PREPARATORY PLANNING STUDY
FOR
MEGHNA RIVER BASIN MANAGEMENT
IN THE PEOPLE'S REPUBLIC OF BANGLADESH
SUMMARY

MARCH 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

INFRASTRUCTURE DEVELOPMENT INSTITUTE - JAPAN

YACHIYO ENGINEERING CO., LTD.

SAD
JR
11-003

PREPARATORY PLANNING STUDY
FOR
MEGHNA RIVER BASIN MANAGEMENT
IN THE PEOPLE'S REPUBLIC OF BANGLADESH
SUMMARY

MARCH 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

INFRASTRUCTURE DEVELOPMENT INSTITUTE - JAPAN

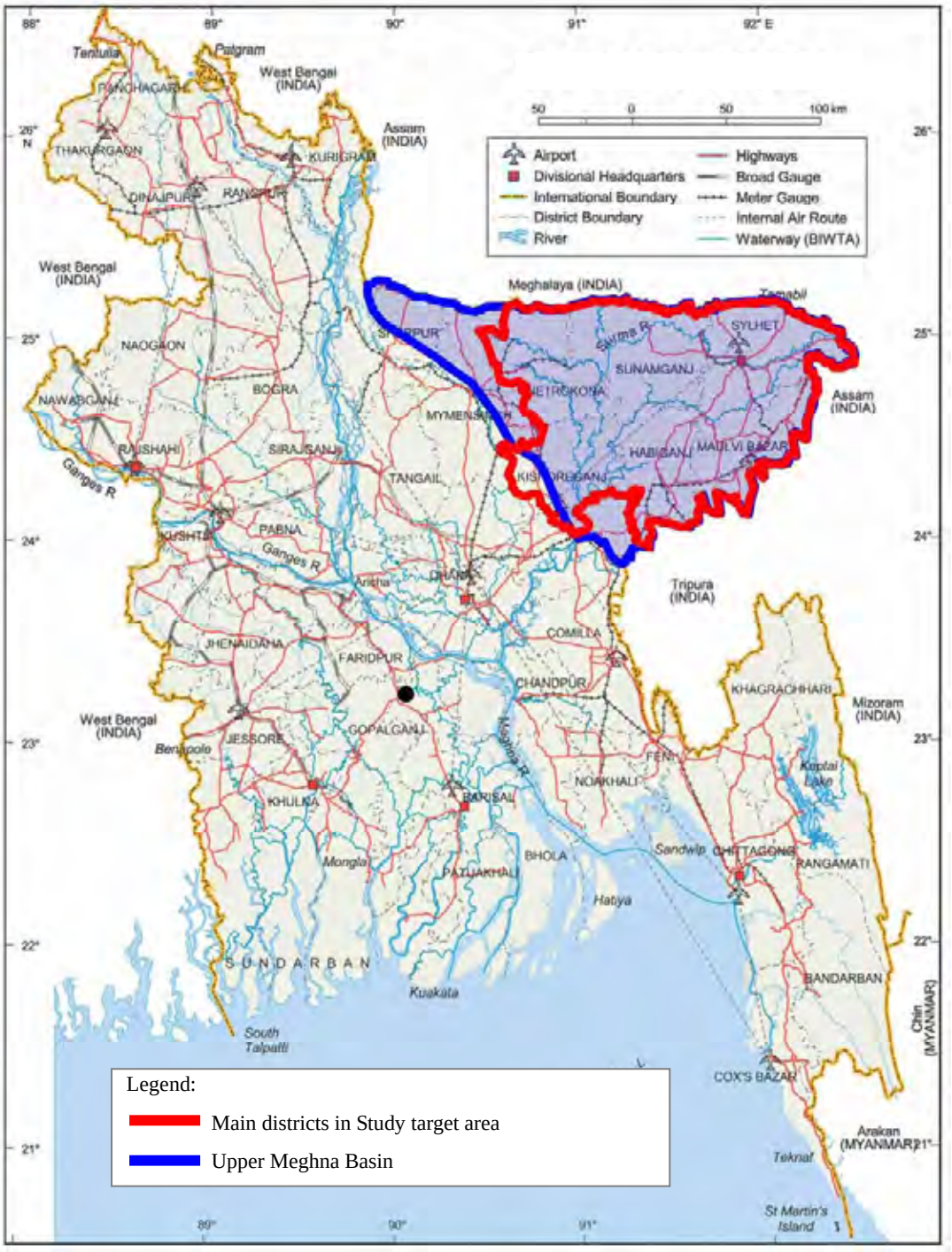
YACHIYO ENGINEERING CO., LTD.

Exchange Rates:

Tk (Bangladesh Taka) 1.00=1.172 JPY

USD 1.00 = JPY 82.16

(As of February 2011)



Map of Bangladesh

PREPARATORY PLANNING STUDY
FOR
MEGHNA RIVER BASIN MANAGEMENT
IN THE PEOPLE'S REPUBLIC OF BANGLADESH
SUMMARY
-Contents-

Map of Bangladesh

1 Outline of the Study 1-1
1-1 Background of the Study 1-1
1-2 Study Objectives 1-1
1-3 Study Target Area 1-2
2 Current Conditions and Issues in Upper Meghna Basin Management 2-1
2-1 Current Conditions of Upper Meghna Basin 2-1
2-2 Flow of Basin Management Planning and Flood Countermeasures 2-3
2-3 Current Conditions and Problems of Basin Management 2-6
3 Necessity, Effects and Basic Concept of Basin Management 3-1
3-1 Necessity and Effects of Basin Management 3-1
3-2 Basic Concept of Basin Management 3-6
4 Outline of the Cooperation Program (Draft) 4-1
4-1 Japan's Assistance Policy 4-1
4-2 Status in Bangladesh National Policy 4-1
4-3 Movements in International Agencies and Aid Donors 4-1
4-4 Overall Policy of the Cooperation Programs 4-3
4-5 Identification of Priority Issues to be Considered for Cooperation 4-5
Figure 4-5-1 Summary of Issues and Cooperation Program 4-5
4-6 Outline of the Cooperation Programs 4-6

Appendices

Appendix-1 List of Counterpart Personnel

-List of Figures-

Figure 1-3-1 Study Target Area 1-2
Figure 2-1-1 Transitions in Boro Rice Yields per Unit Area (t/ha) 2-2
Figure 2-2-1 Flow of Main Basin Management Plans and Flood Countermeasures in the Upper Meghna Basin 2-3
Figure 2-3-1 Ideal of Upper Meghna Basin Management 2-6
Figure 2-3-2 Results of Problem Analysis in the Workshop 2-7
Figure 2-3-1 Current Conditions and Problems of Basin Management 2-9
Figure 3-1-1 2005 Poverty Map 3-2
Figure 3-1-2 Map of Food Insecurity 3-4
Figure 3-1-3 Percentage of Household with Agricultural Labor as Main Income 3-5
Figure 3-1-4 Travel Times to Dhaka on the Road Network 3-6
Figure 4-5-1 Summary of Issues and Cooperation Program 4-5

-List of Tables-

Table 2-1-1 Upper Meghna Basin Potential and Current Conditions and Problems of Flood Damage 2-3

Table 2-2-1 Contents of Main Basin Management Plans and Flood Countermeasures in Upper Meghna Basin 2-4

Table 2-3-1 Outline of Workshop 2-8

Table 4-3-1 Outline of Assistance by International Agencies and Aid Donors 4-2

Table 4-6-1 List of Cooperation Programs 4-6

-List of Abbreviations-

ADB	Asian Development Bank
BDT	Bangladesh Taka
BHWDB	Bangladesh Haor and Wetland Development Board
BWDB	Bangladesh Water Development Board
CDMP	Comprehensive Disaster Management Programme
CEGIS	Center for Environmental and Geographic Information Services
DoF	Department of Fisheries
DPP	Development Project Performa/ Proposal
FAP	Flood Action Plan
FCD	Flood Control and Drainage
FCD/I	Flood Control, Drainage, and Irrigation
FFWC	Flood Forecasting and Warning Centre
GDP	Gross Domestic Product
ICHARM	International Centre for Water Hazard and Risk Management under the auspices of UNESCO
IWM	Institute of Water Modeling
IWRM	Integrated Water Resource Management
JICA	Japan International Cooperation Agency
JRC	Joint Rivers Commission Bangladesh
LGED	Local Government Engineering Department
MP	Master Plan
NGO	Non-governmental Organization
NWMP	National Water Management Plan
NWP	National Water Policy
PRSP	Poverty Reduction Strategy Paper
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USD	US Dollars
WARPO	Water Resources Planning Organization
WB	World Bank

1 Outline of the Study

1-1 Background of the Study

Due to the climatic feature whereby 20~25 percent of the national land becomes inundated during the rainy season, Bangladesh is ranked as the country "most vulnerable to the impacts of natural disasters" in the Poverty Reduction Strategy Paper (PRSP) II. Against such a background, the Government of Bangladesh formulated the Flood Action Plan (FAP) in 1995, the National Water Policy (NWP) in 1999 and the National Water Management Plan (NWMP) in 2004. The Bangladesh Water Development Board (BWDB) and Local Government Engineering Department (LGED) are conducting measures based on the above policy and plan while receiving support from numerous donors; however, due to the extremely large scale and complexity of river topography and flooding in Bangladesh, the measures are not always producing sufficient outcomes.

The Study mainly targets the Meghna River Basin (the so-called Upper Meghna) and haor areas in that basin, and it aims to examine the direction and approach for support that will contribute to effective river basin management geared to mitigating damage caused by flash flooding.

Through implementing this support, it is anticipated that flood damage mitigation measures in the Upper Meghan Basin will become more effective and that direct poverty countermeasures and improvement of livelihoods will be realized in the haor areas, and it is intended to further strengthen local disaster prevention capacity in this area in future.

1-2 Study Objectives

The Study intends to conduct outline examination of projects geared to building sustainable infrastructure in consideration of natural environmental conservation and enhancing implementation capacity that will contribute to long-term improvement in livelihood via basic surveys of river basin management including effective flood countermeasures suited to local characteristics and geographical conditions. [BWDB is viewed as the primary implementing agency]

1-3 Study Target Area

The Study target area is the Upper Meghna Basin and haor areas within the basin, which includes six administrative districts, that is, Kishoreganj, Netrokona, Habiganj, Moulvibazar, Sunamgan, and Sylhet. Figure 1-3-1 showsthe Upper Meghna Basin and the main districts in the Upper Meghna Basin as the Study target area.

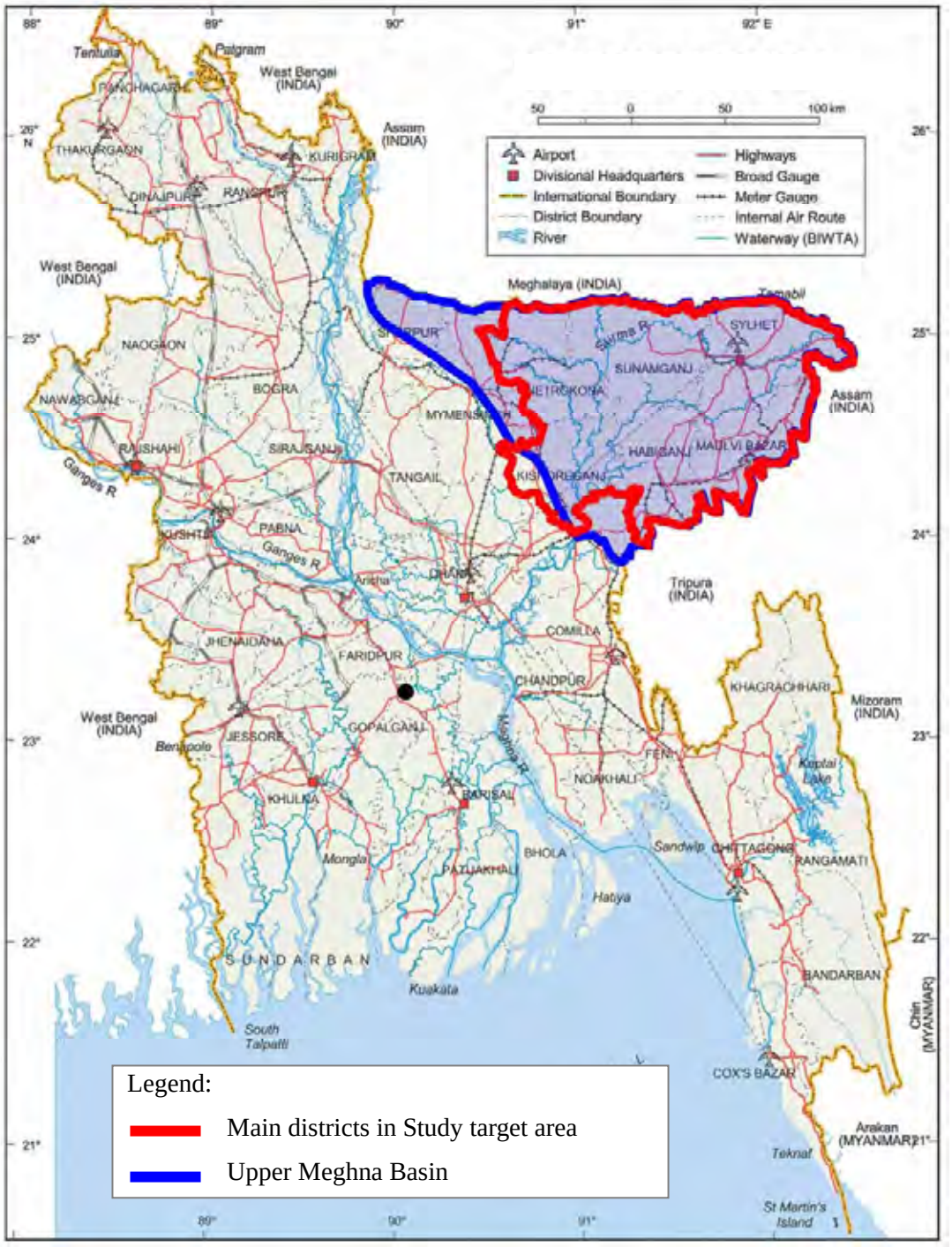


Figure 1-3-1 Study Target Area

2 Current Conditions and Issues in Upper Meghna Basin Management

2-1 Current Conditions of Upper Meghna Basin

(1) Natural Conditions

Upper Meghna Basin, situated in the south of one of the rainiest regions in the world, has annual rainfall of up to 5,800 mm. Meghna River is estimated to have a peak flood flow of 19,800 m3/sec[1] and it receives a huge amount of sediment inflow (approximately 13 million tons is deposited in the Upper Meghna Basin every year[2]), resulting in extremely harsh natural conditions.

Furthermore, since much of the basin is located in India and impacts are imparted by the Tipaimukn Dam, etc. on the Indian side, it is not realistic to resolve these natural conditions from the Bangladeshi side alone. In addition, concerns exist over the impact of climate change and so on in the future.

Accordingly, in the Upper Meghna Basin, it is extremely difficult to set the natural external forces to be targeted by the flood plans, etc., and since the scale of facilities such as embankments, etc. would need to be huge in order to provide total protection against flooding, rather than aiming for this, it is more important to mitigate flood damage over the entire basin while coexisting with the floods.

(2) Rivers and Basins

The representative rivers and basins in the Upper Meghna Basin are broadly divided into the following two.

- ✧ Basin system centered on Surma River and Kushiara River, where the central lowland haors are vulnerable to damage from flash floods and monsoon floods.
- ✧ River and basin systems near to sloping land around the border regions, for example, Khowai River in the south and Khankusha River in the north, which are vulnerable to damage from flash floods

In the aforementioned harsh natural environment, each basin system experiences flash flood impacts such as damage to Boro rice, damage to submergible embankments and other infrastructure, reduced river discharge capacity caused by sedimentation in monsoon floods, poor drainage and erosion of river banks, etc. The said damage can be summarized into that arising from sediment problems and that arising from water level.

Furthermore, individual countermeasures are complexly inter-related, for example, construction of embankments, etc. geared to preventing flooding in a certain area can impart a negative impact on agriculture and fisheries in other areas through triggering sedimentation and impeding drainage.

[1] Meghna Basin Study Report, IWFM

[2] FAP6 Report

Therefore, in order to mitigate flood damage over the entire Upper Meghna Basin, rather than separately planning individual countermeasures in each area, it is necessary to mitigate flood damage through conducting sediment management and water level management based on a basin-wide viewpoint.

(3) Socio-economic Condition

The Upper Meghna Basin is the source of precious resources and has high potential, making it an indispensible area for an impoverished region.

- ✧ People: Abundant labor (the estimated working population is approximately 7 million, accounting for 9 percent of the working population of Bangladesh. Of these, between 15~50 percent are deprived of work depending on the season and geographical area).
- ✧ Agricultural products: This is an important supply center for foodstuffs, and further improvement in production is anticipated through mitigation of flood damage and agricultural development. (Local production yields are increasing every year).
- ✧ Fisheries products: Fish catches in the haors (Catches of typical freshwater species such as carp and catfish account for 39 percent of freshwater fish catches, and freshwater sish catches in the area accounts for 14 percent of total fish catches in Bangladesh).
- ✧ Sediment: Sand and sediment are shipped as construction materials to Dhaka (high quality Sylhet sand. The target area also produces 23 percent of overall Gross Domestic Product (GDP) in the mining and quarrying sector).

The Upper Meghna Basin, especially the haor areas, is viewed as an important grain basket for Bangladesh. If growing seasons can be coordinated and appropriate agricultural development and infrastructure construction can be carried out, production yields could be further increased and this region could greatly contribute to securing and sustaining food self sufficiency in Bangladesh.

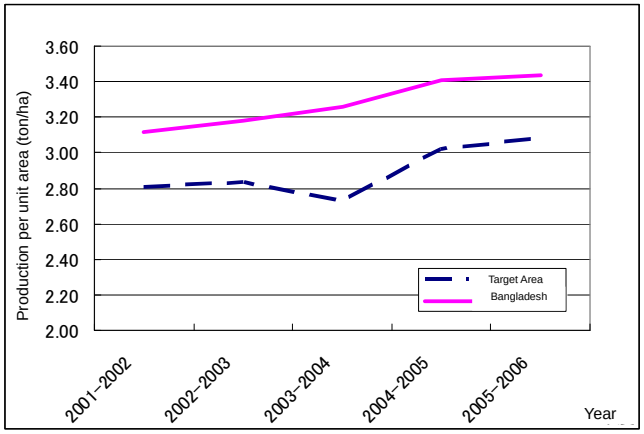


Figure 2-1-1
Transitions in Boro Rice Yields per Unit Area (t/ha)

The Upper Meghna Basin has extremely high potential if sustainable basin development (people, land use, agriculture, fisheries, transport, communication network, industry, etc.) can be carried out and the local economy can switch to positive growth. It is thus an important region in Bangladesh.

However, despite being endowed with precious resources, this is also an impoverished area and the basic cause of poverty is flooding and the damage that is imparted by this. People living in poverty lose all their possessions and a further impoverished every time that flooding occurs.

Table 2-1-1 Upper Meghna Basin Potential and Current Conditions and Problems of Flood Damage

Item	Potential	Current Conditions and Problems of Flood Damage
People	• Abundant labor force • (estimated working population is approximately 7 million, accounting for 9%of the working population of Bangladesh)	• People are vulnerable to flooding and lose their homes and means of livelihood to floodwaters.
Agricultural products	• Increasing production • (yields are increasing in the target area every year)	• Damage to Boro rice in the harvest season, delayed planting due to poor drainage, damage to submergible embankments, etc.
Fisheries products	• Haor fish catches • (representative freshwater fish catches account for 14% of fish catches in Bangladesh)	• Effects of flooding on fisheries resources, damage to ecosystems caused by embankment construction, etc., over-fishing of valuable species
Sediment	• Shipping of sand and sediment as construction materials • (23% of the mining and quarrying GDP)	• Northern areas are vulnerable to flood damage and sediment damage, and people lose their homes and means of livelihood to floodwaters.

2-2 Flow of Basin Management Planning and Flood Countermeasures

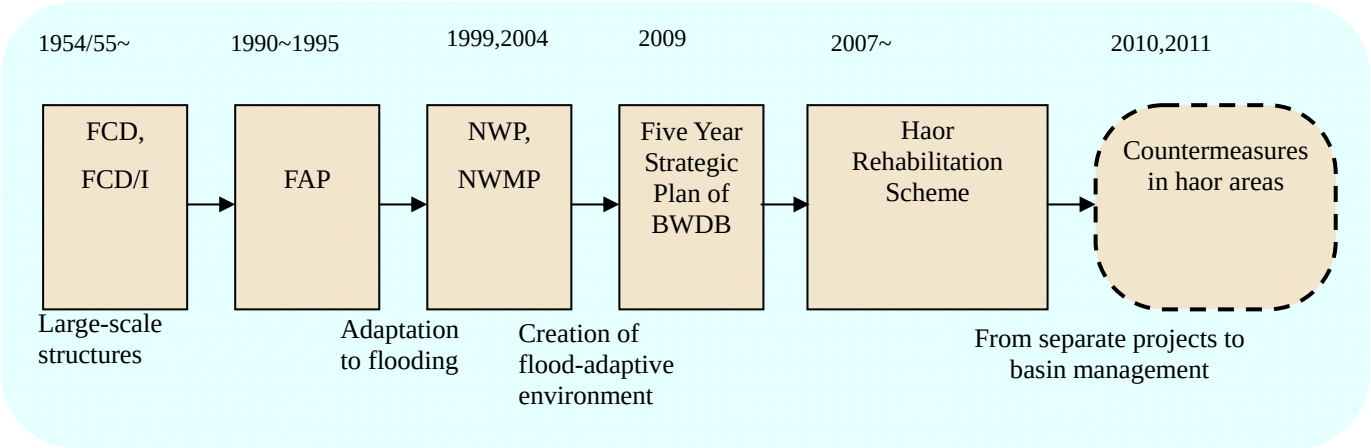


Figure 2-2-1 Flow of Main Basin Management Plans and Flood Countermeasures in the Upper Meghna Basin

Table 2-2-1 Contents of Main Basin Management Plans and Flood Countermeasures in Upper Meghna Basin

Year	Contents of Main Plans and Flood Countermeasures
1954/55～ Flood Control and Drainage (FCD),FCD/I	・ Following the major flooding of 1954/55, Bangladesh embarked on full-scale flood countermeasures. ・ A comprehensive long-term master plan (Water and Power MP) geared to realizing flood protection, water resources development and increased food production through the large-scale construction of embankments was compiled in 1964. ・ The large-scale construction of embankments based on the MP was not entirely successful: collapse of embankments and poor drainage became problems all over the country. Various problems also arose in implementation such as project delays, cost, land issues, non-participation by residents and public cuts, etc. ・ In these circumstances, major flooding occurred in 1987-88, leading to review of past large-scale embankment-based projects and growing calls for acceptance for inundation within Bangladesh and among donors.
1990～1995 FAP,FAP6	・ Following the major flooding of 1987-88, the United Nations Development Programme (UNDP) and World Bank (WB) took the initiative in launching the FAP composed of 26 components from 1990. ・ The FAP was mainly based on embankments and other structural measures, and it drew criticism from within Bangladesh and from international Non-governmental Organizations (NGOs), etc. However, as it also formed important concepts such as public participation, coordination with other sectors and the need for flood countermeasures according to local characteristics and so on, it provided the impetus for deriving the concept of “coexistence with flooding.” ・ In FAP6, comprehensive water management plans including preparation of the environment for realizing sustainable economic growth and social development in the northeast of Bangladesh were formulated, and steps were taken to confirm the order of priority of projects for executing these. ・ FAP6 addressed development issues over a broad scope, and individual projects covered the following fields. - Water supply and hygiene in urban areas - Fisheries management - Flood protection, water supply and hygiene in rural communities - Dredging geared to securing navigation routes in rivers - Conservation and sustainable management of biodiversity - Institutional strengthening and development ・ In Phase I of FAP6 (1991-1994), the actual conditions were gauged, assessment of the current situation was conducted and a strategy plan for development of local water resources was formulated. As a result, 44 projects were proposed. ・ In Phase II (1994-1997), additional surveys were carried out and it was agreed to conduct ongoing surveys on the Kalni-Kusiyara River Management Project and so forth.
1999,2004 NWP, NWMP	・ The National Water Management Plan (NWMP, 2004) was compiled as the implementation plan of the National Water Policy (NWP) that was newly compiled following completion of the FAP study in 1999, and in order to indicate the way forward for flood countermeasures in Bangladesh. ・ The NWMP, which is composed of eight sectors in which flood adaptation programs in char and haor areas are classified under “6. Disaster countermeasures”, aimed to provide a flood-adaptive environment.

Year	Contents of Main Plans and Flood Countermeasures
2009 Five Year Strategic Plan of BWDB	・ The BWDB 5-year Strategic Plan (2009-2014) indicated the way forward based on the PRSP and previous plans such as the FAP6, NWP and NWMP. Concerning the Upper Meghna Basin, it proposed 10 projects out of a total of 117 proposals.
Now onwards	・ Present countermeasures are being examined as a continuation of these overarching plans, flood countermeasures and projects. ・ In the Haor Rehabilitation Scheme (BWDB), following the flood damage of 2004, it is planned to implement rehabilitation of 37 haors and dredging, etc. of Surma River. The effectiveness of this project is being verified in the Center for Environmental and Geographic Information Services (CEGIS) stakeholders meetings and numerical analysis by the Institute of Water Modeling (IWM). Subsequently, following flash flooding in 2010, an additional 15 haors have been targeted (Pre-Monsoon Flood Protection and Drainage Improvement Project, BWDB). ・ The Integrated Master Plan of Haor Areas (consigned agency: CEGIS) currently being formulated by the Bangladesh Haor and Wetland Development Board (BHWDB) is scheduled to be a comprehensive basin development plan targeting the entire Upper Meghna Basin, and it covers a wide range of 14 sectors including water management (including flooding), agricultural development, fisheries development, environment and disaster prevention, etc. Concerning flood countermeasures, this plan aims to review overarching plans, FAP6 and each Development Project Proposal (DPP), etc. and to propose projects with a high level of priority.

2-3 Current Conditions and Problems of Basin Management

Basin management is not merely limited to specific river course sections and defined areas such as rivers, villages, upazillas and districts (countries), etc., but rather it encompasses the entire basin to which the rainfall, etc. that provides the origin of the target river flows into, and the global trend is shifting towards river management based on integrated water resources management and concern over the impacts of climate change.

Basin management comprises the three components of organization/setup, budget and appropriate planning (basin management planning) based on a pertinent basic ideal and basic policy.

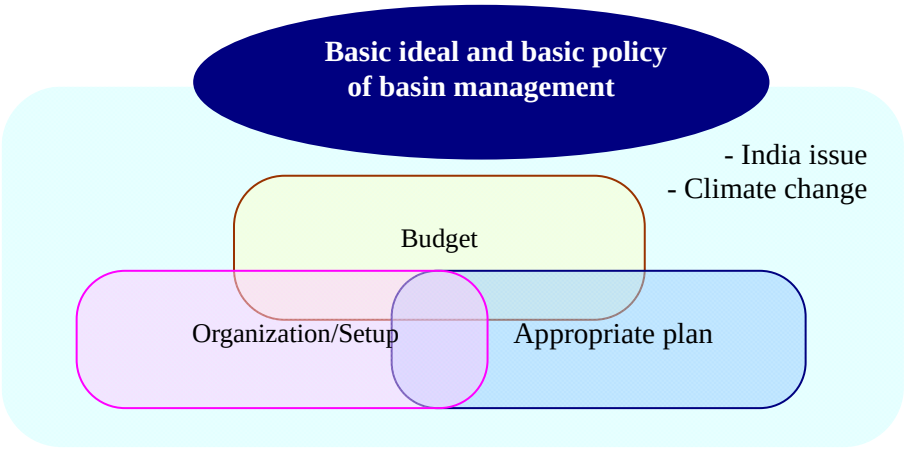


Figure 2-3-1 Ideal of Upper Meghna Basin Management

Looking at the Upper Meghna Basin, it cannot be said that planned basin management incorporating the viewpoint of the entire basin is being implemented in consideration of natural and social features.

However, the need for planning was debated within the FAP of 1990, and basin management is now implemented based on plans for haor rehabilitation and a haor master plan (currently being compiled) incorporating the basin-wide perspective by the BWDB and BHWDB.

Organizations and setup in Bangladesh are firmly rooted in Bangladeshi society. The BWDB, which is responsible for management of rivers and embankments, has administrative branches and engineers in each district and upazilla. The BHWDB was established under presidential decree in 2000 in order to promote the comprehensive development of haor areas, and it is responsible for coordinating with related agencies, compiling projects and implementing works related to the comprehensive development of haor areas. Regarding organization and setups, it will be necessary to strengthen organizational capacity and enhance sustainability while respecting existing organizations and setups such as the BWDB and BHWDB, etc.

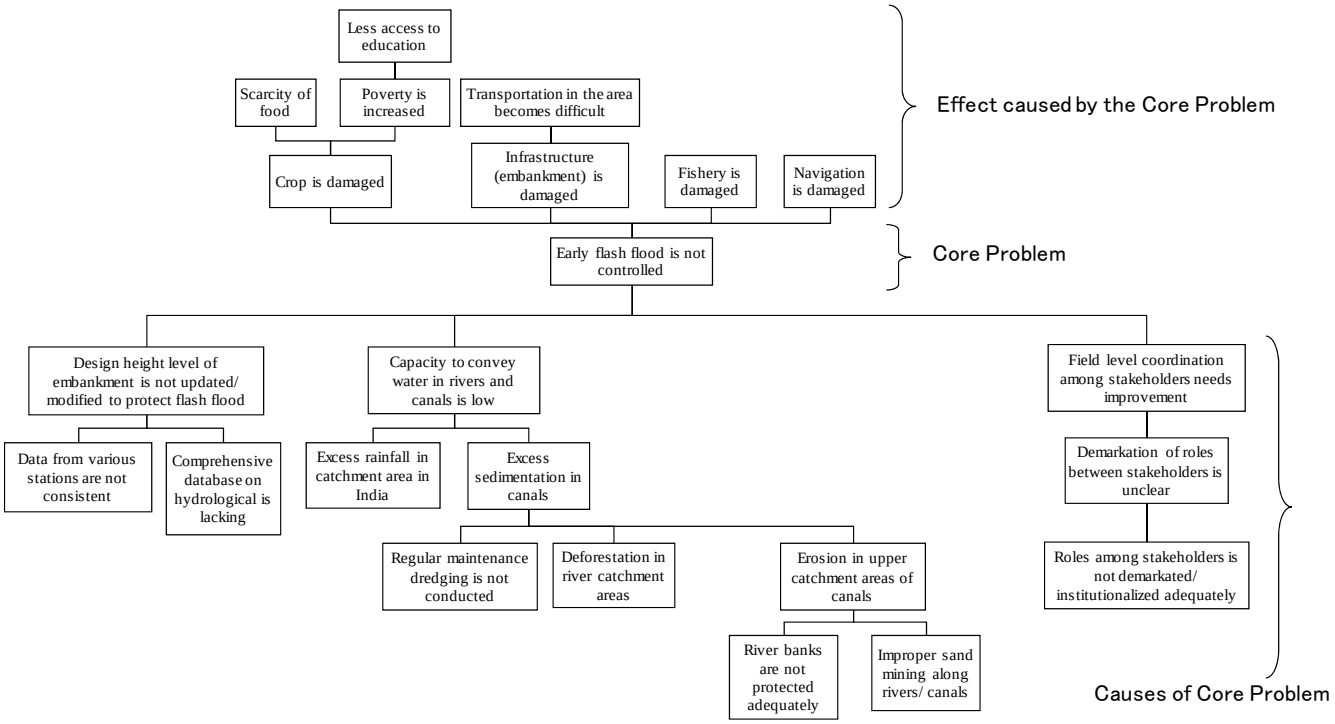
Concerning budget, Bangladesh has an established budget system; however, due to negative effects arising from political, social and economic factors, etc., projects for which budget is not implemented and projects that have exceeded budget have been confirmed. Moreover, on the regional level, cases of insufficient budget being available for maintenance have been confirmed.

Concerning appropriate planning (basin management planning), separate problems and issues have been confirmed regarding individual plans and measures; however, on the grand scale, it has been confirmed as necessary to conduct long-term and sustainable flood mitigation measures and planning

and cross-sectoral countermeasures and planning based on consideration of the entire basin.

Particularly in the Upper Meghna Basin, since analysis of flood damage characteristics and current conditions indicates that the causes of flood damage are concentrated on flood level (water level) and sediment problems, when it comes to examining basin management plans, it is effective to focus on water level management and sediment management over the entire basin, and it has been confirmed as necessary to plan infrastructure development and examine construction of a management setup that give consideration to both factors.

Moreover, in the problem analysis workshop conducted with local related government agencies, problems were confirmed as shown below.



Source: PCM workshop by the Study Team

Figure 2-3-2 Results of Problem Analysis in the Workshop

Table 2-3-1 Outline of Workshop

Item	Explanation	
Date	October 27, 2010, 12:30~16:30	
Place	BWDB Director General Conference Room	
Participants	Approximately 30 participants • Bangladeshi side ・WARPO ・BWDB ・BHWDB ・LGED ・CEGIS ・IWM ・JRC ・DoF Others • Japanese side ・JICA Expert (Advisor on River Management) ・Project Formulation Advisor (JICA Bangladesh Office)	
Contents	Stakeholder analysis	Identifying of problems and needs faced by government agencies
	Problem analysis	Analyzing and summarizing of problems and cause-effect relationships in the Upper Meghna Basin

DoF: Department of Fisheris, JICA: Japan International Cooperation Agency, JRC: Joint Rivers Commission Bangladesh, WARPO: Water Resources Planning Organization

Figure 2-3-1 shows the current conditions and problems of basin management in consideration of the above points.

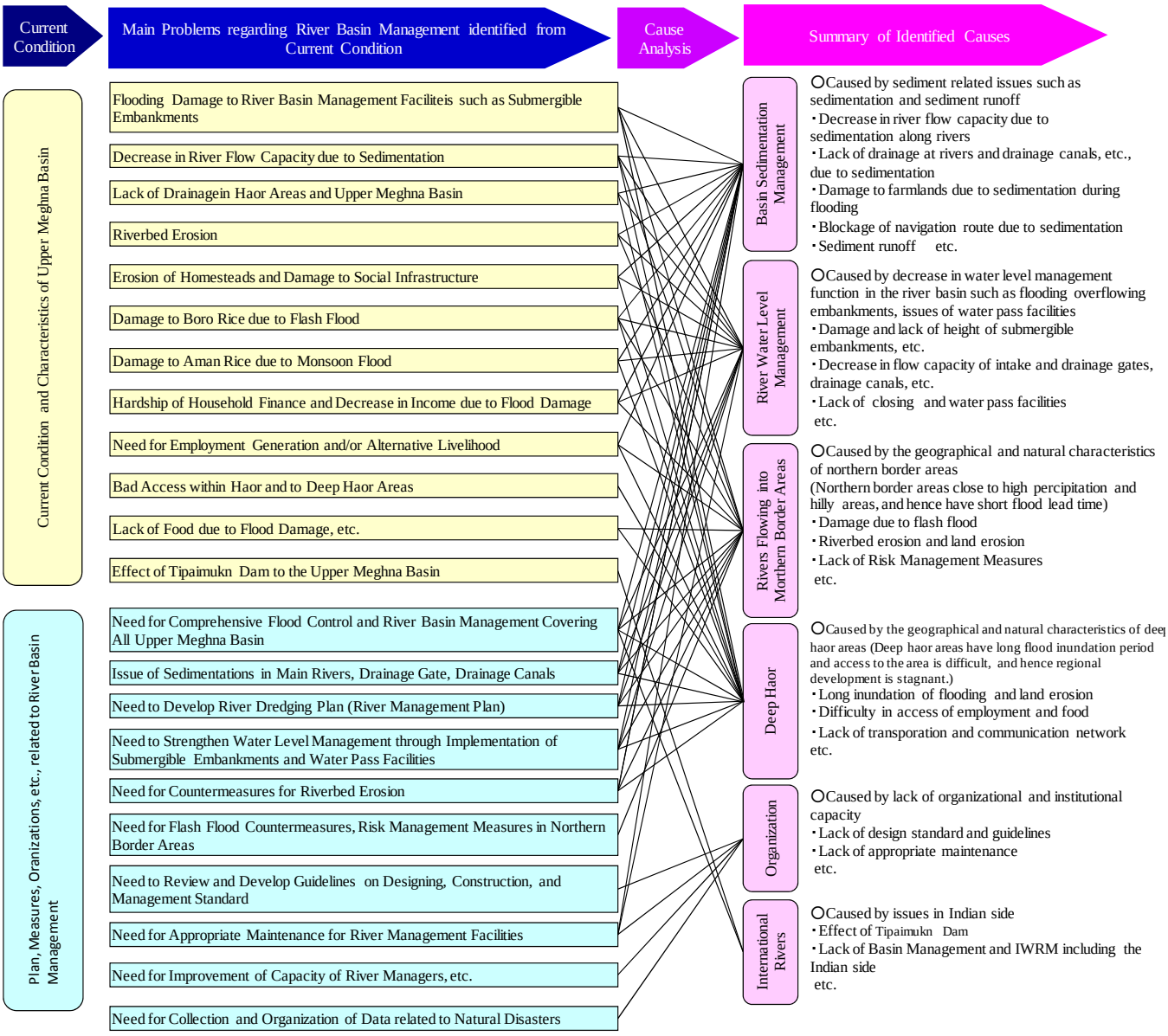


Figure 2-3-1 Current Conditions and Problems of Basin Management

3 Necessity, Effects and Basic Concept of Basin Management

3-1 Necessity and Effects of Basin Management

(1) Reduction of Flood Damage over the Entire Basin

Looking at the Upper Meghna Basin, planned basin management incorporating the viewpoint of the entire basin is not being implemented in consideration of natural and social features, and repeated flood damage is occurring every year. The flooding of 2004 caused damage amounting to approximately 220 billion USD[3], and there is need to take urgent, long-term and sustainable countermeasures in order to mitigate such damage.

The necessity of basin management was also discussed in the FAP in 1990. Following that, the BWDB and BHWDB, etc. have compiled a 5-year strategic plan, the haor rehabilitation plan and the Haor Master Plan (currently being formulated), and flood countermeasures are shifting from the large-scale structural measures of the past to measures more geared to creating a flood-adaptive living environment based on the assumption of coexistence with flooding.

Particularly in the Upper Meghna Basin that has complex and harsh natural conditions, immense natural external forces and characteristics of an international waterway, efforts to achieve total flood protection and simplistic individual countermeasures cannot be effective or sustainable. Rather, it is more important to conduct sediment management and water level management with a view to mitigating flood damage over the entire basin based on the concept of achieving coexistence with flooding and with consideration given to Integrated Water Resource Management (IWRM) and the impacts of climate change, etc.

(2) Necessity of Basin Management Viewed in terms of Secondary Effects and Long-term Effects

The Upper Meghna Basin contains approximately 4,000 km^2 of haor areas that becomes inundated during the rainy season, and the flood damage that occurs every year greatly hinders poverty mitigation efforts and local economic development and is a fundamental cause of poverty.

Therefore, through conducting flood damage mitigation and eliminating the fundamental cause of poverty through conducting basin management, contribution can be made towards reducing poverty, achieving food security and promoting local economic development in the Upper Meghna Basin. Moreover, through making a contribution to reducing poverty, which is the top priority facing Bangladesh, this will be beneficial to the country as a whole.

1) Poverty Alleviation

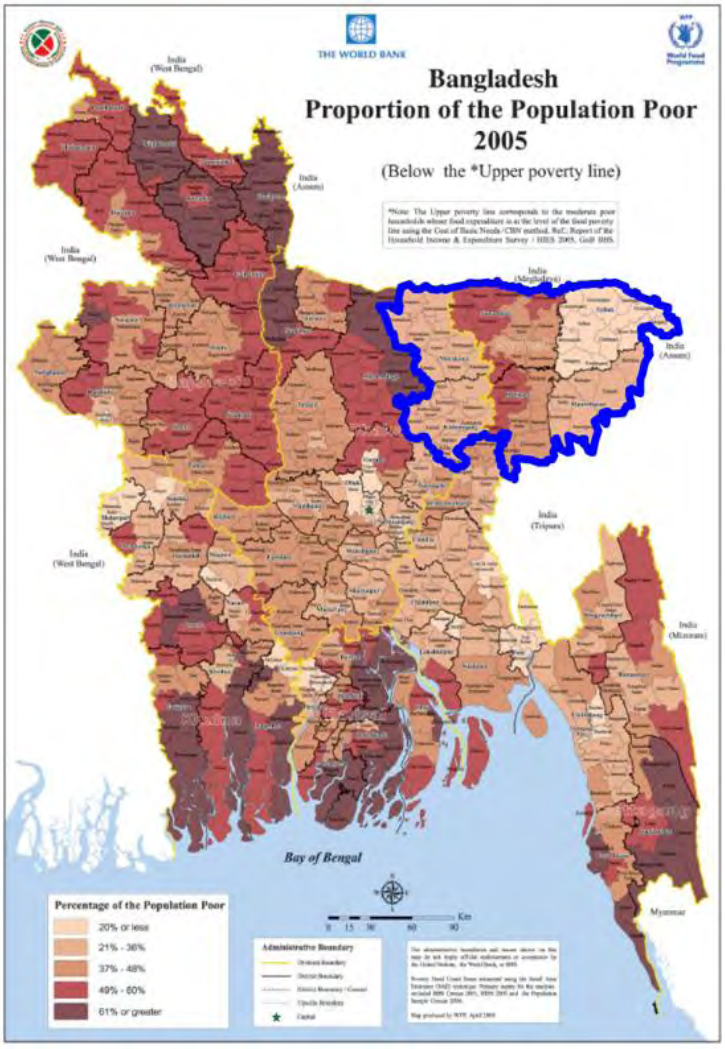
In the haor areas that constitute the majority of the Upper Meghna Basin, many upazillas are impoverished due to the harsh natural conditions, and the fundamental cause of such poverty is the pressure imparted on livelihoods as a result of frequently occurring flooding (see Figure 3-1-1). When flooding occurs, massive damage is imparted to agricultural products, fisheries and livestock, etc. and many households lose their means of livelihood.

[3] Centre for Research on the Epidemiology of Disasters, Website

In addition, since it requires uncalled-for expenditure in order to recover the houses and property, etc. destroyed by flooding, numerous households that do not posses sufficient savings are forced to borrow money, thereby deepening the negative cycle of impoverishment. The ratio of households confronted with long-term or temporary bankruptcy is approximately 40 percent in the whole of Bangladesh; however, this figure rises to between 50~70 percent in haor areas. As a result, per capita GRP in haor areas in 1999/2000 was 266~322 USD, approximately 10~30 percent lower than the national average of 363 USD/person.

Furthermore, since more than 60 percent of workers in haor areas are engaged in agriculture, many households become unemployed during the agricultural off-season. Accordingly, almost 50 percent of households have no employment depending on the season and area.

Accordingly, in order to overcome the situation where destruction of means of income and property by flooding exasperates poverty, it is necessary to take measures that will contribute to the mitigation of flood damage (basin management).



Note: Blue line indicates the target area.

Figure 3-1-1 2005 Poverty Map

2) Food security

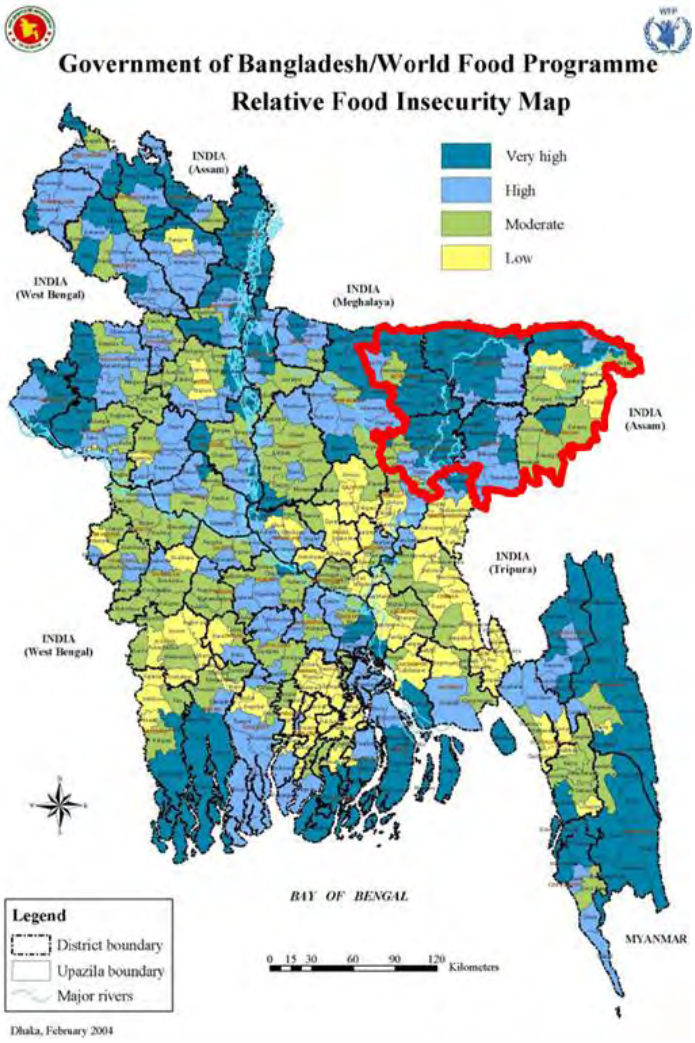
Agriculture and fisheries in the Upper Meghna Basin greatly contribute to the local and national food security; however, losses of agricultural products (in particular Boro rice) as a result of flooding represent a major threat to this security.

This region is viewed as an important grain basket in Bangladesh and produces approximately 14 percent of the country's Boro rice. Since Boro rice harvested before the rainy season becomes a valuable source of food during the rainy season, any damage to Boro rice caused by flooding has a critical impact on the food situation during this time. The majority of haor areas are constantly exposed to a critical threat to food security due to the losses of agricultural products and so on caused by flood damage.

In these circumstances, in policy and plans related to agriculture in Bangladesh, it is intended to coordinate cultivation seasons and conduct appropriate agricultural development, infrastructure construction and flood control in the Upper Meghna Basin with a view to boosting agricultural yields and thereby making a contribution to securing and maintaining food self sufficiency. In the national food policy implementation plan (2008-2015) too, food security in the Upper Meghna Basin is regarded as an important item.

In the fisheries sector too, catches of the representative freshwater fish species of carp and catfish in the Upper Meghna Basin account for roughly 40 percent of catches in Bangladesh. Moreover, this area accounts for 45 percent of the national production of prawns, which are important export commodity, indicating just how important the Upper Meghna Basin is as a source of fisheries resources.

Accordingly, not only is it important to mitigate flood damage and reduce damage to agricultural products (especially Boro rice damage) from the viewpoint of food security, but also it is necessary to conduct appropriate water resources management and basin management without threatening fisheries resources.



Note: The red line indicates the target area

Figure 3-1-2 Map of Food Insecurity

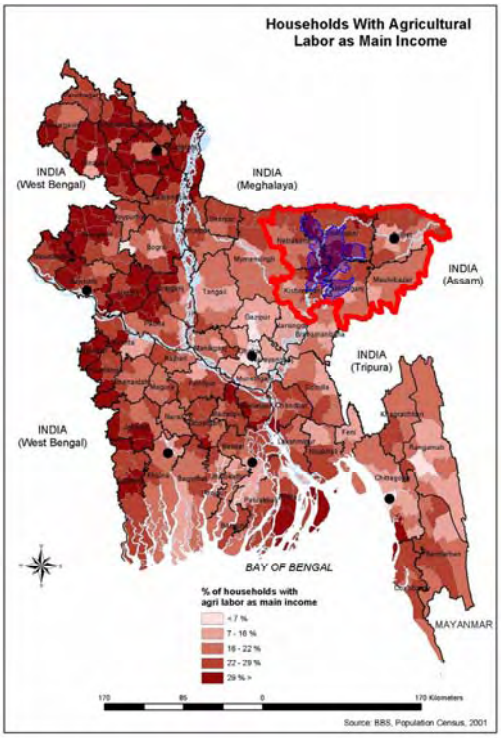
(3) Promotion of the local economy

The Upper Meghna Basin is faced with harsh natural conditions and repeated flood damage, which impoverishes the local economy.

In rural poverty alleviation in Bangladesh, access to urban economies, access to the industrial and service sectors and promotion of local economy are generally regarded as important. If access to employment can be facilitated, thereby promoting local economies, new forms of employment will be generated and a synergistic effect will be created in poverty alleviation and local economic development.

However, in haor areas, because employment opportunities in the industrial sector and service sector are scarce (see Figure 3-1-3), transport conditions are hindered by flooding especially in the dry season and households do not possess the savings or funds to engage in migrant labor, access to employment opportunities in cities is restricted. Furthermore, the Upper Meghna Basin has some of the worst access to the capital Dhaka in the whole country (see Figure 3-1-4). For this reason, people cannot find work and are forced to live in poverty; moreover, the harsh natural conditions and repeated flood damage in this region impede local economic development. Against such a background, the aforementioned National Food Policy Action Plan (2008-2015) stresses the need for not only food security but also systematic employment creation in order to assist impoverished people in haor areas.

Accordingly, in order to create employment and promote the local economy in this area of limited economic opportunities, it is necessary to mitigate flood damage to social infrastructure such as embankment roads and residential areas, etc. and to conduct basin management that takes the entire region into account.



Note: The red line indicates the target area, and the blue line shows the central area where the impacts of flash floods are largest.

Figure 3-1-3 Percentage of Household with Agricultural Labor as Main Income

Note: The red line indicates the target area.

Figure 3-1-4 Travel Times to Dhaka on the Road Network

3-2 Basic Concept of Basin Management

As was mentioned earlier, basin management comprises the three components of organization/setup, budget and appropriate planning (basin management planning) based on an appropriate basic ideal and basic policy. In the Upper Meghna Basin, basin management is now being implemented based on plans for haor rehabilitation and a Haor Master Plan (currently being compiled) incorporating the basin-wide perspective by the BWDB and BHWDB.

The basic concept of basin management, as is indicated in the NWMP, etc., is shifting to "coexistence with flooding" and "creation of a flood-adaptive environment" in consideration of past and present basin management policies, basin characteristics and flood damage characteristics.

In considering the concrete elements of basin management planning, attention is directed to basin-wide water level management and sediment management reflecting the basin characteristics and flood damage characteristics.

4 Outline of the Cooperation Program (Draft)

4-1 Japan's Assistance Policy

Since poverty alleviation is a top priority for Bangladesh and an issue that the Bangladeshi authorities are tackling through the PRSP, the Study will aim to propose a cooperation program that will contribute to this objective.

In addition, in order to effectively utilize limited resources, cooperation program should focus resource input to specific target while considering the strength of Japan. Meanwhile, cooperation program can also stabilize or expand the outputs so far by cooperation by Japan.

Therefore, in order to mazimize the effect of cooperation with limited resources, the proposed cooperation program considers completed and on-going assistance by Japan and demarcation among various donors within the related sectors in the Country Assistance Plan.

4-2 Status in Bangladesh National Policy

Based on recognition that natural disasters arising from flooding, severe storms and cyclones impart massive impacts on the society and economy, the PRSP (October 2005) stressed the importance of establishing a disaster management setup that includes early warning, and this cooperation project, which aims to mitigate damage from natural disasters, is regarded as one element in establishing of the disaster management setup.

4-3 Movements in International Agencies and Aid Donors

Assistance in the flood disaster field in Bangladesh has been continuously provided by the WB, Asian Development Bank (ADB) and UNDP, etc. In recent years, measures to address river bank erosion in line with bridge projects have been an important theme, and this has also been the case in the Padma Bridge project implemented under loan aid. In addition, urban flooding and drainage countermeasures suited to climate change have been conducted together with capacity building of the BWDB.

These measures aim to raise disaster prevention capacity on the nationwide level, and they do not focus particular attention on the Meghna River Basin. However, it is desirable to analyze outputs that relate to Meghna River Basin and incorporate them into basin management plans. Table 4-3-1 gives an outline of the cooperation projects that are being conducted by the WB, the Netherlands, ADB, UNDP and Denmark in the flood disaster field.

Table 4-3-1 Outline of Assistance by International Agencies and Aid Donors

Main International Agency and Donor	Outline of Main Assistance
Co-financing	**Bangladesh Padma Multipurpose Bridge Project** • This project to build a massive bridge over Padma River costs 2.9 billion USD, and the Project Appraisal Document was announced in January 2011.
WB (World Bank)	**Water Management Improvement Project** • This project was started in 2007 with the objective of improving national water management under participatory planning and management including local communities. The project is composed of the following three components: (1) Support of rehabilitation and improvement of 102 existing facilities and transfer of management technology to local communities (2) Improvement of operation and maintenance for 98 existing facilities (3) Organizational capacity building of the BWDB and WARPO • So far, based around the Project Coordination Unit established in the BWDB, efforts have been made to recover from the disaster caused by Cyclone Sidr in 2008. Work has not yet been started on facilities in Components (1) and (2), and in February 2011, the number of targets was revised to 32 and 35 respectively.
Netherlands	**Estuary Development Programme** • This project aims to conduct large-scale reclamation works targeting 6,000 km^2 of coastal area in Bangladesh. Based on the creation of land via the promotion of sedimentation in cofferdam embankments, this aims to expand farmland, address flooding, high tides and coastal erosion being exasperated by climate change, and boost food production and take poverty countermeasures based on farmland expansion and economic promotion.
ADB (Asian Development Bank)	**Secondary Towns Integrated Flood Protection Project Phase II** • Targeting nine cities throughout the country including three cities in Meghna River Basin (Brahmanbaria, Mymensingh and Sunamganj), this project has been conducted since 2004 and comprises flood countermeasures, drainage system improvement, urban environmental development (solid waste, hygiene, illegal squatters), capacity building and implementation support. **Supporting Investment in Water-Related Disaster management (ADB-ICHARM)** • International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM) implements technical cooperation in order to facilitate future disaster prevention-related investment to Asian countries that struggle with flooding. Concerning Bangladesh, cooperation was implemented from 2009 to 2011 regarding model practice of community-led flood management and review of flood early warning systems and proposals for the future.

Main International Agency and Donor	Outline of Main Assistance
UNDP	**Comprehensive Disaster Management Programme Phase II (CDMP II)** • In the CDMP implemented between 2004-2009, the Ministry of Food and Disaster Management promoted disaster management and a cross-ministry management program was conducted with a view to enabling related agencies to play appropriate roles in gauging disaster management. In Phase II, which is being conducted as follow-up to this from 2010 to 2014, efforts are being conducted on six outputs, i.e. organizational and institutional strengthening for comprehensive risk reduction, risk reduction in rural areas, risk reduction in urban areas, improvement of disaster preparations and responses, utilization of development funding in disasters, and examination of community level adaptation measures for climate change.
Denmark	**Assistance to Climate Change Adaptation and Disaster Risk Reduction in the NE Region of Bangladesh** • This project aims to seek changes in rainfall patterns and rainfall from the local climate model and climate change scenarios, and primarily to analyze impacts on Boro rice in the pre-monsoon season. The target area also includes Meghna River Basin, and impacts on embankments are being analyzed in the pilot area of Sunamganj. Since 2009, assistance has been provided to the Flood Forecasting Warning Centre (FFWC) (BWDB) and IWM.

4-4 Overall Policy of the Cooperation Programs

The cooperation programs were examined based on the priority issues. The following three items were adopted as the overall policy in compiling the programs.

➢ Policy 1: Programs that can be expected to impart impacts in haor areas

Haor areas have high development potential in terms of agriculture, fisheries, construction materials and communication to the Dhaka metropolitan region, etc. However, in the northern areas and upazillas that possess multiple haors, poverty remains chronic and it is necessary to construct programs that can impact overall area development via disaster prevention and development from the viewpoint of reducing social vulnerability. Furthermore, following program implementation, it will be necessary to encourage sustainability and continuous operation on the Bangladeshi side.

➢ Policy 2: Programs that consider organization and budget for haor management

Currently, programs geared to improving the organization and systems of WARPO and the BWDB and promoting local community participation are being implemented under cooperation from the World Bank. Meanwhile, BHWDB, which was established by presidential decree, is charged with developing and preserving haors, however, its functions are inadequate in terms of organization, facilities, maintenance and guidance capacity.

Accordingly, it is thought that development of haor areas can be accelerated through giving the BHWDB ample functions. Moreover, it is necessary to conduct programs that contribute to the

construction of basin management capacity including maintenance of water utilization facilities, etc. inside haors.

- Policy 3: Programs that can strengthen and complement Japan's support performance and record and activities currently in progress

Japanese support for disaster countermeasures within the priority sector of "social development and human security" has continued for almost 20 years since the FAP. Such support has entailed assistance for installation of flood warning facilities, construction of cyclone shelters, river shore erosion countermeasures, and planning and survey on coexistence with flooding, and the effects are steadily manifesting. Moreover, Japan is currently implementing a technical cooperation project for LGED and a fund cooperation program concerning rural community development in the southwest. Meanwhile, as the risk of disasters caused by climate change increases, it is necessary to realize high quality outputs that take changes in the Bangladeshi needs and global conditions (food security) into account.

Accordingly, a program will be devised that upholds the effects of activities currently in progress and past assistance and can promise outputs with even greater added value.

4-5 Identification of Priority Issues to be Considered for Cooperation

Priority Issues to be considered for cooperation are identified through identifying and organizing problems of river basin management based on the results of this Study.

Figure 4-5-1 shows the the results of consolidated priority issues.

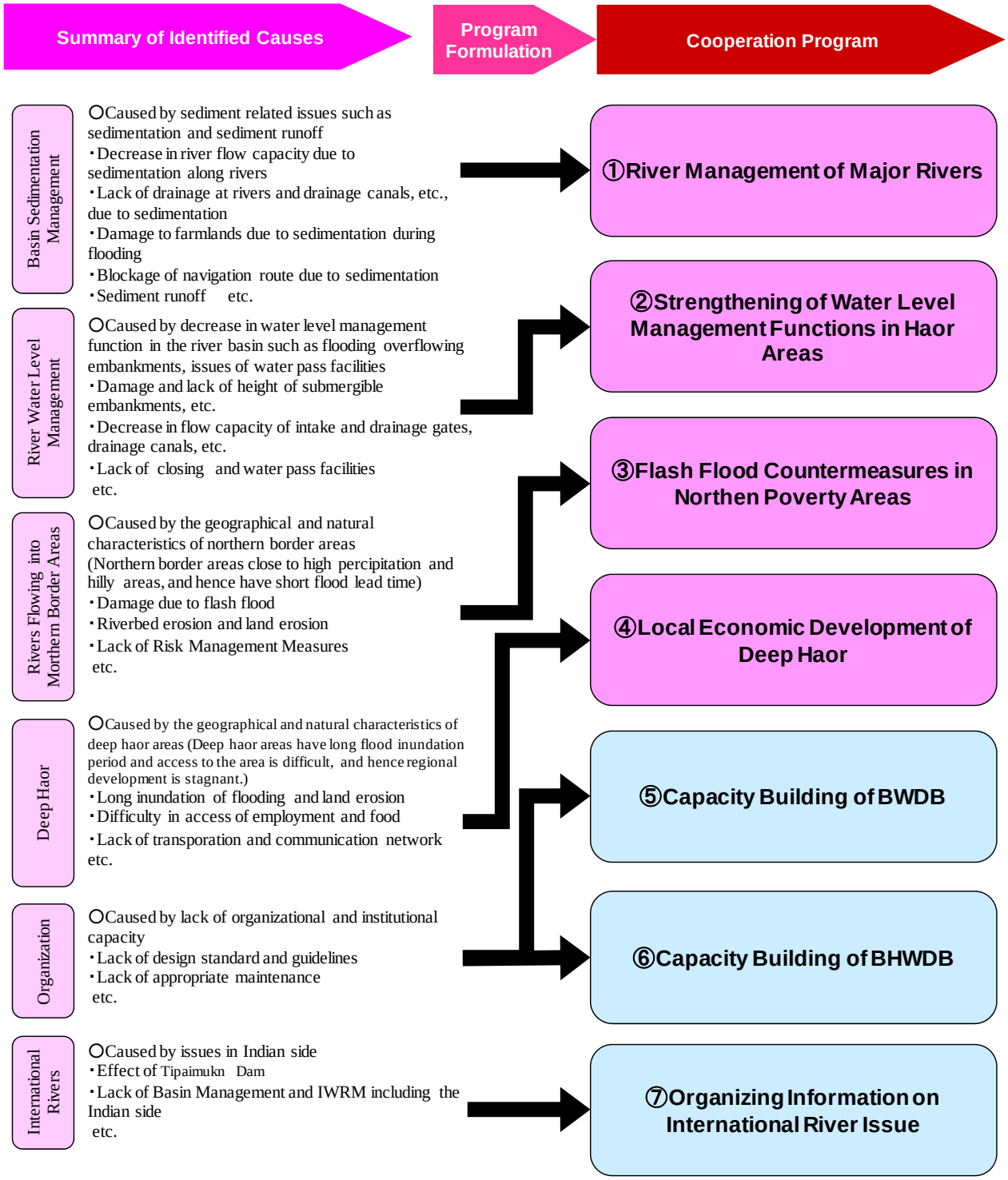


Figure 4-5-1 Summary of Issues and Cooperation Program

4-6 Outline of the Cooperation Programs

Table 4-6-1 shows a list of cooperation programs.

Table 4-6-1 List of Cooperation Programs

			Cooperation Program Title	Objectives	Main Activities	Proposed scheme/ period
Basin Management	Basin management (mitigation of flood damage)	Basin sediment management	①River management of major rivers	・Reduction of inundation area/ Reduction of flooding period	・Development of river management (dredging) plan (development of management standard, effective use of sediment, transfer of operation technology)	Loan (5 years)
				・Securing local land and water transportation	・Dredging of Surma River	
					・Dredging of Kushiyara River	
		Basin water level management	②Strengthening of hydrological functions in haor areas	・Securing production of agriculture (Boro rice)	・Securing function of drainage canals (dreding etc.)	Loan (5 years)
				・Securing fishery catches and water transportation	・Rehabilitation of embankments	
				・Conservation of natural environment	・Drainage earthwork and facilities	
				・Local management through public participation (employment generation)	・Quality management of construction materials (transfer of know-how on mechanical stabilization , effective use of sediment, utilization of vegetation plantation), technology development of sediment utilization (soil cement, etc.)	
					・Community participation (local management, employment generation)	
		Measures for rivers flowing into northern border areas	③Flash flood countermeasures in northern poverty areas	・Poverty alleviation (employment generation) ・Reduction of flash flood damage ・Stable supply of sediment materials	・Excavation of sediment	Loan (2 years)
					・Construction of embankment and retarding basin	
					・Countermeasures for sedimentation (dam, river erosion countermeasures)	
					・Construction of disaster management facilities (shelter, warning system, etc.)	Grant (2 years)
					・Establishment of community-based disaster management setup (NGO partnership)	
					・Development of hazard maps (risk assessment)	
		Deep haor measures	④Local economic development of deep haor	・Poverty alleviation (employment generation)	・Strengthening of access between east and west side of haor (utilization of road and water transportation)	Loan (3 years)
				・Alleviation of domestic economic gap	・Establishment of disaster prevention station (for storing food and emergency relief materials)	
					・Strengthening of communication function with poor areas	
	Organizational capacity building	Implementation of basin management	⑤Capacity building of BWDB	・Building capacity of basin management implementation ・Facilitation of partnership with communities	・Training of managerial technicians (strengthening of implementation of basin mangement, partnership with communitieis, collaboration with BUET)	Technical Cooperation (3 years)
					・Developing guidelines on design, construction and management	
					・Systemizing information on maintenance	
		Evaluation of basin mangement	⑥Capacity building of BHWDB	・Monitoring regional development ・Coordination among sectors	・Reviewing Haor MP (Development of action plan)	Technical Cooperation (3 years)
					・Strengthening of monitoring function of the haor region	
	Others		⑦Organizing information on international river issue	・Impact assessment of Tipaimukn Dam	・Impact assessment survey on Tipaimukn Dam (scale, operation rules, etc.)	-

APPENDICES

APPENDIX-1
LIST OF COUNTERPART PERSONNEL

Bangladesh Central Government

Institutions	Name
Bangladesh Haor Wetland Development Board (BHWDB)	
Director General	Major Golam Kibra Khan Choudhury
Director (Admin & Finance)	Engr. A.K.MmozzemHossain
Director	Eng. Md. Rowshan Ali
Additional Director (Civil)	Engr. Shahidul Islam
Bangladesh Inland Water Transport Authority (BIWTA)	
Director (Conservancy & Pilotage Dept.)	Md. Emdadul Haque
Director (Planning)	Mr. Mahmud Hasan Salim
Deputy Director (Conservancy & Pilotage Dept.)	Mr. Sadiqul Islam
Bangladesh Water Development Board (BWDB)	
Chief Staff Officer	Mr. S.M. Shaidul Haque
Chief Engineer	Mr. Dhali Abdul Quium
Chief Engineer (Hydrology)	Engr. A. H. M. Kausher
Chief Engineer (Design)	Mr. M.A. Kashem
Chief Planning	Engr. Md. A. Wadud Bhuiyan
Director (Planning I)	Engr. Md. Azharul Islam
Superintending Engineer (Chief Planning Office)	Mr. Obaidur Rahman
Superintending Engineer (Processing and Flood Forecasting Circle)	Md. Salim Bhuiyan
Superintending Engineer (Sylhet)	Mr. Syed Ahsan Ali
Executive Engineer (Chief Planning Office)	Md. Sarafat Hossain Khan
Executive Engineer (NE Measurement Division)	Engr. Md. Abdul Hye
Executive Engineer	Mr. S.M.M.Ataur Rahman
Executive Engineer	Mr. Obaidur Rahman
Executive Engineer	Mr. Saleh Ahnemed
Executive Engineer	Mr. Mohammad Shahabuddin
Executive Engineer (Design Circle)	Md. Jahangir Kabir
Executive Engineer (Office of the Chief Planning)	Mr. Fazlur Rashid
Executive Engineer (Maulvibazar)	Md. Mustafizur Rahman
Executive Engineer (Sylhet)	Mr. AKM Shafiqul Haque
Executive Engineer (Netrokona)	Eng. Md. Harun-Ar- Rashid
Executive Engineer (Sunamganj)	Eng. Sailen Chandra Paul
Sub-divisional Engineer	Mr. Mahmud Ilias
Sub-divisional Engineer (Office of the Chief Planning)	Mr. Robin Kumar Biswas
Sub-divisional Engineer (Planning I)	Md. Abu Bokkor Siddik
Sub-divisional Engineer (Sylhet)	Mr. Taposh Kanti Punkaystha
System Analyst	MD Mohiuddin Ahmed
Center for Environmental and Geographic Information Services (CEGIS)	
Executive Director	Mr. Giasuddin Ahmed Choudhury
Deputy Executive Director (Development)	Mr. Maminul Haque Sarker
Chief Specialist and Director (Business Development and Admin and HRD)	Mr. Sultan Ahmed
Director (Climate Change Study Division)	Mr. Malik Fida A khan
Director (Water Resources Division)	Md. Sarafat Wahed
Adviser	Mr. Mozadded Faruq
Department of Agricultural Extension (DAE), Ministry of Agriculture	
Additional Director (Planning and Evaluation Wing)	Mr. Kbd. M. A. Salam
Deputy Director (Sunamganj)	Md. Abdul Mannan
Deputy Director and Assistant Director (in charge) (Sylhet Division)	Mr. Jaydeb Roy
Upazilla Agriculture Officer (Srimongol)	Mr. Kabir Ahmed
Department of Environment (DoE), Ministry of Environment and Forest	
Director(Climate change)	Mr. Fazle Rabbi Sadeque Ahmed

Institutions	Name
Department of Fisheries (DoF), Ministry of Fisheries and Livestock	
Assistant Director District Fishery Officer (Sunamganj) Upazilla Fishery Officer (Srimongol)	Dr. Md. Sainar Alam Md. Sultan Ahmed Mr. Shohidul Islam
Disaster Management Bureau (DMB), Ministry of Food and Disaster Management	
Director General Assistant Director (GIS)	Mr. Ahasan Zakir Mr. Netai Chandra Dey Sarker
Economic Relations Division (ERD), Ministry of Finance	
Deputy Secretary	Ms. Nasreen Akhtar Chowdhury
Institute of Water Modeling (IWM)	
Deputy Executive Director Director Senior Specialist	Mr. Abu Saleh Khan Mr. Sardar M shah-Newaz Md.Sohel Masud
Joint River Commission (JRC)	
Executive Engineer	Md. Mahmudur Rahman
Local Government Engineering Department (LGED)	
Superintending Engineer(IWRM) & Project Director (SSWRDSP-2) Superintending Engineer Executive Engineer (Sunamganj) Executive Engineer (Small Scale Water Resources Development Project) Senior Assistant Engineer (Participatory Small Scale Water Resource Sector Project) Senior Assistant Engineer	Engr. Moshiur Rahman Md. Moshiur Rahman Engr. Bipul Banik Md. Abdus Salam Mandal Md. Kamrul Islam Md. Abdur Rouf
Ministry of Land (MoL)	
Deputy Secretary Additional Secretary	Mr. ATM Nashir Mia Md. Abu Bakr Sddique
River Research Institute (RRI)	
Director, Hydraulic Research Directorate Senior Scientific Officer Senior Scientific Officer	Md. Nazul Islam Siddique Md. Alauddin Hossai Dr. Moniruzzaman Khan Yusufzai
Road and Highways Department (RHD)	
Chief Engineer Additional Chief Engineer Superintending Engineer Executive Engineer Engineer	Mr. Abdul Khaleque Md. Aminur Rahman Lasker Engr. lftekhar Kabir Md.Shamsul Haque Mr. A. K. M. Paz Karim
Water Resources Planning Organization (WARPO)	
Director General Director	Dr. M A Taher Khandakar Dr. Nilufa Islam

NGOs

Institutions	Name
IUCN	
	Md. Istiak Sobhan
CARE	
Chief of Party, SHOUHARDO II Project Human Assistance Coordinator	Mr. Faheen Y. Khan Mr. Suman SMA Islam
CNRS	
Director Project Coordinator Project Coordinator Site Facilitator	Mr. M.Anisul Islam Mr. Shafiqul Islam Mr. Enamul Mr. Monir
OXFAM	
Humanitarian Programme Coordinator	Mr. Kaiser Rejve
Concern Worldwide	
Assistant Country Director Head of Risk Reduction and Response Technical specialist-construction Project Coordinator	Ms. Kwanli Kladstrup Mr. Bijoy Krishna Nath Mr. Mizanur Rahman Mr. Mahmudun Nabi Khan

Donors

Institutions	Name
Embassy of the Netherlands in Bangladesh	
First Secretary (Devt. Cooperation) Advisor (Water Management)	Mr. Andre C. Vermeer Mr. A. T. M. Khaleduzzaman

Government of Japan

Institutions	Name
JICA Expert	
JICA Expert (RHD) Chief Advisor for Public Survey Administration Advisor on River Management	Mr. Toyoaki ITO Mr. Bokuro URABE Mr. Michio Ota
Embassy of Japan in Bangladesh	
Second Secretary (Development Cooperation and Economic Affairs) Advisor	Mr. Tetsumi TAKAHASHI Ms. Miki YAMAMOTO
JICA Bangladesh Office	
Chief Representative Senior Representative Project Formulation Adviser Program Officer	Dr. Takao TODA Mr. Shigeki FURUTA Mr. Hideki KATAYAMA Mr. Anisuzzaman Chowdhury