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**Haor Master Plan: A Sustainable Planning  
and Management of Ecosystem of  
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*Occasional Paper/2018/02*

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*This BKRI series has been published by :*

*The Registrar*

*Krishna Kanta Handiqui State Open University*

*Headquarters: Patgaon, Rani Gate, P.O.: Azara, Guwahati – 781017*

*City Centre : Housefed Complex, Dispur Last Gate, P.O.: Assam Sachivalaya, Dispur, Guwahati – 781006*

*Assam, INDIA.*

*Web: [www.kkhsou.in/web](http://www.kkhsou.in/web)*

*Date of First Publication: January, 2018.*

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Price: Rs. 100.00 (INR), \$ 50.00 (USD)

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*Printed at: S S Graphics, Guwahati*

# HAOR MASTER PLAN: A SUSTAINABLE PLANNING AND MANAGEMENT OF ECOSYSTEM OF NORTH-EASTERN BANGLADESH

## Abstract

Haor and wetlands located in the northeastern regions at the foothills of Assam and Meghalaya are potential resources to boost up the regional economy of Bangladesh and for improving the living standard of the entire region, which are still under-developed due to their physical and hydrological settings. The broad region is a major economic production zone. Agriculture, fisheries and ecological resources are its main diversified economic resources. However, sudden and unprecedented flash floods destroy agricultural production, leading to the fall the national agricultural contribution by 3% to the Gross Domestic Product (GDP). Despite the economic importance of the zone, people of the Haor area are poorer than other parts of the country. More than 28% of the total Haor population lives below the Lower Poverty Line(LPL). Agriculture is the principal livelihood of the farmers who cultivate a single crop in the whole year. This single crop remains under the constant threat of partial to complete damage from the early onrush of flash floods. Increasing fisheries productivity, mainly open water fishery and the importance of fisheries in the economy should be given priority since the area has a huge potential for various fish production. The Haor region has long been lagging behind mainstream national development, although the economic development of Bangladesh is moving steadily at a constant accelerated pace. The government has taken many initiatives including the preparation of national and regional strategies to steer economic growth and accordingly prepared plans over the years to boost up country's development. It is difficult to foresee the country's overall progress without the development of the Haor and wetlands region and its population which deserves special development initiatives.

At present, sectoral development initiatives have been executed and/or are being executed by different agencies within respective sectoral considerations. However, no macro level and holistic studies have been conducted so far to review the impact of such sectoral development to

interact with the overall development of this ecologically critical zone of Haor, Baors and Wetlands. The natural resources that contribute significantly to the socio-economic development are also getting depleted and degraded rapidly. The present practice manifests that different agencies are involved in their sectoral objectives and targets, which sometimes lack coordination and an integrated approach for sustainable development.

Therefore, a Sustainable Master Planning and Management of Haor and Wetland Ecosystem is required to harness the development potential by addressing the issues as well as to gain a 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 timely initiative of developing a comprehensive Master Plan with 154 future projects under six thematic areas for integrated development of the Haor area and to preserve, protect and restore the ecosystem as well as to protect the people of this area from natural disasters and to improve the livelihood of poor people.

## **Keywords**

**Haor and wetlands of Northeastern Bangladesh, resource management and planning, poverty determination and control, master plan strategy**

## **Introduction:**

Haors and wetlands with their unique hydro-ecological characteristics are large bowls shaped floodplain depressions located in the north-eastern region of Bangladesh covering about 1.99 million ha of the area and accommodating about 19.37 million people (Figure 1). There are about 373 Haors/wetlands located in the districts of Sunamganj, Habiganj, Netrakona, Kishoreganj, Sylhet, Maulvibazar and Brahmanbaria. These 373 Haors cover an area of about 859,000 ha which is around 43% of the total area of the Haor region. It is a mosaic of wetland habitats including rivers, streams, canals, large areas of seasonally flooded cultivated plains, and beels. The Haor region lies in the Meghna basin which is a part of the Ganges-Meghna-Brahmaputra (GMB) basins. Flow from about 69,514 km<sup>2</sup> of the Meghna basin is drained into the Bay of Bengal through the Kalni-Kushiyara and Surma-Baulai system. Of this area, 33% or 23,137 km<sup>2</sup> lies in Bangladesh. The outflow of water from this region

into the Bay of Bengal amounts an average of 159,087 million m<sup>3</sup>/year. Of this flow, 56% is generated at the upstream of Bangladesh, while 44% is generated within the country. Hakaluki Haor, Hail Haor, Tanguar Haor (Ramsar Site), and Pagner Haor are the most significant wetlands in this region with a rich wildlife including 257 species of birds, 40 species of reptiles, 29 species of mammals and nine species of amphibians. Most of the important Haor and wetlands are enriched by wetland plants and lowland plantation. The physical setting and hydrology of this region have created a myriad of opportunities as well as constraints for the inhabitants.

The region receives water from the catchment slopes of the Shillong Plateau and the Tripura Hills in (India). Flash flood is the main problem in the Haor area which engulfs the primary production sector (e.g., agriculture and fisheries), and thus threatens the lives and livelihood 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.

### **Objectives**

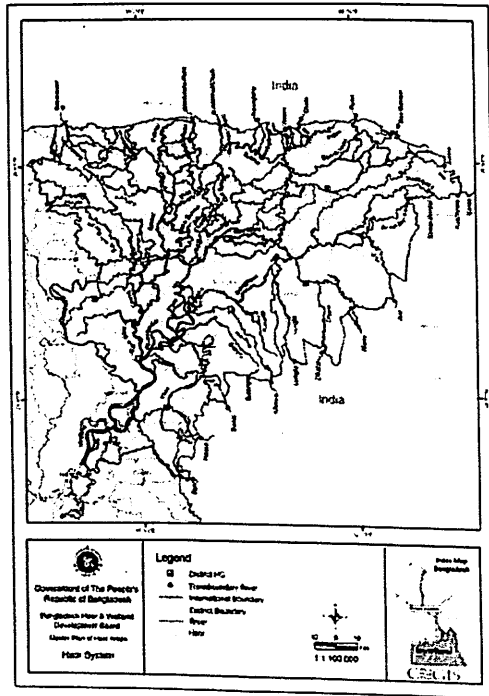
The objectives of this Plan are to develop the resources of the area as rapidly as possible in order to promote the welfare of the people, ensure adequate living standards, social services, opportunity and aim at the widest and most equitable distribution of income and property while maintaining and conserving the Haor and wetlands ecosystem. Implicitly it aims at the increase production and distribution of all kinds of goods which together generate and sustain healthy growth towards a modern economy. Accordingly, the specific objectives of the Master Plan are to:

(a) maintain the aquatic environment, preserve natural water bodies such as Haor and beels and facilitate drainage; (b) maintain existing wetlands in and around natural canals for mitigation of flood risk and damage; (c) ensure crop and fish production, protection of homesteads and infrastructure and conservation of Biodiversity; (d) guide and control expansion of settlements and infrastructural development for wise management of wetlands; (e) develop integrated programmes to prevent degradation of resources and ensure sustainable management; (f) prepare and recommend integrated approach oriented interventions and future action programmes as well as department/agency-wise

action plans; and (g) frame projects in line with stakeholder demands for the development of Haor area.

### Rationale

The North-eastern region of Bangladesh has long been lagging behind mainstream national development although the economic development of the country 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 many plans over the years to boost the country's development. Therefore, a region-specific Master Plan is obligatory for this area to harness the development potentials by addressing the issues as well as to gain a comprehensive understanding of the present hydrological and hydro-morphological characteristics and conditions, land-use patterns, ecological sensitivity and water quality situation. The Bangladesh Haor and Wetland Development Department (BHWDD) has taken the timely initiative to prepare a comprehensive Master Plan to preserve, protect and restore the eco-system, protect the people of this area from natural disasters and improve the livelihood of poor people.

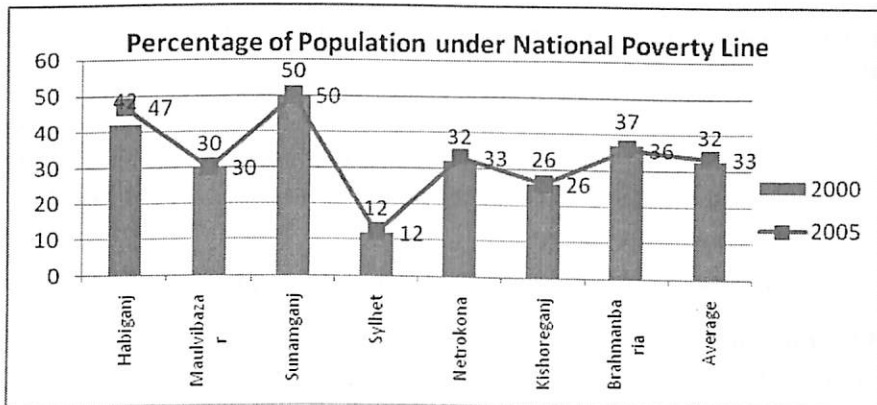


**Figure 1: Haor and Wetlands of North Eastern Region of Bangladesh (Source: CEGIS, 2012)**

## Poverty incidence

The poverty incidence of Haor and wetlands is estimated based on the upper poverty line in the Report on HIES (2010) at 31.5% at national level, 35.2% at rural area level and 21.3% at the urban area level. In 2005, these rates were 40.0%, 43.8% and 28.4% respectively. Poverty declined by 8.5% (approximately 1.7% per annum) at the national level, 8.6% at rural area level and 7.1% at urban area level from 2005 to 2010. On the other hand, based on the lower poverty line, incidence of poverty in 2010 is estimated at 17.6% at national level, 21.1% at rural area level and 7.7% at the urban area level. In 2005 these rates were 25.1%, 28.6% and 14.6% respectively. Hardcore poverty declined by 7.5% at the national level as well as rural area level and 6.9% at urban area level from 2005 to 2010 (BBS, 2012).

Among the Haor and wetlands covered districts, the most severe poverty situation exists in Sunamganj, where 50% of the population lives under the national poverty line. On the other hand, Sylhet district enjoys the lowest rate of poverty among the study districts (Figure 2). On an average, 33% of the population in the Haor area suffers from poverty. Based on the upper poverty line, the rate is higher here than the national poverty rate of 31.5%.



**Figure 2: Poverty Status in the Haor and Wetlands Covered Area (Source: BBS, 2006)**

In spite of having ample natural resources, people have no equitable access and distribution. Very few people have access to whereas most of the people have limited/no access to those resources. Thus, there emerges a significant poverty gap.<sup>1</sup> This figure also shows that although



the percentage of poor households decreased at the national level (from 34% in 2000 to 25% in 2005<sup>2</sup>); in Haor area it increased or remained the same in some districts.

### **Poverty determinants**

The study area was characterised to be flooded at different levels due to its geophysical settings and divided into three segments (though overlapping occurs) considering the depth of flooding, such as, deeply flooded, moderately flooded and low flooded. It is found that poverty was higher in deeply flooded areas (41%) in 2005 (Figure 3). It is assumed that since this area remains under water for eight months and more, local people cannot employ in single cropped agricultural production during dry season rather they depend on fishing. But fishing is limited with government's provision or existing lease system. However, the percentage of poor households is lower in moderately flooded areas as two opportunities both fishing and cultivation are available.

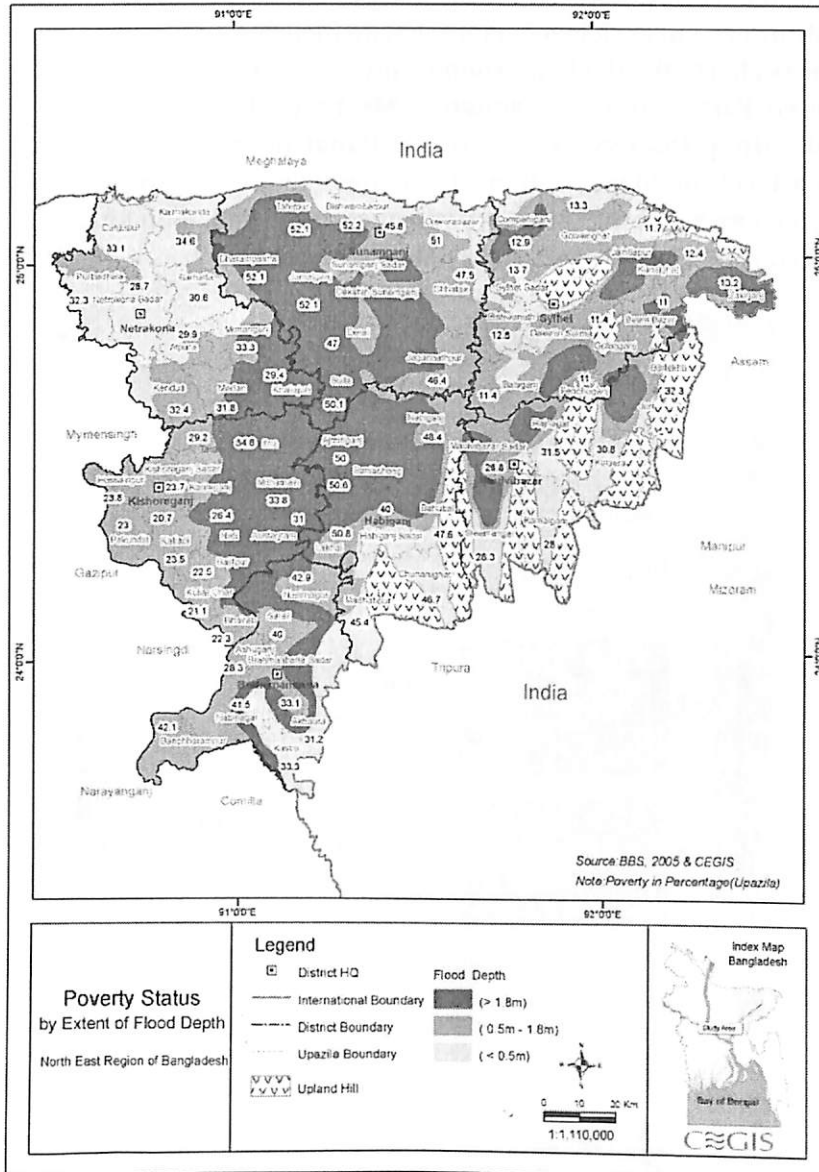
It is mentionable that, poverty and livelihood are dependent on the percentage of irrigated coverage area Haor. The more the percentage of irrigated area, less is the tendency of the percentage of population living below poverty line. On the other hand, the extent of drought area, flooded area and variability of rainfall has had a positive impact on poverty incidence. That is, droughts, floods and variability of rainfalls directly contribute to increasing poverty levels. Besides, there are some other determinants of the higher poverty rate in this area, which are:

(a) geographical isolation, (b) inhospitable climatic conditions, (c) poor Infrastructure, (d) lack of electricity, (e) proximity of larger market, (f) low household employment and income, (g) less Household asset and (h) income from other sources.

### **Haors and wetlands Master Planning Framework**

This Haor and wetlands Master Plan is an integrated and interactive framework plan for developing the Haor and wetlands areas through optimal and equitable utilisation of natural and human resources for the next 20 years (up to 2032). It has been formulated following the IWRM principles. It will be implemented in the short-term (five years), medium-term (five to ten years) and long-term (beyond ten years) 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 (Figure 4).



**Figure 3: Poverty distribution by flood depth level in the Haor region of Bangladesh**

Spatial planning, as well as non-spatial planning (i.e. social and

economic planning) techniques, have been adopted in its preparation. Space technology and GIS have been extensively used in the spatial planning process for data extraction, interpretation and information management. Planning tools that are Touch Table include software connected with google map and information data layers have been firstly utilised in desk level planning with inclusion of expert judgments before going to the field for ground truthing. Social tools and techniques covered Participatory Consultation Meetings (PCM) at Upazila level, Focus Group Discussions (FGD) and Rapid Rural Appraisal (RRA) at union level for identification of problems, issues, people's need and project interventions. Moreover, agency level and individual expert-level consultations were held to finalise the plan.

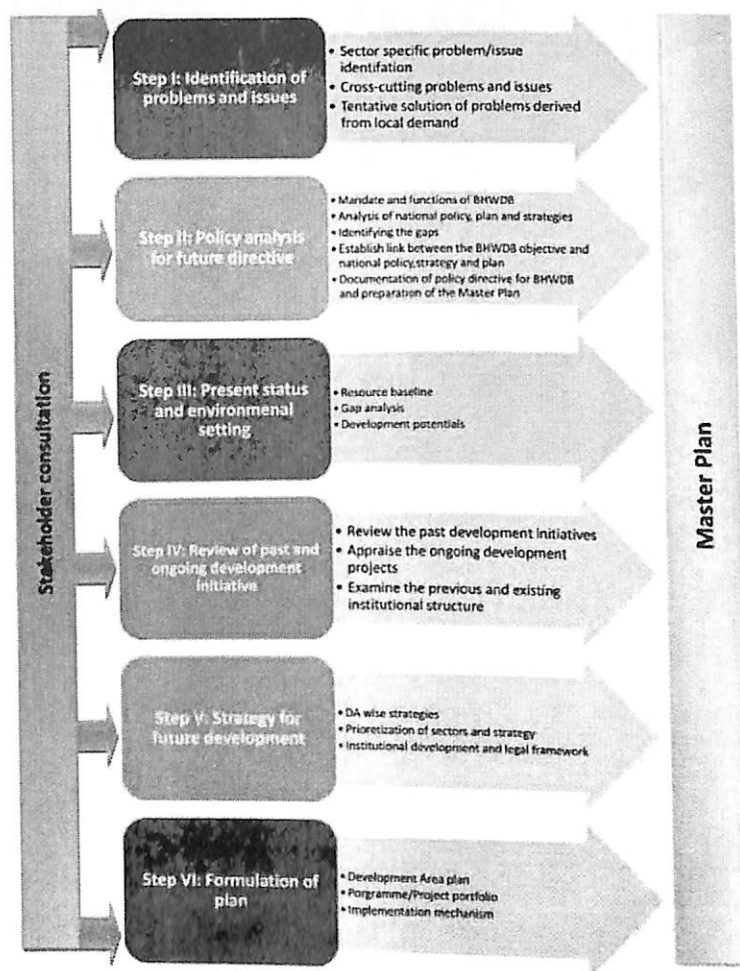
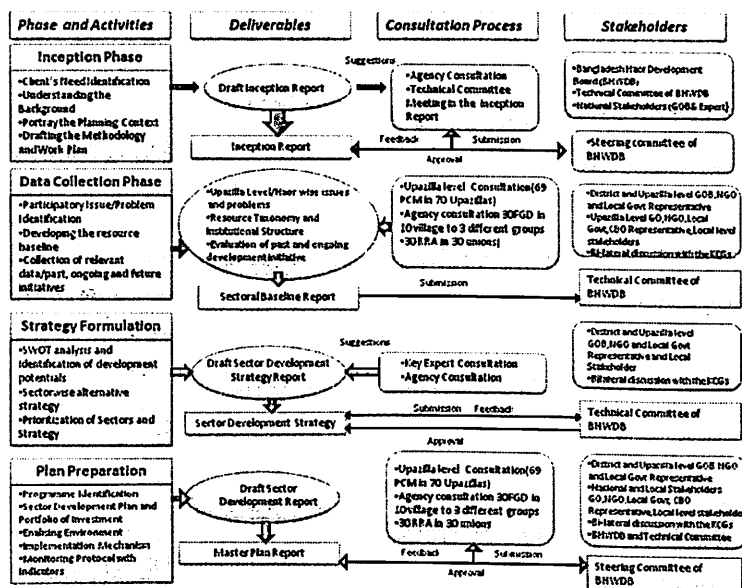


Figure 4: Framework for planning process of the Master Plan

A six-step interactive planning methodology has been adopted for the preparation of the Master Plan following the principles mentioned above. Development of the Plan has been initiated from policy analysis to set policy directives for it. The mandates of the BHWDD has 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 second step, development issues and problems of various development area/sub-sectors such as water resources, agriculture, fisheries, health, education, communication, ecosystem, etc., have been identified. In the third step, past and ongoing development initiatives have been thoroughly reviewed to learn from the past about the successes, achievements and failures. The current synoptic profile (2010) of physical, socio-economic and environmental resources has been set followed by resource projection and gap analysis between the base situations. These steps have revealed the development potential of the Haor area considered during the preparation of the Master Plan. Solutions to problems have been derived considering the demands of local stakeholders, considering individual and cross-cutting and technical issues. The Haor Master Plan was formulated in this region of Bangladesh to achieve six national goals which are:

(i) economic development, (ii) food security, (iii) decent standard of living for the people, (iv) poverty alleviation, (v) public health and safety and (vi) protection of the natural environment.

The overall participatory action development process was organised considering four focus points such as phase and activities, deliverables, consultation process and stakeholders (Figure-5). The phase and activities were divided into several chronological phases like Inception phase, data collection phase, strategy formulation and then plan preparation. Every phase was completed by providing a final report as a deliverable after consultation with respective stakeholders through suggestions, submission, feedback and approval. The stakeholders were the steering committee and the technical committee of the BHWDB in different phases.



**Figure 5: Overall Participatory Action Plan Development Process Problems and Challenges**

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

The major identified problems are:

- (a) flash floods, (b) siltation and sedimentation of major rivers, (c) river bank erosion and wave action, (d) reduction of navigability, (e) lack of proper hygiene and sanitation, (f) scarcity of drinking water, (g) fragile and inadequate road network, (h) degradation of ecosystem, (i) indiscriminate harvest of natural resources, (j) over exploitation of fisheries resources and swamp forest, (k) weakness in leasing system for fisheries, (l) illiteracy, (m) poverty, (n) inadequate health facilities, and (o) inadequate O&M of existing infrastructure.

**The identified issues include:**

- (1) Haors and wetlands, (2) water resources and sectoral water sharing, (3) agriculture, (4) fisheries, (5) pearl culture, (6) livestock, (7) social forestry, (8) biodiversity, (9) livelihood, (10) employment opportunity,

(11) transportation and communication, (12) education and health, (13) market facility, (14) religious institutions, (15) graveyards and cremation grounds, (16) food godowns and cold storage, (17) mini hydropower, (18) solar power and fuel, (19) tourism, settlements and public security, (20) usage of water, (21) sanitation, (22) industrial development, (23) sports and culture, (24) social welfare, (25) gender concerns, (26) institutional infrastructure, (28) natural disasters and climate change, and (29) GO/NGO project interventions.

### **Development Areas (DA) of Master Plan**

The Haors of the North East region of Bangladesh can be divided into three categories depending on the geographical location and characteristics of the area. The categories are foothill and near hill Haors; floodplain area Haors; and deeply flooded Haors.

A complete set of investment portfolio has been prepared for each of the sub-sectors or development areas which have the potential for development in the Haor region. Following are the DAs identified in the Master Plan:

(a) water resources, (b) agriculture, (c) fisheries, (d) pearl culture, (e) livestock, (f) forest, (g) education, (h) health, (i) transportation and communication, (j) housing and settlement, (k) water supply and sanitation, (l) industry, (m) energy and Power, (n) mineral resources, (o) biodiversity and wetland management tourism, (p) social services and facilities.

### **Planning vision and implementation strategy**

The vision of the government is to achieve sustainable national resources 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, storm surge and has proven to be a successful innovator with a turn for proactive action that brings beneficial outcomes. Bangladesh has six clearly defined national goals (National Water Policy, 1990):

(i) economic development, (ii) poverty alleviation, (iii) food security, (iv) public health and safety, (v) decent standard of living for the people, (vi) protection of the natural environment.

The development priorities are to promote an equitable society as a basis for social and political stability. When that is achieved, there will be

poverty reduction, gender equity, balanced regional development; and an inclusive society with workers' rights and responsibilities could be 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:

(a) ensuring effective governance, (b) developing a sound environment and creation of an innovative people for a modern digital Bangladesh, (c) creating a caring society, (d) addressing globalisation and challenges of regional cooperation, (f) ensuring broad-based growth and food security, (g) providing energy security for development and welfare, (h) building a sound infrastructure, and (i) mitigating the impact of climate change.

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

(i) compliance with declared development policies, strategies and plans, (ii) consideration of the national vision, goal, objectives and strategies, (iii) recognition of the recommendations and suggestions based on public participation and consultation process, (iv) pursuing the integrated policy directives of the government for sustainable development of the Haor area, and (v) maximisation of resources utilization with minimum degradation of the Haor wetlands and ecosystem.

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

(a) improved water and disaster management, (b) agricultural development for food security, (c) biodiversity enhancement and Wetland management, (d) social safety net and improved standard of living, (e) improved physical infrastructure, and (f) 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 1.

**Table 1: Strategic Thematic Areas and Development Areas**

SI No.	Strategic Thematic Area	Development Areas/sectors
1	Improved water and disaster management	Trans-boundary and in-country 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**

Water is central to the fragile ecosystem of the Haor and wetland area. The Haor basin contains 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 captured 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.

**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. 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 also covers biodiversity, wetlands and also the 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.

### **Social safety net and improved standard of living**

This strategic thematic area integrates the health, education, water supply and sanitation, housing and settlement and social services sectors to provide a 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 the involvement of local entrepreneurs. This will create employment opportunities for the poor.

## Investment Plan

The planned investment portfolios have been prepared considering the strategic thematic area and presented according to Development Areas(DA). Each DA consists of a number of individual projects. A total of 154 projects have been identified and presented in the investment portfolios. The projects may involve the development of new projects, rehabilitation of existing projects, improvement of projects or a combination of these activities which may be undertaken by public or private agencies individually or jointly. The Plan looks into the coordination of activities of the local authority, other public agencies and NGOs. The investment cost distribution by Thematic Area has been stated in Table 2

**Table 2: Investment cost by Thematic Area**

SINo.	Thematic Area	Project Nos	Cost Contribution (%)
1	Agricultural development for food security	53	28.35
2	Biodiversity enhancement and wetland management	16	12.82
3	Enterprise and Technology Development	16	22.44
4	Improved physical infrastructure	28	18.55
5	Improved water and disaster management	09	6.36
6	Social safety net and improved standard of living	32	11.48
	<b>Grand Total</b>	<b>154</b>	<b>100%</b>

## Conclusion

In conclusion, it is to be mentioned here that this is the first time participatory initiative of preparation of integrated and holistic plan which includes 154 project portfolios considering sectoral issues and challenges for environment-friendly sustainable natural resource management. This plan evolves sectoral development portfolios in six thematic development areas for the planning periods, which need coordinated implementation efforts from all implementing agencies in relevant sectors. Through the implementation of these portfolios, there will be enormous socio-economic development, prevention from the recurrent damage of crops from natural disasters like flash floods, reduction in the poverty rate, increase equity in development and

improve livelihoods of the people residing in Haor areas, conserve ecosystem functions and its bio-diversity. Finally, this will help in achieving sustainable development of the country.

### **Acknowledgement**

The authors acknowledge with thanks the help and cooperation of the BHWDB and the CEGIS in sharing all the information and data of a study on the specific topics and getting support from the professionals of the CEGIS in the formulation of the paper.

### **Notes**

1. The Poverty Gap (PG) estimates the depth of poverty of the population.
2. Comparison between year 2005 and 2010 is not given since districts/upazila level data are not available.

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