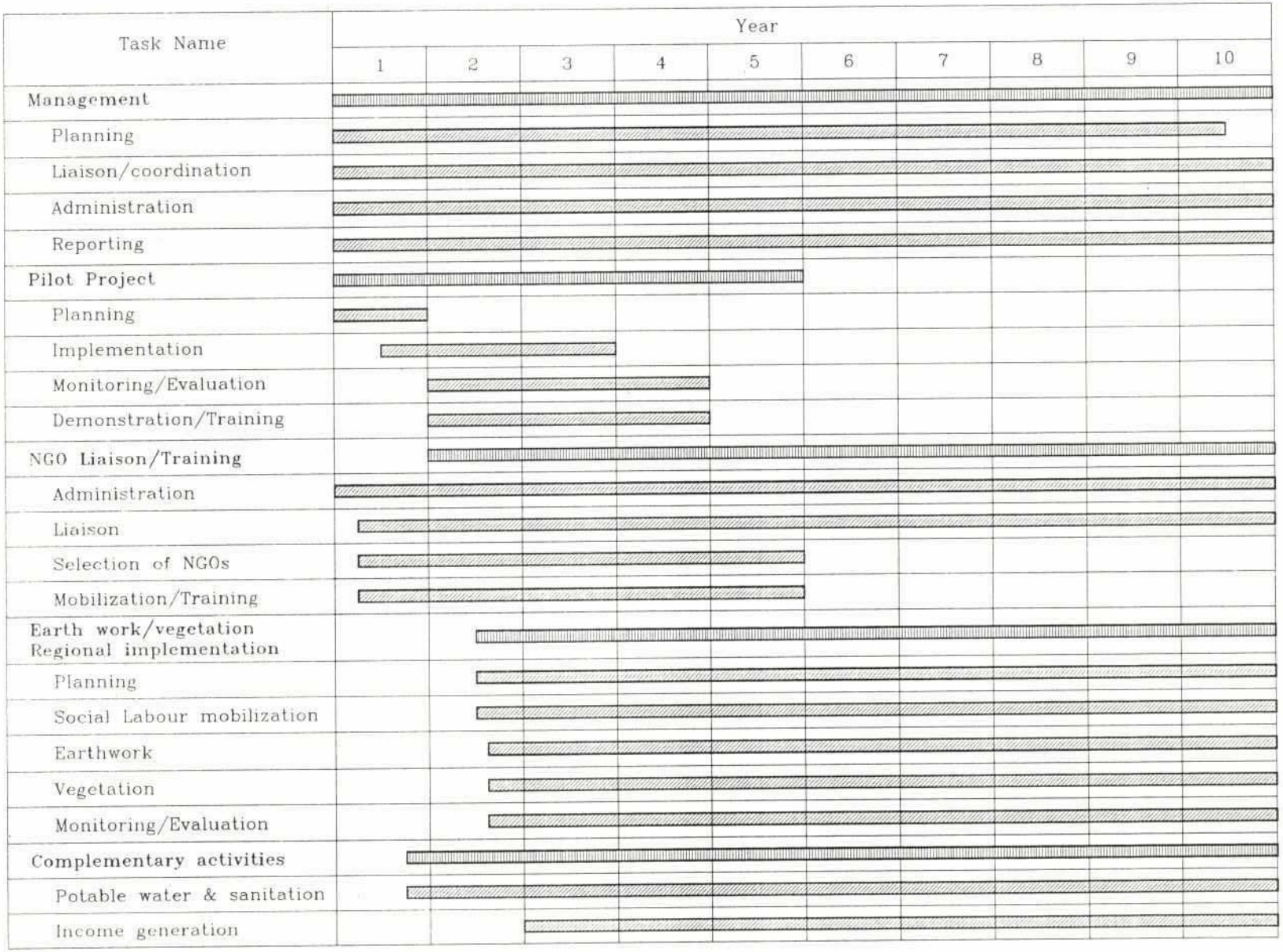
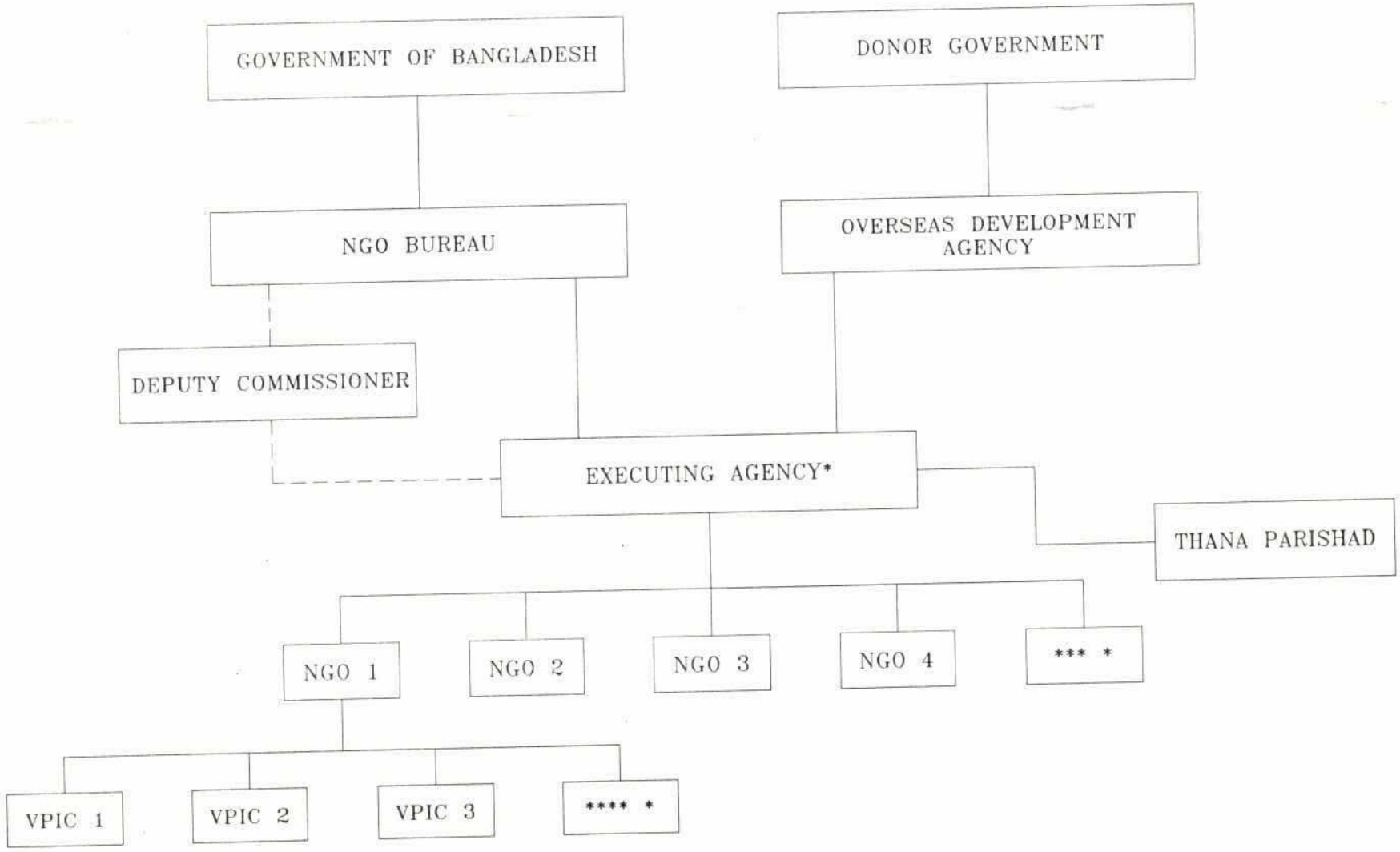


Figure 8: Organizational Structure



* Lead NGO plus local/expartriate exparts.

FIGURE 9: FLOODPROOFING

Flood damage benefit of raising 4500 flood-prone villages by 1.5 m

Return period (yr)	*Freq (non-exceedance)*	*Households affected (%)*	*Damage value (Tk/hh)*	*Total damage (US$M)*	*Annualized tot dmg (US$M)*
	0.00			0.00	
1:2	0.50	0.25	1400.00	5.12	1.28
1:5	0.80	0.60	1600.00	14.04	2.87
1:10	0.90	1.00	2200.00	32.18	2.31
1:100	0.99	1.00	4200.00	61.43	4.21
				TOTAL:	10.68

Year	*Adjusted annualized flood damage* (US$M)*	*Net present value (US$M)*
0	10.68	42.65
1	9.99	
2	9.24	
3	8.41	
4	7.49	
5	6.49	
6	5.40	
7	4.21	
8	2.92	
9	1.52	

*Reflects (1) relaxation of platform by 15cm per year (i.e. no maintenance case) and (2) 4% annual growth in flood damage value

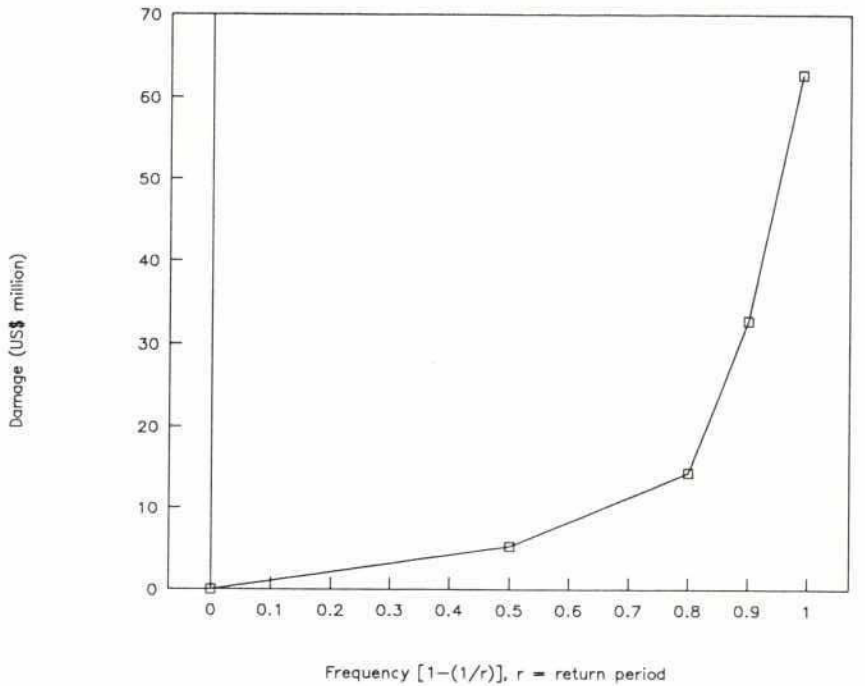


FIGURE 10: GRAIN DRYING

0.84 MT, total boro harvest value for the 4500 flood-proofed villages

Return period (yr)	*Freq (non-exceedance)*	*Harvest affected (%)*	*Damage value (Million Tk)*	*(US$M)*	*Annualized tot dmg (US$M)*
	0.00			0.00	
1:2	0.50	2%	84.00	2.10	0.53
1:5	0.80	5%	189.00	4.73	1.02
1:10	0.90	6%	252.00	6.30	0.55
1:100	0.99	8%	336.00	8.40	0.66
				TOTAL:	2.76

Year	*Adjusted annualized benefit* (US$M)*	*Net present value (US$M)*
0	2.76	11.03
1	2.58	
2	2.39	
3	2.17	
4	1.94	
5	1.68	
6	1.40	
7	1.09	
8	0.76	
9	0.39	

*Reflects (1) relaxation of platform by 15cm per year (i.e. no maintenance case) and (2) 4% annual growth in boro harvest value

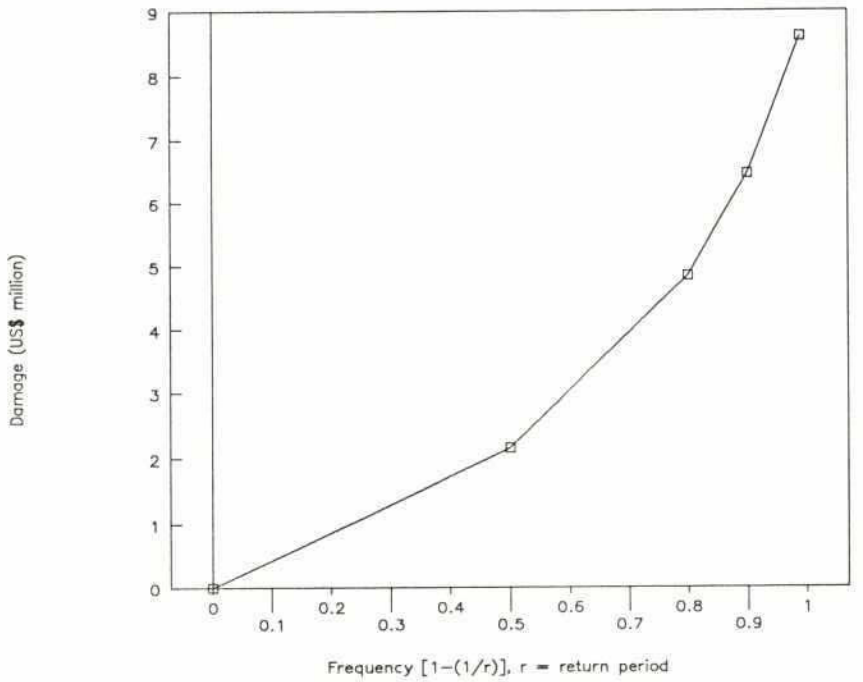


Figure 1

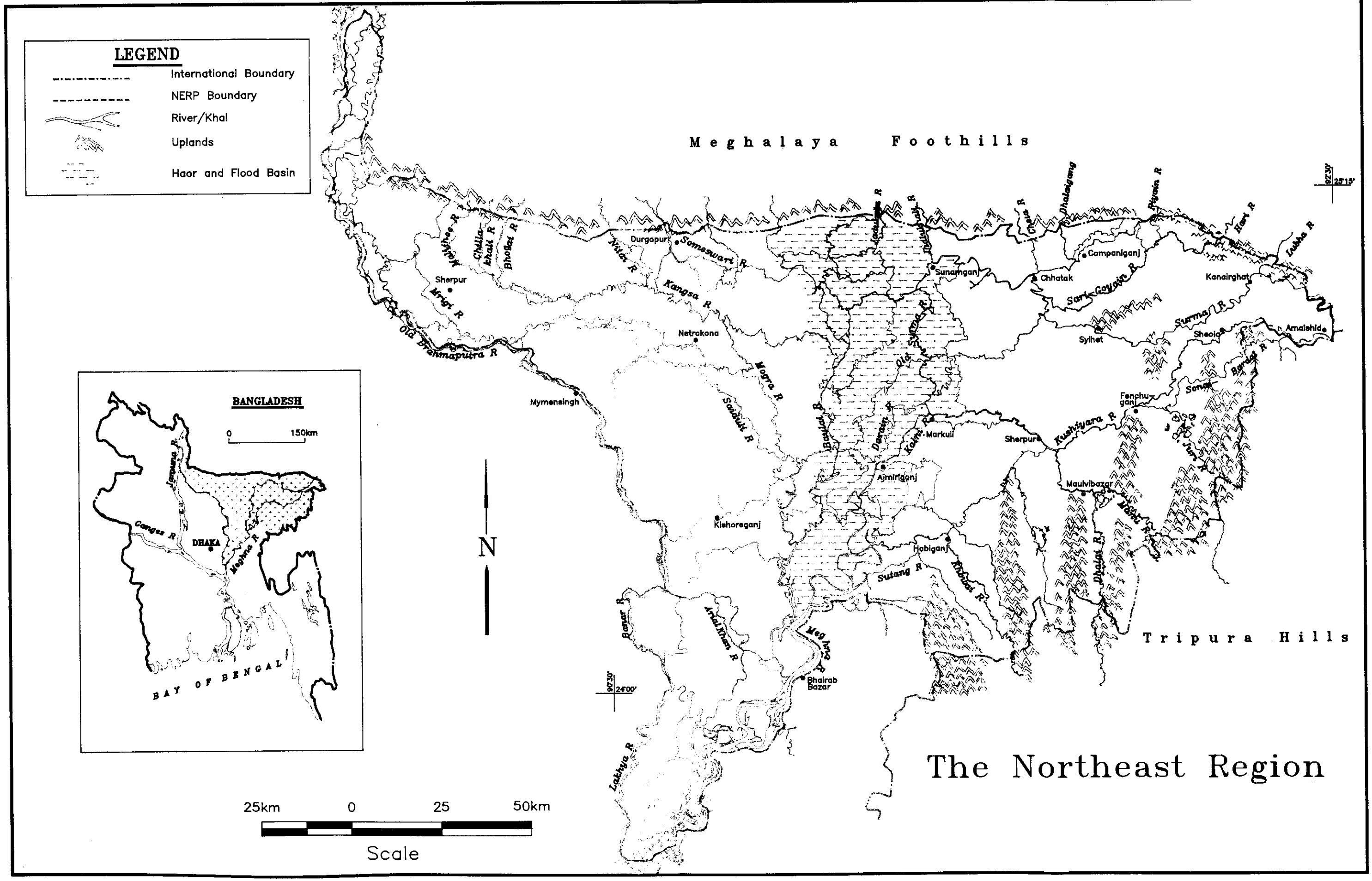
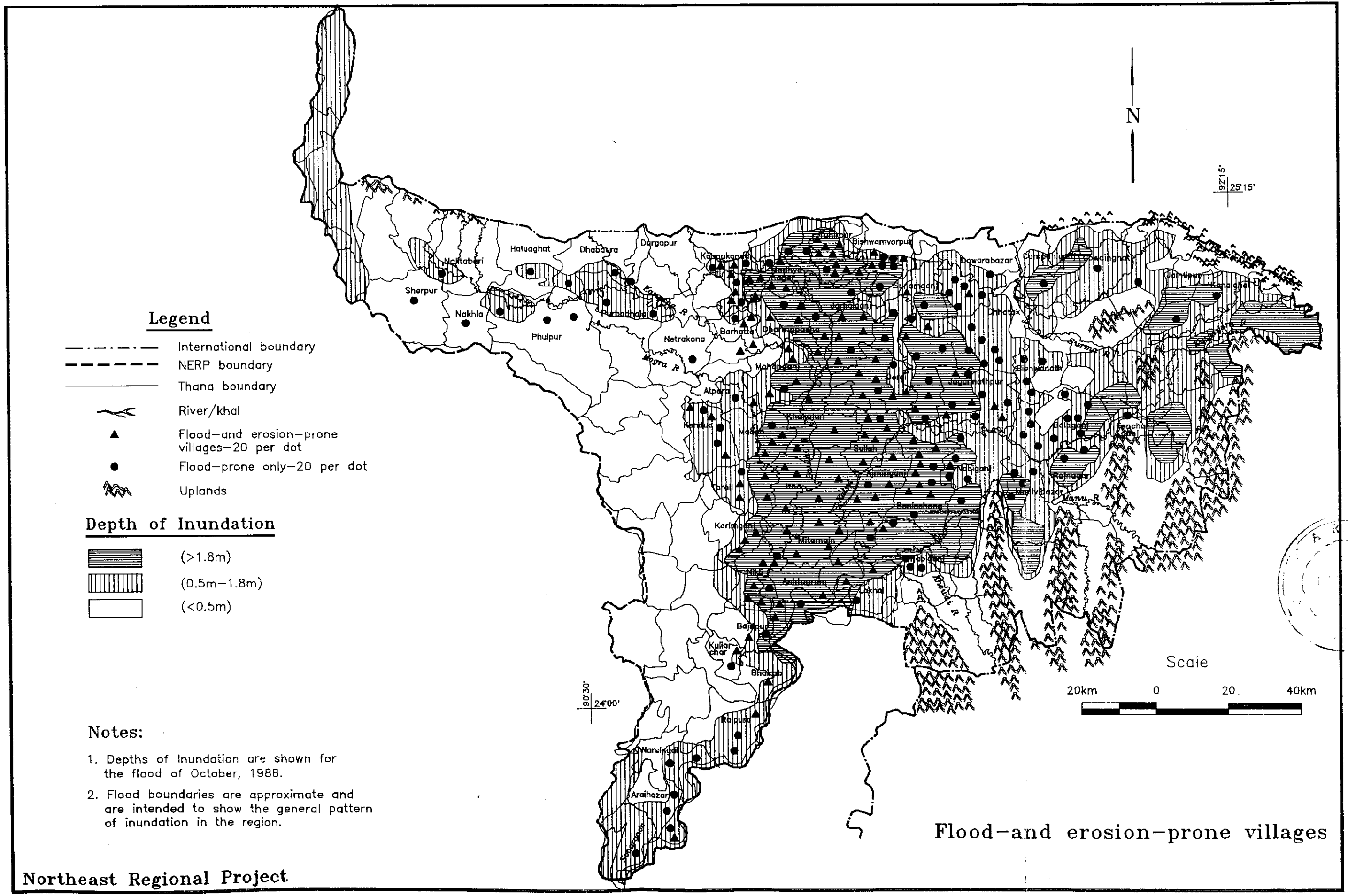

LEGEND
International Boundary
NERP Boundary
River/Khal
Uplands
Haor and Flood Basin
BANGLADESH
0 150km
Jamuna R
Ganges R
DHAKA
Meghna R
BAY OF BENGAL
Meghalaya Foothills
Durgapur
Someswari R
Kitta R
Sherpur
Mrigi R
Old Brahmaputra R
Netrokona
Kangsa R
Mymensingh
Sutia R
Jadukata R
Dhalai R
Dhaleswari R
Piyain R
Harl R
Lubha R
Sunamganj
Chhatak
Companiganj
Kanairghat
Sari Gowain R
Surma R
Sylhet
Sheola
Amalshid
Fenchuganj
Sonai
Barak R
Dorain R
Kalma R
Markuli
Sherpur
Kushiyara R
Ajmiriganj
Maulvibazar
Juri
Kishoreganj
Habiganj
Sutang R
Khowai R
Dhalai R
Tripura Hills
Barner R
Arial Khan R
Meghna R
Bhairab Bazar
Lathipa R
92°30'
25°15'
90°30'
24°00'
N
25km 0 25 50km
Scale
The Northeast Region

Figure 2


N
92°15'
25°15'
Legend
International boundary
NERP boundary
Thana boundary
River/khal
Flood-and erosion-prone villages-20 per dot
Flood-prone only-20 per dot
Uplands
Depth of Inundation
(>1.8m)
(0.5m-1.8m)
(<0.5m)
Notes:
1. Depths of Inundation are shown for the flood of October, 1988.
2. Flood boundaries are approximate and are intended to show the general pattern of inundation in the region.
Sherpur
Nakhla
Nalitabari
Hatuaghat
Dhabaura
Durgapur
Phulpur
Purbadhala
Netrakona
Barhatta
Mohanganj
Atpara
Kendua
Madan
Kalmakanda
Kishoreganj
Bishwamvarpur
Dowarabazar
Jamalganj
Sunamganj
Jagannathpur
Dharmapasha
Khaliajuri
Sulla
Jaintiapur
Gowainghat
Kanaighat
Beanibazar
Golapganj
Fenchuganj
Balaganj
Companiganj
Karimganj
Nikli
Bajitpur
Kuliarchar
Bhairab
Raipura
Narsingdi
Araihazar
Scale
20km 0 20 40km
90°30'
24°00'
Flood-and erosion-prone villages
Northeast Regional Project

ANNEX B

INITIAL ENVIRONMENTAL EXAMINATION

ANNEX B: INITIAL ENVIRONMENTAL EXAMINATION

B.1 Introduction

This Initial Environmental Examination (IEE) (pre-feasibility level Environmental Impact Assessment or EIA) follows the steps specified in the *Bangladesh Flood Action Plan Guidelines for Environmental Impact Assessment* (ISPAN, 1992). These steps are illustrated in Figure 2 of ISPAN (1992).

Much of the information required for the IEE/EIA appears in the main body of the study. The section and chapter references given below cite this information.

B.2 Proposed Project

B.2.1 Project Design and Description (Step 1)

As described in Chapter 3, Project Description.

B.2.2 Environmental Baseline Description (Step 2)

As described in Section 2.2; in the *Northeast Regional Water Management Plan*; and in the other NERP reports (see list, pp. ii and iii).

B.2.3 Scoping (Step 3)

Technical:

Literature review: As described in Section 2.1.

Local community: As described in Sections 2.3 and 4.1.

B.2.4 Bounding (Step 4)

Physical:

Project area: Northeast Region.
Impacted area: Adverse impacts would be localized within and near villages where earthwork would be performed and/or new vegetation established.

Temporal:

Project duration: As described in Section 3.7, Phasing.

Cumulative impacts:

With other development projects and processes: Intent of project is to improve the human environment of homestead areas. No adverse cumulative impacts are foreseen.

B.2.5 Field Investigations (Step 5)

Field investigations are described in Section 3.4.

B.2.6 Impact Assessment (Step 6)

Homestead expansion and vegetation restoration activities: Land use changes will occur as new homestead land is created and new vegetation is established. Planning and implementation in the pilot villages should include systematic review to identify and properly manage any adverse impacts, and to identify, design, and test any environmental management measures that would be needed for regional implementation.

Rural domestic water supply and sanitation: No adverse impacts are expected. Achievement of acceptable socioeconomic and gender equity of benefits should be monitored.

B.2.7 Quantify and Value Impacts (Step 7)

Adverse impacts will become quantifiable as specific plans for intervention are developed. All such impacts are expected to be localized, minor, and manageable.

B.2.8 Environmental Management Plan (Step 8)

Mitigation and enhancement. Measures should be incorporated as/when needed.

Compensation. Measures should be incorporated as/when needed.

Monitoring. Monitoring would be carried out by the Village Project Implementation Committees, supported and supervised by the NGOs and Executing Agency

People's participation. People's participation is an integral part of the design and implementation of the project.

Disaster management (contingency planning). Not relevant.

EMP institutionalization. Executing Agency, which will continue to exist until project activities are completed; no post-completion impacts are expected.

Residual impact description. Pilot project documents should include a discussion of this.

Reporting and accountability framework. EMP reporting/accountability should be integrated into EA reporting/accountability to other elements of organizational structure.

Budget estimates. The environmental management costs involved should be minimal and can be estimated as part of budgets for pilot project and for regional implementation.