“TANGUA HAOR”, Ramsar Site, Wetlands Gene Bank of Bangladesh

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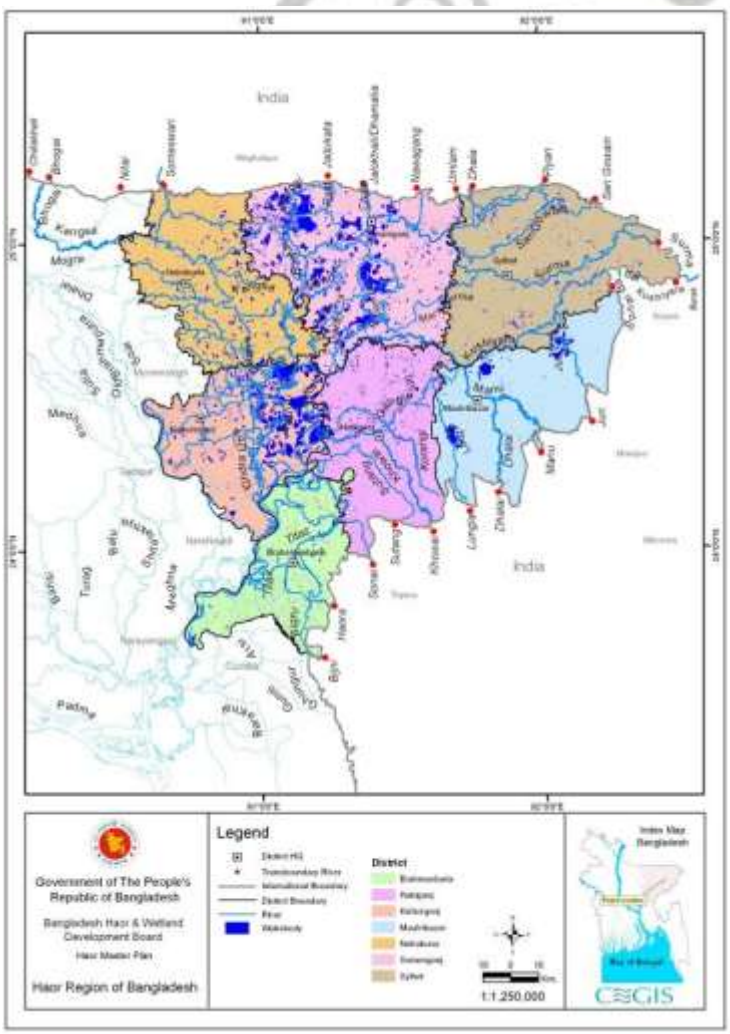
Haors and Baors are the last stronghold of freshwater biodiversity gene bank in Bangladesh surviving by its own despite negligence in appropriate conservation and sustainable development measures in wetlands management.

Map courtesy: CEGIS, Haor Master Plan



Haor is a great reservoir of aquatic biological resources and acts as the ecological safety net to the nature as well as to the dwellers of the haor. But in reality, these areas are considered as wastelands and to make these wastelands into a productive one, a one sided plan has been implementing since long. The programme is popularly known as Flood Control, Drainage and Irrigation (FCDI) which is mainly devoted to increase the monoculture rice production. However, in fact haor ecosystem is a multiple-resource base which demands an integrated polygonal sustainable development approach. The ongoing management approach is biased to only rice production through FCDI. Thus this primitive mode of action is narrowing other resources base having more economic potential ever thought.

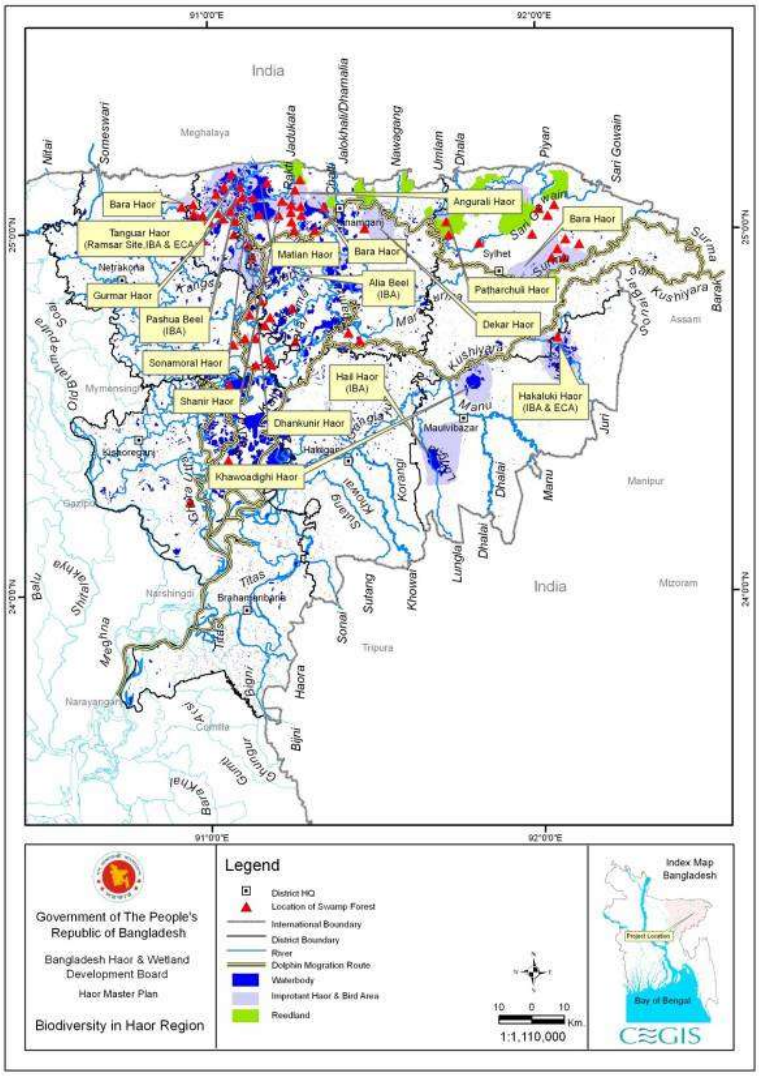
These resources are: grass, reeds, submerged plants, mollusks, fishes, turtles, birds and the swamp forests. Natural gas and peats are two dominant natural energy sources of haor ecosystem. Bio-fuels, Biomass, Bio-energy, Natural manure/compost out of huge aquatic vegetation are somehow ignored in the ongoing haor resource management approach. Eventually mollusk culture, cattle grazing, natural fattening of livestock, duck-rearing and winter horticulture might generate huge

revenue and local employment. In addition SME in aquatic resources sector could be a new arena of sustainable development for haor basin. At the given climate change scenario "raised housing" and "monsoon pisciculture" are two major options to combat the flash floods of haors, which need to be implemented.

Clearing of swamp forest, reedlands and indiscriminate hunting and poaching resulted in extinction of all most all mega fauna including Swamp Deer, Hog Deer, Rhinoceros, and Marsh Crocodile, Rock Python, Black-necked Stork, Bengal Florican, Pink-headed Duck and so on from the haor basin. In addition a large numbers of valuable wetlands species of flora and fauna are on the verge of extinction. Fisheries resources have also been depleting at an alarming rate and more than a dozen of freshwater fish species are categorized as vulnerable and endangered. This implies that there is a crisis of visionary philosophy to the haor basin resource management. Now, as far as Ramsar convention is concerned, it is an urgent need to change the vision and act as per the modern concept of sustainable development vide the CBD/Ramsar/agenda-21/PRSP and MDGs goals and objectives of which Bangladesh is an active partner. Hence, national wetlands policy is key demand to fulfill the national obligation for managing wetlands and its precious biological and other renewable natural resources in a sustainable way.

Bangladesh is the largest delta in the world predominantly comprising large network of rives and wetlands. Wetlands in Bangladesh are represented by inland freshwater, estuarine brakishwater and tidal salt-water coastal wetlands. Bangladesh posses enormous area of wetlands including rivers and streams, freshwater lakes and marshes, *haors, baors, beels*, water storage reservoirs, fish ponds, flooded cultivated fields and estuarine systems with extensive mangrove swamps. The past, present, and future of Bangladesh, and its people's livelihoods are intimately connected to its relationship with water and wetlands. More than 90% of the country's total area consists of alluvial plains, crisscrossed by a complex network of rivers and their tributaries. Floodplains, beels (low-lying depressions in the floodplain), haors (deep depression) and baors (oxbow lakes) represent the inland freshwater wetlands. The country's wetland ecosystems also offer critical habitats for globally significant biological diversity. Of these the deeply flooded basins of north-east Bangladesh, known as haors, are a habitat of wide range of wild flora and fauna unique to Bangladesh.

The haor basin lies within the districts of Sylhet, Sunamgonj, Netrokona, Kishoregonj, Habigonj, Moulvibazar and Brahmanbaria in the Northeast region of Bangladesh comprises the floodplains of the Meghna tributaries and is characterized by the presence of numerous large, deeply flooded depressions, known as haors. It covers about around 8,568 km^2 area of Bangladesh. The topography of the region is steep at around foothills in the north and slopes becoming mild and milder gradually at downstream towards south.



Map Courtesy: CEGIS, Haor Master Plam

The haor basin is characterized by having diverse wetlands (beels, khals, rivers and vast seasonally flooded lands) and kanda's (ridges along the edges of wetlands which usually remain fallow in the dry season). Presence of Swamp forests and reed lands in the haor basin constitute the rich aquatic environment. The aquatic products are used to provide various benefits to the people such as food, nutrition, income, fodder, fuel, thatching materials, medicine and varieties of other benefits. These are now under threat due to over use and lack of any sustainable management interventions.

The seriousness of the continuing loss of wetlands demands a new approach to wetland management. A major portion of the wetland area has been converted from its natural state to support alternative land uses including agriculture, culture fisheries, urbanization, industry, and other development pursuits. Wetlands have also been degraded by unsustainable land use practices that have resulted in vegetation destruction; nutrient and toxin loading, sedimentation, turbidity, and altered flow regimes. Intensive use of agrochemicals and water transport has also affected the natural balance of wetlands. To sustain the balanced economic growth, there is a dire need to manage the haor wetlands in a symmetrical manner so that the renewability of the natural resources could be maintained while sustaining social and economic benefits from the haor wetlands and biodiversity. Since the early 1990s the importance of wetlands in Bangladesh has started to be recognized. There is now a growing recognition in Bangladesh that remaining wetlands are important as demonstrated by changes in policy: the National Water Policy directs that there will be no further drainage of wetlands for agriculture, while filling of water bodies for urban and industrial development has become a contentious issue and subject to litigation on environmental grounds. Diverse species of plants, insects, amphibians, reptiles, birds, fishes, and mammals depend on wetlands for food, habitat, or temporary shelter. Environment and its allied national policies of Bangladesh have conceived that wetlands have archeological, historical,

cultural, recreational, and scientific values. Societies have traditionally formed along bodies of water and artifacts found in wetlands provide information about these societies.

Haors are important reservoir of wetlands natural resources in the northeast region of Bangladesh. These include both renewable and non-renewable natural resources. Geographically haor region is located in between two major ecosystems/ biomes. One is Meghalaya- Assam-Tarap hill ranges of India and the other is Brahmaputra-Meghna river systems in Bangladesh. These hill ranges are covered with mixed evergreen forests from where haors receives most of its freshwater through thousands of hill streams locally known as *Charas*.

Rivers runs along haor at Tahirpur. Photo courtesy Kabir Bin Anwar

This natural mineral water in particular enriches the aquatic biological diversity specially the aquatic plants, waterfowl, aquatic insects, fish and mollusk fauna. *Haor* swamps and marshes are particularly rich in aquatic plants with enormous diversity. Biomass productivity of these submersed plants is noticed too high. Agriculture, fisheries and animal husbandry are three pillars of Haor economy from time immemorial.

Wetlands are seldom explicitly covered at a national level in other existing natural resource management policies such as for water, forest, land, agriculture or other sectors. Development of a unique or "stand alone" wetland policy statement and/or strategy can be an important step in recognition of wetland problems and targeted action to deal with them. A unique wetland policy provides a clear opportunity to recognize wetlands as ecosystems requiring different approaches to their management and conservation, and not being masked under other sectoral management objectives.

Rare fish Napteni Koi of Haor. Photo by Sourav Mahmud

Ministry of Environment and Forest as the focal organization of Ramsar Convention for Bangladesh had took initiative to prepare a national wetlands policy. A draft was prepared and discussed at various forums in association with IUCN Bangladesh. As a member country of wetlands convention it is mandatory to develop national wetlands policy. Organizations engaged in wetlands conservation and learned bodies of the country were also urged govt. to have the national policy and strategies for wetlands conservation. But somehow or rather the policy is not yet on card. Despite the fact govt. of Bangladesh has very recently reconstituted the Haor and Wetlands Development Board (HWDB) and prepared a "Haor Master Plan". The prime focus is poverty reduction of Northeastern Haor basin through water and flood management. Increase agricultural and fisheries productivity for livelihood improvement in the haor basin is the main thrust of the plan.

Isabela Team at Tangua Haor. Photo by Fazle Rabby

These haors and beels support major subsistence and commercial fisheries while the seasonally flooded lake margins support major rice-growing activities and abundant aquatic vegetation provides ideal grazing for domestic livestock and a source of fuel and fertilizers for the local inhabitants. The wetlands are also home to a wide variety of resident and migratory waterfowls including perhaps as many as 100,000 to 150,000 duck and provide a refuge to many other species of wildlife. Keeping in mind all these ecological benefits, the Tanguar Haor which is located in this zone has been declared as a Ramsar site as well as Ecologically Critical Area (ECA).

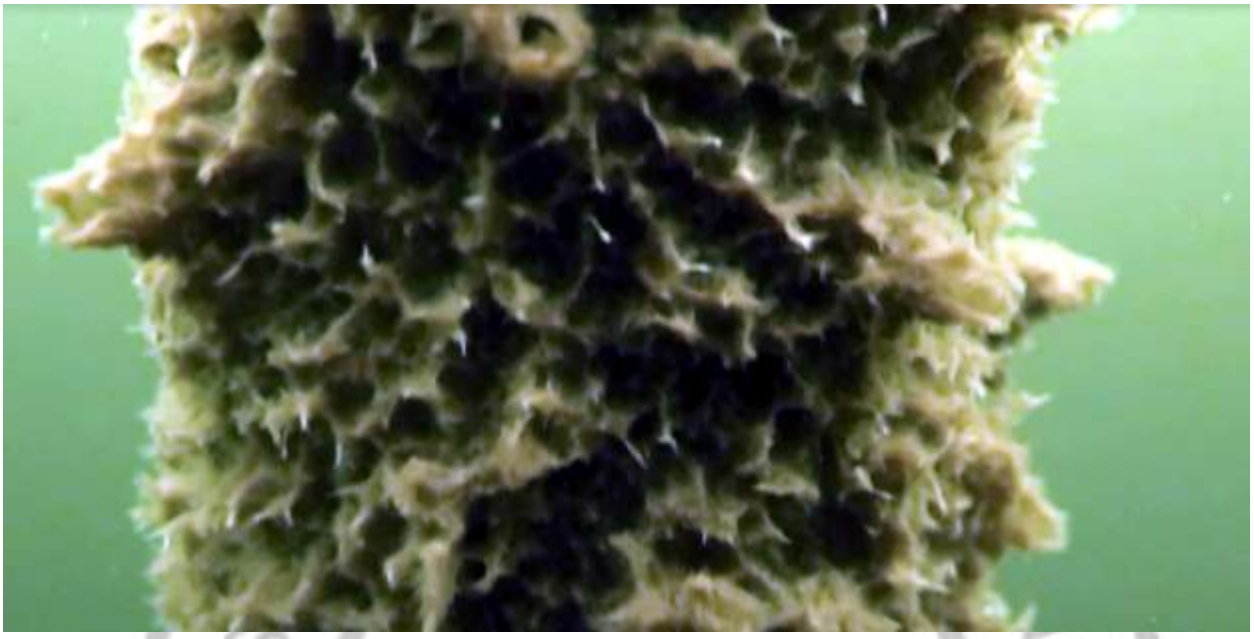
Under water research by Isabelafoundation .Photo by Sarif Sarwar

Underwater biodiversity of Tangua Haor. Photo by Sharif Sarwar

Tangua Haor a general waterscape. Photo by Sourav Mahmud

The haors bear high aquatic plant and animal diversity. The diversity of aquatic plant species in haor is very high. Haor is the habitat of freshwater swamp forest .There are about 150 plant species that are adapted to low-lying conditions of various inundations, of which 73 are reported to grow and thrive in Bangladesh (Alamed et al., 1991). However, 123 species (Khan and Halim1987) freshwater angiosperm

(excluding amphibious and marshy species) reported from the aquatic habitats of Bangladesh, while karim (1993) suggested the total number of freshwater plants to be 153.



Rare freshwater Sponge discovered by Isabela Team from Tangua Haor. Photo by Sharif Sarwar

A total of 10 species amphibians recorded from the Tanguar haor (NCS/MoEF). A study of National Conservation Strategy Implementation Plan I claimed a total of 35 reptiles were recorded from Tanguar haor area, of which 10 are turtle and tortoise, 8 lizards and 17 snakes.

A total of 233 birds in 48 families are recorded from Tanguar haor area (NCS/MoEF). About 175 species of waterfowl have been recorded from Haor area (IUCN, Bangladesh), but 70 of these are now rare and several have not been reported for many years. Every winter the haor is the home to about 200 species of migratory waterfowl including perhaps as many as 100,000 to 150,000 ducks and other species .Although a piece meal bird watching activities are noticed but no comprehensives management plan for the avifauna of haor basin is not available. Hunting, poison baiting of waterbirds is going unabated as a result the numbers of birds in Tangua and Hakaluki Haor has reduced enormously.

Ferruginous Duck :a rare duck at Tangua haor, Photo by Sourav Mahmud

The basic ecological functions and attributes of the wetlands are:

- **Maintenance of essential ecological processes and life-support systems**

Wetlands perform these functions in various ways; some maintain and improve water quality, some regulate flows to reduce flooding and may augment late summer stream flows, and some recharge groundwater supply. Wetlands are important as reproduction and staging areas for migratory birds, as spawning and nursery grounds for fish, and as habitat for a great many invertebrates, reptiles, amphibians and plants.

- **Preservation of genetic diversity**

Wetlands play an essential role in maintaining wildlife populations, providing key habitat for a diverse fauna and flora.

- **Ground water recharge**

Wetlands store surface water, which then infiltrates into the ground, providing recharge to aquifers. This ground water recharge in turn is slowly released back to adjacent surface water bodies, such as streams, providing water during low flow periods (base flow).

- **Floodwater storage**

Wetlands store water during flooding events and then slowly release the water as flooding subsides. This can significantly reduce peak flood flows and resulting flood damage downstream.

- **Wildlife Habitat**

Many species are dependent upon wetlands for all or a portion of their life cycle. Wetlands provide habitat for fish, birds, mammals, reptiles, amphibians, and invertebrates.

- **Erosion Control**

Wetlands support vegetation that acts as a flood buffer and reduces stream bank erosion during flooding events.

- **Water Purification**

Wetlands improve water quality by filtering polluted runoff from cities and agricultural lands. They trap sediments, utilize excess nutrients present in runoff, and breakdown many waterborne contaminants. Constructed wetlands are being used to treat contaminated waters from mines, sewer systems, and urban storm water runoff

- **Sustainable utilization of species and ecosystems**

Many local and provincial /territorial economies rely directly on wetland resources such as fish and wildlife, plant products and wood. Renewable resources associated with wetlands are central to the traditional subsistence lifestyle of a nation's aboriginal and indigenous peoples. Wetlands also support substantial tourism and recreational opportunities, such as water cruise, hunting, fishing, bird watching, boat racing and nature photography.

- **Research , Education & Economic Benefits**

Wetlands are often visited for recreational purposes such as hiking, bird watching, wildlife photography, and hunting. These activities can translate into dollars spent at local businesses, adding to the economy. The students get to see numerous plants and animals, and the cost to local schools is minor, other than the transportation.

The wetland is the source of income and nutrition for the millions of rural people. Intensive use of agriculture, Fishing and collection of other aquatic resources help the rural peoples. Economic value of wetlands can be quantified in economic (monetary) terms. The goods and services provided by the environmental resources or systems, whether or not market prices are available to assist us. There is no market for a good or service a value has to be found through surrogate (replacement) method to establish society's willingness to pay for the goods or its services.

The existing natural wetland resources are;

- Fisheries
- Non fish product
- Pasture
- Boro paddy
- Aus and Aman rice
- Transportation
- Recreation
- Water Quality & Flood control

The values of natural resources are:

- Direct Value
- Indirect Value
- Existence value

The study conducted by the MACH project to make a detailed assessment of economic values of Hail Haor by developing a simple bio-economic model using data from 1999-2000 (Table.3). In 1999 the maximum extent of Hail Haor was 12300 Ha. The annual economic output values estimated for Hail Haor in that study was TK 454 million (USD 7.98 million 1USD=56.9 TK). The net present value (NPV) of this benefit stream over 15 years is taka 4.6 billion (USD 79.7 million). The NPV of one hectare of this wetland is taka 373,000 (USD 6,568).

Estimated value of Hail Haor economic outputs in 1999-2000

Type of Good or services	Total return (TK)	Value per area (TK/Ha)*	Percent
Commercial Fisheries	56,272,200	4,580	12
Subsistence fisheries	83,651,100	6,800	18
Non Fish aquatic product**	127,973,300	10,410	28
Boro Rice Value	63,857,500	5,190	14
Project /Biodiversity funds	43,650,600	3,550	10
Pasture Value	40,292,800	3,280	9
Flood control	23,443,200	1,910	5
Recreation	7,025,600	570	2
Transportation	8,758,300	710	2
Total Taka	454,924,600	37,000	100
Total USD	USD7,981,100	USD 650	

Taka - 37,000/ha

Water quality, aquifer recharge benefits and existence value were no valued.

** Total output value divided by maximum water area (12,300 ha in 1999)*

*** Includes aquatic plants used by local residents and by tea estates.*

Exchange rate at that time USD 1= TK 56.9

- Non Fish aquatic products: Shaluk, Grass, pokol, Snail, Dolkolmi/khulum, Halenchashak, Dunuman Kanpata, Kolmishak, Shapla, Lota, Ugol Grass, Gangra, Dona.

Singra: wetlands edible fruits having high nutritional values

Apart from the scenic beauty of these wetlands, they have great economical and environmental value. The haor region accounts for a large share of the natural capture fisheries and provides a habitat for a wide variety of aquatic vegetation and birds both resident and migratory. But these wetlands biodiversity in Bangladesh have long been facing serious degradation and loss, due to many natural and anthropogenic factors. Besides natural causes, factors like overexploitation of resources, lack of property rights, human encroachment, conflicts over natural resource management, pollution, and conversion to other uses and also absence of effective enforcement of laws are some of the most important factors for the decline in wetlands biodiversity of the northeast region of the country. These natural resources need to protect and conserve to maintain the ecological balance, protect environment and improve the livelihood of poor people.

Problem Status Evaluation of Haor Wetlands

Problem	Nature	Present State	Needs	Comments
Vision	Policy	National wetlands policy not exist	National Wetlands Policy Preparation	IUCN has drafted one
Wetlands Management Organization	Institution	Haor and Wetlands Management Board	Proper operation and functioning of the board at its up to the mark	Cross-sectoral integration and Haor Master plan implementation
Species extinction	Genetic erosion	Causes are not known	Study is required by inviting international expert	Rhinoceros, Wild Buffalo, Swamp Deer, Hog Deer, Bengal Florican, Marsh Crocodiles are extinct
Threatened species	Ecological crisis	Preliminary list available	Species Recovery and Protection programme for threatened species with highest priority	
Swamp forest	Habitat loss	More than 75% of swamp and reeds are damaged	Restoration, regeneration and rehabilitation should be started	
Bird Hunting	Bio resources	Trends of harvest shifted from local consumption to commercial poaching	Hunting permits should be allowed to certain species having normal population/to certain time /quota/location	Vide the rules of Bangladesh Wildlife Preservation Acts
Mother fishery	Genome base	Overharvest by dewaterizing the beels and harvest during breeding season	Fish sanctuary and their implementation	Replication of success cases
Mollusks	Invertebrates resources	No data available	Needs detail study	High development value for pearl/duck feeds
Turtles	Fauna	Fishers are harvesting	No data available on its harvest quantity	Population recovery/farming
Mammals	Fauna	Hunting and forest destruction wipped out all big games	Captive breeding and re-introduction of Swamp and Hog deer	In future Rhinoceros/Wild buffalo/Blue bull may be re-intro duced in Companyganj reedlands
Alien Species	Flora	Situations are	Immediate survey should	Manual uprooting events

Problem	Nature	Present State	Needs	Comments
		aggravating in some wetlands with Ipomoea and Water hyacinth	be conducted and actions taken to solve the problems	should be initiated urgently

Haor Basin is losing its wild genome of wildlife flora and fauna at an alarming rate. Most of its wild relatives of flood tolerant rice varieties are eroding fast. Rate of depletion of Wild Bengal Roses habitat is also high. The mother fisheries especially the breeding ground of *Chital, Gazar, Gonia and Sharpunti are* destroying. The productivity of open water capture fisheries has gone down in the haor basin. Pink-pearl producing bivalve mollusks are overharvested for using in poultry feed industries. Population of Spotted Pond turtle, Pallas's Fish Eagle and Ganges River dolphin in the haor basin has gone down at a vulnerable state.

Rosa involucrata an endemic wild Bengal Rose at Tangua Haor. Phto by Sourav Mahmud

Wetlands are seldom explicitly covered at a national level in other existing natural resource management policies such as for water, forest, land, agriculture or other sectors. Development of a unique or "stand alone" wetland policy statement and/or strategy can be an important step in recognition of wetland problems and targeted action to deal with them. A unique wetland policy provides a clear opportunity to recognize wetlands as ecosystems requiring different approaches to their management and conservation, and not being masked under other sectoral management objectives.

In many cases, wetland policies or strategies are components of national sustainable development, water or other sectoral environmental policies. The wetland messages can thus become diffused and overpowered by these broader objectives of the Government. In many countries, where staff in management agencies are few and face many demands and new challenges and expectations daily, dedicated staff time for implementation of wetland commitments or objectives may be overridden by the pressure to deal with the broader issues. This works to the disadvantage of any wetland conservation objective.

A stand-alone, unique wetland policy draws considerable attention to wetland issues particularly by legislators and the public. Articulation of clear goals and objectives for these ecosystems identifies clear responsibilities of the Government and an expectation that the Government will actually deliver on these commitments.

A National Wetland Policy is understood to be nationwide in scope but it may be developed simultaneously or in sequence at several levels of government. In Australia and Canada, for example, both the federal government and component state (or provincial) governments have developed wetland conservation policies. This reflects the federal nature of these two nations, wherein constitutional authority for natural resources management (including wetland management) is divided between the levels of government.

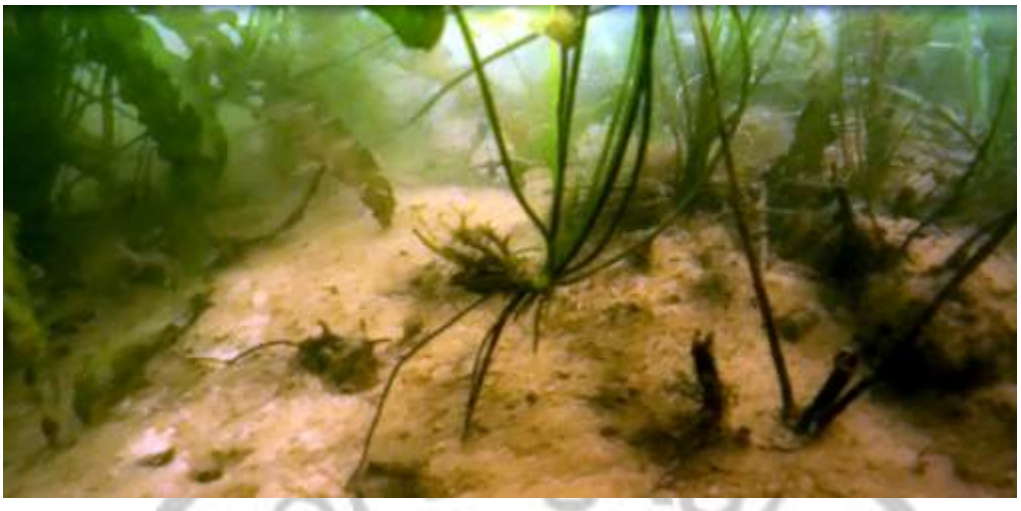
In some nations, policy can be formally adopted by an appropriate process by the national government at a level (e.g. Cabinet) which can commit all relevant arms of government to its implementation. In federal states with shared constitutional jurisdictions, this may not be the case. A federal government may express its commitments to wetland conservation through a federal policy. Such a policy would, however, only apply to federal authorities and areas of federal control.

A National Wetland Policy will function as a framework that enables clear conclusions to be drawn about what actions are required (but does not in it set out detailed prescriptions for actions) and what end result is expected. It must be clear how things would be different if the policy did not exist and thus demonstrate its own net added value. If purporting to be the definitive expression of national policy about wetlands, then it can be short and just a "framework" in nature. Depth is not critical but it must be complete in its coverage of key policy issues which affect wetlands (so breadth is critical), even if the jurisdiction for some of these lies outside the originating agency. These include jurisdictional authority for natural resources management such as water resources, development planning, pollution control, education and foreign relations.

The following 14 key messages are the globally endorsed as the turn key to formulate the wetlands policy and strategy (Ramsar Conventions). National wetlands policy is an important national need of the country which might consider key messages.

- A cross-sectoral focus is urgently needed from policy- and decision-makers that emphasizes securing wetland ecosystems and their services in the context of achieving sustainable development and improving human well-being.
- Management of wetlands and water resources is most successfully addressed through integrated management at the river (or lake or aquifer) basin scale that is linked to coastal zone management for coastal and near-shore wetlands and that takes into account water allocations for the ecosystems.
- Wetlands deliver a wide range of critical and important services (e.g. fish and fiber, water supply, water purification, coastal protection, recreational opportunities, and increasingly, tourism) vital for human well-being. Maintaining the natural functioning of wetlands will enable them to continue to deliver these services.
- The principal supply of renewable fresh water for humans comes from an array of wetland types, including lakes, rivers, swamps and groundwater aquifers. Up to 3 billion people are dependent on groundwater as a source of drinking water, but such abstractions increasingly exceed their recharge from surface wetlands.

- The services delivered by wetlands have been arguably valued at US$14 trillion annually. Economic valuation now provides a powerful tool for placing wetlands on the agenda of conservation and development decision-makers.
- Wetlands encompass a significant proportion of the area of the planet; the global estimate is 1280 million hectares (equivalent to approximately 9% of land surface) and is recognized as an under-estimate.
- The degradation and loss of wetlands is more rapid than that for other ecosystems. Similarly, the status of both freshwater and, to a lesser extent, coastal species is deteriorating faster than that of species in other ecosystems. Wetland-dependent biodiversity in many parts of the world is in continuing and accelerating decline.
- Wetland loss and degradation has primarily been driven by land conversion and infrastructure development, water abstraction, eutrophication and pollution and over-exploitation. Losses tend to be more rapid where populations are increasing most and where demands for increased economic development are greatest. There are a number of broad, interrelated economic reasons, including perverse subsidies, why wetlands continue to be lost and degraded.
- Global climate changes is expected to further exacerbate the loss and degradation of wetland biodiversity including species that cannot relocate and migratory species that rely on a number of wetlands at different stages of their life cycle.
- The continuing loss and degradation of wetlands are leading to reduction in the delivery of wetland ecosystem services, yet at the same time demand for these same services is projected to increase.
- Current use of two wetland ecosystem services – freshwater and capture fisheries dependent on natural reproduction - in some regions is now in excess of levels that can be sustained even at current demands, much less future ones.
- The projected continued loss and degradation of wetlands will result in further reduction in human well-being, especially for poorer people in less developed countries where technological solutions are not as readily available.
- Progress towards achievement of the Millennium Development Goals depends on maintaining or enhancing wetland ecosystem services.
- The priority when making choices about wetland management decisions is to ensure that the ecosystem services of the wetland are maintained (and, where appropriate, restored). This can be achieved by application of the wise use principle and guidelines of the Ramsar Convention.



Underwater vegetation and soil profile of Tangua Haor. Photo by Sharif Sarwar