



Research Article

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Unlocking Potential, Overcoming Challenges and Future Development Plans in the Haor Region of Bangladesh: A Comprehensive Study

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Abstract

This review article examines the possibilities and difficulties that the Haor region in northeastern Bangladesh faces in order to look at its needs and problems. The report examines the challenges faced by specific sectors in the Haor regions in addition to outlining the various future development strategies implemented by different governmental and non-governmental groups. The Haor areas' agricultural output is limited by a number of issues, including flash floods, floods, and low winter temperatures. Converting the Haor regions from less productive to more productive land is a difficult task. The socioeconomic and biophysical features of Haors are examined in detail in this study emphasizes both the advantages and disadvantages of agricultural production. It looks on ways to significantly increase fish, cattle, and agricultural productivity in the Haor ecosystem in compliance with government directives. This article provides suggestions for ways to boost crop yields and cropping intensity as well as livestock and fish production in order to improve food security, alleviate poverty, and raise the standard of living for people living in Haor regions. The table included in the report also includes information on the Haor regions' significance and prospects for growth.

Keywords: Significance; Strategy; Development plan of Haor

Introduction

In technical terms, haors are low, swampy regions that resemble circles. "Haor" was originally derived from the Sanskrit word "Shagor," which means "sea." Along with the barind, char, hill, and coastal habitats, the Haor is listed as one of the nation's "hotspots" for fragile ecosystems in the Bangladesh Delta Plan 2100 [Bangladesh-Delta-Plan-2100]. In portions of Bangladesh, especially in the northeast, there is a specific type of wetland habitat called "Haor". It occupies 1.99 million hectares (19,998 square kilometers) and is home to about 19.37 million people [1-4]. The main Haor area includes Kishoreganj, Netrokona, and Brahmanbaria districts in addition to greater portions of Sunamganj, Habiganj, Moulvibazar, and Sylhet districts. The distinctive hydrology of these seasonal floodplains, which includes marshy areas and shallow lakes that flood during the

monsoon season, is what makes them special. The districts of Bangladesh's northeastern area include 373 Haor, or wetlands. About 858,000 hectares, or almost 43% of the Haor region's total area, are covered by these 373 Haor [5,6]. Table 1 below lists the number of Haor and their areas in Haor districts. Despite being a major economic output zone in the nation, the Haor area remains underdeveloped due to its physical and hydrological surroundings. The primary pillars of the region's diverse economic resources are agriculture and fishing. This area has over 0.71 million hectares of net cultivable land and produces more than 5.25 million tons of paddy annually. Despite the Haor region's economic significance, its inhabitants live in poverty compared to those in other regions of Bangladesh. About 28% of Haor people live in poverty (LPL), according to Ayers and Forsyth [7]. Haors are vital to the local ecology since they are home to a diverse array of flora and fauna,

including migratory fish and bird species. They also provide neighbouring towns with essential resources, such as water for agriculture, fishing, and cattle. The Haor region is home to thousands of migratory birds and 140 different varieties of fish. Consequently, the area is steadily gaining traction as a travel destination in Bangladesh. Fish farming is a major economic activity in the Haor region. Social, economic, and technical issues restrict the fishermen's capacity to follow their career. They often depend on modern fisheries management practices to achieve their basic needs and are fairly deprived. Improving livelihoods and ensuring food security in various regions are the goals of

this paper. An overview of the biophysical and socioeconomic characteristics of the ecosystem is provided by this study, which also looks at the barriers to agricultural production and the possibility of transforming the Haor environment into a viable agro-ecosystem. Based on an analysis of the risks, opportunities, strengths, and difficulties of each industry, the research paper makes recommendations for future growth. It was created holistically, with a primary focus on afforestation, crop, fisheries, and livestock production, environmental sustainability, and flood control.

Table 1: Bangladesh's Haor areas.

District	Total area in ha	Haor area in ha	No. of Haors
Sunamgonj	3,67,000	2,68,531	95
Sylhet	3,49,000	1,89,909	105
Habigonj	2,63,700	1,09,514	14
Maulvibazar	2,79,900	47,602	3
Netrokona	2,74,400	79,345	52
Kishoregonj	2,73,100	1,33,943	97
Brahmanbaria	1,92,700	29,616	7
Total	19,99,800	8,58,460	373

(Source: [49]).

Methodology

A comprehensive analysis of the pertinent offline and online literature produced secondary data and information. We focused on peer-reviewed research, English-language, online-published PhD and Master's theses, and scientific reports about Haor region. We looked for information in three large databases of scholarly publications: Web of Science, Google Scholar, and Scopus. The data covered demographics, agricultural production methods, Haor area distribution and extent, unlocking potential, addressing obstacles, and formulating future development strategies for each Haor region. Data and information were gathered through a Google search and interaction with a large number of governmental and non-governmental groups. Books, research or study papers, and policy documents were among the authentic documents that were consulted. In order to extract pertinent information on a variety of themes, textual materials—including books, articles, oral communications, interviews, and visuals—were analyzed and categorized using the “content analysis” approach. The requirements for later inclusion were that the publications, after being thoroughly examined, must contain information about the author or authors, the year of publication, and the titles; duplicates were removed, and only studies conducted in Haor were included in the abstracts and titles of articles.

Discussion

The demographic details and importance of Haors and their features

Aziz & Hasan [8] list several important Haors in Bangladesh,

including Hakaluki Haor, Tanguar Haor, Gurmar Haor, Hail Haor, Kawadighi Haor, Balai Haor, Bara Haor, Maijeil Haor, Dekher Haor, Panger Haor, Kanamaiya Haor, and others. The demographic information for these Haors is as follows (Figure 1).

Tanguar haor: Mostly in the Sunamganj District in northeastern Bangladesh, Tanguar Haor is a stunning wetland ecosystem. One of the nation's main Haor (seasonally inundated lowland) regions, it is renowned for its abundant biodiversity, which includes a diverse range of plants and animals. The Haor is a well-liked spot for birdwatchers since it provides vital habitat for many resident and migratory bird species. The Haor is a great place to see migratory birds. Approximately 200 different migrating bird species come to this area each winter to establish temporary residences. This Haor is home to several significant and endangered species of freshwater wetland trees, including karach, nalkhagra, hijal, gulli, balua, and bantulsi [9,10]. It also plays a crucial role in the local economy, as it supports fishing, agriculture, and traditional livelihoods for the surrounding communities.

Hakaluki haor: One of the biggest marsh wetlands in Asia is Hakaluki Haor, a wide area in northeastern Bangladesh. The river Kushiara traverses it. There are little, medium, and large beels among the more than 238 interconnecting beels. The biodiversity of the area is enhanced by humans, birds, reptiles, and amphibians [11,12].

It is renowned for its abundant biodiversity, which includes a wide variety of fish, bird, and plant species. Many communities rely on the region's fishing and agriculture for their livelihoods. Hakaluki Haor serves as a natural reservoir during the monsoon

season and is crucial to flood control and water management. A popular destination for ecotourism and bird viewing, it draws tourists drawn by its animals and natural beauty. To safeguard

this priceless ecosystem against dangers like pollution and habitat loss, conservation efforts are still being made.

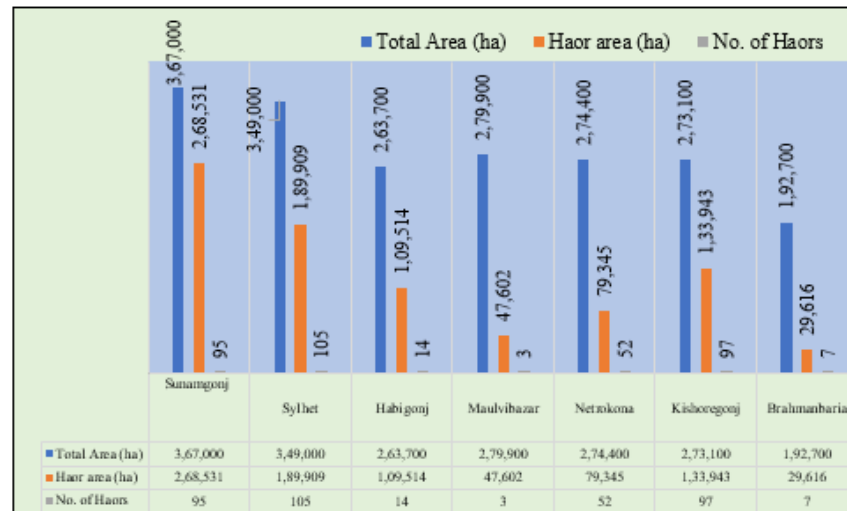


Figure 1: Haor wetland areas of Bangladesh.

Hail haor: Being the largest of its kind and having the majority of its catchment inside Bangladesh, Hail Haor is a special kind of freshwater wetland. It has long been recognized as an area of ecological value, having been included in the Asian Wetlands Directory [13]. The area was recently named one of just 19 Important Bird Areas in Bangladesh [14] and has been recommended as a Ramsar site. The Haor floods in March, when it barely covers around 3,000 ha, and between May and October, when it covers about 13,000 ha [15]. Much of Haor's surface is covered in water hyacinth, lotus, and grass. The water's highest depth during the wet season is around 7.5 meters [16]. In Hail Haor, wintertime fish illnesses have increased, water retention capacity has decreased, fish diversity has decreased, and the water supply canal has dried out [17].

Kawadighi haor: Originally a mother fishery, the Kawadighi Haor is now a multifunctional (FCDI) project that spans 22700 hectares and is bordered to the north by the Kushiara River, to the south and west by the Monu River, and to the east by the base of the Bhatara hills. The Haor spans over 12,295 hectares in the project area, with 63 beels and linking canals situated in the Rajnagar upazila under the Moulvibazar district. Koradoyer khal (canal) connects the Haor to the Kushiara River. The Haor is essential to early May bird nesting, nest-building at Patang Beel, and black-winged stilts. Fish is this Haor's most important product. This Haor provides almost all of the fish in the region, according to [4,18,19].

Nikli haor: With 30 species spread across 7 orders and 15 families, the Nikli Haor region is renowned for having the

largest biodiversity of SIS (small indigenous fish species) [20]. The growth and spread of fish species in natural water bodies depend on primary production. The concentration of nutrients in the aquatic environment is the primary determinant of primary production. Primary productivity fluctuates due to changes in nutrient concentrations brought on by variations in river upwelling cycles and water flow [21]. The water body's biological riches is described by its primary production, which is an essential component of the food chain. Compared to other forms of wetland habitat, haor is thought to have an extraordinarily high primary productivity [3]. The phytoplankton serves as the foundation of the food chain in any aquatic habitat, ensuring the survival of aquatic animals. Fish and zooplankton productivity are closely related to the phytoplankton communities of Haor [3]. In the Haor region, 107 genera of phytoplankton covering six groups were discovered by Muzaffar and Ahmed [3].

Balai haor: The isolated Balai Haor site is located in the far east of the project area, between the Surma and Kushiara rivers. It is made up of three large beels (Dubail, Jugni, and Khakra Kuri) that are surrounded by extensively grazed grazing area and rice crops. Dense stands of the invasive alien plant *Ipomoea acutata* (kalmi) have taken over much of the numerous low embankments and water course margins, and they are already extending into the cultivable zones.

Kaliajuri Area: This comparatively untouched region exemplifies the extensively flooded area. Additionally, it has been recognized as a mother fishery. There are parts of swamp forest in the area, and during the dry season, there are large expanses

of winter grasses like *Hematheria protensa chailla*, which is rot-resistant, commonly collected, and used to build erosion protection structures for homesteads.

Companiganj Area: Companiganj Area has some floodplain grassland, which could serve as habitat for one or more endangered passerine bird species, and the best reed swamp still present in the area. Additionally, it has been recognized as a mother fishery. Large numbers of turtles and otters have been spotted.

Role of haor in bangladesh economy

Haors play a crucial role in the economy of Bangladesh, particularly in terms of agriculture, fisheries, and biodiversity. Here are some key aspects of their economic significance:

Agriculture: Seasonal floodplains known as hars offer rich soil for farming, particularly the production of rice. Flooding adds nutrients to the soil, which makes it perfect for cultivating a variety of crops, especially during the monsoon season. Of the 11.35 million hectares of rice fields in Bangladesh, 15.3 percent (1.74 million hectares) are in the Haor zone [22,23]. 5.25 million metric tonnes of rice are produced in the Haor area, making up 16.5% of Bangladesh's total rice production. Roughly 90.2% of the total crop area is used for rice production. Roughly 9.8% of all cropped land is non-rice harvested land. About 0.7% of the entire farmed area is made up of the other major cereal crops, maize and wheat.

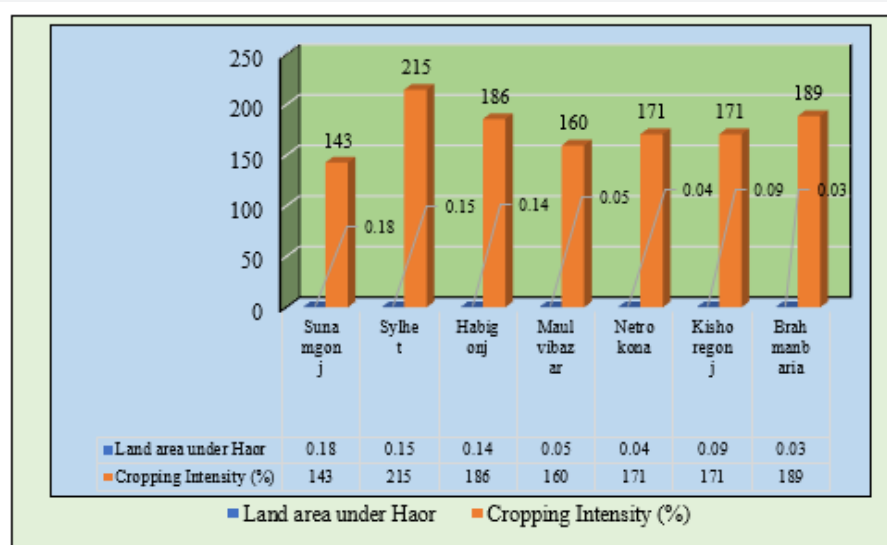


Figure 2: District-wise land area and cropping intensity.

Fisheries: Because they are home to a wide variety of fish species, these wetlands are essential to fisheries. Fishing is the main source of sustenance and revenue for the local communities, making it a major contributor to food security. Many types of freshwater prawns and fin fish, including 12 endemic and 143 native species, may be found in the Haor area. The entire area of fish habitat in the Haor region is approximately 967,000 hectares. Catch fishing accounts for 73.7 percent of the 4.32 lakh tonnes of fish in the fish ecosystems, whereas cultural fishing accounts for the remaining amount (Table 2). About 23.4% of the total fish production in the Haor districts comes from Sunamganj, with Netrokona (16.9%), Kishoreganj (16.2%), Sylhet (14.8%), Brahmanbaria (12.7%), Habiganj (8.1%), and Maulvibazar (8.1%) coming in first and second, respectively. 7.9 percent (Resources, 2005 #873; Poffenberger, 2000 #885). The fishing industry made for 22.23% of all agricultural GDP and 3.74% of the national GDP

in the 2009–2010 fiscal year (DoF, 2010–2011). In 2010–11, this sector generated 2.72% of the nation's export revenue (DoF, 2010–2011). About 60% of the animal protein we need each day is supplemented by fish alone. Over the past three years, this sector has grown at an average rate of 6.1%. Approximately 10% of the population works directly or indirectly in the fishing industry. T32513.41 metric tons of fish are produced overall in Mithamoin Haor [24]. A survey indicates that the majority of people think Tanguar Haor's (TH) fish production is declining. The National Conservation Strategy research assessed fish output at 5,500 metric tons, compared to an expected 6,500 metric tons in 2008 [25]. The Department of Fisheries (DoF) set a 28,000-ton fish output goal for Hakaluki Haor in 2022–2023. However, following the Sylhet flash floods, fish productivity in Hakaluki Haor rose by 5–7% annually (Figure 2).

Table 2

District	Total cultivated land (million ha)	Land area under Haor (million ha)	Cultivated Land under Haor		% of Cropped Area Under			Cropping Intensity (%)
			(million ha)	% of Haor area	Single cropping	Double cropping	Triple cropping	
Sunamgonj	0.2	0.18	0.14	78	44	23	3	143
Kishoregonj	0.17	0.15	0.12	80	14	25	12	215
Netrokona	0.21	0.14	0.09	61	15	29	8	186
Sylhet	0.21	0.05	0.03	60	28	30	4	160
Hobigonj	0.19	0.04	0.04	100	27	27	7	171
Moulvi Bazar	0.13	0.09	0.02	22	22	32	5	171
B. Baria	0.15	0.03	0.01	33	18	29	8	189
Total	1.26	0.68	0.45	66				

(Source: [6,36,46]).

Biodiversity: Numerous plants, animal, and bird species can be found in haors, which are rich in biodiversity. This biodiversity has the ability to generate economic activity related to conservation and promotes ecotourism.

Livestock: In the Haor region, cattle, buffaloes, goats, sheep, chickens, and ducks are the most prevalent animals. Bangladesh's agricultural economy depends heavily on livestock, which among other things helps to guarantee the population's access to food and nutrition, generate revenue for rural households, and provide manure to increase soil fertility [6,8]. In 2019, there were 37.33 million livestock and poultry in the haor areas, which accounted for 9.3% of Bangladesh's overall livestock and poultry count of 402.5 million [26]. Between 2010 and 2019, the numbers of cattle, buffalo, and goats in the Haor areas declined from 5.01 to 3.74 million, 0.3 to 0.127 million, and 1.28 to 0.973 million, respectively. However, the sheep population increased by 67% from 0.19 million in 2010 to 0.318 million in 2019. Between 2010 and 2019, the number of cattle declined in every Haor district with the exception of Sylhet, where it increased from 0.86 to 1.04 million. The goat population decreased in the Haor districts as well, with the exception of Habiganj, Moulvibazar, and Sylhet, where headcounts increased by 30%, 12%, and 43%, respectively [26,27]. A large number of rural populations rely on haors to support them through farming, fishing, and water plant collection. This dependence highlights these wetlands' socioeconomic significance. Cattle, buffaloes, goats, sheep, poultry, and ducks are the most prevalent animals in the Haor region. Cattle, goats, lambs, ducks, and poultry are among the approximately 32.68 million animals that call the Haor farms home [6,8].

Poultry: The poultry population has significantly grown in other districts, with the exception of Netrakona, which saw a 19% decrease from 2.32 million in 2010 to 1.869 million in 2019 [28]. While the number of ducks declined in Brahmanbaria, Netrakona, and Habiganj, it rose in Sunamganj, Sylhet, Kishoreganj, and

Moulvibazar. Only women are allowed to raise poultry in the Haor area, though they may also raise ducks and other animals. The homestead provides Haor households with nutrition and money as a livestock production unit [29]. More than a fifth of all ducks in the nation were found in the Haor regions.

Forestry: The only remaining areas of freshwater wetlands and reed lands in Bangladesh are found in the Haor basin [30]. Large tracts of hijol (Indian oak) forests in the Haor region were formerly a significant supply of firewood, but they are now nearly extinct. Various aquatic plants and herbs have been gathered recently for fuel. Additionally, aquatic plants are being gathered for fertilizer [31].

Natural resources: Haors support local economies by providing a variety of natural resources, such as reeds and other aquatic plants used for handicrafts and thatching.

Climate regulation: They help lessen the consequences of climate change, which can have major economic ramifications, by managing floods and regulating water. **Overcoming obstacles in the haor area**

The distinct geographical and meteorological circumstances of the Haor regions, which are mainly located in northeastern Bangladesh, provide a number of difficulties. The Haor basin experiences flash flooding for an average of six months each year. The entire region becomes a haven for freshwater fishing during the monsoon season [10,32,33].

Here are a few major issues:

Fisheries: The fisheries resource in various Haor has been declining recently, despite its significance from an ecological and economic perspective. Future yields are in jeopardy as a result of excessive harvesting practices that are reducing the fish population. The main causes of fish deterioration in Tanguar Haor, according to Ahmed [34], include illegal fishing, natural

sedimentation on the Haor basin, careless reed and brush collection from the Haor, loss of settlement, and catching mother fish. He added that another significant factor contributing to the decline in the quantitative amount of the fisheries resource is Ujja fishing, a kind of festival. There are not enough fish pass structures protecting fishing resources from the negative impacts of flood control embankments, roads, etc. [35]. The intricate food chain of the ecosystem is intimately linked to the diversity of fish species. Consequently, a chain reaction that destabilizes and damages the entire ecosystem may result from the extinction of these species. The most unsustainable fishing practices in different Haor have included over-harvesting, using illegal and damaging gear, drying out water bodies, harvesting the last fish, and commercial fish harvesting every year.

Agriculture: Flooding-related crop failure, insufficient seed supply, and a subpar seed transportation system are among the issues facing agriculture. Flooding is the most frequent source of crop loss, particularly to rice crops, however other variables including pests, cyclones, hailstorms, and drainage congestion can also have an impact [19]. The information on crop flood damage from 1993 to 2010 that is currently accessible, the average total area impacted by floods was more than 4% [4].

Water resources: The Haor area's primary water-related problems are sedimentation, poor navigability, drainage congestion, wave and river bank erosion, and flash floods. One of the greatest tragedies that threatens the lives and livelihoods of the people of Haor is pre-monsoon flash floods, which overwhelm the primary production sector [36]. Since the Boro crop is planted in December, which is a critical month, the drainage problem here primarily occurs during that month. The main sources of drainage problems are river sedimentation and the breakdown of contact between the rivers and the Haor. Rivers and canals become silted up as a result of the sedimentation process, which reduces their ability to carry water.

Pearl culture: The Haor region's residents are well aware of the pearls' monetary worth, yet they lack the knowledge necessary to grow this priceless commodity. The primary barriers to pearl culture potential in this area have been a lack of training and extension efforts. Another significant issue is that pearl cultivation necessitates highly skilled workers during the laboratory stage and a high degree of technical expertise during the early stages of muscle operation. Lack of technological know-how, extension efforts, and pearl culture preparation among the impoverished in the Haor region are the main barriers to pearl culture opportunities [35,37,38].

Forest: The socioeconomic status of the populace, particularly the rural power structure, resource users, land tenure system, access, and benefit sharing; the lack of sufficient scientific data and information availability; and the involvement of GOs and NGO's are the main obstacles to the continued development of forest resources in relation to forestry. The primary problems

facing forestry are a lack of natural resource management plans, negligent resource exploitation, a lack of community involvement, and problems with land tenure [39].

Transportation: The transportation and communication systems in the Haor area are beset by a number of problems, including inadequate infrastructure, lower land elevation, seasonal susceptibility, a lack of services, an absence of suitable modes, and unexpected transportation growth [40]. The main issues facing the Haor basin are inadequate sanitary facilities, a lack of safe water, and a lack of basic water delivery networks. Particularly during flood season, it has significantly harmed the ecosystem and caused health issues. One major source of contamination is the discharge of latrine wastewater into groundwater [40-42].

Flooding and waterlogging: Seasonal flooding is common in moor areas, which can cause waterlogging that impacts daily life, transportation, and agriculture.

Health concerns: Vulnerability to waterborne illnesses is increased by limited access to clean water and medical facilities, particularly during and after floods.

Environmental degradation: Pollution, deforestation, and overuse of natural resources can cause ecosystems to deteriorate and biodiversity to disappear.

Climate change: The region is more vulnerable to extreme weather events as a result of rising temperatures and shifting rainfall patterns, which worsen already-existing problems.

Integrated strategies emphasizing community empowerment, climatic resilience, and sustainable development are needed to address these issues.

Policies and Strategies of Haors

Throughout the last decade, Bangladesh has developed a number of national policies, including the National Water Policy, the National Agriculture Policy, the National Fisheries Policy, the National Land Use Policy, the National Environmental Policy, the National Policy for Safe Water Supply and Sanitation, the Sixth Five Year Plan, the Outline Perspective Plan of Bangladesh, the National Water Management Plan, the Flood Action Plan, the National Plan for Disaster Management, the Bangladesh Climate Change Strategy and Action Plan, the Poverty Reduction Strategy Paper, and more. Through two announcements, the "Bangladesh Haor & Marshy Land Creation Board" and "The working committee" of the Board were constituted on January 10, 2001. In order to give Haor and marshy areas a boost in development, the Haor and Marshy Land Development Board was later created as a directorate on November 17, 2014, under the kind guidance of the Ex. Prime Minister Sheikh Hasina [22].

Several significant and pertinent governmental policies, programs, and strategies have been examined in the ensuing subsections in order to prepare the Master Plan of the Haor Area [39].

I. The National Fisheries Policy 1998, can direct pertinent harbors under the water sector for the advancement and long-term expansion of fish culture.

II. National Policy for Safe Water Supply and Sanitation 1998, is to guarantee universal access to sanitary facilities and water. Therefore, this policy also applies to Haor regions.

III. National Water Policy 1999, this comprises seventeen sections that deal with policy directions for certain topics pertaining to the Haor areas.

IV. National Agriculture Policy, 1999, Which also has to do with the water in the Haors region and was announced by the government.

V. National Livestock Development Policy, 2007: By developing an enabling policy framework, the Policy (2007) aims to address the main obstacles and prospects for the livestock sub-sector's overall sustainable growth.

VI. National Forestry Policy, 1994: In order to preserve the surviving native habitats of migratory and native animals and birds, and to enhance biodiversity in the current degraded woodlands

VII. National Education Policy, 2010: To guarantee that everyone has access to education, the policy established a number of guidelines and objectives pertaining to various forms of education.

VIII. National Environment Policy, 1992: The Ministry of Environment and Forests introduced the Policy in 1992. The policy directives that have a direct or indirect connection to the Haor and Wetland region's water sector.

IX. A number of statements in the National Rural Development Policy, 2001, have a direct connection to the Haor regions.

X. National Tourism Policy, 2009: It unequivocally emphasizes the necessity of developing the Haor region's tourism industry.

XI. National Health Policy, 2010 that talks about some aspects of the Haors region's industrial sector's expansion.

XII. The Climate Change Strategy and Action Plan of Bangladesh, 2009 is a ten-year initiative that runs from 2009 to 2018 and is directly tied to the implementation of navigational facilities in the Haor area that do not require the use of fuel.

XIII. The Haors might be related to the 2011 Outline Perspective Plan

XIV. A 20-year master plan for the general development of the Haor areas was created, covering the years 2012–2032.

XV. Overview the National Disaster Management Plan for

2008: The National Plan for Disaster Management for the years 2008–2015 has long been a sought-after document, based on the GoB's commitment on a regional and global level as well as its disaster management strategy.

Recommendations for Future Management

The local population, especially the fishermen, greatly values the Haor's natural resources, especially its fisheries [43]. In these situations, community-based fisheries management can contribute to the preservation and improvement of these natural resources. However, establishing trust and awareness, building local capability, and bringing community governments together usually take time, the preservation of informal resource access for the impoverished by creating effective leasing schemes and other strategies [44,45]. In this instance, the proper authorities must give the administration and upkeep of this wetland habitat their prompt attention.

Nonetheless, the following particular factors are highly advised for the appropriate handling of Haor:

a. Encourage community members to take an active role in managing Haor fisheries by raising awareness and motivating them;

b. Create a balanced fishing strategy by limiting fishing in various locations and during various times;

c. To guarantee the advantages of all resource harvesters, encourage the application of science-based co-management by making sure that national policies and wetland management plans incorporate both traditional and technological skills;

A. General recommendations-

a. To reduce damage from unexpected floods, establish a flash flood early warning system for the Haor Basin.

b. Several Haor system areas now have more effective fish sanctuaries in addition to the fish conservation katha.

c. Since ecotourism is hardly acknowledged due to its undesired influence, government policy and interdepartmental links should be updated and representative in order to lessen its negative consequences while taking sustainable harbor management into account.

d. Finally, create a comprehensive plan for Haors' overall development that considers all relevant factors, including forestry, fisheries, water resources, wetland management, and the distribution of Khas land.

Conclusion

The aforementioned discussion makes it abundantly evident that the various Haor's fisheries contribute significantly to both ecological and economic value. The The distribution, size,

biophysical features, biodiversity, demography, agricultural production techniques, and prospects for agricultural expansion of Bangladesh's Haor ecosystem have all been examined in this study. Benefits include rearing ducks, cattle, and buffalo, growing rice, processing fish, gathering grass, and gathering aquatic and other vegetation. The main obstacles to improved and sustainable agriculture, animal, and fish production in the Haor region are the low-lying plains, frequent floods and flash floods, and extended wetness. Other issues include declining soil fertility and locals abusing natural resources. The significance of Haor as a natural resource source that provides substantial economic and livelihood advantages to the local community and the nation at large is highlighted by this study. With the correct technology and management, the Haor's productivity can be greatly raised. This article offers ideas for increasing fish and animal output, agricultural yields, and cropping intensity in order to increase food security, alleviate poverty, and raise the standard of living for people living in Haor areas. An integrated management strategy and practical solutions encompassing the utilization of wood and non-wood products, agriculture, fisheries, and biodiversity protection are essential for the future expansion of the Haor areas of Bangladesh.

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