

THE PEOPLE'S REPUBLIC OF BANGLADESH

**PREPARATORY SURVEY
ON
COOPERATION PROGRAM FOR
THE DISASTER MANAGEMENT
IN
BANGLADESH**

**FINAL REPORT
SUMMARY**

JULY 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI CO., LTD.

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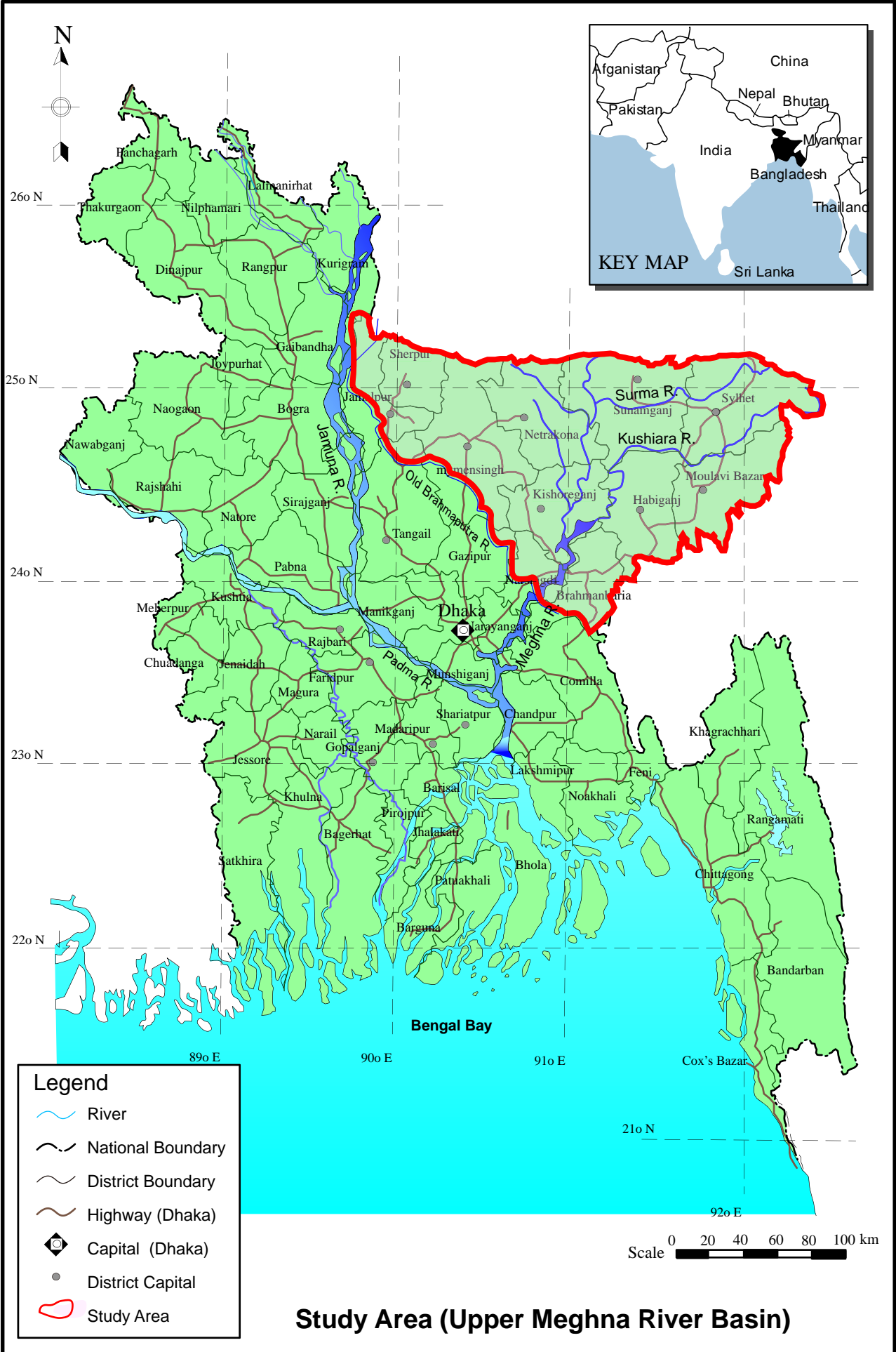
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(As of October 2011)



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Table of Contents

	<u>Page</u>
I. Introduction	S-1
II. Current Conditions of the Upper Meghna Area	S-1
III. Prevailing Problems and Issues on Disaster Management in the Upper Meghna Area	S-2
IV. Measures for Disaster Management in the Upper Meghna Area	S-5
V. Potential Projects Identified for Realization of the Disaster Management Measures	S-5
VI. Goal of JICA Cooperation Program for Disaster Management	S-7
VII. Selection of Candidate Projects and Preliminary Design.....	S-8
VIII. JICA Cooperation Program for Disaster Management	S-19
IX. Recommendations	S-24

Summary

I. Introduction

- 1.1 The objectives of the Preparatory Survey on Cooperation Program for the Disaster Management in Bangladesh (hereinafter referred to as the Study) are:
- (1) To clarify policies and issues on flood measures and water resources management in the Upper Meghna River basin (hereinafter referred to as the Upper Meghna area),
 - (2) To prepare measures for the management of the Upper Meghna area (not limited to JICA cooperation), and
 - (3) To formulate a JICA cooperation program for comprehensive river basin management and capacity development of communities for flood disaster prevention.
- 1.2 The study area covers the Upper Meghna area in the northeastern region of Bangladesh, as shown in the location map in the opening page.
- 1.3 This Final Report describes all the findings and results of the Study, which includes the first to third field works conducted in Bangladesh during the period from September 2011 to May 2012.

II. Current Conditions of the Upper Meghna Area

- 2.1 Recently, rice production in the Upper Meghna area contributed about 15% of the total national production in Bangladesh. However, rice production has frequently been affected by floods, and serious flood damage has made significant negative impact to national food security.
- 2.2 Every year, the Upper Meghna area has vast haors (very large lakes which result from flood inundation) during the monsoon season (from mid-May to October), and majority of the haor areas are dependent on a single cropping of boro rice, the harvesting season of which generally extends from mid-April to mid-May. Once the boro rice is damaged by floods, particularly by flash floods, harvesting in the pre-monsoon season (April to mid-May) will not happen, forcing the farmers to succumb into severe poverty for a year since they lose their food and major source of income. During the succeeding rainy months, farmers will be limited to fishing activities to sustain their lives.
- 2.3 The damage brought about by flash floods to the boro rice fields in the pre-monsoon season was tremendous in three districts of Sunamganj, Netorakona, and Kishoreganj. Consequently, these districts are more severely deep in poverty compared to other districts in the Upper Meghna area.
- 2.4 Although the Government of Bangladesh (hereinafter referred to as the GOB), other donors and NGOs have implemented aid projects in the Upper Meghna area so far, the current state of project aid implementation seems to be within the bounds of piecemeal

measures.

III. Prevailing Problems and Issues on Disaster Management in the Upper Meghna Area

It has been found, through the comprehensive survey in the Upper Meghna area, that the following seven problems and issues on disaster management are prevailing in the area:

(1) Flash Flood Onslaught

Flash floods generally occur in two seasons: pre-monsoon and monsoon. Flash flood in the pre-monsoon season (April to mid-May) is a major concern due to its effect to crop production/harvest but that in the monsoon season (mid-May to October) is not considerably important since no crops are planted.

The occurrence of flash floods in the pre-monsoon season damages boro rice (single crop) and other cereals in the area. This is considered one of the major disasters in the area, which affects the primary production sector (e.g., agriculture and fisheries) and thus, threatens the lives and livelihood of the people (mostly farmers). In recent years, extraordinary flash floods occurred roughly every two to three years in the pre-monsoon season. For example, the 2004 flash flood, which was a ten-year flood in the pre-monsoon season, caused damage to about 43% and 21% of boro rice harvests in the Sylhet and Kishoreganj regions of the Upper Meghna area, respectively. In addition, the 2010 flash flood damaged 14% of boro rice harvest in the Kishoreganj region.

If flash floods continue to damage the production of boro rice, people will remain in a stressful condition until the next year's harvest. Also, many farmers will be forced to sell their livestock because of fodder shortage.

(2) Drainage Congestion in Rivers and Channels

Drainage congestion is a major concern in the Upper Meghna area. Drainage is mainly very important during the month of December since it is the planting time for boro rice. The usual time for planting boro is every mid-December. However, due to congestion or delayed drainage in rivers and channels, plantation of boro rice is always delayed. As a result, its harvesting is also delayed, which increases the risk of pre-monsoon flash flood.

(3) Riverbank Erosion

Riverbank erosion is significant in such middle scale rivers as the Manu, Dharai, and Khoai Rivers, as well as in major rivers such as the Surma and the Kushiya Rivers. These resulted to washout of houses, cultivated lands, and other properties owned by the people residing along the rivers.

(4) Sedimentation in Rivers, Haors, and Other Water Bodies

Sedimentation is a concern in the area because it plays a governing role in the morphology of rivers, i.e., the change in the river channels and flood plains. Furthermore, sedimentation in river channels has induced incomplete drainage, frequent overtopping of floods from rivers, and aggravation of riverbank erosion in the upstream reaches. Besides, sedimentation in some haor areas has resulted in negative impacts on fisheries and decrease in the flood-retarding capacity in the areas.

(5) Lack of Sufficient Operation and Maintenance for Project Facilities

The Bangladesh Water Development Board (BWDB) under the Ministry of Water Resources (MoWR) is the government organization mandated to operate and manage project facilities in the area. It is reported that BWDB has implemented 118 water development projects in haor areas so far. Most of the projects were constructed some 10-20 years back. Due to repeated occurrence of natural calamities (flood, river erosion, etc.) and lack of proper maintenance, many of the projects did not achieve the desired benefits.

Major reasons for the poor performance of projects are described below.

- **Unavailability of Adequate Funds for O&M:** Inadequate fund is the main cause of poor maintenance of projects; as a result, desired benefits were not achieved. As referred to in the table below, the amounts of operation and maintenance (O&M) fund actually allotted to BWDB for the past two fiscal years were less than 20% of the BWDB total requested amount.

(Change of BWDB's O&M Fund)

(Unit : Crore)

Fiscal year	Requested (a)	Allotted (b)	(b)/(a) (%)
2008/2009	529	305	58
2009/2010	846	402	48
2010/2011	1,799	305	17
2011/20112	2,135	316	15

Source: Interview survey by JICA Study Team

In emergency cases, O&M funds are diverted and replenishment is not made. As a result, the original activities/works listed under the O&M lost the opportunity to be funded or implemented. This has a cumulative effect on the performance of the existing projects. Timely release of fund is another issue which needs much attention. In addition, due to complex financial procedures, delay in the release of fund is a very common phenomenon.

- **Inadequate Staff:** Due to serious shortage of professionals, particularly skilled technical staff, supervision and monitoring of both project implementation and O&M routine works have suffered badly. The total manpower of BWDB was 24,368 when it was organized in 1972. However, the manpower was reduced to 5,284 (as of June 2011). BWDB prepared the

Need-based Manpower Setup, 2009 and submitted it to the Ministry of Finance (MOF) through MoWR in October 2009. The proposed setup has not been approved yet by the GOB. The total manpower in the proposed setup was 13,594.

- **Lack of Other Resources:** Lack of logistics like transport (motor vehicles/speed boats) is a serious problem. Without adequate number and good condition of vehicles, supervision work suffers and quality cannot be ensured. Also, BWDB does not have sufficient numbers of computers. As such, monitoring process is also delayed.

(6) Erosion due to Wave Action Induced on Haor Water Surface

The villages in the haors are formed on earthen mounds or man-made platforms to keep their houses and cultivated land above the water level during the monsoon season, which lasts for about five months (mid-May to October) in a year.

The mounds and platforms have been threatened by repeated erosion due to wave action induced on the haor water surface by winds. Although bamboo and *tarja* (local grass) fencing are used by the people for mound/platform protection from wave action, the protection works often proved ineffective. Therefore, the mounds/platforms remain exposed to erosion for about five months (the monsoon season), resulting sometimes in washout destroying houses, cultivated land, etc.



Revetment works provided by the people using bamboo and grass to protect their mound from wave action and erosion in haors (Khaliajuri, Netrokona)

(7) Institutional Problem

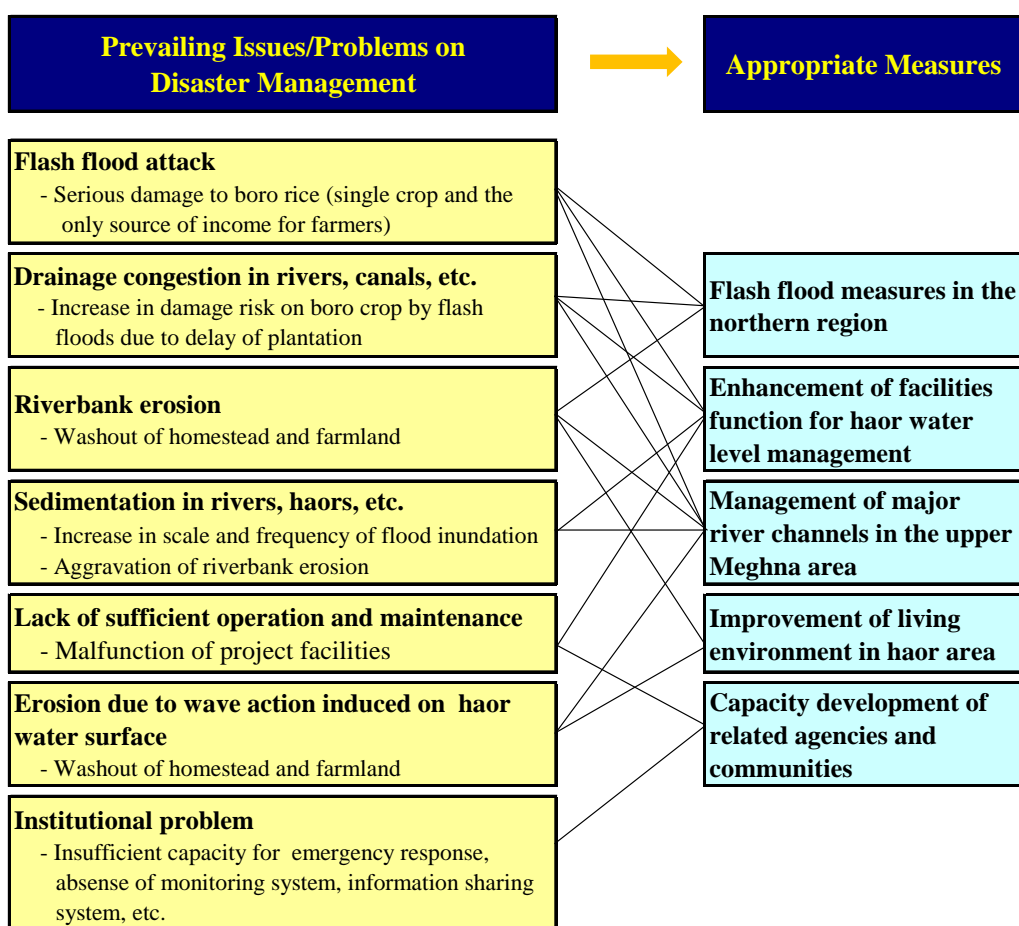
The following problems, which have resulted in unsatisfied disaster management and poor emergency response during flood events, are recognized in BWDB:

- Incomplete sharing of information about existing project facilities among the central and local offices due to absence of proper inventory management,

- Inadequate institutional arrangements for monitoring and assessment by the central office about the quality control and fund management of the projects handled by the local offices,
- Complicated approval process.

IV. Measures for Disaster Management in the Upper Meghna Area

Referring to the national development policies and plans of Bangladesh, and the strategies and recommendations made in the Haor Master Plan (2012), the Study introduced five measures, as presented in Figure 4.1, to address the seven problems and issues on disaster management which are currently prevailing in the Upper Meghna area as discussed in Chapter III,



Source: JICA Study Team

Figure 4.1 Measures for Disaster Management in the Upper Meghna Area

V. Potential Projects Identified for Realization of the Disaster Management Measures

5.1 The Study has identified 17 potential projects, which are defined as possible projects

to realize the five measures for disaster management in the Upper Meghna area as discussed in Chapter IV. The identification of potential projects was made without any limitation to Japan's aid. The 17 potential projects were identified by clarifying site peculiarities and real needs in the Upper Meghna area which are characterized by the appearance of huge haors as well as various kinds of impacts due to flash flood.

5.2 The 17 potential projects identified are compiled in Table 5.1, and divided into five categories, namely:

- Category a : projects included in the latest BWDB's Development Project Proposal (DPP),
- Category b : projects included in the DPP prepared by Bangladesh Haor and Wetland Development Board (BHWDB) based on the Haor Master Plan (2012),
- Category c : on-going projects handled by BWDB,
- Category d : on-going NGO projects, and
- Category e : projects found in the Study by JICA Study Team.

Table 5.1 Identification of Potential Projects

Category		Project Name	Date of DPP Approval	No. of Projects**
a	DPP, BWDB	Pre-monsoon Flood Protection and Drainage Improvement in Haor Areas	April 2011	52
b	DPP, BHWDB	1) Pre-monsoon Flood Protection and Drainage Improvement in Haor Areas, 2nd Stage	*	30
		2) Flood Management of Haor Areas	*	19
		3) River Dredging and Development of Settlement	*	1
		4) Village Protection against Wave Action in Haor Area	*	195
		5) Development of Early Warning System for Flash Flood Prone Areas in Haor and Dissemination to Community Level	Not yet prepared	-
c	On-going , BWDB	(with GOB own fund)		
		1) Kalni-Kushiyara River Management Project	April 2011	1
		(under donors' financial assistance)		
		2) Secondary Towns Integrated Flood Protection (Phase-II) Project	November 2010	1
		3) Water Management Improvement Project (WMIP)		32~35
d	Community-based Disaster Management with NGO			17
e	Identified by JICA Study Team	1) Protection of Unprotected Haors from Flash Floods	-	-
		2) Establishment of Effective Dissemination of Early Flood Warning and Evacuation Systems in the Northeastern Region	-	-
		3) Juri-Continala River Improvement Project	-	-

Category	Project Name	Date of DPP Approval	No. of Projects**
	4) Improvement of Operation and Maintenance of FCD/I Systems in the Upper Meghna River Basin with Beneficiaries' Participation	-	-
	5) Sand Mining Management for River Channel Stabilization and Improvement of Livelihoods of Local Population	-	-
	6) Life Safety Enhancement for People Living on Haor Mounds under Improved Road Communication Network	-	-
	7) Capacity Development of BWDB for Disaster Management	-	-

Source: JICA Study Team

Note: * The DPP is under review of Ministry of Water Resources/Ministry of Finance.

** the number of project sites in the study area

VI. Goal of JICA Cooperation Program for Disaster Management

6.1 After due consideration of the devastating flood damage which brought the people to suffer extreme poverty in the Upper Meghna area, directions of Japanese aid, as provided in the JICA Cooperation Program for Disaster Management (hereinafter referred to as the JICA Cooperation Program), were established as stated below.

1) Direction 1 : The areas in and around the three districts of Sunamganj, Netrokona, and Kishoreganj, wherein vast haors emerge unevenly in the Upper Meghna area every rainy season causing the people to suffer chronic poverty since the economic and social activities in the areas are terribly depressed due to unavoidable flood risk to damage of agricultural crop (boro rice and other cereals) and wave erosion of house mounds incurred by the emergence of vast haors.

Therefore, it is significant to provide Japan's aid for the people in the areas affected through the implementation of measures that reduce the said flood risk to activate the economic and social activities and realize poverty reduction and livelihood improvement.

2) Direction 2: It is important that Japan's aid place more focus in Netrokona and Kishoreganj Districts and their suburbs, because not enough aid has been provided to Netrokona and Kishoreganj Districts yet, while the Sunamganj District has received lots of aid projects from the GOB, other donors, and NGOs so far.

3) Direction 3 : Bangladesh has been positively promoting an equitable society for social and political stability as a development priority of the country through addressing poverty reduction, gender equity, balanced regional development, social security, etc. The JICA Cooperation Program which follows the above two directions of Japan's aid could

effectively contribute to the development priority of Bangladesh and therefore, it is aimed to implement the above two directions.

6.2 The goal of the JICA Cooperation Program is boxed below, based on the directions discussed in Section 6.1.

Goal of JICA Cooperation Program

The goal of the JICA Cooperation Program for disaster management is to reduce the unavoidable flood risk to damage of agricultural crop (boro rice and other cereals) and wave erosion of house mounds, and realize poverty reduction and livelihood improvement, placing much importance to the areas in and around Netrokona and Kishoreganj Districts where little development aid is received so far compared to other surroundings, so as to contribute towards the development priority of Bangladesh, which is to promote “an equitable society” as a basis for social and political stability, through raising the level of economic and social activities and materializing balanced regional development. These areas have been chronically compelled to experience more poverty due to the said unavoidable flood risk which occurs every rainy season where vast haor emerged unevenly in the Upper Meghna area (the study area).

VII. Selection of Candidate Projects and Preliminary Design

Selection of Candidate Projects

7.1 In this chapter, some projects were selected out of the potential projects, presented in Section 5.2, as candidate projects which will be implemented under the JICA Cooperation Program in order to achieve the goal stated in Chapter 6. The selection of candidate projects adopted the following four criteria, in consonance with the national policies and plans in Bangladesh.

Selection Criteria of Candidate Projects

- (1) Technically feasible and sustainable for construction and O&M under the natural and socio-economic conditions of the Upper Meghna area,
- (2) Environmentally/socially acceptable,
- (3) No overlap with the GOB’s own funded projects and supported by other donors and NGOs, and
- (4) Conformity with JICA’s cooperation policy for Bangladesh.

7.2 Through examination of potential projects against the criteria, six potential projects namely: b1, b2, b3, b4, e2, e5, were qualified and selected as candidate projects. The results are summarized in Table 7.1.

Table 7.1 Examination of Potential Projects

Project Name	Description	Failed Criteria	Judge ment
a) Pre-monsoon Flood Protection and Drainage Improvement in Haor Areas	Implementation with the GOB's own fund has been decided.	(3)	-
b1) Pre-monsoon Flood Protection and Drainage Improvement in Haor Areas, 2nd Stage	The source of project fund has been unsettled yet. Incorporation into the JICA Cooperation Program is to be examined.		○
b2) Flood Management of Haor Areas	- do -		○
b3) River Dredging and Development of Settlement	- do -		○
b4) Village Protection Against Wave Action in Haor Area	- do -		○
b5) Development of Early Warning System for Flash Flood Prone Areas in Haor and Dissemination to Community Level	This project is to be classified into a mid-/long-term plan, since the current availability of rainfall data in the Indian territory is extremely limited.	(1)	-
c1) Kalni-Kushiyara River Management Project	In progress with the GOB's own fund	(3)	-
c2) Secondary Towns Integrated Flood Protection (Phase II) Project	In progress under ADB's financial assistance	(3)	-
c3) Water Management Improvement Project (WMIP)	In progress under World Bank's financial assistance	(3)	-
d) Community-based Disaster Management with NGO	The project contents overlapped with b4 and e2.	*	-
e1) Protection of Unprotected Haors from Flash Floods	It is possible to integrate the project contents to b2.	*	-
e2) Establishment of Effective Dissemination of Early Flood Warning and Evacuation Systems in Northeastern Region	Incorporation into the JICA Cooperation Program is to be examined.		○
e3) Juri-Continala River Improvement Project	It is difficult to ensure project sustainability from the technical/ environmental/ social aspects.	(1) (2)	-
e4) Improvement of Operation and Maintenance of FCD/I Systems in the Upper Meghna River Basin with Beneficiaries' Participation	It is possible to integrate the project contents to b1/b2.	*	-
e5) Sand Mining Management for River Channel Stabilization and	Incorporation into the JICA Cooperation Program		○

Project Name	Description	Failed Criteria	Judge ment
Improvement of Livelihood of Local Population	is to be examined.		
e6) Life Safety Enhancement for People Living on Haor Mounds under Improved Road Communication Network	It is possible to integrate the project contents to b4.	*	-
e7) Capacity Development of BWDB for Disaster Management	In progress as part of c3.	(3)	-

Source: JICA Study Team

Notes:

* The project can be integrated into another potential project in view of their project contents.

○ to be selected as the candidate project

Preliminary Design of Candidate Projects

7.3 Preliminary designs of the selected six candidate projects (b1, b2, b3, b4, e2, and e5) contained the major components, implementation period, beneficiaries, project cost, economic viability, etc. with the aim of realizing the goal of the JICA Cooperation Program.

Through these preliminary designs, b1 and b2 were integrated into one project because both have the same objectives and function, whereas b3, e2, and e5 were renamed so that their project names may represent the project contents (see Table 7.2).

The candidate projects were defined as Projects 1 to 4 and Study respectively, as shown in Table 7.2.

Table 7.2 Candidate Projects for JICA Cooperation Program

	Project Name	Remarks*
Project 1	Pre-monsoon Flood Protection and Drainage Improvement in Haor Areas in and around Netrokona and Kishoreganj Districts	b1)+b2)
Project 2	Village Protection against Wave Action in Haor Area	b4)
Project 3	River Dredging, Village Platforms, and Crop Diversification along Surma-Baulai River System	b3) renamed
Project 4	Capacity Development of Communities for Flood Disaster Prevention	e2) renamed
Study	Study on Sustainability of Rivers in the Upper Meghna Area through Management of Sand Mining and Sediment	e5) renamed

Source: JICA Study Team

Note: * corresponding to the project numbers in **Table 7.1**

7.4 Each of the candidate projects has been formulated as flood disaster management measure, targeting the local people, particularly the poor farmers and fishermen, in the

Upper Meghna area as major beneficiaries. Furthermore, the projects aim to contribute to social security, poverty reduction, livelihood improvement, and balanced regional development in order to promote an equitable society (one of development priorities of Bangladesh) as a basis for social and political stability, and therefore, the candidate projects have high priority in the national development of Bangladesh.

The outline of each project is compiled in Table 7.3 (1/5 to 5/5).

Table 7.3 Outline of Candidate Projects (1/5)

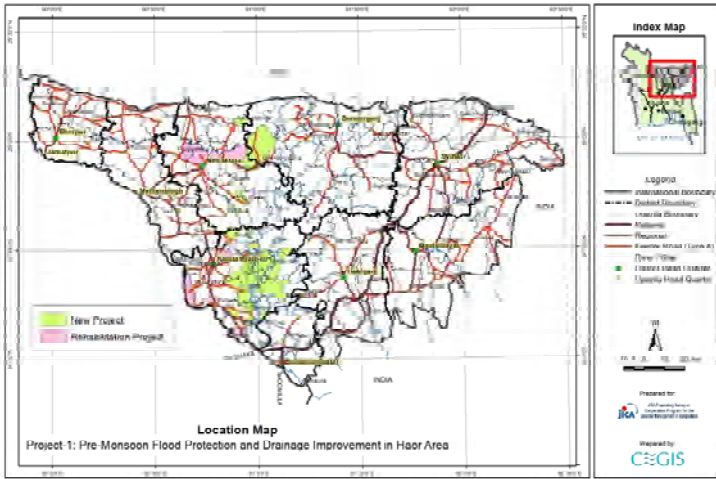
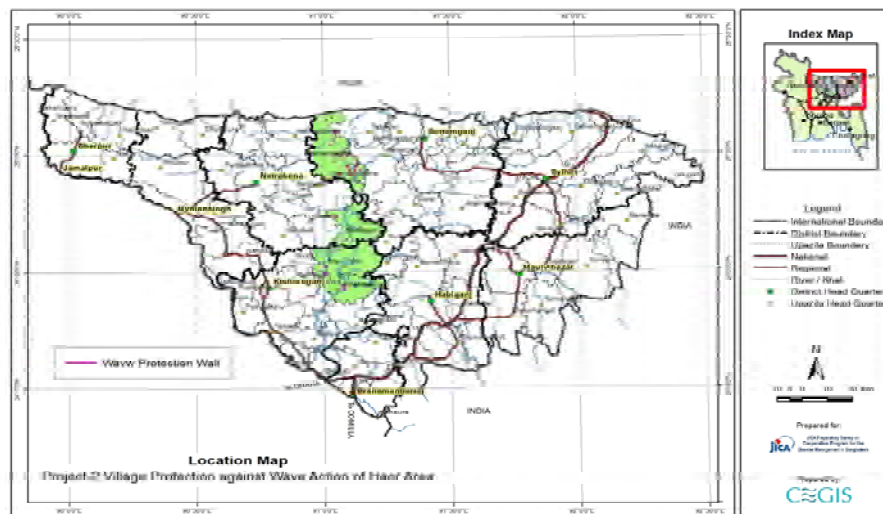
Project 1: Pre-monsoon Flood Protection and Drainage Improvement in Haor Areas in and around Netrokona and Kishoreganj Districts	
Measures*	<ul style="list-style-type: none"> Flash flood measures in the northern region Enhancement of facilities' function for haor water level management
Location	<ul style="list-style-type: none"> Areas in and around Netrokona and Kishoreganj Districts (see Location Map)
Objectives	<ul style="list-style-type: none"> To protect boro crops and fish ponds against pre-monsoon flash floods To improve flow capacity of internal drainage canals in the project areas To enhance agricultural and fishery productivity including crop diversification To improve navigation activities of local people in haors To ensure sustainable project functions through the establishment of new O&M system for rehabilitated/new flood control facilities
Major components	<p>The project is composed of rehabilitation of existing haor projects and development of new haor projects, each of which includes the following:</p> <ul style="list-style-type: none"> Feasibility study (F/S) and initial environmental examination (IEE) and/or environmental impact assessment (EIA) for the project To construct/rehabilitate civil structures of submersible embankment (SE), regulators, causeways and revetments on SE slope, including drainage canal re-excavation Community-based institutional development including capacity development of beneficiaries for operation and management of flood control facilities, and sustainable O&M system To support the enhancement of agricultural and fishery productivity through providing guidance on crop diversification by introducing upland crops such as potato, tomato, maize, pepper, etc. and provision of fish shelters
Expected executing agency	BWDB
Construction period	seven years
Beneficiaries	Benefited area: 170,000 ha, Beneficiaries: 1,873,000 people
Preliminary project cost	BDT 11,200 million (equivalent to JPY 11,200 million)
Economic viability	18.8% > 12%**
 <p style="text-align: center;">Location Map</p>	
<p>Notes:</p> <ul style="list-style-type: none"> * corresponding to the appropriate measures in Figure 4.1, ** opportunity cost of capital of the disaster management sector in Bangladesh 	

Table 7.3 Outline of Candidate Projects (2/5)

Project 2: Village Protection against Wave Action in Haor Area	
Measures*	<ul style="list-style-type: none"> Improvement of the living environment in haor area
Location	<ul style="list-style-type: none"> Four <i>upazilas</i> in Netrokona, Kishoreganj, and Sunamganj Districts (see Location Map)
Objectives	<ul style="list-style-type: none"> To protect village mounds/cultivated land in haor areas against wave action To ensure sustainable project functions through the establishment of a participatory maintenance system for facilities for village protection against wave action
Major components	<ul style="list-style-type: none"> FS, IEE and/or EIA of the project To construct civil structures for wave protection, including revetment, stairs, and ramps Community-based institutional development including capacity development of beneficiaries and sustainable maintenance system for facilities of wave protection measures
Expected executing agency	BWDB
Construction period	three years
Beneficiaries	95 villages in four upazilas (beneficiaries: 18,000 people)
Preliminary project cost	BDT 1,500 million (equivalent to JPY 1,500 million)
Economic viability	15.0% > 12% **



Location Map

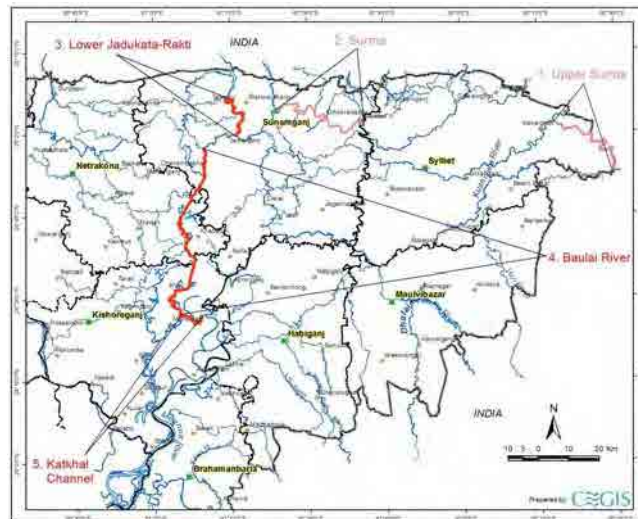
Notes:

* corresponding to the appropriate measures in Figure 4.1

** opportunity cost of capital of the disaster management sector in Bangladesh

Table 7.3 Outline of Candidate Projects (3/5)

Project 3: River Dredging, Village Platforms, and Crop Diversification along Surma-Baulai River System	
Measures*	<ul style="list-style-type: none"> • Management of major river channels in the Upper Meghna area
Location	<ul style="list-style-type: none"> • Three river stretches in Netrokona, Kishoreganj, and Sunamganj Districts (see Location Map)
Objectives	<ul style="list-style-type: none"> • To protect existing BWDB's haor project facilities (submersible embankment, regulators, etc.) and other infrastructure such as roads and bridges from 10-year pre-monsoon floods • To improve post-monsoon drainage in haors • To construct village platform by using dredged materials for safety of people and properties • To implement crop diversification • To improve navigation
Major components	<ul style="list-style-type: none"> • FS, including simulation model analysis on dredging effects, development of dredged river channel monitoring plan, and recommendation of additional river stretches for future dredging project, and EIA • To dredge priority river stretches • To construct village mounds/upland crop areas using dredged materials • To provide technical guidance on crop diversification • To provide guidance prior to the initiation of dredged river stretch monitoring • To formulate a plan of maintenance dredging
Expected executing agency	BWDB
Construction period	five years
Beneficiaries	840,000 people residing along the three dredging stretches
Preliminary project cost	BDT 6,220 million (equivalent to JPY 6,220 million)
Economic viability	16.6% > 12%**



Location

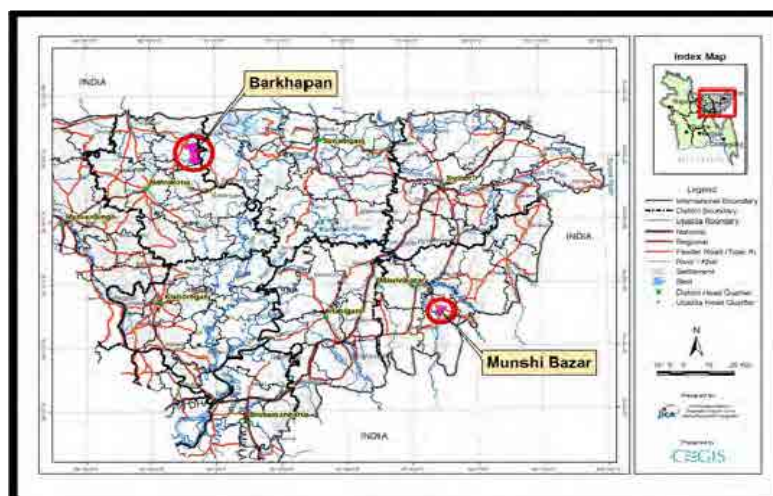
Notes:

* corresponding to the appropriate measures in Figure 4.1,

** opportunity cost of capital of the disaster management sector in Bangladesh

Table 7.3 Outline of Candidate Projects (4/5)

Project 4: Capacity Development of Communities for Flood Disaster Prevention	
Measures*	• Capacity development of related agencies and communities
Location	• Two unions: Barkhapon, Netrokona and Munshi Bazar, Maulvibazar (see Location Map)
Objectives	• To establish pilot disaster resilient communities in the Upper Meghna area which can be replicated in other areas of Upper Meghna in near future
Major components	<ul style="list-style-type: none"> • Activation of existing union level disaster management committees and formation of village level disaster management organizations • Provision of training and drill on disaster management and capacity development • Provision of multi-purpose shelters and operation/management guidance
Expected executing agency	Disaster Management and Relief Division/Ministry of Food and Disaster Management
Implementation period	two years
Beneficiaries	47,500 people (22,500 people in Barkhapon, Netrokona and 25,000 people in Munshi Bazar, Maulvibazar)
Preliminary project cost	BDT 400 million (equivalent to JPY 400 million)
Economic viability	-



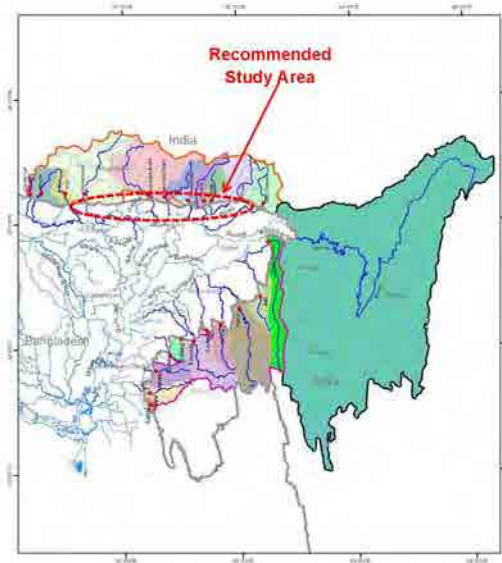
Location Map

Notes:

* corresponding to the appropriate measures in Figure 4.1,

** opportunity cost of capital of the disaster management sector in Bangladesh

Table 7.3 Outline of Candidate Projects (5/5)

Study: Study on Sustainability of Rivers in the Upper Meghna Area through Management of Sand Mining and Sediment	
Measures*	<ul style="list-style-type: none"> • Management of major river channels in the Upper Meghna area
Location	<ul style="list-style-type: none"> • Netrokona, Sunamganj, and Sylhet Districts (see Location Map)
Objectives	<ul style="list-style-type: none"> • To develop basic management plan of river sedimentation and sand mining for appropriate river management • To implement pilot project based on the basic management plan
Major components	<p>(Phase I)</p> <ul style="list-style-type: none"> • Field survey and analysis, including river bed material survey, hydrology, geomorphology, basin-wide sediment balance analysis, sediment resource and sustainable yield, water quality and downstream impacts of existing mining operations on river stability, sedimentation, flooding, and ecology • Socio-economic assessment and analysis, including existing mining enterprise structures on ownership, labor, yield, sale, transport and marketing, research on alternative structures, and sediment materials market analysis • To study sediment mining best management practices (BMPs), including sediment trapping that minimizes damage or improves downstream conditions • To study sediment mining business, which creates income generation for poorest people for their livelihood improvement • To assess existing sediment mining regulations, monitoring, and enforcement, including recommendations on sediment mining regulations and monitoring, and capacity improvement of managing agencies • To formulate basic management plan of river sedimentation and sand mining for river management • To prepare a pilot project plan (selection of river/stream locations, BMP implementation plan, project evaluation, etc.) <p>(Phase II)</p> <ul style="list-style-type: none"> • Implementation of pilot project(s)
Expected executing agency	BWDB
Implementation period	Phase I: 24 months, Phase II: 12 months
 <p>Figure 2- Recommended Study Area</p> <p style="text-align: center;">Location Map</p>	
<p>Notes:</p> <ul style="list-style-type: none"> * corresponding to the appropriate measures in Figure 4.1 ** opportunity cost of capital of the disaster management sector in Bangladesh 	

Assessment of Candidate Projects (MOA)

7.5 The candidate projects, except the Study, were assessed through the multi-objective analysis (MOA) method. Through careful consideration of the natural conditions and socio-economy in the Upper Meghna area, the Study used six issues of assessment with corresponding scores, which totaled to 36 items as tabulated below.

Assessment Issues	Items
Social issue	7
Environmental issue	4
Institutional issue	7
Economic issue	7
Financial issue	4
Technical issue	7
Total	36

7.6 The following table and figure present the assessment results by MOA.

Assessment of Candidate Projects by MOA

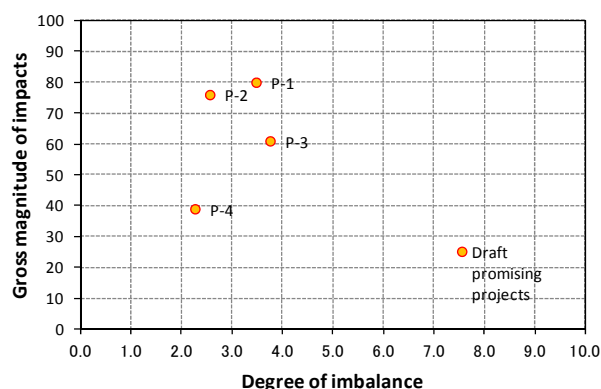
Candidate Projects		Total Score (GMI*)	Degree of Imbalance
Project 1	Pre-monsoon Flood Protection and Drainage Improvement in Haor Areas in and around Netrokona and Kishoreganj Districts	80	3.5
Project 2	Village Protection against Wave Action in Haor Area	76	2.6
Project 3	River Dredging, Village Platforms, and Crop Diversification along Surma-Baulai River System	61	3.8
Project 4	Capacity Development of Communities for Flood Disaster Prevention(towards resilient community)	39	2.3

Source: JICA Study Team

Note: * GMI = Gross Magnitude of Impacts

According to the abovementioned results of MOA, the soundness and priority of Projects 1 to 4 are assessed as follows:

- 1) The degree of imbalance ranges from 2 to 4 in each project case, and there is no large difference presented among the four candidate projects.
- 2) As for the total score, which is translated into gross magnitude of impacts (GMI), Projects 1 and 2 obtained higher points followed by Projects 3 and 4.
- 3) For Projects 1 and 2, their project soundness is expected to be more or less the same and their degree of priority recognized in terms of GMI and degree of imbalance are higher.



Operational Approaches of Candidate Projects for JICA Cooperation Program

7.7 When these candidate projects are implemented under the JICA Cooperation Program through the Japanese development assistance schemes, i.e., ODA loan project, technical cooperation project, and technical cooperation for development planning, among others, the following operational approaches of these projects are proposed in due consideration of the project characteristics and need for the attainment of the project objectives:

(1) Projects 1 and 3

It is desirable to implement Projects 1 and 3 as ODA loan projects, since both projects are characterized by the following:

- They build infrastructure for economic/social development and stability in the project areas.
- Since they aim to activate economic and social activities and contribute to poverty reduction and livelihood improvement in the project areas, the project ownership on the Bangladesh side is crucial in the development process.

(2) Project 2

It is desirable to implement Project 2 as a technical cooperation project in the first place and after that as ODA loan project, since the project is characterized as follows:

- As wave erosion measures have not been established yet in the haor areas, it is required to prepare guidelines of the measures as the first step through pilot works and expand the measures under ODA loan by using the guidelines.
- The project needs to place importance on the development of problem-solving capacity of Bangladesh to ensure self-reliant development and sustainable development outcomes in the country.
- Participatory methods whereby local people in the project area participate in project planning, operation management and evaluation activities are crucial to nurture a sense of project ownership in Bangladesh.
- The project builds infrastructure for economic/social stability in the project areas.

(3) Project 4

This project is positioned as a project for community-based disaster management (CBDM). Currently, Bangladesh has been carrying out the Coastal Area Preparedness Project (CAPP); however, the priority of CBDM is not given to the Upper Meghna area but to the coastal areas in the country. Therefore, it is proposed that Project 4 be excluded in the JICA Cooperation Program at this stage.

(4) Study

It is desirable to carry out the Study as technical cooperation for development planning, since the Study has the following characteristic:

- It is important that the Study conduct transfer of technology to the Bangladeshi side about survey/analysis methodology and planning for sediment control and sand mining management in rivers as well as support policy making such as legal regulations and monitoring system for the sand mining business in the Upper Meghna area.
- (5) Remarks on Project 3 and the Study
- The Study prepares a management plan of sedimentation and sand mining activities in the Surma-Baulai River system. Therefore, it is essential that the dredging plan of Project 3, of which the target river stretches are located in the Surma-Baulai River system, be formulated taking the said management plan into consideration so as to enhance synergistic effects of both schemes. Furthermore, formulation of the dredging plan and management plan needs basin-wide sediment balance analysis of the Surma-Baulai River system taking into account both river dredging and sand mining activities in the river system.
- Therefore, it is required that the feasibility study of Project 3 and the Study be conducted at the same time and incorporated in one study as technical cooperation for development planning.

VIII. JICA Cooperation Program for Disaster Management

Goal of JICA Cooperation Program

- 8.1 The goal of the JICA Cooperation Program is boxed below. the JICA Cooperation Program may effectively contribute to promote an equitable society for social and political stability through raising the level of economic and social activities in the poverty-stricken areas situated unevenly in the Upper Meghna area.

Goal of JICA Cooperation Program

The goal of the JICA Cooperation Program for disaster management is to reduce the unavoidable flood risk to damage of agricultural crop (boro rice and other cereals) and wave erosion of house mounds, and realize poverty reduction and livelihood improvement, placing much importance to the areas in and around Netrokona and Kishoreganj Districts where little development aid is received so far compared to other surroundings, so as to contribute towards the development priority of Bangladesh, which is to promote “an equitable society” as a basis for social and political stability, through raising the level of economic and social activities and materializing balanced regional development. These areas have been chronically compelled to experience more poverty due to the said unavoidable flood risk which occurs every rainy season where vast haor emerged unevenly in the Upper Meghna area (the study area).

Projects for JICA Cooperation Program

8.2 According to the operational approaches proposed in Section 7.7 for each of the candidate project, the projects for the JICA Cooperation Program are compiled as shown in Table 8.1.

Table 8.1 Projects for JICA Cooperation Program

Project Name	Measures*	Approx. Project Cost (BDT 10 ⁶)	Operational approach**
Project 1 Pre-monsoon Flood Protection and Drainage Improvement in Haor Areas in and around Netrokona and Kishoreganj Districts	<ul style="list-style-type: none"> Flash flood measures in the northern region Enhancement of facilities' function for haor water level management 	11,160 (equiv. to JPY 11.2 billion)	ODA loan project
Project 2 Village Protection against Wave Action in Haor Area	<ul style="list-style-type: none"> Improvement of the living environment in haor area (measures against wave action) 	1,500 (equiv. to JPY 1.5 billion)	Technical cooperation project/ ODA loan project
Project 3 River Dredging, Village Platforms, and Crop Diversification along Surma-Baulai River System	<ul style="list-style-type: none"> Management of major river channels in the Upper Meghna area (river dredging) 	6,220 (equiv. to JPY 6.2 billion)	ODA loan project
Study Study on Sustainability of Rivers in the Upper Meghna Area through Management of Sand Mining and Sediment	<ul style="list-style-type: none"> Management of major river channels in the Upper Meghna area (sediment management) 	-	Technical cooperation for development planning

Source: JICA Study Team

Note: * see Figure 4.1, **see Section 7.2

Cooperation Scenarios

8.3 Table 8.2 compiles the cooperation scenarios of the proposed projects to fulfill the goal of JICA cooperation program.

Table 8.2 Cooperation Scenarios of Proposed Projects

Project	Cooperation Scenarios
Project - 1	<u>Project contents</u>

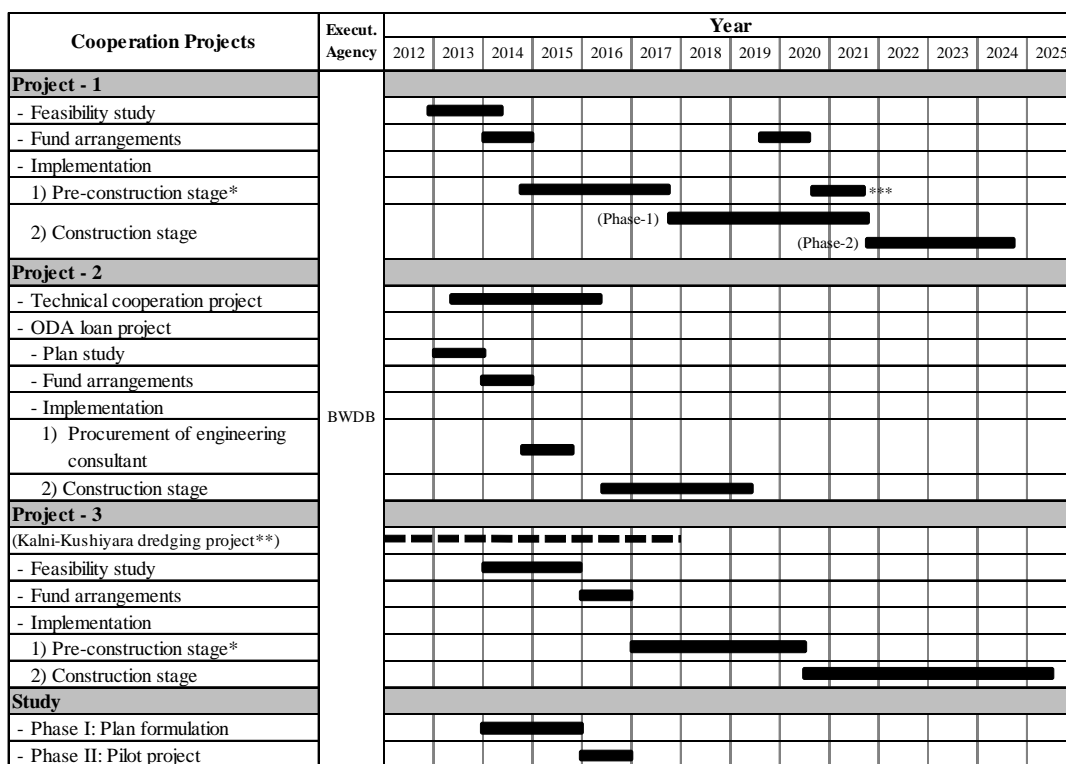
Project	Cooperation Scenarios
	<p>Reduction of flood damage risk to agricultural crop (boro rice and other cereals), crop diversification in the project areas and set-up of O/M system for project facilities through rehabilitation of existing haor projects and development of new haor projects, of which the major structures are submergible embankment and regulators, in and around Netrokona and Kishoreganj Districts,</p> <p><u>Benefited areas/beneficiaries</u> Project areas in and around Netrokona and Kishoreganj Districts (169,555ha)/1,873,000 people</p> <p><u>Target year</u> 2024</p> <p><u>Project goal</u> Reduction of flood damage risk (up to 10 year premonsoon floods) to agricultural crop (boro rice and other cereals) in the project areas in and around Netrokona and Kishoreganj Districts and poverty reduction and livelihood improvement</p>
Project - 2	<p><u>Project contents</u></p> <ul style="list-style-type: none"> i) Technical cooperation project : Preparation of guidelines for wave erosion measures for house mounds in the haor areas and training with participation of local people ii) ODA loan project : Construction of wave erosion measures for house mounds in and around Netrokona and Kishoreganj Districts and set-up of O/M system for project facilities <p><u>Benefited areas/beneficiaries</u> Areas in and around Netrokona and Kishoreganj Districts (95 villages)/about 18,000 people</p> <p><u>Target year</u> 2019</p> <p><u>Project goal</u> Reduction of wave erosion risk to house mounds in the project areas (95 villages) in and around Netrokona and Kishoreganj Districts</p>
Project - 3	<p><u>Project contents</u> Dredging works of selected river stretches in the Surma-Baulai River system situated in Netrokona, Kishoreganj and Sunamganj Districts, construction of platform for housing and cultivation by using dredged earth materials, crop diversification and set-up of new O/M system of river channels</p> <p><u>Benefited areas/beneficiaries</u> Areas along the dredged river stretches in Netrokona, Kishoreganj and Sunamganj Districts (about 167,000 ha)/about 840,000 people</p> <p><u>Target year</u> 2025</p> <p><u>Project goal</u> Reduction of flood damage risk (up to 10 year premonsoon floods) to agricultural crop (boro rice and other cereals) outside the project areas of the Project-1 in and around Netrokona and Kishoreganj Districts and poverty reduction and livelihood improvement</p>
Study	<p><u>Project contents</u> Formulation of management plan for mining business of riverbed materials in the Surma-Baulai River system in the northern border areas of Netrokona, Sunamganj,</p>

Project	Cooperation Scenarios
	and Shlhhet Districts and implementation of pilot project for management of the mining business <u>Target year</u> 2016 <u>Project goal</u> Adding synergy effect to the Project-3 through management of riverbed material mining business in the Surma-Baulai River system in the northern border areas of Netrokona, Sunamganj, and Shlhhet Districts

Implementation Schedule

8.4 The overall implementation schedule for the JICA Cooperation Program is proposed as presented in Figure 8.1.

Figure 8.1 Overall Implementation Schedule Proposed for the JICA Cooperation Program



Notes:

* including procurement of engineering consultant, detailed design, procurement of contractor, etc.

** currently in progress by GOB fund, *** procurement of contractor for Phase-2

- (1) Project 1 : Commencement of feasibility study (F/S) in the late months of 2012 since field works in the F/S, including topographic survey and geotechnical investigation with core drilling, need to be carried out during the dry season before the onset of rainy season in 2013,

followed by three-year pre-construction stage scheduled in the late months of 2014, seven-year construction works, composed of Phases -1 and -2, starting in the late months of 2017, and completion in 2024;

- (2) Project 2 : For technical cooperation project, commencement in 2013 with three years project period, and plan formulation study for the ODA loan project in parallel, followed by commence of loan project in 2016 with completion in 2019,
- (3) Project 3 : Commencement of F/S in the late months of 2013, followed by pre-construction stage scheduled from 2017 to mid-2020, five-year dredging works scheduled in mid-2020 and completion in 2025; and
- (4) Study : Commencement of Phase I in 2014 since it is required to be conducted simultaneously with the F/S of Project 3, followed by the implementation of Phase II in 2016.

Necessity of Program Approach

8.4 The haor area of about 8000 km² is situated roughly in the central part of the Upper Meghna area, while its northern border is adjacent to the downstream of the Meghalaya Hills, which is located in the Indian territory. As recorded, this location has a rainfall of 12,000 mm per year on average and considered as one of the heaviest rainfall zones in the world. The haor area has repeatedly experienced devastating flood damage which brought about bitter poverty and chronic stagnation of the economic and social activities of the people. These are mainly due to the following multiple negative impacts of hydrologic and hydraulic events:

- (1) frequent flash floods in the pre-monsoon season from April to mid-May,
- (2) serious wave action in the haor area during the monsoon season from mid-May to October, and
- (3) thick sediment deposition into the rivers, drainage canals, and other water bodies.

This Study has recommended three projects and one study (hereinafter referred to as the Cooperation Schemes) to be incorporated into the JICA Cooperation Program for disaster management (listed below). To solve significantly the above-mentioned problematic situation of the haor area caused by combined impacts of flash flood, wave actions, and sedimentation, it is essential to take the following measures incorporating the synergistic effects of each project as mentioned below:

- (1) Project 1 : measures to protect boro rice from flash floods during the pre-monsoon season and improve post-monsoon drainage inside the confined project areas by constructing submersible embankments which are major flood control structures in the haor area,
- (2) Project 2 : measures to protect village mounds/platforms against wave actions in the haor areas,
- (3) Project 3 : measures of river dredging not only to protect boro rice from

- pre-monsoon flash floods and improve post-monsoon drainage outside the haor project areas but also to enhance the project effects of Projects 1 and 2, and
- (4) Study : management of sand mining activities as well as sedimentation in the river channels.

The expected synergetic effects of the Cooperation Schemes are mentioned below:

- (1) Project 3 could expect to receive a synergistic effect from the Study by incorporating the Study's proposed management plan of river sedimentation and mining activities into its river dredging plan.
- (2) It is expected that integrating Project 3 and the Study would result to proper management of river dredging and sand mining activities that would provide Projects 1 and 2 with high synergistic effects because the former two schemes will contribute toward lowering the water level of flooding along the Surma-Baulai Rivers during the pre-monsoon season and improve post-monsoon drainage inside and outside the haor project areas.
- (3) The Cooperation Schemes could firmly perform the mission through positive linkage of projects to one another. Furthermore, the integration of the Cooperation Schemes in one disaster management program would materialize the measures effectively focusing more on providing benefits to the poor through reduction of flood damages in the area and activation of economic and social activities.

As such, it is needed to launch the assistance by implementing the JICA Cooperation Program composed of the Cooperation Schemes as one disaster management project of the Upper Meghna area.

IX. Recommendations

9.1 The proposed projects for the JICA cooperation program are assessed from economic, technical and environmental/social aspects, as stated below.

(1) Economic aspect

The EIRRs of the projects 1 to 3 were preliminarily calculated, ranging between 15% and 19%, and are above 12.0% of the "opportunity cost of capital" in the disaster management sector in Bangladesh. These calculation results have proven that all the proposed projects are expected to be feasible from the economic point of view.

(2) Technical aspect

The flood measures in the projects 1- to -3 have been planned in principle by employing rather technically conventional knowledge and approaches that have been usually applied to flood control projects in Japan as well, and hence it is expected that

there would be no technically challenging problems to be encountered in the project implementation and also their operation and maintenance stages.

However, since the lack of sufficient operation and maintenance (O/M) for project facilities by BWDB, expected implementing agency, is clarified as mentioned before, it is essential to improve the current O/M system in due consideration of the proposal in this study so as to secure project sustainability.

(3) Environmental/social aspects

No reserved area registered by the domestic and multilateral environmental agreements are located in the project areas of the projects-1 to -3, which include structural measures with submergible embankment, regulators, revetment and river dredging. However, Tanguar Haor, the registered area of the Ramsar Convention, is situated upstream of the project areas and it is anticipated that the projects might bring about impact on the haor area, it is important to conduct environmental and social impact assessment with verification by hydrological and hydraulic analyses in the succeeding study stage

9.2 Through the workshops, which were held twice in Dhaka in the course of the Study, the JICA Study Team with kind cooperation of BWDB and with the attendance of JICA Bangladesh Office, constructive opinions were exchanged among the Study Team, Bangladeshi officials and other stakeholders about the study outputs produced by the Study Team. Also, useful advices were given by the Bangladeshi side. In the second workshop on 10 May 2012 during the third study work in Bangladesh, the Bangladeshi side highly recognized the importance of and positive impacts expected from the implementation of the proposed JICA Cooperation Program, and expressed their strong request for Japanese assistance realizing the need for the timely implementation of the JICA Cooperation Program.

9.3 In view of the above, it is recommended to commence the feasibility study without any delay in due consideration of the implementation schedule proposed in Section 8.4 so as to respond to the earnest request of the local people, particularly the poor in the haor area who have suffered repeated devastation of flood that affected the production of boro rice in recent years, in order to alleviate them from chronic poverty.