

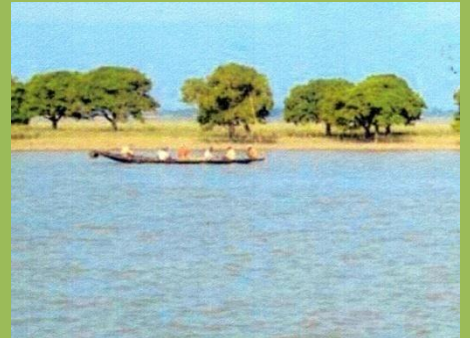


Government of the People's Republic of Bangladesh
Ministry of Water Resources
Bangladesh Haor and Wetland Development Board

Master Plan of Haor Area

Volume I Summary Report

April 2012





Government of the People's Republic of Bangladesh

Ministry of Water Resources

Bangladesh Haor and Wetland Development Board

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Volume 1

Summary Report

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Master Plan of Haor Area

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Preamble

One of the most important steps towards socio-economic rejuvenation following the independence of Bangladesh has been the visionary initiative taken by the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman, in 1974 in creating an independent Board for the development of the Haor region. The tragic event of his assassination, however, put a halt to any progress toward achieving that vision. Over three decades later, the commitment to develop the Haor region has been renewed by the honourable Prime Minister Sheikh Hasina by taking up initiatives to gear up development activities in the Haor region. In this respect, the year 2000 witnessed the establishment of the Bangladesh Haor and Wetland Development Board (BHWDB) through a resolution approved by the Cabinet. The mandate of the BHWDB is to coordinate the activities and formulate projects relating to a holistic development of the Haor and wetlands of the country.

The Haor region has long been lagging behind mainstream of the national development, although the economic development of Bangladesh is moving steadily at a moderate pace. The future challenges in the context of climate change and variability are also a major concern for the sustainable development of the region. In this connection it has become imperative to formulate a Master Plan that aims at integrated development of the Haor area considering its development potential. In fact, one of the prime responsibilities of the BHWDB is to prepare a Master Plan of Haor Area. In order to make it comprehensive and well-articulated, spatial planning technique has been adopted to prepare the Plan with extensive use of space technology and GIS for data extraction, interpretation and information management.

The overall objectives of this plan are in line with the Vision 2021, Sixth Five Year Plan and other relevant policies and plans of the Government of Bangladesh. Accordingly, the objectives of the Master Plan are to develop the resources of the Haor region as rapidly as possible so as to promote the welfare of its inhabitants, provide adequate living standards, social services and equal opportunity, and aim at the widest and most equitable distribution of income and property. Implicit in the policy of the government is an increase in production and distribution of the many kinds of goods and services which together generate and sustain healthy growth towards a modern economy.

The 20-year Master Plan is a framework plan which will be implemented on the short, medium and long term basis. This 'integrated development plan' spells out the means for optimising available resources of the area for future development of potentials by incorporating all relevant social and environmental considerations. Specifically, integrated development would comprise mainly flood management, environmental sustainability, production of crop, fisheries and livestock, expansion of education, settlement and health facilities, road communication, navigation, water supply and sanitation, industry, afforestation, and generation of power and energy. The planned investment portfolios have been prepared for seventeen sectors namely Water Resources, Agriculture, Fisheries, Pearl Culture, Livestock, Forest, Education, Health, Transportation, Housing and Settlement, Water Supply and Sanitation, Industry, Energy and Power, Mineral Resources, Biodiversity and Wetland, Tourism and Social Services.

Multi-organisational involvement and community participation would be the key to successful implementation of the Plan for optimum utilisation of resources and reduction of poverty. Involvement of development organisations and people's participation will create conditions in which the development of sustainable livelihoods and integration of the area into the national development processes can take place.

The implementation of the Master Plan of Haor Area will be financed through the government's own resources and with external support. Public Private Partnership (PPP) has also been foreseen for implementation of the initiatives which are private and commercial in nature. A coordinated monitoring mechanism needs to be set up during the implementation process by developing a set of indicators to measure progress towards achieving a holistic development of the Haor and wetlands of the country.

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Chapter 1 Introduction

Haors with their unique hydro-ecological characteristics are large bowl shaped floodplain depressions located in the north-eastern region of Bangladesh covering about 1.99 million ha (19,998 sq km) of area and accommodating about 19.37 million people. There are 373 Haor/wetland located in the districts of Sunamganj, Sylhet, Habiganj, Maulvibazar, Netrakona, Kishoreganj and Brahmanbaria. These 373 Haor cover an area of about 859,000 ha which is around 43% of the total area of the Haor districts. It is a mosaic of wetland habitats including rivers, streams, canals, large areas of seasonally flooded cultivated plains and beels. Table 1.1 gives the number of haor with areas in the seven haor districts while Figure 1.1 shows the haor location and system in the North-East region of Bangladesh.

The physical setting and hydrology of the haor region have created innumerable opportunities as well as constraints for the inhabitants of the haor. The region has distinctive hydrological characteristics. Annual rainfall ranges from 2200 mm along the western boundary to 5800 mm in its north east corner and is as high as 12000 mm in the headwaters of some catchments extending to India. The region receives water from the catchment slopes of the Shillong Plateau across the borders in India to the north and the Tripura Hills in India to the south-east. Flash flood is the main disaster in the haor area which engulfs the primary production sector (e.g., agriculture) and thus threatens the lives and livelihoods of the people. Excess rainfall in the upstream hilly areas and subsequent runoff, sedimentation in the rivers, deforestation and hill cuts, landslide, improper drainage, unplanned road and water management infrastructure and the effect of climate variability can be viewed as the main reasons for the devastation caused by flash floods.

District	Total area in ha	Haor area in ha	No. of haor
Sunamganj	367,000	268,531	95
Sylhet	349,000	189,909	105
Habiganj	263,700	109,514	14
Maulvibazar	279,900	47,602	3
Netrakona	274,400	79,345	52
Kishoreganj	273,100	133,943	97
Brahmanbaria	192,700	29,616	7
Total	1,999,800	858,460	373

The haor region has long been lagging behind mainstream national development although the economic development of Bangladesh is moving steadily at a moderate pace. The government has taken many initiatives including the preparation of national and regional strategies to steer economic growth and has accordingly prepared plans over the years to boost the country's development. It is difficult to foresee the country's overall progress without the development of the haor region as it covers a major part of the country and population which deserves special development initiatives. The future challenges in the context of climate change are also a major concern for the sustainable development of the region.

Therefore, a Master Plan is required for this area to harness the development potentials by addressing the issues as well as to gain comprehensive understanding on the present hydrological and hydro-morphological characteristics and conditions, land-use patterns, ecological sensitivity and water quality situation. The Bangladesh Haor and Wetland Development Board (BHWDB) has taken the initiative to prepare a comprehensive Master Plan with a view to preserve, protect and restore the ecosystem as well as to protect the people of this area from natural disasters and improve the livelihood of poor people.

The objectives of the Master Plan are to develop the resources of the area as rapidly as possible so as to promote the welfare of the people, provide adequate living standards, social services, and opportunity, and aim at the widest and most equitable distribution of income and resources without degradation of the haor ecology and biodiversity. Implicit in the plan is an increase in production and distribution of all kinds of goods and services which together generate and sustain healthy growth towards a modern economy. The outcome of this planning exercise is in harmony with the Vision 2021, the 6th Five Year Plan and other relevant policies and plans of the Government of Bangladesh (GoB).

This Master Plan is a framework plan for developing the haor areas through optimal utilisation of natural and human resources for the next 20 years (up to FY 2031-32). The Plan has been formulated following the principles of the IWRM. It will be implemented on the short, medium and long term basis with the provision of updating and incorporating rationale changes in demand. It has been formulated in an integrated manner envisioning mainly flood management, environmental sustainability, production of crop, fisheries and livestock, expansion of education, settlement and health facilities, road communication, navigation, water supply and sanitation, industry, afforestation, tourism, use of mineral resources and generation of power and energy.

The Plan will be implemented in three phases and implementation will begin conceptually in the financial year 2012-2013 and will be completed at the end of the financial year 2031-2032. The three phases of the Plan are:

- Short Term: 1-5 years (from FY 2012-13 to FY 2016-17)
- Medium Term: 6-10 years (from FY 2017-18 to FY 2021-22)
- Long Term: 11-20 years (from FY 2022-23 to FY 2031-32)

Implementation of the Master Plan projects will be mainly financed through the government's own resources and with external support that may be available from development partners. Financial support through Public Private Partnership (PPP) has also been foreseen. A coordinated monitoring mechanism will be needed to set up during the implementation process by developing a set of indicators to monitor the progress.

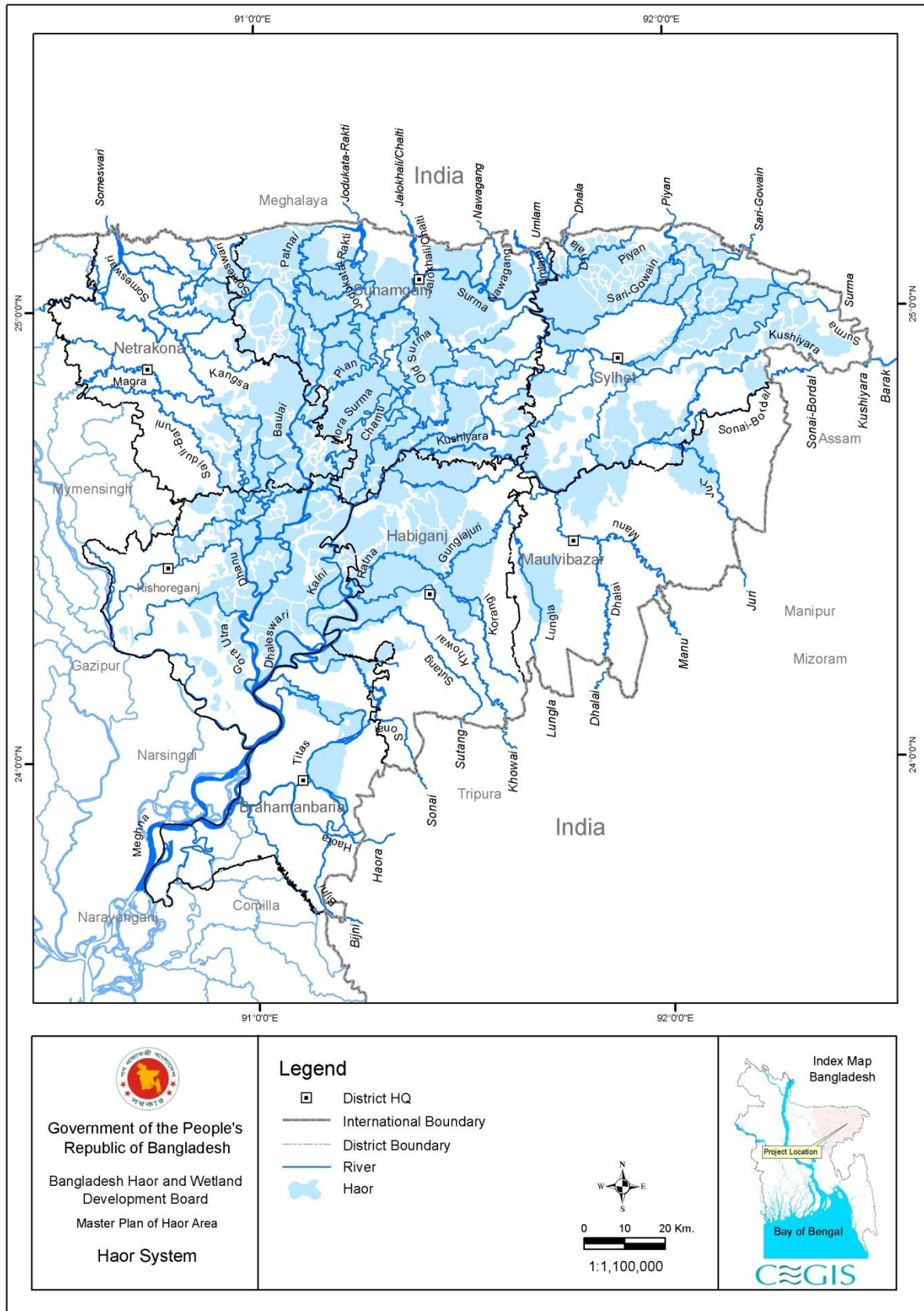


Figure 1.1: Haor of North East Region of Bangladesh

Chapter 2 Planning Process

The Master Plan of the haor area is an “integrated development plan” that optimises available resources for future development potentials, incorporating all relevant social and environmental considerations. The entire planning process is much more dynamic unlike that of the traditional sectoral plans which mainly concentrate on potential development of areas and landuse plans.

Concept of Integrated Water Resources Management (IWRM) approach has been followed in formulation of the Master Plan, which has been defined by Global Water Partnership (GWP) as:

“A process which promotes the co-ordinated development and management of water, land and related resources, in order to minimize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystem”

Spatial planning as well as non-spatial planning (i.e. social and economic planning) techniques have been adopted in the preparation of the Plan. Space technology and GIS have been extensively used in the planning process for data extraction, interpretation and information management. Social techniques which have been followed include Public Consultation Meetings (PCMs) at upazila level, Focus Group Discussions (FGD) and Rapid Rural Appraisals (RRA) at union level for identification of problems, issues, people’s need and project interventions. Moreover, agency level and individual expert level consultations have been conducted to finalize the plan.

Primary data have been collected through survey carried out during PCMs and RRA. Remote Sensing images have been processed and analyzed using GIS techniques. Secondary data have been obtained from National Water Resources Database (NWRD), Bangladesh Bureau of Statistics (BBS) and published documents of different organizations.

A six-step methodology shown in Figure 2.1 has been adopted for the preparation of the Master Plan following the above-mentioned principles. Development of the Plan has been initiated through identification of development issues and problems of various development area sub-sectors such as water resources, agriculture, fisheries, health, education, transportation, ecosystem, etc. In the second step, policy analysis for future directives was carried out. The mandates of the Bangladesh Haor and Wetland Development Board (BHWDB) have been elaborated and an in-depth review has been made on existing policies, strategies and plans to correlate the mandates of the BHWDB with national policy directives. In the third step, the current profile (2010) of physical setting, human, natural and economic resources have been set followed by gap analysis between the base situation and development potential. In



PCM in Mohanganj upazila, Netrakona



FGD with Farmers in Nasirnagar upazila, Brahmanbaria



Agency consultation, DC office, Netrakona

the fourth step, past and ongoing development initiatives have been thoroughly reviewed to learn from the past about the successes, achievements and failures.

These steps have helped to reveal the development potentials of the haor area, which have been considered during the preparation of the master plan. Solutions to problems have been derived considering individual, cross cutting and technical issues as well as the demand of local stakeholders.

Development Area (DA)-wise strategies have been formulated in the fifth step. Based on the development strategies set as such, a development plan has been formulated in the final step.

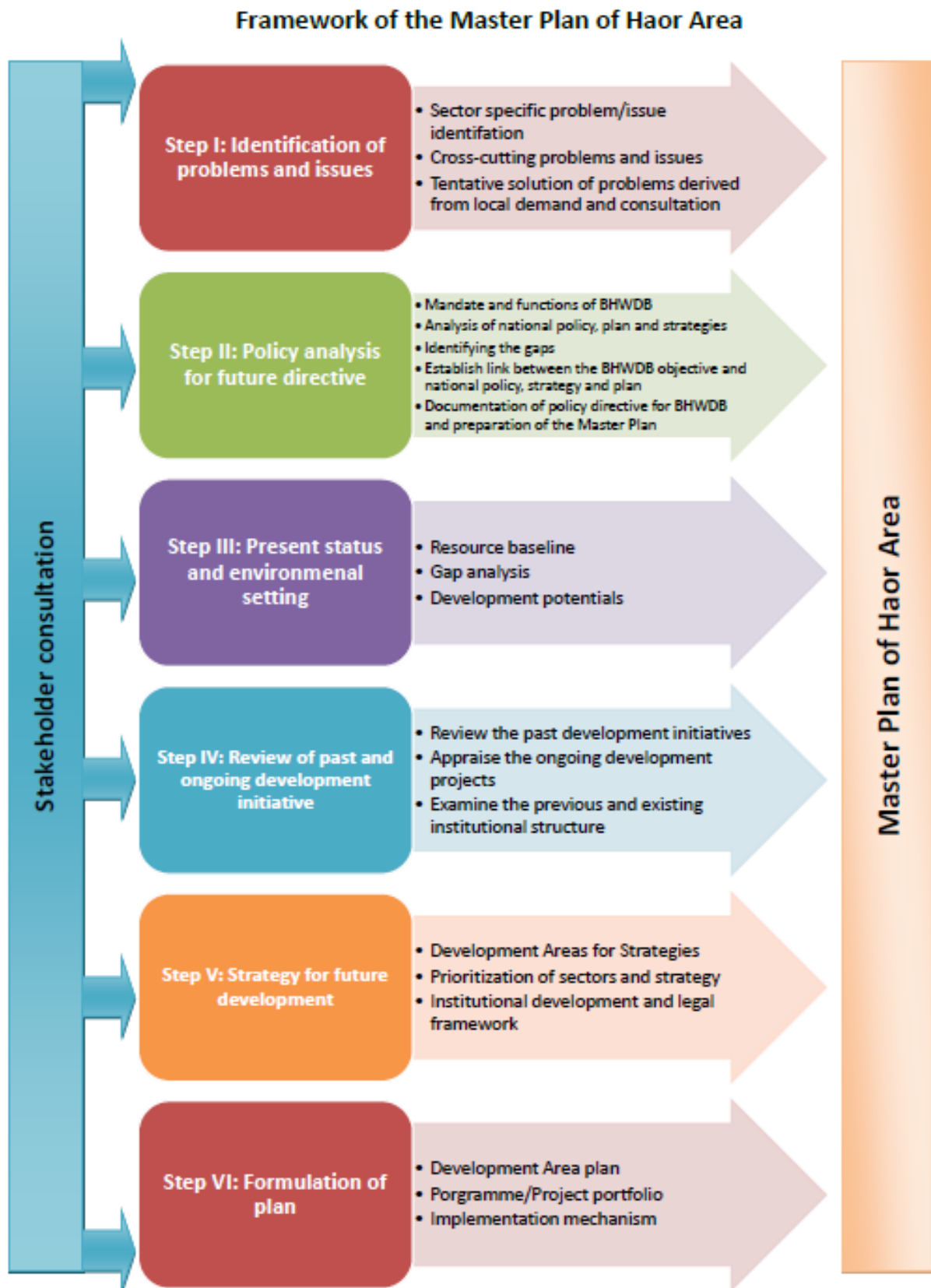


Figure 2.1: Framework for planning process of the Master Plan

Public consultations, an integral part of the participatory planning process, have been conducted to involve stakeholders in the Master Plan preparation process. Mainly three types of consultation have been conducted namely Public Consultation Meetings (PCM) including Focus Group Discussion (FGD) and Rapid Rural Appraisal (RRA), Agency Consultations and Bi-lateral Discussions. Overall participatory action plan development process is shown in Figure 2.2.

PCMs have been carried out in 69 upazilas to identify upazila-wise problems, issues, opportunities and project interventions associated with the haor region for each of the 17 Development Areas (DAs).

The DAs include:

- Water Resources
- Agriculture
- Fisheries
- Pearl Culture
- Livestock
- Forest
- Biodiversity and Wetland
- Transportation
- Water Supply and Sanitation
- Housing and Settlement
- Education
- Health
- Tourism
- Industry
- Power and Energy
- Mineral Resources
- Social services

Concurrent to the PCMs, a total number of 30 FGDs with farmers, fishermen and women groups have been conducted in 10 unions of 10 upazilas to address sector specific problems in detail. RRAs have been conducted one in each of the 14 unions for collection and validation of the socio-economic condition of the haor area. A total number of 34 government and non-government agencies located at upazila and district levels have been identified as Key Contact Groups (KCG). Reports, documents and data through KCGs have been collected and collated. The data are both spatial and non-spatial and in some cases historical and time series. All the main DA reports have been discussed with the KCGs.

A number of meetings, both formal and informal, have been conducted with different agencies, national experts and individuals to get information, data and views on different perspectives. Formal meetings on draft DA reports with respective departments/agencies have been conducted to get their views, opinion and comments. Other than this, formal meetings have also been organised with the Technical Committee and Steering Committee of the project for their recommendations, feedback and advice. Moreover, district level workshop (at Sylhet) and national level workshop (at Dhaka) have been conducted to discuss the (draft) Master Plan of Haor Area. The feedbacks from such meetings and workshops have been incorporated accordingly during finalization of the reports.

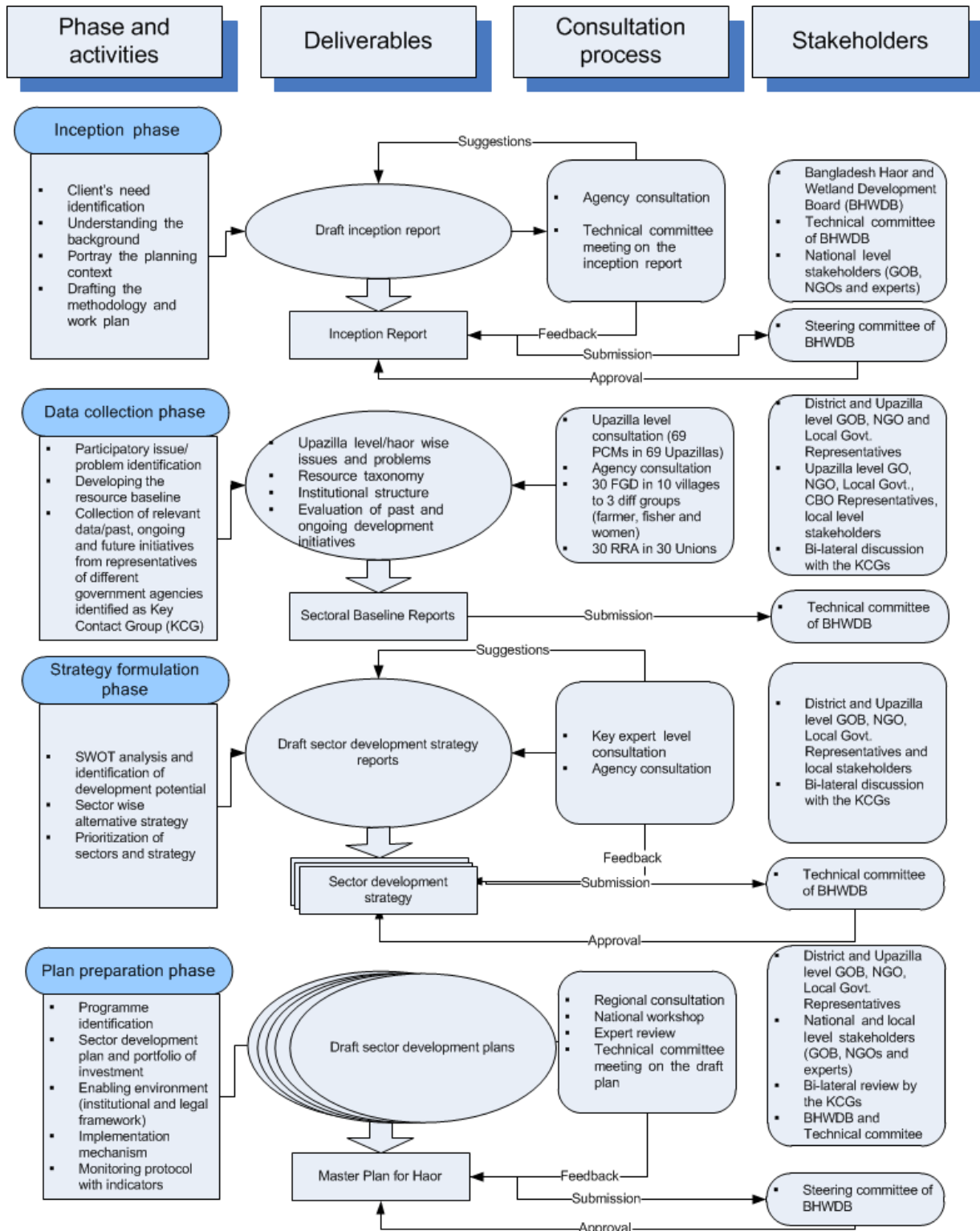


Figure 2.2: Overall Participatory action plan development process

Chapter 3 Problems and Issues

The abundant natural resources that the haor region has been bestowed with could be utilised to enhance the economic condition and quality of life of haor inhabitants. Still the natural settings of the area pose a threat to the development potentials of the region. A range of problems and issues have been identified through a series of consultations conducted at union and upazila level in each of the haor districts.

The natural, physical and social environments influence the life style and the thinking process of the people. The consultation meetings have helped understand the way that haor people perceive the problems of the region and its potentials for development.

As mentioned earlier, the PCMs conducted at the upazila level helped to identify the problems and issues of the haor area. The identified areas of development and issues include:

- Water resources
- Water sharing
- Agriculture
- Fisheries
- Pearl culture
- Livestock
- Social forestry
- Biodiversity
- Livelihood
- Employment opportunity
- Transportation
- Education and health
- Market facility
- Religious institutions
- Graveyards and cremation grounds
- Food godowns and cold storage
- Mini hydropower
- Solar power and fuel
- Tourism, settlements and public security
- Usage of water
- Sanitation
- Industrial development
- Sports and culture
- Social welfare
- Gender concerns
- Institutional infrastructure
- Natural disasters and climate change
- GO/NGO project interventions

FGDs and RRAs have been conducted for an in-depth look at the problems of some of the major livelihood groups working in the haor region. Issues for consultation in the FGDs are environment, haor ecology and biodiversity, disasters, livelihood, gender concerns, transportation, industrialisation, livestock and poultry, public security, people's participation, and development projects. Discussion on livelihood has focused on agricultural practices, fishing and other income generating opportunities. Similarly, topics on development projects, has included the projects likely to be implemented by the government and NGOs and their impacts on the haor area.

The major identified problems are:

- Flash flood
- Siltation and sedimentation of major rivers
- River bank erosion and wave action
- Reduction of navigability
- Lack of proper sanitation
- Scarcity of drinking water
- Fragile and inadequate road network
- Degradation of ecosystem
- Indiscriminate harvest of natural resources
- Over exploitation of fisheries resources and swamp forest
- Weakness in leasing system for fisheries
- Illiteracy
- poverty
- Inadequate health facilities
- Inadequate O&M of existing infrastructure

Chapter 4 Review of Policies, Strategies and Plans

Introduction

Mandates of the BHWDB, Outline Perspective Plan (Vision 2021), the 6th Five Year Plan and different national policies and strategies have been thoroughly reviewed to set the main policy directives for the development of the Master Plan of Haor Area. In addition, over the years, Bangladesh has developed a substantive number of national plans for different sectors which also contain directives relevant to the formulation of the Master Plan of Haor Area. The following important national policies have been reviewed:

- National Water Policy, 1999
- National Agriculture Policy, 1999
- National Fisheries Policy, 1998
- National Livestock Development Policy, 2007
- National Policy for Safe Water Supply and Sanitation, 1998
- National Forestry Policy, 1994
- National Education Policy, 2010
- National Health Policy, 2010
- National Land Transport Policy, 2004
- National Energy Policy, 1996
- National Tourism Policy, 2009
- National Environment Policy, 1992
- National Land Use Policy, 2001
- National Jute Policy, 2002
- National Rural Development Policy, 2001
- National Industrial Policy, 2005
- National Information and Communication Technology Policy, 2009
- National Jalmoahal Management Policy, 2009
- National Renewable Energy Policy, 2008

The National Water Policy, one of the important policies, explicitly mentions the development of the haor area considering its preservation of ecosystem. Box 1 presents the main directives mentioned in the National Water Policy.

Box 1: NWPo directives

Water for Preservation of Haors, Baors and Beels

- a. Natural water bodies such as beels, haor, and baors will be preserved for maintaining the aquatic environment and facilitating drainage.*
- b. Only those water related projects will be taken up for execution that will not interfere with the aquatic characteristics of those water bodies.*
- c. Haors that naturally dry up during the winter will be developed for dry season agriculture.*
- d. Integrated projects will be taken up in those water bodies for increasing fish production.*
- e. Natural water bodies will be developed, where possible, for recreational use in support of tourism.*

The Master Plan of haor area has been formulated to achieve the following six national goals:

- Economic development
- Food security
- Decent standard of living for the people
- Poverty alleviation
- Public health and safety
- Protection of the natural environment

The plans and strategies relevant to the haor area have been extensively reviewed. Lessons learnt from these plans in terms of success and failures have also been thoroughly considered.

The three main national strategies reviewed are: Steps Towards Change, National Strategy for Accelerated Poverty Reduction (2008), the Bangladesh National Conservation Strategy and the Bangladesh Climate Change Strategy and Action Plan, 2009. In addition, the following important plans have been reviewed to formulate strategies for the Master Plan of Haor Area.

- Outline Perspective Plan, 2011
- 6th Five Year Plan of Bangladesh, 2011
- National Water Management Plan, 2004
- EPWAPDA Master Plan, 1964
- Biodiversity Strategy and Action Plan, 1999
- North East Regional Water Management Plan (FAP 6), 1993
- National Environment Management Action Plan, 1995
- National Plan for Disaster Management, 2008

Directives given in some international obligations, such as multilateral environmental agreements, have been considered in the formulation of the Plan. The important agreements are the Ramsar Convention, 1972, the Convention on Biological Diversity, 1992 and the Millennium Development Goals, 2000.

Policy Directive for the Master Plan

The policy statements of the above-mentioned documents provide an extensive framework for the preparation of the Master Plan of Haor Area. Review of these policies, strategies and plans indicates that there are no major contradictions among them, however there are gaps in terms of best use of natural resources, integration of different sectoral objectives and coordination for implementing and monitoring the development activities.

The main policy gap is in landuse planning and land zoning. Principles need to be established that will guide the management of the ever decreasing agricultural land and water bodies and expansion of non-productive landuse over the next 20 years plan period. The land management and leasing systems of haor wetlands are still complex. Land zoning is very crucial for sustainable development of the area keeping the fragile wetlands intact and alive. Proper enforcement of law, essential for the sustainable management of wetlands resources, is another constraint.

Box 2: Functions of the BHWDB

- Coordinate the integrated development of the haor and wetlands of Bangladesh among the ministries, agencies and local government bodies. For this purpose, it is to prepare a Master Plan for integrated development of haor and wetlands;
- Formulate projects related to the development of haor and wetlands and implement projects through local government bodies or other agencies;
- Examine and coordinate different projects to be implemented in haor and wetlands by different ministries and agencies and provide proper advice to the implementing agencies; and
- Take necessary steps to perform the activities of the Board.

As per the Resolution 2000, the BHWDB has been mandated to coordinate the activities for integrated development of haor areas and to formulate relevant projects. The main role of the BHWDB is coordination, monitoring and evaluation of the projects proposed under this Master Plan.

Chapter 5 Context of the Plan

Introduction

Haor resources have been broadly grouped into three categories: human, economic and natural resources based on an understanding of the possible size, composition, resource management and growth potentials for resources in the area. Furthermore, the economic resources have been subdivided into primary productive and service areas. The description of these resources includes the present status (2010) which has been considered as the baseline for preparation of the Master Plan of Haor area.

Human Resources

Population

The total population of the seven haor districts is 19.37 million (projected from BBS, 2001 census). The overall population density in the haor districts is 987 per sq km which is lower than the average national population density of 1142 per sq km.

By the years 2020 and 2030 the population may increase to 21.38 million and 22.92 million respectively. The population growth rate per annum for the overall haor area is 1.09% which is lower than the national rate. It might decrease further from 1.09% to 0.63% by the year 2030, while the overall national growth rate might also decrease from 1.31% to 0.84% over the same period. Figure 5.1 shows the trend of population distribution by age groups for 2010, 2020 and 2030.

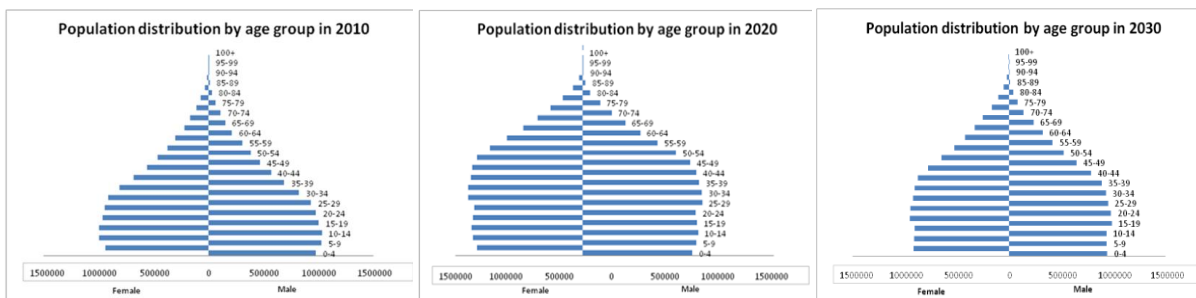


Figure 5.1: Trend of population distribution by age groups

Human resource development is almost certainly the most important factor to be addressed and financially supported if development is to be achieved in the haor region. The current average rate of literacy of 38% and will reach to 63% and 75% by the year 2020 and 2030 respectively.

Urban and rural Population

The proportion of urban people is expected to follow an increasing trend and reach to 12.62% in 2020 and to 13.72% in 2030. The population in the rural areas will follow a steady growth and eventually be stabilized after 2020.

Poverty incidence

In haor area 29.56% of the population lives below the Lower Poverty Level (LPL), which is slightly higher than the national average of 29.26%. Out of the seven haor districts, poverty incidence is the worst in Netrakona (39.5%) and Kishoreganj (34.0%) districts while in other districts it lies within deviation range of 5%. Figure 5.2 presents poverty incidence in the seven haor districts.

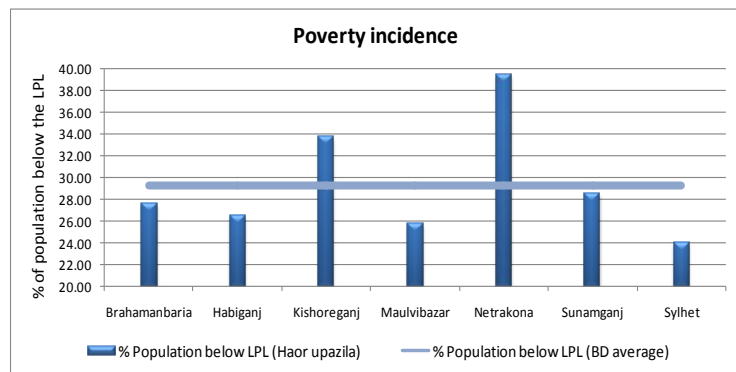


Figure 5.2: Poverty incidence of haor area

Employment status

Employment potential is generally expressed as the participation rate (%) of the number of economically active population above age 15. At present 61.84% of the economically active population in the haor area can serve in the labour force which is higher than the national average (58.74%). Currently, 28.5% of the population of the haor area is not engaged in any kind of employment.

Land ownership

The total house holdings of the haor area can be considered as two types: Non-farm (48%) and farm holdings (52%). The non-farm holdings can be further sub-divided into (i) holdings with no operated area, (ii) holdings with no cultivated area and (iii) holdings with 0.01-0.04 acre cultivated area. The farm holdings can be sub-divided into (i) holdings with marginal farming (0.05-0.49 acres) (ii) holdings with small farming (0.50 to 2.49 acres) (iii) holdings with medium farming (2.50 to 7.49 acres) and (iv) holdings with large farming (7.50 acres and more). Figure 5.3 shows the comparison of non-farm and farm holdings between national and haor area level.

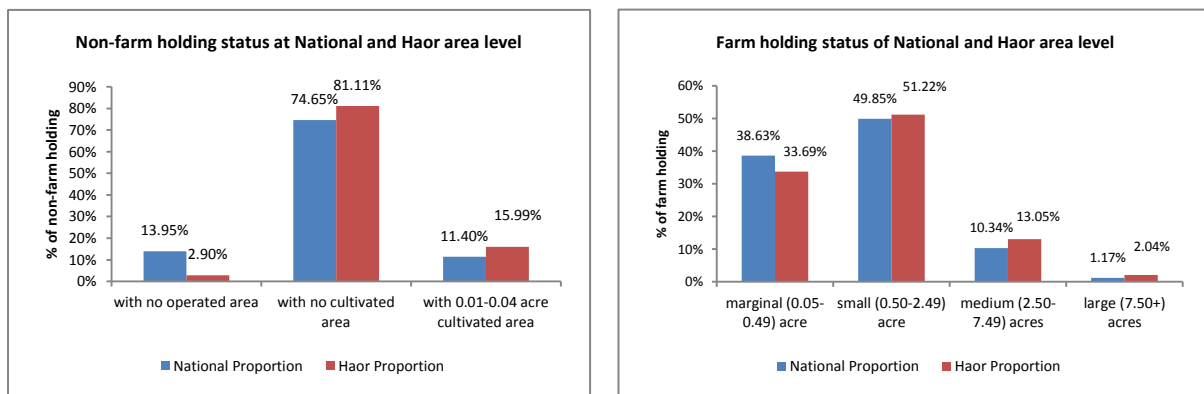


Figure 5.3: Comparison of non-farm and farm holding status

In case of non-farm holdings, it has been observed that “Holding with no operated area” is about 2.9% in the haor region while the national figure is 13.9%. Percentage of holdings with “No cultivated area” is about 81.1% in haor in comparison with national percentage of 74.71%. “Holdings with 0.01-0.04 acre cultivated area” is about 16% in the haor region, while the national figure is

11.40%. In case of farm holdings, comparison between haor and national percentage are for marginal holdings - 33.69% and 38.63%, for small holdings-51.2% and 49.9%, for medium holding 13% and 10.3% and for large holdings 2 % and 1.2% respectively.

The tenure pattern depends on the prevailing practices of land use and crop cultivation. There are three types of tenure groups in the area such as tenant (4%), owner (68%) and owner-cum-tenant (25%). Landowners either cultivate their land themselves or/and have them cultivated by hired labour. The owner-cum-tenant cultivates land of other people along with their own land while tenant farmers (7%) cultivate land belonging to others only.

Occupation

The major occupation of the people of the haor districts is agriculture. Half of the population (53.67%) depends on agriculture for their subsistence. There is a remarkable variation in the occupation of the haor population. A large portion of the population earn their livelihood from business (12.52%) followed by non-agricultural labour (6.13%), service (5.65%), fishery (2.59%), and transport (2.39%). A significant part of the population (3.41%), especially in Sylhet (10.32%), Maulvibazar (4.64%) and Brahmanbaria (4.56%) depends on remittances coming from abroad.

Natural Resources

Water Resources

The haor region lies in the Meghna basin which is part of the Ganges-Brahmaputra-Meghna (GBM) basins. Flow from about 66,640 km² of the Meghna basin is drained ultimately into the Bay of Bengal through the Kalni-Kushiyara and Surma-Baulai river system. Of this area 35 %, or 23,137 km², lies in Bangladesh. The estimated outflow of water from this region into the Bay amounts on average is 162,619 million m³/year. Fifty seven percentage of this flow is generated at the upstream of Bangladesh while 43% is generated within the country. Transboundary flow from India is 70%, 60%, 37% and 80% of total flow in pre-monsoon, monsoon, post-monsoon and dry season respectively. This inflow (mainly pre-monsoon flow) from India into Bangladesh is the main cause of flash flood in the haor area. River system of haor area is shown in Figure 5.4.

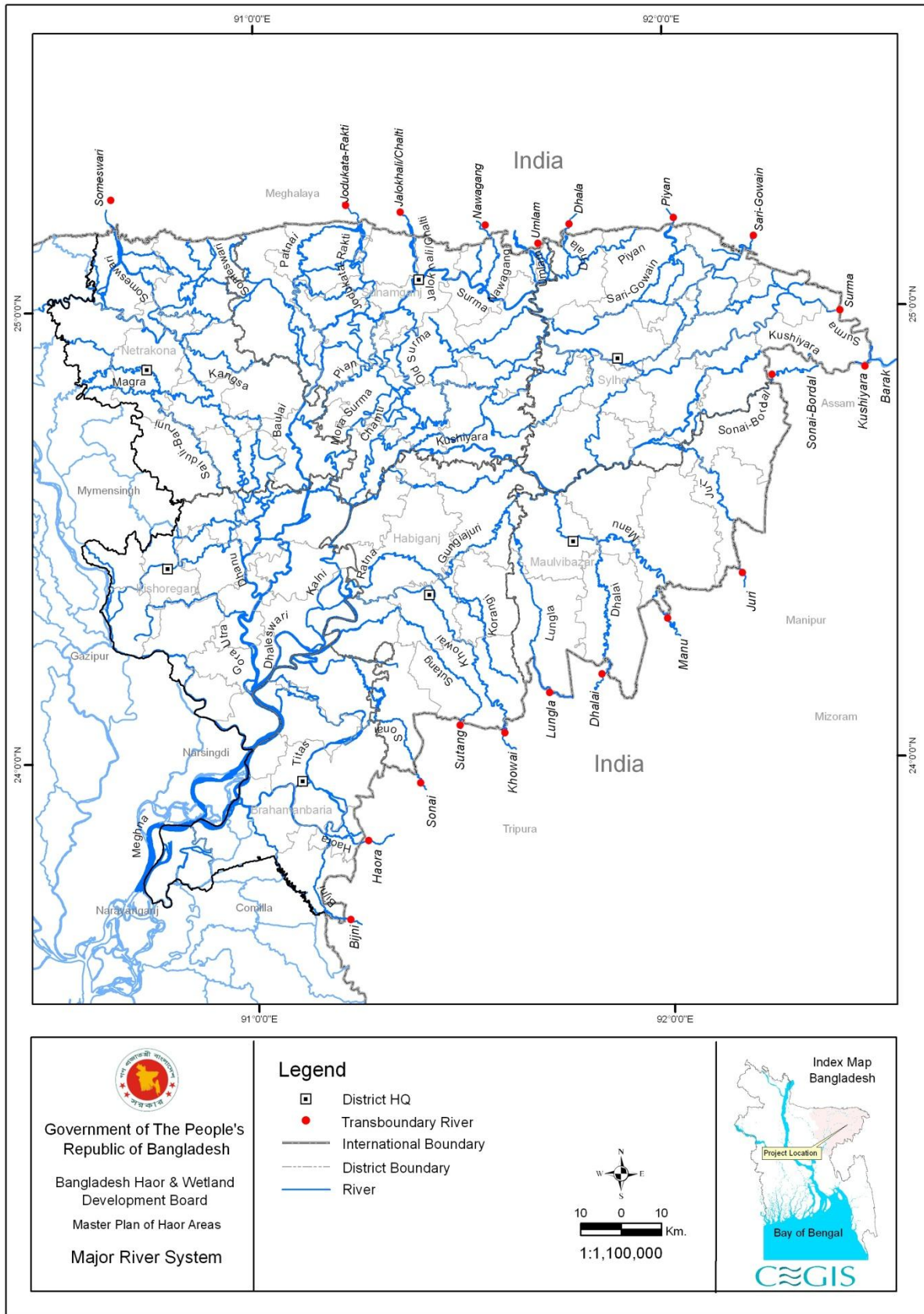


Figure 5.4: River system of haor area

Forest

In the haor basin districts there are hill forest, social forest, fresh water swamp forest, reed lands, murta and cane bush, bamboo grove and homestead vegetation etc. Each type is an aggregated assemblage of particular plant species, and is a characteristic of particular environmental conditions (hydro-period, flow regime, water quality and soil). Wetland condition ranges from perennial aquatic lowlands to seasonally dry uplands. It has been found that 1308 ha of land and 145 km of (strip) area are being planted each year in the haor area. The average trend is about 1% of land being planted each year. The type of plantation is strip plantation which includes bamboo, cane, murta, shegun, agar, etc.

Biodiversity and Wetland

The most significant wetlands in the haor area are Hakaluki Haor, Tanguar Haor, Hail Haor, Matian Haor, Pasuar Beel Haor, Dekar Haor, Baro Haor, Gurmar Haor, Sonamorol Haor, Baram Haor, Kalnar Haor, Kauadighi Haor, and Pagnar Haor. These wetlands have a rich wildlife community including 257 species of bird, 40 species of reptile, 29 species of mammal and 9 species of amphibian. Most of the important haor areas are also enriched by wetland plants and lowland plantation.

Mineral Resources

Various types of mineral and energy resources are found in the haor area. The mineral resources discovered here are natural gas, crude oil, limestone, white clay, glass sand, peat, coal, gravel, and sand as construction material. A projection has been made based on the daily gas production and total remaining reserve of the different wells in haor districts. Up to 2010 the cumulative gas production from gas wells in the haor districts is 8,095 Billion Cubic Feet (BCF) and the remaining reserve is 8,717 BCF.

Economic Resources

Gross Domestic Product (GDP)

The contribution of the haor region has been on average around 6-8% of the national GDP. Considering the regional growth, the current GDP contribution of the haor region in the base year of 2010 is 263 billion, which is 6% of the total GDP of the country. Thirty six percent of which is from the agriculture sector, 27% from the industrial sector and 37% from the service sector. The annual average growth rate of GDP of the haor region is 5% whereas the national average is 6.1%. Figure 5.5 shows the GDP contribution of the haor area to the national GDP.

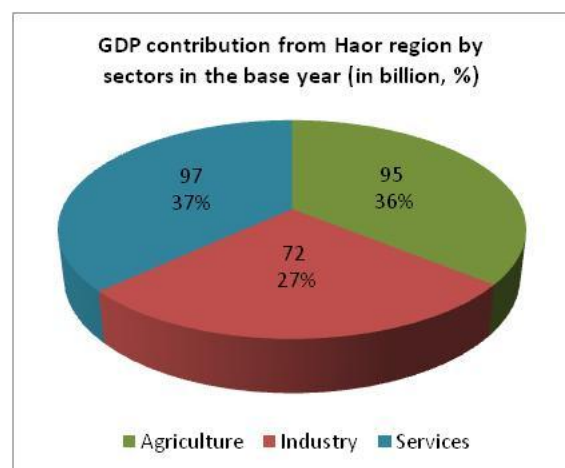


Figure 5.5: GDP contribution from Haor region

Major Productive Area

Agriculture

The total area in the seven district considered under the Master Plan is about 1.99 million ha of which net cultivated area is about 1.31 million ha. Total cropped area is about 1.93 million ha, of which rice is covered by 1.74 million ha (90.2%) and the rest 0.19 million ha (9.8%) is by non-rice crop. The total rice area of Bangladesh is 11.35 million ha of which 15.3% falls in the haor area. The cropping intensity in the haor area is about 147% which is much below the national average of 182%. About 5.25 million metric tons of rice is produced which is 16.5% of the total rice production of Bangladesh. Among the rice production Boro contributes 60%, Aman 33% and Aus 7%. The average rice yield is 3.02 ton/ha.

Fisheries

The haor region comprises a wide variety of fin fish including 143 indigenous and 12 exotic species along with several species of freshwater prawns. Fish species are broadly grouped into two categories, large and small fish. The estimated fish habitat area in the haor region is nearly 966,900 ha. The fish habitats in the haor area produce about 0.432 million ton of fish per year of which 73.7% is contributed by capture fishery and the remaining is shared by culture fishery. Wetlands are breeding, nursing, feeding and overwintering grounds of the resident as well as most of the freshwater migratory fish species. Culture fish ponds in the haor area produce about 0.114 million ton which is 26.3% of the total production.

Livestock

The livestock resources of the haor region are mainly cattle, buffalo, goat, sheep, chicken and duck, with poultry and duck constituting the major types of livestock population. In fact, more than 24% of the country's total duck population exists in the haor region. Mostly cattle, duck and chicken are reared by the haor people. There are around 32.68 million head of livestock (cattle, goat, sheep, duck and poultry) in the community farms of the haor area constituting approximately 22% of the total cattle population in the country. Milk production in the haor districts for 2010 has been estimated to be about 0.62 million ton. Similarly meat production has been estimated as 0.14 million ton in the year 2010. Presently, about 989 million pieces of egg are being produced in the haor districts.

Power and Energy

Out of total number of 15,374 villages in the haor area 6740 number of villages has been brought under electrification which is only about 44% compared to the nationwide coverage of about 72%. The intensity of electrification has still remained low. In 2010, the intensity of electrification as seen from the percentage of households brought under electrification has been only 20% on average across the seven haor districts. Compared to the nationwide average consumption of about 200 kWh per capita, the haor area has consumed only 47 kWh per capita in 2010. The electricity distribution system comprises 46 substations along with 15775 km long 11Kv/6.35 Kv and 9750 km long 0.4 Kv/0.23 Kv distribution lines.

Industry

Industrialisation has not taken place to a great extent in the haor area and consequently the number of industries and people engaged in this sector has been low (1.33% of the total population only). The tea estates of the country have widened the scope of tea processing industries in this region. The major industrial products include fertilizer, cement and liquefied petroleum (propane) gas. Other industries include textiles and leather, chemical and plastic and non-metallic mineral products. The area is endowed with ample natural resource to develop food and beverage which may include fish can product, pineapple and lemon beverage, and cottage industries including shitol pati, bamboo and cane furniture and herbal medicine factories, etc.

Major Service Area**Water Supply and Sanitation**

The haor basin has been mainly inhabited by the mostly poor and unfortunate group with deficient accessibility to basic drinking water options and sanitation services. The haor area has total 7 district and 69 upazilas. Most of the households of the haor area have been found to use tube well water for drinking purposes. About 50% of households depend on water from nearby river/pond for domestic purposes. From the public consultation meeting and discussion with the core haor people it has been found that about 10% of the total population surveyed in haor localities had no idea about safe water (13% from severely flood prone, and 7% and 10% from moderate and normal flood prone areas), 42% referred to tube well water and 25% referred to arsenic free tube well water as safe water.

The major drinking water supply sources in the haor area are mainly tube well, pipe water supply (in town), pond sand filter (PSF), rainwater harvesting system (RWH), deep tube well, etc. From the present situation analysis it has been observed that number of people per water sources is nearly 100 to more than 150 whereas the minimum standard is 50 people per water sources and the recommended value is 25 people per water sources.

Natural disaster, particularly flood is one of the main reasons for poor sanitation status in haor areas. River erosion, lack of road networks, scarcity of land and standing water bodies are major challenges to secure well sanitation in haor areas. Flooding, high water table, excessive rainfall and loose soil formation are the causes of overflow and collapse of pit latrine. Every year most of the areas remain under water for about 4 to 7 months and it wipes out all existing sanitation system. Therefore, it becomes almost impossible for hardcore poor people to reconstruct toilets on a regular basis. The main reasons for poor sanitation coverage in the haor area are lack of proper awareness, coupled with financial constraints. As a result, in average only 44.25% people in the haor region use sanitary latrine. The poorest scenario is in Netrakona where only 34.79% people use sanitary latrine.

From the present situation analysis it has been observed that around fifty (50%) percent of the households have latrines with inadequate capacity. Based on the data analysis of core area it has been found that around 50% people has no access on sanitary latrine and in some places the situation is even worse especially in Dharmapasha upazila of Sunamganj district where it is less than 30%.

Education

The literacy rate of the population of the haor districts is on an average 38%. The haor region is still to achieve Millennium Development Goals (MDG) and Outline Perspective Plan (OPP) goals of 100% literacy. Among the haor districts, Maulvibazar has the highest literate population (42%) followed by Sylhet (41%), Brahmanbaria (40%), Habiganj (37%), Kishoreganj (37%), Netrakona (34%), and Sunamganj (33%). Maulvibazar district also has the highest percentage (72%) of literate women aged 15-24 years. Habiganj has the lowest percentage (56%) of literate women.

About 60-80% of both male and female students attend school in the seven haor districts. The highest rate of attendance is observed in Maulvibazar at 81% and the lowest in Sunamganj at 67%. About 29% to 42% children attend secondary school which is lower than primary school attendance. This also indicates that transition of students from primary school to secondary school is low (60%). Similarly, primary school dropout is very high in the haor region (44%) and in secondary school (61%) and it is due to their poor socio-economic condition.

There are 8381 (7148 in haor) primary schools, 1224 (1009 in haor) secondary schools, 232 (195 in haor) colleges, 2 universities, 625 (93 in haor) madrasas and 30 (26 in haor) vocational institutes in the haor districts.

Health

Health is one of the foremost prerogatives in the national policies and plans namely the MDGs, the OPP, the National Health Programme (NHP) etc. for ensuring national development. Reducing child mortality rates, improving maternal health, and combating HIV/AIDS as well as malaria and other diseases, are the main goals identified in the MDG. The communicable and non-communicable diseases prevalent in the haor area are: asthma, peptic ulcer, anaemia, acute respiratory infection (ARI), worm infection, hypertension, diarrhoea, malnutrition, skin diseases, dysentery, malaria, pneumonia and fever (influenza). Among these diseases the incidence of peptic ulcer, diarrhoea, anaemia, ARI, asthma, worm infection, skin disease and hypertension are the most common. The emerging non-communicable diseases are ischemic heart disease, diabetes mellitus, cancer, chronic obstructive pulmonary disease, mental health problems and injury.

The majority of the women (62% to 85%) in the haor region are assisted by Traditional Birth Attendants (TBA). Delivery conducted by skilled health personnel (Community Skilled Birth Attendants - CSBA) is only 13.4% on average for all the haor districts which is lower than the MDG target of 15% and national average of 18% (BDHS 2007). The average Infant Mortality Rate (IMR) and Child Mortality Rate (U5MR) in the haor area, except for Brahmanbaria district, are 57 (per 1000 infants) and 76 (per 1000 children) respectively which are much higher than the national IMR of 49 and U5MR of 64, and also way beyond the MDG target of IMR of 32 and U5MR of 48.

Health services and facilities in the haor region are available in four tiers: seven hospitals at district level, 58 Upazila Health Complexes (UHC) at upazila level, 500 Upazila Health and Family Welfare Center (UH&FWC) or Rural Dispensaries (RD) at union level, and 1291 Community Clinic (CC) at community level. In the haor upazilas, out of the total numbers, there are 51 Upazila Health Complex and 1009 Community Clinic. The paucity of human resources in health facilities is reflected in the low coverage of population per doctor and nurse. In the haor region, population coverage per doctor is 23,304, which is ten times higher than the national value of 2,785. The lowest coverage is observed in Habiganj (44,000) followed by Sunamganj (37,000) district. The number of population per nurse is

11,729 in the haor region compared to that of 5,782 at national level. This is highest in Kishoreganj (15,920) followed by Maulvibazar (15,553) and Sunamganj (13,000) districts. The nurse-doctor ratio in the haor districts is 1.83:1 on average compared to the national ratio of 2.07:1.

Tourism

Haor are unique wetlands that have potential for attracting tourists. The best time to visit the haor is at the later part of monsoon, i.e. around August-September, when haors are full of water. In winter, the haor and beels receive thousands of migratory birds. It is the ideal season for bird-watchers specially in the Hakaluki and Tanguar Haor, but during that time the haor are reduced in size and loss much of their watery grandeur. Tanguar haor is one of the largest wetland of Bangladesh having an area of about 2802 ha and has been declared as RAMSAR Site under the Ramsar Convention. The Hakaluki haor with 18,000 ha area, has been demarcated as Ecologically Critical Area and Important Bird Area declared by the Government of Bangladesh and Birdlife International for Hakaluki haor. There are a number of locations in the haor districts that could be developed for tourism. In the haor region, 144 numbers of tourism spots of which 37 are natural and 107 are manmade. Madhabkunda waterfall in Maulvibazar, tea gardens in Sylhet, Sholakia Eid ground in Kishoreganj, 'Hazrat Shahjalal' and 'Shahparan' Mazar in Sylhet generates more than 2 lakh of tourists each year. The GoB aims to increase the current GDP rate of the tourism sector from 0.70 to 2% by 2015 and then to 5% by 2021.

Road Transport

Haor areas remain under water for 4-7 months during the pre-monsoon and monsoon seasons. The roads are submerged during this period making it impossible to move from one place to other without using boats.

The road network of haor is comprised 430 km National Highways (NH), 578 km Regional Highways (RH), 937 km district roads and 24,948 km rural roads. The Roads and Highways Department (RHD) is responsible for construction of national, regional and district level roads. Rural roads, consisting of upazila roads (1,090 km unpaved, 1,134 km paved), union roads (3402 km unpaved, 902 km paved), village road type A (11,061 km unpaved, 685 km paved) and village road type B (6,536 km unpaved, 138 km paved) are constructed by the Local Government Engineering Department (LGED). Eleven upazilas out of the total 69 upazilas in the haor districts are not connected with the RHD network. The upazilas are: Austagram, Itna, and Mithamain upazilas in Kishoreganj district; Kalmakanda and Khaliajuri upazila in Netrakona; Dowarabazaar, Jamalganj, Sulla and Tahirpur upazila in Sunamganj district. There are 1005 number of bridges and 2074 number of culverts in the RHD road network of the haor region (RHD 2010). The lowest road coverage is in Sunamganj district while Sylhet has the highest road coverage. Two major routes of the Asian Highway, the AH-1 and the AH-2 cross, Bangladesh through the haor region.

Railway network of 430 km length connects all the districts and 54 upazilas of the haor region with 88 number of railway stations. Only 14 km railway line lies within the Sunamganj district. Bulk of the passenger traffic and cargo enters the haor region through Kasba station in Brahmanbaria District and ends at the Shahbazpur station of the border district of Maulvibazar.

On an average in the haor region, daily traffic is 4,434 of which 66% is motorised and 34% is non-motorised traffic. The average numbers of passengers travelling daily are 33,756 of which 89% travel

in non-motorised vehicles and the rest in motorised vehicles. Annually, more than one crore population moves within or through the haor region.

Inland Navigation

There are 25 (inland water Transport) routes covering a length of 1,829 km which remain navigable during monsoon from May-September (BIWTA 2010). However, during the lean period (October-April) inland vessels cannot navigate about 1000 km of the waterways. There are 205 landing stations used by inland vessels and mechanised country boats. Under the existing Protocol on Inland Water Transit and Trade with India the route between Ashuganj and Zakiganj (296 km) has been considered as one of the routes for transporting transit cargo of India through the territory of Bangladesh.

It has been estimated that the 73 major landing stations handle about 705,000 tons of cargo and 105,650 passengers daily. About 500 inland vessels, 117 passenger launches and as many as 75,000 bulk head and mechanised boats in the haor area contribute more than one-third of the total IWT output in the country. The major commodities transported from the haor area to other parts of the country are sand, stone, food grain and fish while fertilizer and liquid fuel are transported from other parts to the haor area. IWT in the haor area is the second largest employment sector next to agriculture. More than 8,00,000 people are directly employed in inland navigation.

Housing and Settlement

The haor area covers about 15 % of the total area of Bangladesh. Due to the area's geographical setting, the housing and settlement patterns are not similar to the other parts of Bangladesh. Almost all land above the maximum flood level is under permanent cultivation and human settlement. Three settlement patterns have been identified, such as a linear settlement pattern, a cluster settlement pattern and a scattered settlement pattern. The total settlement area and number of houses in the area is 303,120 ha and 3,244,380 respectively. The settlement area covers 12% of the total area. Three flooding zones are classified under the sector, these are deeply flooded zone, medium flooded zone and low flooded zone. However, about 202 locations of the settlement area are more vulnerable in deeply flooded zone due to wave action during wet season.

Climate Change

Bangladesh is one of the most climate change vulnerable countries in the world and the impact of climate change may be even worse than that anticipated (MoEF, 2008). Floods, tropical cyclones, storm surges and droughts are likely to become more frequent and severe in the coming years. The 4th Inter-Governmental Panel on Climate Change (IPCC) Report predicts that seasonal (pre-monsoon) rainfall will increase up to 31% in 2099, resulting in higher river flow during the monsoon season. Global warming will cause sea level to rise between 0.18 and 0.79 meters in 2099. In response to this, the Bangladesh has recently developed the Bangladesh Climate Change Strategy and Action Plan (BCCSAP, 2009) for building a climate resilient development framework through adaptation and mitigation. Adaptation for physical infrastructure is one of the six pillars in the BCCSAP, which stresses the need to deal with the likely impacts of climate change.

The projected global average surface warming and sea level rise at the end of the year 2100 based on AOGCMs is presented in Table 5.1.

Table 5.1: Projected global average surface warming and sea level rise under different scenarios

Item	Scenarios					
	B1	A1T	B2	A1B	A2	A1FI
Temperature(⁰ c)	1.1 – 2.9	1.4 – 3.8	1.4 – 3.8	1.7 – 4.4	2.0 – 5.4	2.4 – 6.4
Sea Level Rise(m)	0.18 – 0.38	0.20 – 0.45	0.20 – 0.43	0.21 – 0.48	0.23 – 0.51	0.26 – 0.59

The projected precipitation change in Southeast Asia during the 21st century based on AOGCMs is presented in Table 5.2.

Table 5.2: Projected precipitation change in Southeast Asia during the 21st century

Sub-region	Season	2010 – 2039		2040 – 2069		2070 - 2099	
		A1FI	B1	A1FI	B1	A1FI	B1
South Asia	DJF	-3	4	0	0	-16	-6
	MAM	7	8	26	24	31	20
	JJA	5	7	13	11	26	15
	SON	1	3	8	6	26	10

Note: DJF: December, January & February; MAM: March, April & May; JJA: June, July & August; SON: September, October & November (-ve : decrease)

Emission Scenarios

- A1 - a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Three sub groups: fossil intensive (A1FI), non-fossil energy sources (A1T), or a balance across all sources (A1B).
- A2 - A very heterogeneous world. The underlying theme is that of strengthening regional cultural identities, with an emphasis on family values and local traditions, high population growth, and less concern for rapid economic development.
- B1 - a convergent world with the same global population, that peaks in mid-century and declines thereafter, as in the A1 storyline.
- B2 - a world in which the emphasis is on local solutions to economic, social and environmental sustainability

There is no specific or comprehensive study on climate change impact on the haor area. However, projections made by the IPCC (4th Assessment) for south Asia as well as other projections could be considered for the haor region for insight into climate change impact, adaptation and mitigation.

Driving Forces

The driving forces at different levels shape future developments. Many parallels and linkages between forces at different levels contribute in adopting policies for development of the future economy. Following are the major driving forces controlling the future development of the haor region:

- Pressure on agriculture Land
- Pressure on fragile ecosystems
- Urbanization and migration
- Transportation system
- Economic diversification
- Dependency on local resources
- International demand for conservation of wetlands
- Initiation of agricultural technologies
- Ownership of wetland areas
- Recurrence of water related risks and hazards
- Social change
- Local initiatives and decentralization of power
- Availability/arrangement of fund

Chapter 6 Formulation of Strategy

The strategy of the Master Plan of Haor Area has been formulated based on a blend of structural and non-structural measures to make optimal use of available natural resources with minimal disturbance to the haor wetland ecosystem.

The vision of the GoB has been to achieve sustainable national development which encompasses all aspects of economic, social, cultural, political, and other areas of development. Bangladesh has shown high resilience against natural disasters including recurrent floods and has proven to be a successful innovator with a turn for proactive action that brings beneficial outcomes. As mentioned earlier Bangladesh has six clearly defined national goals (National Water Policy, 1990):

- Economic development
- Poverty alleviation
- Food security
- Public health and safety
- Decent standard of living for the people and
- Protection of the natural environment

The development priorities of Bangladesh are to promote an equitable society as a basis for social and political stability. There will be poverty reduction, gender equity, balanced regional development, and an inclusive society with workers' rights and responsibilities firmly established. The provision of universal socio-economic-cultural safety nets or social protection, including targeted programmes is part of the government policy to ensure an equitable society as the country climbs the ladder to higher economic growth. The development priorities of the government as set out in the Outline Perspective Plan (2010) are:

- Ensuring effective governance
- Developing a sound environment and an innovative people for a modern digital Bangladesh
- Creating a caring society
- Addressing globalisation and challenges of regional cooperation
- Ensuring broad-based growth and food security
- Providing energy security for development and welfare
- Building a sound infrastructure, and
- Mitigating the impacts of climate change

The strategy has been formulated to identify a set of priority actions based on assumptions and constraints to achieve the objectives of the Master Plan. The principles followed for developing the Master Plan strategy are:

- Compliance with declared development policies, strategies and plans
- Consideration of the national vision, goal, objectives and strategies
- Recognition of the recommendations and suggestions based on public participation and consultation process
- Pursuing the integrated policy directives of the government for sustainable development of the haor area

- Maximisation of resources utilisation with minimum degradation of the haor wetlands and ecosystem

Based on the above principles, the strategies have been formulated under the umbrella of six broad thematic areas, which are:

1. Improved water and disaster management
2. Agricultural development for food security
3. Biodiversity enhancement and Wetland management
4. Social safety net and improved standard of living
5. Improved physical infrastructure, and
6. Enterprise and technology development

The strategic thematic areas have been integrated into the Development Area (DA) considered under this Master Plan are given in Table 6.1.

Table 6.1: Strategic Thematic Areas and Development Areas

Sl no	Strategic Thematic Area	Development Areas
1	Improved water and disaster management	Water Resources
2	Agricultural development for food security	Agriculture, Fisheries, Pearl culture and Livestock
3	Biodiversity enhancement and wetland management	Biodiversity and Wetland and Forest
4	Social safety net and improved standard of living	Education, Health, Water Supply and Sanitation, Housing and Settlement and Social Services
5	Improved physical infrastructure	Transportation and Tourism
6	Enterprise and technology development	Industry, Energy and Power and Mineral Resources

Improved water and disaster management

The haor areas have been experiencing some crucial problems related to water resources management such as flash floods, wave erosion, drainage congestion, scarcity of irrigation water in dry season, inadequate institutional set-up and funding, etc. Compounding all these problems is the threat of climate induced changes.

Disaster management for the haor area is to protect lives and properties from any kind of hazard where particular emphasis has been given to water related disasters (like flash flood) with priority given to disaster risk management along with mitigation. This thematic area covers climate resilient improved water and disaster management initiatives in line with the national development goal and other relevant policy directives of the government.

Water is central to the fragile ecosystem of the haor area. The haor basin contains the major natural and large-scale freshwater wetlands of the country and includes important mother-fish sites. The basin is under threat of encroachment by agriculture, deforestation and over exploitation of capture fisheries. The purpose of the programme is to safeguard the water resources and to preserve the natural characteristics of the whole basin with special attention to ecologically important areas. This will be achieved by the development and implementation of a staged, environmentally sound and acceptable water management plan for the area.

Agricultural development for food security

This thematic area encompasses crops, fisheries, pearl culture and livestock sub-sectors to provide food security, economic development and poverty reduction of the haor people. Agriculture plays an important role in the overall economic development of Bangladesh which contributes about 21% of the GDP, sustains the livelihood of about 52% of the labour force, and remains a major supplier of raw materials for agro-based industries. Social issues like food and nutritional security, income generation and poverty reduction are also related to agriculture. Moreover, it is the biggest source of market for a variety of consumer goods, including consumer durables particularly in the rural area. Hence, improvement in agricultural sector performance and acceleration in its growth are critical for reducing rural poverty. Pearl culture can open up a new-dimension of economic activity in the haor areas.

Biodiversity enhancement and wetland management

This strategic thematic area covers biodiversity and wetland and also development of forest resources in the haor area. The biodiversity of the haor region makes it a unique wetland ecosystem. It plays an important role in the ecology, environment, economy and livelihood of the region. Apart from the scenic beauty of these wetlands, which have great economic and environmental value, its natural resources need to be protected and conserved to maintain ecological balance, protect the environment and improve livelihoods of the poor people of the area.

Bangladesh has the obligation to conserve national biodiversity and ensure wise use of wetland resources as the country is signatory to a number of international agreements/protocols related to biodiversity conservation and wetland, such as the Convention on Biological Diversity and the Ramsar Convention. Hence, strategic options on conservation and sustainable management are required to protect the country's wetlands and biodiversity.

Social safety net and improved standard of living

The GoB aims to achieve poverty reduction which is directly targeted to benefit all kinds of poor including the ultra-poor and disabled. The Vision 2021 focuses on a strong and expanded social safety net programme, which will protect the poor from all sorts of social, economic and natural shocks. The PRSP II, 2009 and the Sixth Five Year Plan provide strategic guidelines for poverty reduction.

This strategic thematic area integrates the health, education, water supply and sanitation, housing and settlement and social services sectors to provide social safety net and improved standard of living for the haor people. Ensuring social security for lives and livelihoods, people's participation, employment generation and people's empowerment are the key components for providing social protection to the vulnerable group of people. Social safety nets or "socio-economic safety nets" are non-contributory transfer programmes seeking to protect the poor and those who are vulnerable to shocks and poverty from falling below a certain poverty level.

Improved physical infrastructure

This strategic theme deals with the building of physical infrastructures, transportation and tourism. Infrastructure development for haor areas will contribute to regional economic growth in general and pro-poor growth in particular. Building infrastructures like road, railway, inland waterway,

tourism facilities etc. will help in economic development, enhance tourism, employment generation and help in poverty reduction.

Enterprise and technology development

This strategic theme deals with industry and Small and Medium Enterprise (SME), power and energy, and sustainable extraction and use of mineral resources. SME development for haor areas will contribute to regional economic growth in general and pro-poor growth in particular. Development of agro-based industry and sustainable use of mineral resources will be carried out for economic development of the area as well as of the whole country. This thematic area covers industrial development, exploration and extraction of natural gas and oil, suitable harvesting of gravel, sand and stone with involvement of local entrepreneurs. This will create employment opportunities for the poor.

Chapter 7 Overview of the Plan

To achieve the national goals defined by the GoB, the initiatives taken so far to develop the haor region is considered to be inadequate. The most of the 373 haor/wetlands existing in the region are yet to be brought to an integrated and intensive development process. The area has the most severe hydrological conditions like heavy rainfall and subsequent flash floods which usually strike during the weeks prior to the onset of monsoon. Historically, floods of this type have caused disastrous impacts on the day to day life of the haor population. Although floods often cause much damage to life, livelihood and infrastructure, they also ensure hydraulic connectivity between perennial water bodies and as such are essential for the sustainability of fisheries which represent the principal protein source for the region.

Water is the main controlling factor for economic growth and development of the haor region. Most of the development initiatives are mainly linked with water resources as well as the aquatic environment. Tanguar Haor, one of the prominent wetlands of the haor area, has been declared as a Ramsar Site and many other wetlands have potentials to be considered as Ramsar sites. However, the security of the natural aquatic resources is being slowly but inevitably compromised by human interventions both within the haor area and across its borders.

It has been mentioned earlier that the Master Plan is a framework plan for developing the haor area spanning over a period of 20 years. Policies, strategies and plans relevant to the haor have been extensively reviewed to identify the targeted achievable goal and to establish linkage with the Master Plan. The Plan has been formulated following the principles of IWRM and by introducing integrated development of 17 identified Development Areas.

The strategy of the Master Plan focuses on achieving the objectives of the development areas based on certain key principles. This strategy has been formulated for achieving the optimal benefits with least interruption to the haor ecosystem. It has been necessary to base the strategy on appropriate interventions on nature and the human system with understanding of the processes and impacts of the interventions on the eco-system. Formative and generic investment approaches for meeting the needs and issues have been identified. It has been mentioned that the Development Areas (DA) have been grouped logically and conveniently into six thematic strategic areas.

The plan consists of a set of development activities proposed for specific areas or issues for the next 20 years (up to FY 2031-32). The framework Plan is the core of the proposed development projects in the short (1 to 5 years), medium (5 to 10 years) and long term (beyond 10 to 20 years). It represents distribution of investments and other resources. The plan expresses priorities to be attached to the programmes for holistic development.

Projects may involve new development, rehabilitation of existing projects, improvement or a combination of these activities. Action may be undertaken by public or private agencies or in combination of both. The plan seeks coordination of the activities of the local authority, other public agencies and NGOs.

The planned investment portfolio has been prepared considering both the strategic thematic area and presented as development areas. The strategic thematic area is composed of one or several

DAs. Each DA consists of a number of individual projects. A total number of 154 projects have been identified and presented in the investment portfolio.

The projects included in the portfolio are of umbrella type. Several sub-projects may be formulated from one project. The situation is comparable with the programmes of the NWMP.

The Master Plan will be implemented in three time frames in concurrence with the 6th five year and perspective plan of the GoB. Ideally the first one will be initiated in the 2012-13 financial year, which is termed as short term for immediate action. This term will be completed at the end of the financial year 2016-17. Similarly, the two other, terms are called as medium and long terms. These three terms for implementation of the Plan are:

- Short Term: 1-5 years (from FY 2012-13 to FY 2016-17)
- Medium Term: 6-10 years (from FY 2017-18 to FY 2021-22)
- Long Term: 11-20 years (from FY 2022-23 to FY 2031-32)

Irrespective of starting period, projects which will be completed within first five years are short term, within 6-10 years are medium term and within 11-20 years are considered as long term projects. The investment cost estimate by DA is presented in Table 7.1.

Table 7.1: Investment Cost by Development Area (amount in lakh taka)

Development Area	Nos of Project	Short Term	Medium Term	Long Term	Total	Contribution
Transportation	15	171,143	299,556	45,578	516,277	18.41%
Fisheries	22	217,916	194,906	91,601	504,423	17.99%
Power and Energy	4	28,886	220,931	91,173	340,989	12.16%
Forest	6	66,130	100,690	79,683	246,504	8.79%
Mineral Resources	3	500	215,000		215,500	7.68%
Agriculture	20	94,555	108,109	1,233	203,897	7.27%
Water Resources	9	118,994	59,180	200	178,374	6.36%
Health	16	48,466	56,951	14,945	120,363	4.29%
Biodiversity and wetland	10	26,410	38,680	47,910	113,000	4.03%
Water Supply and Sanitation	2	58,800	36,750	9,450	105,000	3.74%
Livestock	10	19,643	26,903	30,148	76,694	2.73%
Industry	9	1,717	51,000	20,000	72,717	2.59%
Education	7	17,742	15,096	39,138	71,975	2.57%
Social Services	6	2,058	1,882	11,660	15,600	0.56%
Pearl Culture	1	2,000	4,300	3,700	10,000	0.36%
Housing and Settlement	1		9,100		9,100	0.32%
Tourism	13	1,104	1,617	1,171	3,892	0.14%
Grand Total	154	876,063	1,440,652	487,590	2,804,305	100.00%

Chapter 8 Governance and Enabling Environment

The main functions of the BHWDB are coordination, monitoring and evaluation of the projects proposed under the Master Plan. As per the Resolution 2000, the BHWDB has been mandated to coordinate the activities for integrated development of the haor area and to formulate relevant projects.

The BHWDB is governed by a Board consisting of 13 members headed by the Prime Minister. It is the highest authority for approval of policy directives for the BHWDB. There is a ten member Executive Committee chaired by the Minister, Ministry of Water Resources (MoWR). This Executive Committee provides assistance to the Board.

Regulatory and planning agencies are required to frame and periodically revise the policies, rules, procedures and guidelines for integration of different sectoral planning in Bangladesh. Following are the regulatory agencies involved in the implementation of the Master Plan of Haor Area.

- Ministry of Water Resources
- Ministry of Environment and Forest
- Ministry of Planning

Major Implementing Agencies

Major implementing agencies with the assistance of local government bodies will implement the projects proposed in the Master Plan. The government project appraisal guidelines will be followed. A mechanism to resolve inter-agency conflicts will also be evolved.

The major implementers (all government agencies) are committed to involve the local government institution and the private sector. In implementing public sector projects, government agencies will ensure that projects are designed with specific provision for Operation and Maintenance (O&M) activities and funds. The major implementing agencies are:

- Bangladesh Agricultural Development Corporation
- Bangladesh Agricultural Research Council
- Bangladesh Agricultural Research Institute
- Bangladesh Chamber of Commerce and Industries
- Bangladesh Fisheries Development Corporation
- Bangladesh Fisheries Research Institute
- Bangladesh Haor and Wetland Development Board
- Bangladesh Industrial and Technical Assistance Center
- Bangladesh Inland Water Transport Authority
- Bangladesh Inland Water Transport Corporation
- Bangladesh Parjatan Corporation
- Bangladesh Power Development Board
- Bangladesh Small and Cottage Industries Corporation
- Bangladesh Water Development Board
- Bureau of Mineral Development
- City Corporation
- Department of Agricultural Extension
- Department of Agriculture Marketing
- Department of Environment

- Department of Fisheries
- Department of Health Engineering
- Department of Livestock
- Department of Public Health Engineering
- Directorate General of Food
- Directorate General of Health Services
- Directorate of Primary Education
- Directorate of Secondary and Higher Education
- Directorate of Technical Education
- Forest Department
- Islamic Foundation
- Joint Rivers Commission, Bangladesh
- Local Government Engineering Department
- Local Government Institute
- Petrobangla
- Roads and Highway Department
- Rural Electrification Board

Local Government Institutions

The Local Government Division under the Ministry of Local Government, Rural Development and Cooperatives is responsible for coordinating development activities at local level through local government institutions which are the City Corporations, Poursavas, Zila Parishad, the Upazila Parishad and the Union Parishad.

Options for Improved Management

The concept of decentralisation of project management and community participation will be pursued. People of the haor area who are directly or indirectly benefited or affected by the implementation of the project are considered as local stakeholders of that particular project. The local stakeholders may be farmers, fishermen, small traders, craftsmen, boatmen, landless people, destitute women or any other member of the local community.

In the light of the Participatory Water Management Guidelines, 2000, participation of stakeholders may be ensured for sustainable management of natural resources in the haor area. The stakeholders of the bottom level of the proposed institutional framework are the Haor Management Group (HMG). The constitution of HMG and its legal status will be worked out during project formulation taking the lessons of group formation and the activities of different government agencies like the BWDB, the LGED, the Fisheries Department, the Forest Department, etc. The HMG, representing stakeholders, will be the driving force for the management of haor. Ideally this group would have decision-making power at all stages from local level to district level. It will be responsible for the O&M of local projects in a sustainable way as determined by the government/executing agency. Depending on the type and size of the project, the HMG will need to contribute towards the O&M of the project.

Present and Future Legislation

Legislation provides the basis for action by government and non-government entities. The state owns all natural resources and the government authorises the use of these resources. However, priorities are not clearly indicated and in some areas altogether ignored such as the environmental aspects of over exploitation of natural resources. The economic value of wetlands, externalities in use of natural resources and the tendency towards natural monopoly require effective regulatory measures.

The legislation on rights of use of natural resources must be backed by appropriate rules for their administration. Clear administrative procedures for determining priority of use, allocation

mechanism, timing, duration, and the quantity and quality of supply are important for protecting both government and private sector investments.

The BHWDB is now functioning under the mandate given to it by the Resolution 2000. At present, the BHWDB is not empowered to impose obligation upon other agencies or persons regarding its anticipated role of monitoring and coordination as envisaged in the Master Plan. To make it effective and operational, the BHWDB should be invested with additional authority backed/supported by an Act/law and relevant rules and procedures. However for the time being (as an interim arrangement), some administrative decision may be taken by ECNEC (or by the Planning Commission as considered appropriate) based on the advice of the BHWDB/MoWR.

Chapter 9 Investment Portfolio

The investment project portfolio provides a complete set of projects for each strategic thematic area and DA which have been developed in consultation with the respective implementing agencies and from recommendations from the grass-root level. Each project has been formulated to achieve the overall objectives of the Master Plan in an integrated fashion as well as specific objectives of its relevant DA. The portfolio contains 154 projects placed under 17 DAs.

The present projects of different implementing agencies will continue to be implemented in the plan period. Master Plan has considered such initiatives but costs of these initiatives have not been included in the portfolio of Master Plan of Haor Area to avoid duplication or confusion.

The responsibility for implementing these projects lies with the respective line agencies, local government institutions with assistance from special types of national institutions and private agencies under the framework of the proposed investment project portfolio. The line agencies will execute the projects after conducting feasibility study, EIA, SIA following government rules and procedures. Table 9.1 shows the identified projects with duration and estimated cost.

Table 9.1: Project portfolio, duration and estimated cost

<i>(Duration in year and Cost in lakh Taka)</i>						
DA Code	Project Title	Duration in Year	Short Term	Medium Term	Long Term	Total cost
Water Resources						
WR-01***	Pre-Monsoon Flood Protection and Drainage Improvement in Haor Area	5	12,550	-	-	12,550
WR-02**	Flood Management of Haor Area	7	28,575	53,068	-	81,643
WR-03***	River Dredging and Development of Settlement	5	44,073	4,897	-	48,970
WR-04**	Development of Early Warning System for Flash Flood prone area in Haor and dissemination to Community Level	20	353	215	200	768
WR-05***	Village Protection against Wave Action of Haor Area	3	31,046	-	-	31,046
WR-06**	Monitoring of the Rivers in Haor Area	4	450	450	-	900
WR-07***	Impact study of the interventions of transboundary river system	5	1,350	150	-	1,500
WR-08**	Study of the Climate Change impact of Haor area	4	400	400	-	800
WR-09***	Strengthening and Capacity Development of BHWDB	2	197	-	-	197
Total			118,994	59,180	200	178,374
Agriculture						
AG-01***	Expansion of irrigation through utilization of surface water by double lifting in haor area	5	13,000	-	-	13,000
AG-02***	Minor Irrigation by low lift pumps project	6	9,500	500	-	10,000
AG-03**	Investigation and expansion of ground water irrigation	8	25,500	49,500	-	75,000
AG-04*	Promotion and plantation of Agar Plant	20	1,435	874	811	3,120
AG-05*	Automation of rice transplantation system by Auto Rice Transplanter	8	13,600	26,400	-	40,000
AG-06**	Mechanization of Agriculture through Combined Harvester	8	19,800	25,200	-	45,000
AG-07**	Improvement of Quality of Crop Grain through Dryer system	8	68	171	46	285
AG-08***	Intensive Cultivation of homestead	5	135	-	-	135

DA Code	Project Title	Duration in Year	Short Term	Medium Term	Long Term	Total cost
AG-09**	vegetables and horticulture Development of climate resilient High Yielding Varieties of rice and non-rice crops	16	490	280	230	1,000
AG-10**	Selection of Short Duration Boro Rice Cultivars/ Advanced Line	14	53	36	13	102
AG-11***	Changing Cropping Pattern to increase cropping intensity in haor area	9	1,005	495	-	1,500
AG-12*	Extension of Integrated Pest Management Training Project	13	392	245	63	700
AG-13**	Expansion of Integrated Crop Management Training	12	396	270	35	700
AG-14*	Extension of Jute cultivation project	12	396	270	35	700
AG-15**	Integrated Development of Applied Research for Improved Farming Systems	8	810	690	-	1,500
AG-16**	High Value-non-Rice-cum-Deep Water Rice Culture	10	660	840	-	1,500
AG-17***	Assistance to Landless, Marginal and Small Farmers to overcome soaring input, and food prices in impoverished Haor area	8	2,160	1,840	-	4,000
AG-18**	Application of GIS for farm productivity enhancement through land suitability assessment of major cropping pattern in Haor Region	3	450	-	-	450
AG-19*	Improvement of Storage Facilities and Agricultural Marketing System in Haor Area	5	4,500	500	-	5,000
AG-20**	Introduction of Innovative Agriculture through Vegetables cultivation on Floating Bed	5	205	-	-	205
Total			94,555	108,109	1,233	203,897
Fisheries						
FI-01***	Development and Establishment of Fish Sanctuaries	15	3,361	2,675	823	6,860
FI-02***	Habitat Restoration for Fish Diversity	15	141,040	114,800	72,160	328,000
FI-03***	Beel Nursery Programme for Increasing Fish Fingerling Recruitment	18	3,063	1,875	1,313	6,250
FI-04*	Good Fisheries Management Practices following the Mohanganj Experience	18	829	507	355	1,691
FI-05**	Floodplain Aquaculture under the Community Enterprise Approach	15	1,075	875	550	2,500
FI-06**	Community and Household-based Net-pen Fish Culture in the Haor/Floodplain	15	12,250	9,750	3,000	25,000
FI-07***	Fish Fingerling Stocking and Raising Programme	18	251	154	108	512
FI-08**	Capacity Development and Alternate Income Generating Activities (AIGAS) for Fisher Community	11	6,935	6,791	722	14,448
FI-09***	Renovation of Hatcheries for Conserving Quality Brood Stock and Production of Fish Seeds	5	5,000	-	-	5,000
FI-10**	Study on Review of Policies, Regulations and Lease System for Sustaining Fisheries Resources	3	500	-	-	500
FI-11***	Restoration of River Duars (Deep Pools) for Protecting Brood/Mother Fish	10	2,246	3,682	312	6,240
FI-12**	Renovation of Fish Ponds and Dissemination of Improved Aquaculture Technology to Fish Farmers	10	1,620	2,655	225	4,500
FI-13**	Development and Construction of Innovative Fish Pass/Fish Friendly Structures	10	7,000	15,500	2,500	25,000
FI-14*	Establishment of Fisheries Information	5	1,170	130	-	1,300

DA Code	Project Title	Duration in Year	Short Term	Medium Term	Long Term	Total cost
FI-15**	Service Centre Introduction of Deep Water Rice-cum-Fish Culture	10	280	620	100	1,000
FI-16**	Establishment and Rehabilitation of Fish Landing Centers	10	4,088	9,052	1,460	14,600
FI-17**	Establishment of Fish Drying and Fermentation Centre	10	742	1,643	265	2,650
FI-18**	Study on Impact of Climate Change and Interventions on Fisheries Resources	15	24,500	19,500	6,000	50,000
FI-19*	Development and Establishment of Cold Storage and Ice Plants	6	-	761	761	1,522
FI-20*	Research on Fish Stock Improvement through Gene Pool Preservation and In-breeding Depression	16	240	705	555	1,500
FI-21*	Rehabilitation of Existing Fish Processing Units and Establishment of a New Fish Processing Industry	10	700	1,550	250	2,500
FI-22**	Community and Household-based Cage Fish Culture	10	1,026	1,682	143	2,850
	Total		217,916	194,906	91,601	504,423
Pearl Culture						
PC-01**	Development and Dissemination of pearl culture technology in Haor Area	17	2,000	4,300	3,700	10,000
	Total		2,000	4,300	3,700	10,000
Livestock						
LS-01***	Improvement of fodder availability for livestock development	9	5,911	2,912	-	8,823
LS-02**	Integration of livestock in traditional farming system	10	-	3,501	4,455	7,956
LS-03*	Farmers training programs for capacity building	4	-	-	2,400	2,400
LS-04*	Establishment of pilot breeding programme for cattle development	8	-	-	3,600	3,600
LS-05**	Promotion of small and mini dairy farms	9	-	3,920	1,931	5,850
LS-06***	Promotion of conventional and alternative feed resources for livestock feeding	9	1,089	536	-	1,625
LS-07**	Extension of Livestock Services through establishment of Union Livestock Service Center (ULSC)	9	-	10,888	5,363	16,250
LS-08*	Development of Livestock Products through involvement of Community Organization	9	-	-	12,400	12,400
LS-09***	Development of Community Animal Health Workers for Livestock Healthcare	5	6,600	-	-	6,600
LS-10***	Promotion of Small and Mini Poultry and Duck Farms	8	6,043	5,147	-	11,190
	Total		19,643	26,903	30,148	76,694
Forest						
FR-01**	Establishment of One Forest Nurseries in each of the 57 Upazilas of the Haor Area	17	7,690	16,533	14,226	38,449
FR-02***	Afforestation through involvement of local Community in Haor Area	17	15,729	12,234	6,991	34,954
FR-03***	Afforestation of Roads, Embankments, Homesteads and Institutions	17	16,031	12,469	7,125	35,625
FR-04*	Reclamation of Izmaili land for promotion of Social Forestry	17	14,308	30,761	26,469	71,538
FR-05**	Increase the Capacity of Community for forest conservation and Improvement	17	11,829	25,433	21,884	59,146
FR-06*	Research Programmes on Haor Area	16	543	3,260	2,988	6,792

DA Code	Project Title	Duration in Year	Short Term	Medium Term	Long Term	Total cost
	Total		66,130	100,690	79,683	246,504
Biodiversity and wetland						
BW-01***	Eco- management zoning of Haor wetlands for biodiversity protection	3	5,000	-	-	5,000
BW-02***	Restoration of important wetlands	4	6,000	-	-	6,000
BW-03**	Development and implementation of important wetlands for global significance.	7	-	2,950	2,050	5,000
BW-04*	Establishment of global wetlands center	7	-	-	30,000	30,000
BW-05*	Review of policy for biodiversity management	3	-	-	2,000	2,000
BW-06***	Habitat preservation programme for plants, wildlife, fisheries and migratory birds	9	10,050	4,950	-	15,000
BW-07**	Research and education programme on Haor wetlands biodiversity conservation and management	9	-	10,050	4,950	15,000
BW-08**	Management of commercially important Haor wetland biodiversity	9	-	13,400	6,600	20,000
BW-09 **	Pollution control and prevention from agriculture, industry and urban settlement	9	-	4,690	2,310	7,000
BW-10***	Adaption and Mitigation to Climate Disaster Risks in Haor Basin	9	5,360	2,640	-	8,000
	Total		26,410	38,680	47,910	113,000
Transportation						
TR-1***	Upgradation of Rural Roads	10	60,375	133,688	21,563	215,625
TR-2***	Submersible rural road construction	10	41,727	92,396	14,903	149,025
TR-3***	Submersible District road construction (Sulla to Ajmiriganj)	8	1,326	2,574	-	3,900
TR-4***	Submersible District road construction (Khaliajuri to Ajmiriganj)	8	2,402	3,058	-	5,460
TR-5***	Submersible District road construction (Itna to Ajmiriganj)	8	1,238	2,402	-	3,640
TR-6***	Submersible District road construction (Austagram to Lakhai)	8	2,059	2,621	-	4,680
TR-7***	Submersible District road construction (Derai to Jagannathpur)	3	5,200	-	-	5,200
TR-8**	Construction of Regional Highway	2	-	12,800	-	12,800
TR-9*	Construction of Surma Bridge at Chhatak	5	-	-	6,000	6,000
TR-10***	Development of inland navigation by dredging in nine river routes	9	56,816	27,984	-	84,800
TR-11**	Development of 150 landing facilities in the rural area	6	-	14,250	750	15,000
TR-12**	Installation of navigational aids along the river routes	4	-	5,560	-	5,560
TR-13**	Hydrographic survey in the nine major river routes	3	-	87	-	87
TR-14**	Construction of terminal buildings at 15 major passenger stations	6	-	2,138	113	2,250
TR-15*	Development of parking yards, storage facilities and security walls at 13 stations	5	-	-	2,250	2,250
	Total		171,143	299,556	45,578	516,277
Water Supply and Sanitation						
WS-01***	Establishment Sustainable and Community based Haor friendly Water Supply Technologies	13	28,000	17,500	4,500	50,000
WS-02***	Introduce the Sustainable and Community based Flood Proof Hygienic Sanitation System in Haor area	13	30,800	19,250	4,950	55,000
	Total		58,800	36,750	9,450	105,000

DA Code	Project Title	Duration in Year	Short Term	Medium Term	Long Term	Total cost
Housing and Settlement						
ST-01**	Eco Village Platform Development for mitigate future Housing and settlement demand	3	-	9,100	-	9,100
Total			-	9,100	-	9,100
Education						
ED-01***	Establishment of Community based Multigrade Learning Centers	8	2,735	2,329	-	5,064
ED-02**	Community based School Feeding Programme	5	-	2,365	-	2,365
ED-03***	Establishment of Primary Schools	3	15,007	-	-	15,007
ED-04**	School Boat Facilities for Inaccessible Area	8	-	6,801	5,794	12,595
ED-05*	Awareness Generation Programmes on Gender Discrimination	3	-	-	94	94
ED-06**	Introduce skill based training programmes	5	-	3,600	-	3,600
ED-07*	Establishment of High Schools, Colleges and Madrasa	8	-	-	33,250	33,250
Total			17,742	15,096	39,138	71,975
Health						
HE-01***	Upgradation of Upazila Health Complex (UHC) and Construction of Upazila Health & Family Welfare Centre (UHFWC)	8	28,917	24,633	-	53,550
HE-02***	Maternal and Reproductive Health Development Programme	3	571	-	-	571
HE-03***	Child Mortality Reduction Programme	8	9,032	7,694	-	16,725
HE-04**	Promotion of nutrition status of the haor people	3	-	105	-	105
HE-05**	Improve the quality of hospital service	8	-	12,002	10,224	22,226
HE-06*	Capacity Development of Non-government, Non-profit Health Care Agencies using Private-Public-Partnership (PPP)	3	-	-	400	400
HE-07*	Expansion of Alternative Medical Care (Unani, Ayurvedic & Homeopathic system of medicine)	3	-	-	1,200	1,200
HE-08*	Strengthening of supervision and monitoring system	3	-	-	1,650	1,650
HE-09***	Community health care: Establishment of Community clinics (CC)	8	2,171	1,849	-	4,020
HE-10***	Community health care: Mobile clinic and emergency medical team	8	7,776	6,624	-	14,400
HE-11**	Establishment of e-Health Services and Facilities up to Community Level	8	-	82	70	152
HE-12**	Strengthening referral system from CC to UHFWC; UHFWC to UHC; UHC to District Hospitals	8	-	49	41	90
HE-13**	Environmental Health Programme	3	-	3,664	-	3,664
HE-14**	Capacity development of health personnel	3	-	250	-	250
HE-15*	Medical Waste Management in District Hospital and Upazila Health Complex	8	-	-	1,065	1,065
HE-16*	GIS mapping of health facilities and disease pattern	3	-	-	295	295
Total			48,466	56,951	14,945	120,363
Tourism						
TS-01***	Development of Mega Eco-parks	8	108	92	-	200
TS-02**	Establishment of War Museums	1	-	60	-	60
TS-03**	Establishment of Amusement Parks	8	-	540	460	1,000
TS-04**	Development of Tourist/Picnic Spots	8	-	32	28	60
TS-05***	Construction of Bird Watching Tower	8	32	28	-	60
TS-06*	Renovation of Zamindar Palaces	3	-	-	72	72

DA Code	Project Title	Duration in Year	Short Term	Medium Term	Long Term	Total cost
TS-07***	Dolphin Sighting Tour Programme	18	176	108	76	360
TS-08***	Hakaluki Haor Sightseeing Tour Programme	18	265	162	113	540
TS-09**	Development of Fish Park	1	-	20	-	20
TS-10***	Establishment of Wildlife Sanctuary	2	100	-	-	100
TS-11**	Promotional Programmes on Haor for Electronic and Print Media	1	-	100	-	100
TS-12**	Construction of Tourism Infrastructures	18	320	360	320	1,000
TS-13*	Training programmes in Hotel Management and Food Catering	18	102	115	102	320
	Total		1,104	1,617	1,171	3,892
Social Services						
SS-01**	Construction of Growth centers/Rural markets	18	222	250	222	694
SS-02*	Construction of Food Godowns	8	-	-	10,000	10,000
SS-03***	Upgradation/construction of religious prayer house, graveyards and cremation grounds	8	1,620	1,380	-	3,000
SS-04**	Awareness Generation Programme for the Spiritual Leaders	8	-	68	58	126
SS-05*	Construction of Playground and Supply of Sports materials	8	-	-	1,380	1,380
SS-06***	Upgradation and Construction of Police Stations	8	216	184	-	400
	Total		2,058	1,882	11,660	15,600
Industry						
IN-01**	Can food Industry	5	-	10,000	-	10,000
IN-02**	Beverage Industry	3	-	1,000	-	1,000
IN-03***	Small and Cottage Industries Development programme for destitute women's in haor area	1	1,500	-	-	1,500
IN-04*	Swamp Water Processing Industry	2	-	-	10,000	10,000
IN-05**	Tea processing Industry	3	-	10,000	-	10,000
IN-06**	Gas cylinder Industry	4	-	30,000	-	30,000
IN-07*	Industrial Park	4	-	-	10,000	10,000
IN-08***	Establishment of Charcoal Industry	2	200	-	-	200
IN-09***	Boat Manufacturing Industry	2	17	-	-	17
	Total		1,717	51,000	20,000	72,717
Power and Energy						
PW-01***	Expansion of electric distribution systems in Haor districts	12	20,426	174,894	60,000	255,320
PW-02**	Expansion of solar power generation systems	8	8,460	45,684	30,456	84,600
PW-03*	Pre-feasibility Study on Renewable Energy Potentials and Power Generation Possibilities in Haor Area	10	-	-	89	89
PW-04*	Development of mini-hydropower schemes	10	-	353	627	980
	Total		28,886	220,931	91,173	340,989
Mineral Resources						
MR-01**	Seismic survey, exploration drilling in the Haor districts to explore new gas field	5	-	200,000	-	200,000
MR-02**	Development of Mines for gravel, white clay, glass sand, coal and peat extraction from Haor districts	5	-	15,000	-	15,000
MR-03***	Strengthening capacity of miner and mining labor in Haor districts	1	500	-	-	500
	Total		500	215,000	-	215,500
	Grand Total (154 Projects)		876,063	1,440,652	487,590	2,804,305

Note: *** Very High Priority, ** High Priority, * Medium Priority

Prioritization of Project

Three categories/levels of priority of the projects have been recommended based on importance, interdependency, people's demand and sequence of integrated development. Three levels of priorities are: very high, high and medium priority. Table 9.2 shows the priority list of the projects under different Development Areas.

Very High Priority: Very high priority projects are those which are overdue and cover the top five ranked issues identified at the upazila level consultation process. These projects are extremely significant for the economic boost of the area. They are independent of other external actions in the region. These projects can also be treated as action plan for immediate implementation.

High Priority: These kinds of projects are required to be implemented as per government policy directives. They include initiatives proposed in the plans of different implementing agencies. These set of projects are dependent on external and internal actions to be taken in and outside the region. These are considered to be implemented in medium term period of the Master Plan.

Medium Priority: Apart from very high and high priority types, the rest of the projects have been considered as medium priority projects. These projects are dependent on other types of priority projects and cannot be implemented in isolation. It is required to identify the back linkage with the other two types of priorities before implementing the projects.

Table 9.2: Priority wise projects under Development Areas (cost in lakh taka)

Development Area	Very High		High		Medium	
	No of Projects	Total Cost	No of Projects	Total Cost	No of Projects	Total Cost
Water Resources	5	94,263	4	84,111		
Agriculture	5	28,635	10	125,742	5	49,520
Fisheries	6	352,862	11	143,048	5	8,513
Pearl Culture			1	10,000		
Livestock	4	28,238	3	30,056	3	18,400
Forest	2	70,579	2	97,595	2	78,330
Biodiversity and Wetland	4	34,000	4	47,000	2	32,000
Transportation	8	472,330	5	35,697	2	8,250
Water Supply and Sanitation	2	105,000				
Housing and Settlement			1	9,100		
Education	2	20,071	3	18,560	2	33,344
Health	5	89,266	6	26,487	5	4,610
Tourism	5	1,260	6	2,240	2	392
Social Services	2	3,400	2	820	2	11,380
Industry	3	1,717	4	51,000	2	20,000
Power and Energy	1	255,320	1	84,600	2	1,069
Mineral Resources	1	500	2	215,000		
Total	55	1,557,441	65	981,056	34	265,809
% of Total Cost		55%		35%		10%

Chapter 10 Benefits of the Plan

Benefit of the Master Plan

Strategies established the principles upon which Master Plan of Haor Area has been formulated to achieve the government set goals and targets. The plan has been formulated based on the strategies under the six thematic areas. Projects have been identified through multi-level consultation process. Development Area (DA) wise expected benefits due to the implementation of the master plan are described below:

Water Resources

The benefit which is expected from water resources is based on proposed dredging of major rivers, rehabilitation of FCD and FCDI projects, implementation of new FCD/FCDI projects and construction of wave and erosion protection measures. It is estimated that a total length of 124 Km of river will be dredged which will improve the drainage facilities, navigation and connectivity with haor and beel. A total of 9 new projects have been proposed which will protect an additional area of 163,115 ha from pre monsoon flash flood. The rehabilitation of 25 existing schemes of area of 124,754 ha will further enhance the resilience against pre monsoon flash flood. A total of 202 homestead area will be protected against wave action through construction of revetment work, and green belt.

These interventions will help to protect agriculture and fisheries from flash floods, improve pre and post monsoon drainage of haor areas and improve conveyance capacity and navigability of the principal rivers of the region. The projects of water resources will also enhance the benefit of other sector.

Agriculture

The benefits which are expected from agriculture Development Area is based on total cropped area, area and production of rice and non-rice production, cropping intensity, extension of irrigated area by both surface and groundwater. It has been estimated that the total cropped area will be increased from 1.93 to 2.36 million ha though the net cultivated area will decrease from 1.31 to 1.22 million ha. The cropping intensity will be increased to 187% from the present value of 147% through use of HYV, appropriate use of fertilizer, pesticides, and irrigation etc. The rice and non-rice area will be increased from 1.74 to 1.93 million ha and from 0.19 to 0.43 million ha respectively. The total production of rice and non-rice will be increased from 5.25 to 6.55 million ton and from 1.53 to 2.49 million ton respectively. The total irrigated area will be increased from 0.817 to 0.957 million ha.

Fisheries

The benefit which is expected from fisheries development area is based on enhancing fish production (both capture and culture fisheries), management of fish wastage, and export of fish resources and enhancing employment through fish sector. To enhance fish production the strategies to be followed are proper installation of fish passes in hydraulic structures; controlling size and species wise fishing; establishing fish sanctuary for fish spawning; conserving and managing water bodies and restoring the ecosystem.

It is estimated that both capture and culture fish production will be increased from 0.319 to 0.437 million ton and from 0.114 to 0.232 million ton respectively. Total fish export from haor area will be

increased from 452 ton to 905 ton. Number of fishermen and fisherwomen will be increased to 0.346 million from 0.294 million and 0.087million from 0.074 million respectively in the haor region.

Pearl Culture

The benefit which is expected from the pearl culture development is based on production and marketing of pearl which will enhance the employment opportunity of local people along with development of their livelihood. National economy and export will also be boosted through proper implementation of pearl culture plan in the haor area. The benefits in this sector will be materialized through implementation of pilot projects at upazila level in suitable beels and other perennial pockets in the haor basin; setting up laboratory equipments in district level, enhancing capacity building by proper pearl culture training and establishment of strong marketing system etc. with the help of government.

Livestock

The benefit which is expected from the livestock sub sector is based on increased production of milk, meat and egg to meet the nutritional demand, enhancing employment and overall benefit to national economy. Production of milk, meat and egg will be increased to 1.46 million ton, 0.33 million ton and 2,326 million number from 0.62 million ton, 0.14 million ton and 990 million numbers respectively. Benefits can be derived through breed upgradation; developed feed resources; improved health care system of animals and poultry; development of dairy, meat and poultry processing industries; establishment of service centers for the farmers; technological development in upbringing of the livestock processing of livestock products and improved marketing system etc.

Biodiversity and Wetland

The benefit which is expected from the biodiversity and wetland area development is based on biodiversity protection, restoration of internationally and nationally important wetlands, habitat preservation [for plants, wildlife (including Dolphin), fisheries and migratory birds], sustainable management of wetland biodiversity and commercially important species and pollution control. These benefits can be derived through implementation of region wise zoning based on land use pattern and ecological attributes of biological resources; establishment of a recovery programme for threatened species of wild flora and fauna; establishment of a Global Wetland Centre for research; education, conservation, awareness, networking, recreation, monitoring and evaluation; strengthening of local institutions for wetland and biodiversity management; identification of ecologically important areas within the region; monitoring of wetlands to recognise the changes of ecology of wetlands; wetland data management through carrying out a comprehensive national inventory and coordination and rationalisation of government programmes to encourage wetland conservation.

Forest

The benefit which is expected from the forest Development Area is based on the increased fuel-wood supply, restoration of environmental sustainability, reduced exposure of uncovered lands like “Ijmali” lands etc. These benefits can be brought through establishment of upazila forest nursery; afforestation in “Ijmali” lands; creation of freshwater wetland forest; roadside plantation; and community involvement in forest management. Implementation of the plan will result in increased plantation for both hill and agro forest and strip plantation. Additional 14,000 ha of hill and agro

forest will be increased by 2030 involving local community. Similarly, additional 5,000 km of strip plantation will be increased on side of the road, embankment and homesteads by 2030. Restoration of the “Ijmali” land covering 4,180 ha and establishment of a 2 hectare upazila nursery has been considered in the plan to materialize the benefits in the forest Development Area.

Education

Through implementation of the plan, 349 primary schools, 657 multigrade learning centers, 415 secondary schools, 119 colleges, 143 Madrasas and 50 vocational institutes have been proposed for construction. The community based multigrade learning centers thrives to introduce pre-primary level education. The feeding programme and boating services are expected to increase attendance of poor students, increase opportunities for education for the ultra-poor and inhabitants of remote and inaccessible areas of the haor region. It is aimed to fulfill the MDG and OPP goals of achieving literacy rate of 100% from the current 38%. It will also reduce dropout rates at primary level from 44% to 5%, increase net enrollment rate in primary school from 82% to 100%, increase attendance rate in primary school from 74% to 100%, increase attendance rate in secondary level from 37% to 80%, increase transition rate from primary to secondary level from 60% to 100%.

Health

Health plan has been developed to achieve sustainable and long term improvement in health care services in the Haor area. Under the plan, 27 nos of Upazila Health Complex (UHC) will be upgraded from 30 to 50 beds. Eighty seven number of Upazila Health & Family Welfare Centre (UHFWC) and 268 number of community clinics have been proposed for construction along with arrangement of 150 mobile boat clinics covering all types of healthcare services up to community level. The plan also covers programmes on maternal and child health care, promotion of nutrition status, improvement of hospital services, strengthening of referral system, expansion of alternative medical care, etc. The environmental programme and the medical waste management will help to reduce environmental health hazards.

Provision of health care services will be improved specially in the remote locations, which will have impact in decreasing disease prevalence, reducing the rate of under-5 child malnutrition from 46% to 33%, increasing delivery conducted by skilled health personnel from 13% to 50%, decreasing maternal mortality rate (per 1000 live births) from 3.2 to 1.2, reducing under-5 child mortality rate (per 1000 live births) from 76 to 48, reducing infant mortality rate (per 1000 live births) from 57% to 32%.

Power and Energy

The new electricity distribution systems as proposed in the plan will cover additional 1,111 villages through construction of 8 sub-stations, expansion of 19,333 km long (11, 6.35 Kv) lines and 10,750 km long (0.4/0.23 Kv) lines. This will increase the coverage of electricity supply in the rural areas from 44% to 100% villages (15,374 nos). The per capita electricity consumption will be enhanced from 47 to 250 KWh. The Percentage of household to be brought under electrification will be increased from 20% to 100%. The solar electrification is estimated to cover one million households. The feasibility study of mini-hydropower scheme has been proposed to assess the possibility of generation of hydro-electricity to fulfill the energy demand of the haor region.

Transportation

Rural people of the Haor area will be the largest beneficiary due to the development of transportation system under this plan. Development of transportation sector is sure to bring massive changes in accessibility not only within the settlements but also to service areas like education, health, industries and markets. This will act as catalyst for promoting development of other sectors like agriculture, livestock, fisheries, power and energy and tourism etc.

The proposed 32 km regional highway, 88 km submersible district roads, upgradation of 2,875 km rural roads and development of 496 km submersible embankment into submersible rural road will enhance rural connectivity. Under the Roads communication, traffic and passenger will be increased from 1.62 to 2.25 and 12 to 17 million respectively. Similarly, under the inland navigation, freight will be increased from 11.40 to 14.77 billion ton-km and passenger will be increased from 4.65 to 6.02 billion passenger-Km. Additional 5,00,000 employments will be generated in the haor area in a span of ten years time due to development of inland navigation. A developed inland navigation system in the haor area is estimated to save 50 million liters of diesel and 1,25,000 tons of CO₂ emission annually because of lower fuel consumption. Thus this will contribute substantially to reduce the impacts of climate change.

Tourism

The eco-tourism development plan will generate employment and ensure socio-economic development through promotion and development of tourism. A number of tourism facilities as proposed will be developed such as 2 nos. of mega eco-parks, 2 nos. of amusement parks, 6 nos. of tourist/picnic spots and a tourist center near Hammam Waterfall including hotels, restaurants, parking areas etc. Moreover, 3 nos of bird watching tower, a fish park and a wildlife sanctuary will be constructed to preserve haor biodiversity. Renovation of the existing 6 nos. of zamindar palaces will contribute in reviving its historical importance. Construction of the two war museums will preserve the sites bearing historical significance of the 1971 liberation war and uphold its values to the future generation. The sightseeing programmes to Hakaluki haor and dolphin tracks will provide opportunity to view the unique beauty of haor region.

Social Services

There will be a balanced distribution of resources among people and improved marketing of products through construction of 63 nos. of rural markets/growth centers as proposed in the plan. Two hundred food godowns will be constructed near growth centers or rural markets. The godowns will be used to supply food grains during emergency periods as well as to store surplus food grain. Facilities for practicing religion will be further improved through construction of 100 nos. of mosques/temples and churches. Shortage of proper burial place is an issue for haor region. The issue will be addressed through construction of 100 graveyards or cremation grounds. Provision for sports will be made through construction or expansion of 69 playgrounds (one large playground for each upazila). For ensuring safety and security of people in the haor region, establishment of 80 nos. of police stations/outposts have been proposed in the Master Plan.

Mineral Resources

The benefit from the mineral resources area is based on the achievement that will be obtained from exploration of mineral resources through exploration of new gas fields; extraction of coal and peat; and extraction of other minerals like glass sand, limestone, white clay, gravel and ordinary sand etc. The plan has also proposed to conduct seismic survey to identify the new gas fields and quantify the reserve to maximize benefit in the mineral resources development.

Housing and Settlement

The benefits which are expected from the development of housing and settlement are based on protecting the villages of haor from wave erosion and flash floods, expansion of eco-friendly settlement area, ensuring housing for the poor and development of rural livelihood in a healthy liveable environment. The Master Plan of the Haor Area has formulated some projects to maximize the benefits by utilising the spoil (earth obtained) from the dredging of rivers. The dredged spoil will be utilised for development of 38 nos. of settlement platform, adding an additional 1396 ha of new settlement areas, and development of 38 nos. of eco-villages (model village). The programme includes construction of revetment works and green belt to protect the villages from wave erosion.

Industry

The benefits which have been expected from the development of the industry are based on development of the scope of industrialization of the haor region in a sustainable and environment friendly manner which will enable regional development, enhance employment and foster national development. The plan has proposed for establishment of several industries appropriate for this region which includes- can food industry, beverage industry, small and cottage industries for destitute women, mineral water processing plant, tea processing industry, gas cylinder industry, industrial park, charcoal industry and boat manufacturing industry etc. The development can advance through-establishment of agro-based industries, ensuring participation of women. Proposed industries are to be set up on highlands or lands unfit for farming, discouraging establishment of industries on land reserved for cattle pasture or forest as well as rivers, wetlands and urban area etc.

Water Supply and Sanitation

The benefits from water supply and sanitation development are based on provision of water supply and sanitation facilities to the people living in the rural area and promoting hygiene awareness. Development projects of the water supply and sanitation system are proposed to be implemented through Local Government Institute (LGI), public-private sector, NGOs, CBOs and women groups (involving local women) and Government. Present provision per water source (PSF, RWH, and TW etc.) is 93–152 people which will be reduced to 50 people per source. Similarly present provision of 13–18 households per water source (PSF, RWH, and TW etc.) will be reduced to 5 households. The present access to general sanitary latrine is less than 50% households, which will be increased to 90% in 2012 and 100% in 2030.

Gross Regional Products (GRP)

The gross regional products with and without the Master Plan projects have been estimated based on trend analysis of future condition. In case of the Master Plan, the forecasted GRP has been estimated based on a judgement of the magnitude and timing of project implementation. It gives an indicative description of the (regional) economic impacts of the haor area. Figure 10.1 shows the sector wise gross regional products in the haor area.

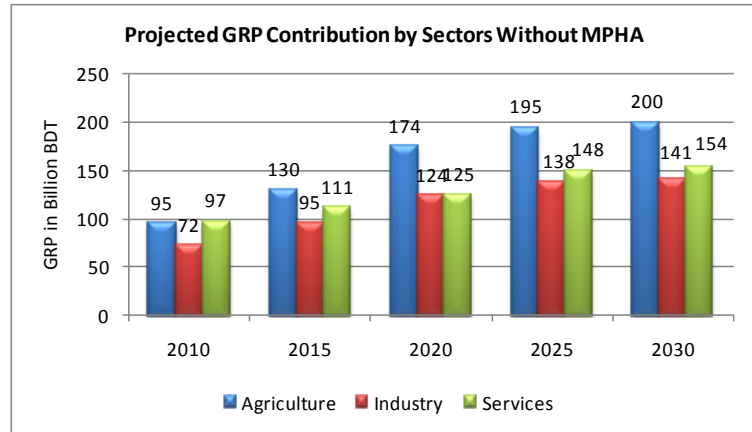


Figure 10.1: Sector wise gross regional products from haor area

According to the Outline Perspective Plan and the 6th Five Year Plan, the GoB aims to achieve growth rate of double digits by the year 2021 to fulfill the projected increase of GDP of the strategic goals.

The GRP following the regional growth trend is expected to reach 336 billion BDT by 2015, 423 billion BDT by 2020 and 495 billion BDT by 2030. This means that the GRP from the haor region is expected to be doubled from the base year 2010 to 2030. Consequently, the sectoral share of agriculture, industry and services will be 42%, 29% and 30% respectively. Growth in each sector is expected to accelerate through the development influx induced by Vision 2021. The FAP-6 had projected GRP growth of 414 billion by the year 2015 which seems ambitious with respect to the current economic growth of the haor region. If

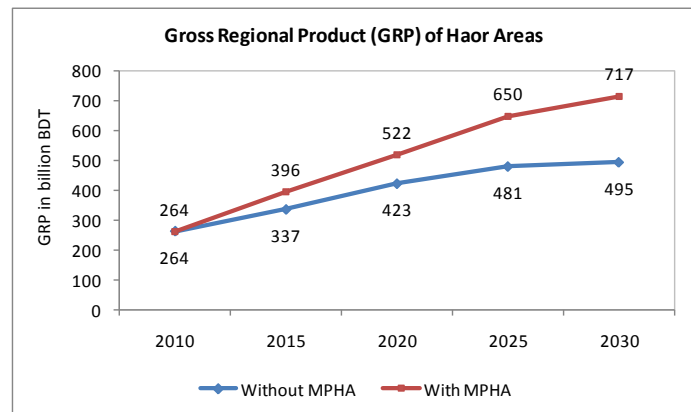


Figure 10.2: Trend of gross regional products with and without Haor Master Plan

the proposed projects under the Master Plan of Haor Area are implemented, then the gross product derived would exceed the regional growth rate and reach to about 717 billion BDT in 2030. Figure 10.2 shows the trend of gross regional products with and without the Master Plan of Haor Area.

Chapter 11 Implementation Plan

Most of the projects proposed under the Master Plan will be linked operationally or conceptually or implemented in parallel to ensure accelerated development of the haor region. The Master Plan of Haor Area will be implemented in three time frames, which begins in the financial year 2012-2013 and is due to be completed at the end of the financial year 2031-32. The time frames of the Plan are:

- Short Term: 1-5 years (from FY 2012-13 to FY 2016-17)
- Medium Term: 6-10 years (from FY 2017-18 to FY 2021-22)
- Long Term: 11-20 years (from FY 2022-23 to FY 2031-32)

The project portfolio will assist the respective implementing agencies to prepare full-fledged project proposals according to the government approved format. However, a feasibility study would need to be conducted for each project with detailed cost estimates. EIA and SIA are to be conducted to meet the government requirements. After the approval of the Master Plan, respective agencies will examine how the projects can fit into their existing investment programmes.

Apart from the MoWR, 15 other ministries will have important roles in implementing the Master Plan. At district and upazila levels, the District Steering Committee (DSC) of the respective districts and the Upazila Nirbahi Officer (UNO) will have vital role in proper implementation of the Plan. This could be the key instrumental platform, which will guide and monitor the implementation of the Plan at district as well as upazila level.

With the involvement of multiple agencies and their multiple activities, the objectives of the Plan are practically achievable, depending on successful implementation through timely initiation of activities. The critical assumption is allocation and availability of government funds, channeled through line agencies in a timely fashion with overall coordination of the BHWDB. The implementing agencies will follow the existing rules and regulations and ensure good governance.

Implementation Schedule

Each project proposed under different DAs has its own schedule for implementation. However, integrated schedules have been developed for the implementation of these projects as per priority and by considering linkage among the DAs. The priorities and schedules have also been developed based on the investment requirement across the different DAs and availability of development budgets of the GoB.

The DAs of water resources, agriculture, fisheries, transportation, water supply and sanitation and biodiversity & wetland are the major thrust areas for improving the quality of life of the people as well as to protect the natural environment and aquatic resources of the area. Before implementing any of the Master Plan projects it will be necessary to carry out feasibility studies and to prepare Environmental Management Plans. The capacity of line agencies will also be developed for efficient and timely implementation of the projects.

Responsibilities and Coordination

The list of the identified line agencies/organisations responsible for implementation of the Plan is given in Table 11.1. Each of these agencies will be responsible for carrying out detailed design and feasibility studies for specific projects. In most cases, the preparation should begin immediately if the full benefit of the plan is to be achieved in the targeted time frame. Descriptions of the activities of the project are available in the proposed investment portfolio while guiding principles have been described in the development strategy of the Master Plan.

The Plan will be implemented by different line agencies under the overall monitoring, coordination and advice of the BWHDB as per its mandate. Monitoring may involve site visits, consultations with the stakeholders etc. This does not involve day to day monitoring of physical or financial progress of any particular project. Such type of monitoring will be done according to the existing mechanism, following the government rules and regulations. An MIS is to be developed and followed by the BWHDB.

Since it will be the agency to operate the Plan, BHWDB's role in the context of the implementation is to be seen as proactive and indirect. To make the BWHDB an effective and efficient organisation, its mandate should be backed by an Act. Furthermore, the Wetland Policy should be finalised and declared by the GoB. To assume an effective role, the BWHDB's current capacity will have to be strengthened both technically and operationally. In particular, it will need a dedicated group of staff recruited/hired directly rather than seconded temporarily from other agencies. These along with other relevant issues have been addressed in the 'BWHDB Capacity Building' project.

Table 11.1: Implementation schedule

DA Code	Projects by Development Area	FY 12-13	FY 16-17	FY 17-18	FY 21-22	FY 22-23	FY 31-32
		Short Term	Medium Term		Long Term		
Water Resources							
WR-01***	Pre-Monsoon Flood Protection and Drainage Improvement in Haor Areas	█	█	█	█	█	█
WR-02**	Flood Management of Haor Areas	█	█	█	█	█	█
WR-03***	River Dredging and Development of Settlement	█	█	█	█	█	█
WR-04**	Development of Early Warning System for Flash Flood prone areas in Haor and dissemination to Community Level	█	█	█	█	█	█
WR-05***	Village Protection against Wave Action of Haor Area	█	█	█	█	█	█
WR-06**	Monitoring of the Rivers in Haor Area	█	█	█	█	█	█
WR-07***	Impact study of the interventions of transboundary river system	█	█	█	█	█	█
WR-08**	Study of the Climate Change impact of Haor areas	█	█	█	█	█	█
WR-09***	Strengthening and Capacity Development of BHWDB	█	█	█	█	█	█
Agriculture							
AG-01***	Expansion of irrigation through utilization of surface water by double lifting in haor area	█	█	█	█	█	█
AG-02***	Minor Irrigation by low lift pumps project	█	█	█	█	█	█
AG-03**	Investigation and expansion of ground water irrigation	█	█	█	█	█	█
AG-04*	Promotion and plantation of Agar Plant	█	█	█	█	█	█
AG-05*	Automation of rice transplantation system by Auto Rice Transplanter	█	█	█	█	█	█
AG-06**	Mechanization of Agriculture through Combined Harvester	█	█	█	█	█	█
AG-07**	Improvement of Quality of Crop Grain through Dryer system	█	█	█	█	█	█
AG-08***	Intensive Cultivation of homestead vegetables and horticulture	█	█	█	█	█	█
AG-09**	Development of climate resilient High Yielding Varieties of rice and non-rice crops	█	█	█	█	█	█
AG-10**	Selection of Short Duration Boro Rice Cultivars/ Advanced Line	█	█	█	█	█	█
AG-11***	Changing Cropping Pattern to increase cropping intensity in haor areas	█	█	█	█	█	█
AG-12*	Extension of Integrated Pest Management Training Project	█	█	█	█	█	█
AG-13**	Expansion of Integrated Crop Management Training	█	█	█	█	█	█

DA Code	Projects by Development Area	FY 12-13	FY 16-17 FY 17-18	FY 21-22 FY 22-23	FY 31-32
		Short Term	Medium Term	Long Term	
AG-14*	Extension of Jute cultivation project				
AG-15**	Integrated Development of Applied Research for Improved Farming Systems				
AG-16**	High Value-non-Rice-cum-Deep Water Rice Culture				
AG-17***	Assistance to Landless, Marginal and Small Farmers to overcome soaring input, and food prices in impoverished Haor area				
AG-18**	Application of GIS for farm productivity enhancement through land suitability assessment of major cropping pattern in Haor Region				
AG-19*	Improvement of Storage Facilities and Agricultural Marketing System in Haor Area				
AG-20**	Introduction of Innovative Agriculture through Vegetables cultivation on Floating Bed				
Fisheries					
FI-01***	Development and Establishment of Fish Sanctuaries				
FI-02***	Habitat Restoration for Fish Diversity				
FI-03***	Beel Nursery Programme for Increasing Fish Fingerling Recruitment				
FI-04*	Good Fisheries Management Practices following the Mohanganj Experience				
FI-05**	Floodplain Aquaculture under the Community Enterprise Approach				
FI-06**	Community and Household-based Net-pen Fish Culture in the Haor/Floodplain				
FI-07***	Fish Fingerling Stocking and Raising Programme				
FI-08**	Capacity Development and Alternate Income Generating Activities (AIGAS) for Fisher Community				
FI-09***	Renovation of Hatcheries for Conserving Quality Brood Stock and Production of Fish Seeds				
FI-10**	Study on Review of Policies, Regulations and Lease System for Sustaining Fisheries Resources				
FI-11***	Restoration of River Duars (Deep Pools) for Protecting Brood/Mother Fish				
FI-12**	Renovation of Fish Ponds and Dissemination of Improved Aquaculture Technology to Fish Farmers				
FI-13**	Development and Construction of Innovative Fish Pass/Fish Friendly Structures				
FI-14*	Establishment of Fisheries Information Service Centre				
FI-15**	Introduction of Deep Water Rice-cum-Fish Culture				
FI-16**	Establishment and Rehabilitation of Fish Landing Centers				
FI-17**	Establishment of Fish Drying and Fermentation Centre				
FI-18**	Study on Impact of Climate Change and Interventions on Fisheries Resources				
FI-19*	Development and Establishment of Cold Storage and Ice Plants				
FI-20*	Research on Fish Stock Improvement through Gene Pool Preservation and In-breeding Depression				
FI-21*	Rehabilitation of Existing Fish Processing Units and Establishment of a New Fish Processing Industry				
FI-22**	Community and Household-based Cage Fish Culture				
Pearl Culture					
PC-01**	Development and Dissemination of pearl culture technology in Haor Area				
Livestock					
LS-01***	Improvement of fodder availability for livestock development				
LS-02**	Integration of livestock in traditional farming system				
LS-03*	Farmers training programs for capacity building				
LS-04*	Establishment of pilot breeding programme for cattle development				
LS-05**	Promotion of small and mini dairy farms				
LS-06***	Promotion of conventional and alternative feed resources for livestock feeding				
LS-07**	Extension of Livestock Services through establishment of Union Livestock Service Center (ULSC)				
LS-08*	Development of Livestock Products through involvement of Community Organization				
LS-09***	Development of Community Animal Health Workers for Livestock Healthcare				
LS-10***	Promotion of Small and Mini Poultry and Duck Farms				

DA Code	Projects by Development Area	FY 12-13	FY 16-17 FY 17-18	FY 21-22 FY 22-23	FY 31-32
		Short Term	Medium Term	Long Term	
Forest					
FR-01**	Establishment of One Forest Nurseries in each of the 57 Upazilas of the Haor Areas				
FR-02***	Afforestation through involvement of local Community in Haor Area				
FR-03***	Afforestation of Roads, Embankments, Homesteads and Institutions				
FR-04*	Reclamation of Izmali land for promotion of Social Forestry				
FR-05**	Increase the Capacity of Community for forest conservation and Improvement				
FR-06*	Research Programmes on Haor Areas				
Biodiversity and wetland					
BW-01***	Eco- management zoning of Haor wetlands for biodiversity protection				
BW-02***	Restoration of important wetlands				
BW-03**	Development and implementation of important wetlands for global significance.				
BW-04*	Establishment of global wetlands center				
BW-05*	Review of policy for biodiversity management				
BW-06***	Habitat preservation programme for plants, wildlife, fisheries and migratory birds				
BW-07**	Research and education programme on Haor wetlands biodiversity conservation and management				
BW-08**	Management of commercially important Haor wetland biodiversity				
BW-09**	Pollution control and prevention from agriculture, industry and urban settlement				
BW-10***	Adaption and Mitigation to Climate Disaster Risks in Haor Basin				
Transportation					
TR-1***	Upgradation of Rural Roads				
TR-2***	Submersible rural road construction				
TR-3***	Submersible District road construction (Sulla to Ajmiriganj)				
TR-4***	Submersible District road construction (Khaliajuri to Ajmiriganj)				
TR-5***	Submersible District road construction (Itna to Ajmiriganj)				
TR-6***	Submersible District road construction (Austagram to Lakhai)				
TR-7***	Submersible District road construction (Derai to Jagannathpur)				
TR-8**	Construction of Regional Highway				
TR-9*	Construction of Surma Bridge at Chhatak				
TR-10***	Development of inland navigation by dredging in nine river routes				
TR-11**	Development of 150 landing facilities in the rural area				
TR-12**	Installation of navigational aids along the river routes				
TR-13**	Hydrographic survey in the nine major river routes				
TR-14**	Construction of terminal buildings at 15 major passenger stations				
TR-15*	Development of parking yards, storage facilities and security walls at 13 stations				
Water Supply and Sanitation					
WS-01***	Establishment Sustainable and Community based Haor friendly Water Supply Technologies				
WS-02***	Introduce the Sustainable and Community based Flood Proof Hygienic Sanitation System in Haor areas				
Housing and Settlement					
ST-01**	Eco Village Platform Development for mitigate future Housing and settlement demand				
Education					
ED-01***	Establishment of Community based Multigrade Learning Centers				
ED-02**	Community based School Feeding Programme				
ED-03***	Establishment of Primary Schools				
ED-04**	School Boat Facilities for Inaccessible Areas				
ED-05*	Awareness Generation Programmes on Gender Discrimination				
ED-06**	Introduce skill based training programmes				
ED-07*	Establishment of High Schools, Colleges and Madrasa				

DA Code	Projects by Development Area	FY 12-13	FY 16-17 FY 17-18	FY 21-22 FY 22-23	FY 31-32
		Short Term	Medium Term	Long Term	
Health					
HE-01***	Upgradation of Upazila Health Complex (UHC) and Construction of Upazila Health & Family Welfare Centre (UHFWC)	█	█		
HE-02***	Maternal and Reproductive Health Development Programme	█	█		
HE-03***	Child Mortality Reduction Programme	█	█		
HE-04**	Promotion of nutrition status of the haor people	█	█		
HE-05**	Improve the quality of hospital service	█	█		
HE-06*	Capacity Development of Non-government, Non-profit Health Care Agencies using Private-Public-Partnership (PPP)	█	█		
HE-07*	Expansion of Alternative Medical Care (Unani, Ayurvedic & Homeopathic system of medicine)	█	█		
HE-08*	Strengthening of supervision and monitoring system	█	█		
HE-09***	Community health care: Establishment of Community clinics (CC)	█	█		
HE-10***	Community health care: Mobile clinic and emergency medical team	█	█		
HE-11**	Establishment of e-Health Services and Facilities up to Community Level	█	█		
HE-12**	Strengthening referral system from CC to UHFWC; UHFWC to UHC; UHC to District Hospitals	█	█		
HE-13**	Environmental Health Programme	█	█		
HE-14**	Capacity development of health personnel	█	█		
HE-15*	Medical Waste Management in District Hospital and Upazila Health Complex	█	█		
HE-16*	GIS mapping of health facilities and disease pattern	█	█		
Tourism					
TS-01***	Development of Mega Eco-parks	█	█		
TS-02**	Establishment of War Museums	█	█		
TS-03**	Establishment of Amusement Parks	█	█		
TS-04**	Development of Tourist/Picnic Spots	█	█		
TS-05***	Construction of Bird Watching Tower	█	█		
TS-06*	Renovation of Zamindar Palaces	█	█		
TS-07***	Dolphin Sighting Tour Programme	█	█		
TS-08***	Hakaluki Haor Sightseeing Tour Programme	█	█		
TS-09**	Development of Fish Park	█	█		
TS-10***	Establishment of Wildlife Sanctuary	█	█		
TS-11**	Promotional Programmes on Haor for Electronic and Print Media	█	█		
TS-12**	Construction of Tourism Infrastructures	█	█		
TS-13*	Training programmes in Hotel Management and Food Catering	█	█		
Social Services					
SS-01**	Construction of Growth centers/Rural markets	█	█		
SS-02*	Construction of Food Godowns	█	█		
SS-03***	Upgradation/construction of religious prayer house, graveyards and cremation grounds	█	█		
SS-04**	Awareness Generation Programme for the Spiritual Leaders	█	█		
SS-05*	Construction of Playground and Supply of Sports materials	█	█		
SS-06***	Upgradation and Construction of Police Stations	█	█		
Industry					
IN-01**	Can food Industry	█	█		
IN-02**	Beverage Industry	█	█		
IN-03***	Small and Cottage Industries Development programme for destitute women's in haor area	█	█		
IN-04*	Swamp Water Processing Industry	█	█		
IN-05**	Tea processing Industry	█	█		
IN-06**	Gas cylinder Industry	█	█		
IN-07*	Industrial Park	█	█		
IN-08***	Establishment of Charcoal Industry	█	█		
IN-09***	Boat Manufacturing Industry	█	█		
Power and Energy					
PW-01***	Expansion of electric distribution systems in Haor districts	█	█		
PW-02**	Expansion of solar power generation systems	█	█		
PW-03*	Pre-feasibility Study on Renewable Energy Potentials and Power Generation Possibilities in Haor Area	█	█		

DA Code	Projects by Development Area	FY 12-13	FY 16-17 FY 17-18	FY 21-22 FY 22-23	FY 31-32
		Short Term	Medium Term	Long Term	
PW-04*	Development of mini-hydropower schemes				
	Mineral Resources				
MR-01**	Seismic survey, exploration drilling in the Haor districts to explore new gas field				
MR-02**	Development of Mines for gravel, white clay, glass sand, coal and peat extraction from Haor districts				
MR-03***	Strengthening capacity of miner and mining labor in Haor districts				

Note: *** Very High Priority, ** High Priority, * Medium Priority

Chapter 12 Funding Mechanism

Disbursement Schedule

Most of the capital investment will come from government allocation. As such, the Annual Development Programme (ADP) allocation of the government needs to be increased. Environment funds and alternative sources of financing as acknowledged in the different policies and detailed out in the Master Plan should be looked into. Alternative funding sources may include the Government of Bangladesh Climate Change Trust Fund (CCTF), Climate Change Resilience Fund (CCRF), Green Fund, Global Environment Facility (GEF) Fund, Short-lived Climate Pollutants (SLCP), Coalition Fund etc. The total estimated capital cost for the implementation of the Master Plan is BDT 2,804,305 lakh taka. The year-wise capital cost of the Master Plan projects is presented in Figure 12.1. Ministry wise distribution of cost is shown in Figure 12.2.

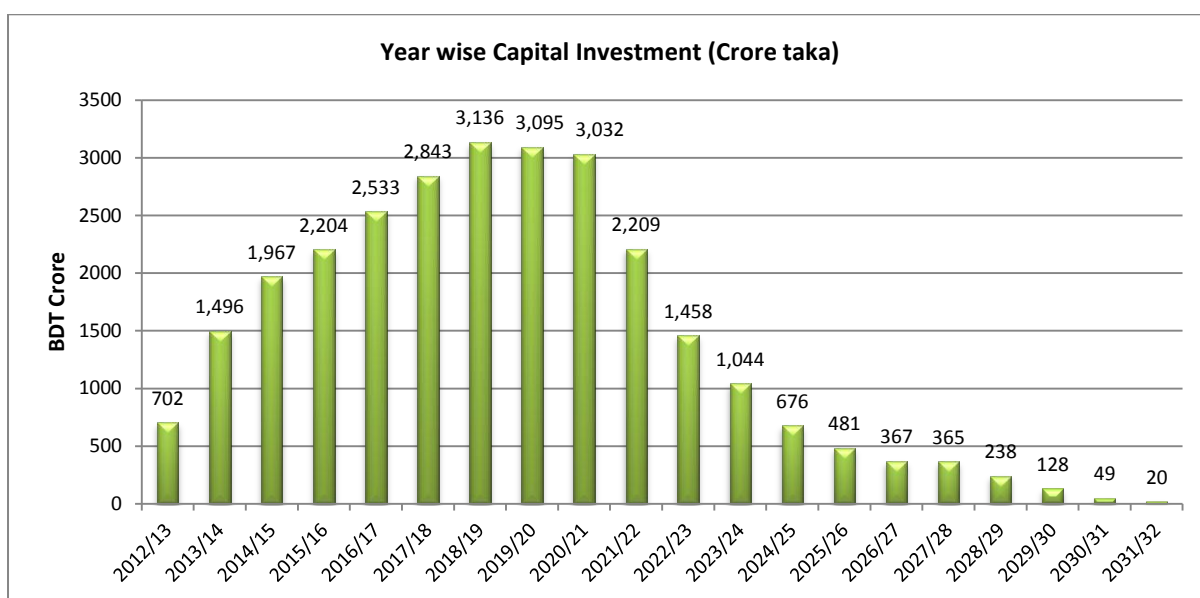


Figure 12.1: Year wise capital investments

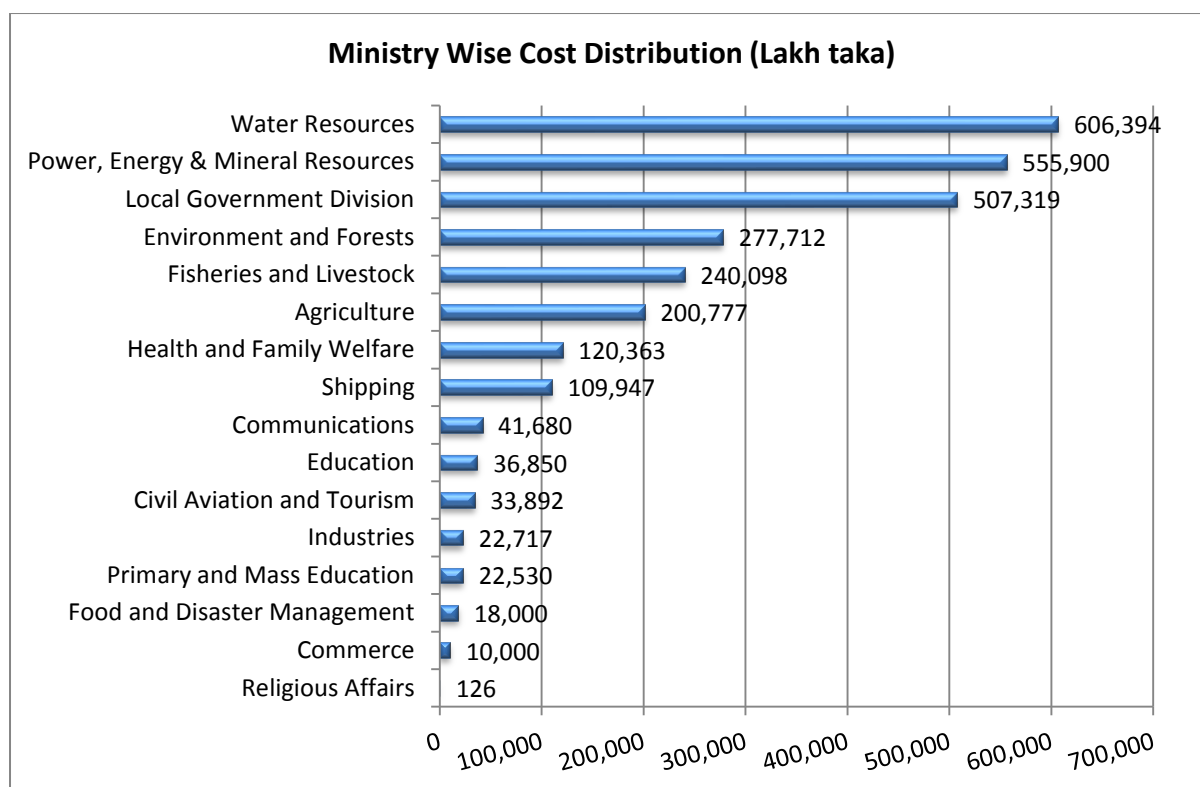


Figure 12.2: Ministry wise cost distribution

Funding Modality

The funding mechanism has been developed considering all possible sources and modality of project implementation. Table 12.1 represents the possible modality of the project financing by GoB, Development partner, PPP and Private sector. Table 12.2 shows the requirement of increase of ADP allocation (in %) to implement the Master Plan of Haor Area. Table 12.3 indicates the possible sources of funding for the proposed projects under the Master Plan.

Table 12.1: Funding modalities

Funding Mechanism	Nos of Project	Short Term	Medium Term	Long Term	(Amount in lakh taka)	
					Total Investment	Investment
Bangladesh Government and Development Partner	123	783,988	1,021,769	411,439	2,217,196	79%
Public Private Partnership	15	74,782	310,257	32,883	417,923	15%
Private Agency	16	17,294	108,625	43,268	169,187	6%
Grand Total	154	876,063	1,440,652	487,590	2,804,305	100%

Table 12.2: Requirement of additional ADP allocation

Development Area	Sector/Sub-sector of Annual Development Programme of GoB	% to Increase per year		
		Short Term	Medium Term	Long Term
Water Resources	Water resources	28.88	33.02	0.19
Agriculture	Crop	0.74	0.63	0.82
Education	Education and Religion	1.22	9.33	1.93

Development Area	Sector/Sub-sector of Annual Development Programme of GoB	% to Increase per year		
		Short Term	Medium Term	Long Term
Power and Energy	Electricity	310.79	281.52	67.34
Fisheries and Pearl Culture	Fisheries	67.41	67.44	67.49
Forest and Biodiversity & wetland	Forest	2.56	3.00	0.39
Health	Health, Nutrition , Population and Family welfare	0.67	19.83	3.89
Industry	Industry	27.65	37.88	21.22
Livestock	Livestock	0.15	65.07	-
Mineral Resources	Oil, Gas and Natural Resource	3.69	2.88	0.30
Housing & Settlement and Water Supply & Sanitation	Physical Planning, Water Supply and Housing	0.10	0.09	0.29
Social Services	Rural Development and Rural Institute	7.56	13.22	1.03
Transportation and Tourism	Transportation	19.93	9.91	0.02

Table 12.3: Possible sources of funding

Development Area	Major Funding Sources / Mechanism						
	GEF	PPP	GoB and DP	CCTF	GF	CCRF	Private
Agriculture			√				
Biodiversity and Wetland	√			√	√	√	
Education			√				
Fisheries	√		√	√		√	
Forest	√			√	√	√	
Health			√				
Housing and Settlement			√				
Industry		√					√
Livestock			√				
Mineral Resources		√					
Pearl Culture			√				
Power and Energy		√					
Social Services			√				
Tourism		√					√
Transportation			√				
Water Resources			√				
Water Supply and Sanitation			√				

Note:

GoB	Government of Bangladesh	CCTF	Climate Change Trust Fund
GEF	Global Environment Fund	GF	Green Fund
PPP	Public Private Partnership	CCRF	Climate Change Resilient Fund
DP	Development Partner	Private	Private Agency

Chapter 13 Monitoring and Evaluation

As described previously, the Master Plan of Haor Area has set investment portfolios in six strategic thematic areas distributed in 17 DAs to provide a complete set of projects. The Master Plan of Haor Area investment portfolio comprises 154 projects. Each strategic thematic area has development objectives consistent with the overall and immediate objectives of the Plan. These are spatially and technically integrated and logically phased to fulfill the overall goals of the Plan as well as national targets of the country. The current institutional framework for implementation of the Master Plan is complex in terms of monitoring and evaluation. There are 38 government agencies affiliated with 16 different ministries, all of which can be identified as having functions or responsibilities relevant to the implementation of the projects of the Master Plan of Haor Area.

The proposed projects would be evaluated by examining their objectives. For co-ordination, monitoring and evaluation of the projects implemented under the Master Plan of Haor Area, the MoWR and the BHWDB could be designated as lead Ministry and lead agency respectively. Permanent Steering Committee with representatives of the implementing ministry and agency, Planning Commission and Finance Ministry will be established. Moreover, Inter-ministerial Technical Committees and Programme Steering Committees constituted at appropriate levels will assist the lead agency and lead Ministry in overall coordination.

A Project Co-ordination Unit (PCU) will be established within the BHWDB in discharging coordination functions. The terms of reference of the PCU would include, among others, the mandate to liaise with the relevant Ministries and development partners.

The Master Plan of Haor Area may be considered as a dynamic document, which is to be reviewed and updated every five year. Against the backdrop of changes in the development scenario both within the country and in the upper riparian country and availability of more knowledge and information about global climate change, the demand scenarios as well as some of the Plan's initial assumptions may be changed. The overall responsibility for monitoring, evaluating and updating the Plan will rest with the BWHDB.

Glossary

Afal	High waves generated due to wind in the haor are locally known as Afal
Aman	Monsoon rice crop cultivated during July-September and harvested in mid-December-January
Aus	Pre-monsoon rice crop grown in Kharif I season, transplanted during mid-April-mid May and harvested during mid-July-mid August
B Aman	Broadcast or deep-water Aman
Baor	Baors are oxbow lakes, formed by dead arms of rivers
Beel	Beels are shallow lakes, which form in the lowest parts of the haor; sometimes these are perennial but more often seasonal. The water surfaces are contiguous with the groundwater table and beels that are sustained from groundwater to a large extent. Surface water accumulates in the beels during wet season, often spilling out into the main river system through khals.
Bondh	Crop land
Boro	Rice grown during the dry winter season, transplanted during January-mid February and harvested during mid-May
Country boat	Wood hull boat of traditional design capacity usually not more than 500 maunds (19 ton)
District	An administrative unit comprising several thanas/upzilas
Division	An administrative unit comprising several administrative districts
Duar	Scour hole in river bed which provides habitat for fish and river dolphins
Haat	Riverine landing market or assembly place
Haor	Haor are bowl-shaped depressions of considerable aerial extent lying between the natural levees of rivers or high lands of the northeast region of Bangladesh. In most cases, haor have formed as a result of peripheral faulting leading to the depression of haor areas. During the wet season, the haor are full of water, but during the dry season, they dry up except for the beels.
Hijal	Type of a water tolerant tree grown in swamps & forests
Household	Family unit that shares common resources for cooking and eating
Jalmohal	Waterbody used for fishery
Kanda	Highland on the haor, used for cattle grazing, cropping or rice threshing
Kharif season	Monsoon crop season. Cropping season from 15 March-15 October, often divided into Kharif I (March-June) and Kharif II (July-October).
Khal	Local name for a drainage channel connecting beels
Khas	Government owned land or waterbodies
Koroch	A type of water-tolerant tree grown in swamp forests
Mauza	Land revenue boundary consisting of land plots
Rabi season	Cropping season between 16 October and 15 March
T. Aman	Transplanted Aman
Taka (Tk)	Unit of Bangladeshi currency
Union	Geo-administrative unit under an upazila comprising several villages/wards

Acronyms and Abbreviations

ADP	Annual Development Programme
FCD	Flood Control and Drainage
AEZs	Agro-Ecological Zones
AH	Asian Highway
AIDS	Acquired Immune Deficiency Syndrome
AIGAS	Alternate Income Generating Activities
ARI	Acute Respiratory Infection
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BDT	Bangladeshi Taka
BFDC	Bangladesh Fisheries Development Corporation
BFRI	Bangladesh Fisheries Research Institute
BHWDB	Bangladesh Haor and Wetland Development Board
BIWTA	Bangladesh Inland Water Transport Authority
BMD	Bangladesh Meteorological Department
BNH	Bangladesh National Herbarium
BPC	Bangladesh Parjatan Corporation
BPDB	Bangladesh Power Development Board
BSCIC	Bangladesh Small and Cottage Industries Corporation
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CBD	Convention on Biological Diversity
CC	Community Clinic
CEGIS	Center for Environmental and Geographic Information Services
CFB	Community Food Bank
CHT	Chittagong Hill Tracts
CNG	Compressed Natural Gas
CSBA	Community-based Skilled Birth Attendant
CSP	Concentrating Solar Power
DAE	Department of Agricultural Extension
DAM	Department of Agricultural Marketing
DA	Development Area
DEM	Digital Elevation Model
DLS	Department of Livestock Services
DMB	Disaster Management Bureau
DoE	Department of Environment
DoF	Department of Fisheries
DPE	Directorate of Primary Education

DPHE	Department of Public Health Engineering
DPP	Development Project Proforma
DSC	District Steering Committee
DSF	Demand Side Financing
DSS	Department of Social Services
DTWs	Deep Tube Wells
ECA	Ecologically Critical Areas
ECNEC	Executive Committee of the National Economic Council
ECNWRC	Executive Committee of the National Water Resources Council
EIA	Environmental Impact Assessment
EPZ	Export Processing Zone
ERD	Economic Relations Division
ESRP	Earth Stabilised Raised Pit
FAO	Food and Agriculture Organization
FAP	Flood Action Plan
FCDI	Flood Control Drainage and Irrigation
FD	Forest Department
FGD	Focus Group Discussion
FWC	Family Welfare Centre
GDP	Gross Domestic Product
GIS	Geographic Information System
GBM	Ganges- Brahmaputra- Meghna
GoB	Government of the People's Republic of Bangladesh
GPI	Gender Parity Index
GRP	Gross Regional Product
GWP	Global Water Partnership
HFO	High-density Fuel Oil
HIV	Human Immunodeficiency Virus
HMG	Haor Management Group
HQ	Head Quarter
HYV	High Yielding Varieties
ICRD	Integrated Coastal Resources Database
ICT	Information and Communication Technology
ICT	Inland Container Terminal
ICZMPP	Integrated Coastal Zone Management Plan Project
IFCDR	Institute of Flood Control and Drainage Research
IHWRD	Integrated Haor and Water Resources Database
IMED	Implementation, Monitoring and Evaluation Division
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
IWFM	Institute of Water and Flood Management
IWM	Institute of Water Modelling
IWRM	Integrated Water Resource Management
IWT	Inland Water Transport

JRC	Joint Rivers Commission
KCG	Key Contact Group
KII	Key Informant Interview
kW	kilowatt
LAD	Least Available Depth
LGD	Local Government Division
LGED	Local Government Engineering Department
LGIs	Local Government Institutions
LLP	Low Lift Pumps
LPL	Lower Poverty Line
MDG	Millennium Development Goals
MEA	Multilateral Environmental Agreements
MIS	Management Information System
MMR	Maternal Mortality Rate
MoEF	Ministry of Environment and Forest
MoF&DM	Ministry of Food and Disaster Management
MOFL	Ministry of Fisheries and Livestock
MOH&P	Ministry of Housing and Public Works
MOHFW	Ministry of Health and Family Welfare
MOI	Ministry of Industries
MoWR	Ministry of Water Resources
MPO	Master Plan Organization
MT	Metric Ton
MW	Megawatt
NBSAP	National Biodiversity Strategy and Action Plan
NCA	Net Cultivated Area
NCS	National Conservation Strategy
NE	North East
NEC	National Economic Council
NEMAP	National Environmental Management Action Plan
NERP	Northeast Regional Water Management Plan
NGO	Non-governmental Organization
NHP	National Health Programme
NNP	National Nutrition Programme
NWMP	National Water Management Plan
NWPo	National Water Policy
NWRC	National Water Resources Council
NWRD	National Water Resources Database
O&M	Operation & Maintenance
ODP	Organizational Development Plan
OPP	Outline Perspective Plan
PA	Protected Area
PAPD	Participatory Action Plan Development
PBS	Palli Bidyut Samitie

PCM	Public Consultation Meeting
PCP	Project Concept Paper
PCU	Project Co-ordination Unit
PGCB	Power Grid Company of Bangladesh
PPP	Public Private Partnership
PRA	Participatory Rural Appraisal
PRM	Participatory Resource Mapping
PRSP	Poverty Reduction Strategy Paper
PSF	Pond Sand Filter
PSMP	Power System Master Plan
RD	Rural Dispensary
REB	Rural Electrification Board
RHD	Roads and Highways Department
RRA	Rapid Rural Appraisal
RS	Remote Sensing
RWH	Rainwater Harvesting System
SB	Surma Basin
SEL	Sand Enveloped Latrine
SERP	Sand Enveloped Raised Pit
SIA	Social Impact Assessment
SME	Small and Medium Enterprise
SRDI	Soil Resources Development Institute
SRP	System Rehabilitation Project
SSP	Survey and Study Project
STW	Shallow Tube Well
TAPP	Technical Assistance Project Proforma
TBA	Traditional Birth Attendant
U5MR	Under-5 Child Mortality Rate
UHC	Upazila Health Complex
UHFWC	Upazila Health & Family Welfare Centre
ULSC	Union Livestock Service Center
UP	Union Parishad
UZP	Upazila Parishad
VSC	Village Sanitation Centre
WARPO	Water Resources Planning Organization
WRE	Water Resources Engineering
ZP	Zila Parishad

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