

Present status of flora, fauna and vegetation structure in the wetlands of Maldah district of West Bengal, India

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Abstract

The highest area of fresh water wetlands in the West Bengal is situated in the district of Maldah. Out of 23 larger wetlands of West Bengal 11 are located in this district. Maldah-wetlands are quite old and natural with good biodiversity and healthy ecosystem. These wetlands are the house of around 351 vascular plant species and several animal species like waterfowl, fishes, reptiles, amphibians, mollusks and numerous insects. The local people largely depend also on these wetlands for their sustenance. But several threats, mainly anthropogenic, are gradually destroying these important ecosystems since the last decade.

Key words: Wetland, Maldah, Biodiversity, Flora, Socio-economy, Threats.

Introduction:

Innumerable and wide range of wetlands are distributed throughout West Bengal including fresh water lakes of Darjeeling hills to the marine wetlands of Sundarbans of South 24 Parganas district. The fresh water marshes of Maldah fall under the sub-Himalayan wetland system of the state. Wetland areas are also called ecotonal zones where more than two habitats meet. Wetlands support both the aquatic and the terrestrial life forms. According to Tiner (1999) 'wetland' is a generic term used to define universe of wet habitats including marshes, swamps, bogs, fens and similar areas. Maldah district is covered with second highest wetlands areas in West Bengal just after 24 Parganas (North & South). The water bodies or wetlands in this area are generally lies along with different major river systems. In nature, the Maldah wetlands are perennial and seasonally flooded fresh water bodies. Most of those are very old and supports rich biological elements. These wetlands are of mainly *Palustrine* (annual or perennial marshy land), *Riverine* (oxbow lake or small streams) and *Lacustrine* (lakes & ponds) types. While first two types are very old and naturally originated, lakes and ponds are mostly

artificially created few centuries back by different kings and *nawabs* ruling over different parts of this region. Considering fresh water wetlands the district of Maldah holds first position based on the number as well as total area of wetlands in this state. According to Meenbarta (1998) highest number of wetlands or water bodies in West Bengal is present in this district. Data presented in Census report provided by Ministry of Environment & Forests, Govt. of India recorded 11 large fresh water wetlands, out of 23 in West Bengal, present in different blocks of this district (Sharma, 2003). Maldah district is located between the 24° 40' 20'' and 25° 32' 08'' N latitude and between 87° 45' 50' / and 88° 28' 10' E longitude with an average altitude of 61 m over mean sea level. Out of the total 3733 sq km area of the district, 156.76 sq km area is occupied by water bodies of less than 10 hectares size and 273.89 sq km areas is covered by wetlands of over 10 hectares in size (Sharma, 2003). Other wetland types like mudflat, sandbanks, marshy lands and low lying areas covers 450.38 sq km, 78.52 sq km, 120.34 sq km and 47.27 sq km respectively, for which the total comes to 645 sq km (Raha *et al*, 1994) of wetland. Recurring floods, almost every year, gradually increases the wetland areas in the district.

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A total of 1076 sq km land i.e. almost 30% area of the district is occupied by wetlands. During

monsoon most of the wetlands merge altogether to form two-three larger water bodies and covers almost around 60% of the total land area of the district. These large water bodies are directly or indirectly connected with different rivers like *Ganga, Fulhar, Pagla, Mahananda, Tangan, Punarhaba, Chitola, Kalindri* etc.

Recent statistics, based on satellite data, estimated by the Institute of Environmental Studies & Wetland Management, Kolkata (IESWM) that total wetland area of Maldah is 29416.95 hectares, which is 7.88% of its total geographical area (Bhattacharyya *et al*, 2000). This area reduces to 6844.53 hectares during pre-monsoon and covers 15191.58 hectares in post-monsoon seasons. Out of the total wetland area 28750.68 hectares i.e. 97.73% of wetland is natural, whereas 665.78 hectares i.e. 2.23% is manmade. Detail information on Maldah wetlands are provided in Table 1. The largest number of 235 seasonal waterlogged natural wetlands represent the most abundant type that contributes 20956.49 hectares area of wetland for the district (Bhattacharyya *et al*, 2000).

Table 1: Distribution of wetland types and areas in Maldah district (Source: Bhattacharyya *et al* 2000)

Nature of Wetland		Classes of Wetland	Number	Area (ha)
INLAND	Natural	Pond	22	2760.79
		Cut off Meanders/Oxbow Lake	190	2986.80
		Marsh/Swamp	20	2047.09
		Waterlogged seasonal	235	20956.49
	Manmade	Reservoir	4	34.86
		Tanks	90	613.07
		Waterlogged	1	17.85
		Ash pond	-	-
		Total	562	29416.95

Methodology:

Several vegetational surveys had been undertaken in the study area in different seasons since 2003. Plant specimens were collected by random sampling. To record plants in their different phenophases and the time of appearance in the different depths of water in different seasons, same area has been visited repeatedly round the year. Plant specimens were processed into dried, poisoned and mounted herbarium sheets following Jain & Rao (1977). The voucher specimens were identified and preserved in the NBU-Herbarium. Plants were identified using available Floras

(Hooker, 1872-1897; Prain, 1903; Deb, 1957; Hara, 1966, 1971; Guha Bakshi, 1984; Grierson & Long, 1987-1999; Cook, 1996) and finally matching at CAL and BSHC. In addition, many interesting birds, fishes and other animals were also photographed. The random interview of local people also helped to collect and/or understand different socio-economic relations and imposing threats faced by the flora and the vegetation.

Observation & Discussion:

The wetlands are locally called as *Beel* or *Beeloth, Dighi, Khal* etc. Most of the wetlands were naturally originated due to sifting of different rivers – oxbow lakes. Apart from natural wetlands there are some artificial or manmade water bodies of which few are hundreds of years old. The nature of a wetland generally depends mostly on the topography of land. The district is composed of three dominating topography namely *Diara, Barind* and *Tal* (Fig 1). The wetlands of Maldah can be divided into the following types based on their origin:

1. Marshes and floodplains of *Barind* region along with small lakes and ponds
2. Marshes and seasonally flooded wetlands of *Tal* region, and

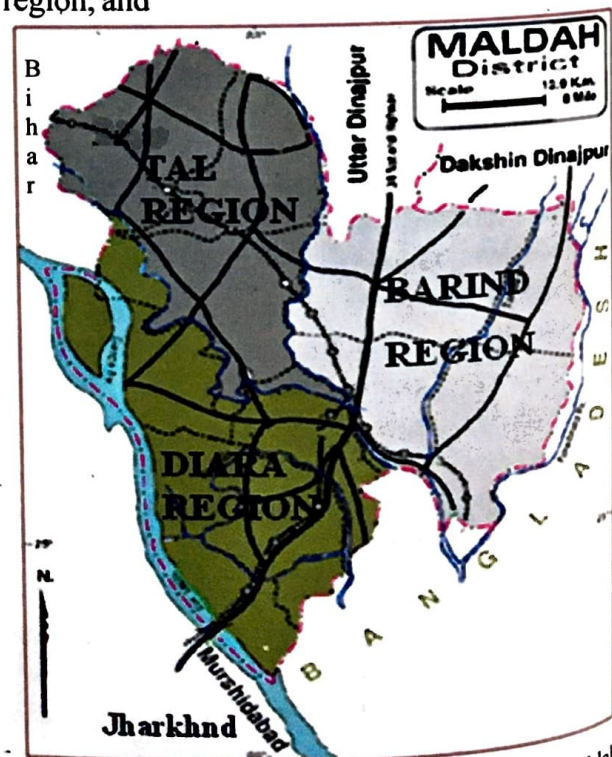


Fig. 1. Wetland Types and their areas in the Maldah District of West Bengal

3. Marshes and seasonally waterlogged swamp wetlands of *Diara* region along with few lakes.

The wetland areas lie in between terrestrial and aquatic ecosystems, so these are characterized by two adjacent ecosystems i.e. aquatic, marsh and terrestrial habitat. Such wetlands are also considered as *ecotonal* habitat (Mitsch & Gosselink, 1993) that clearly shows their capacity to support rich biodiversity suitable for aquatic, marsh and upland vegetation types.

The wetlands of Maldah district are very old and majority of those are naturally originated and developed the ecosystem through suitable seral stages since their origin. The yearly water cycle makes the wetlands more healthy and productive. A small patch of natural vegetation of *Barringtonia acutangula* (Linnaeus) Gaertner (Lecythidaceae) of *Tilasan* areas is a swamp forest situated at the Basin of Punarbhaha River across the Indo-Bangladesh International Boarder. This is the only natural patch of *Barringtonia* vegetation and is a part of the Nayabandh beel complex that includes *Chakla*, *Bakla*, *Ramdole* and *Tilasan beels* within the boundary of West Bengal. The wild biodiversity of Maldah district is mostly restricted in and around the wetlands areas, but are suffering from acute stresses, mainly anthropological and some natural.

The wetland and aquatic flora of Indian sub-continent was studied by several authors including Duthie (1903-1929); Biswas & Calder (1935, 1955); Subramanyam (1961); Deb (1962); Jha (1965); Naskar (1990); Gopal (1995); Ghosh (1994) and Cook (1996). Present study enlisted 345, species, representing 200 genera of flowering plants are growing wild in these water bodies. Out of these 198 species are dicots and the rest are monocots. Six species of 6 different genera of pteridophytes and 4 species of bryophytes are also recorded. The dominating 15 families in such vegetation are presented in Table 2.

The floral composition of different wetland vegetation can be categorized under following sub-groups:

Algal component:

Different types of algae are the common

Table 2: Fifteen most dominating families

Sl. No.	Family	Genus	Species	%
1	Poaceae	34	52	15.07
2	Cyperaceae	8	47	13.62
3	Asteraceae	24	29	8.41
4	Scrophulariaceae	9	22	6.38
5	Euphorbiaceae	6	10	2.90
6	Polygonaceae	2	11	3.19
7	Amaranthaceae	4	9	2.61
8	Lythraceae	3	9	2.61
9	Acanthaceae	4	8	2.32
10	Fabaceae	4	8	2.32
11	Araceae	5	7	2.03
12	Commelinaceae	3	7	2.03
13	Convolvulaceae	4	6	1.74
14	Hydrocharitaceae	5	5	1.45
15	Solanaceae	4	5	1.45

components in the wetland vegetation of Maldah. They are either free living or remain attached to different types of substrata. Common algae found to grow includes different species of *Oedogonium*, *Lyngbea*, *Nostoc*, *Ulothrix*, *Oscillatoria*, *Spirogyra*, *Volvox*, *Hydrodictyon*, *Voucharia*, *Chara*, *Nitella* etc.

True aquatic Plants:

The true aquatic plants are growing strictly in water and can be grouped as (i) *Free floating* [e.g. *Eichhornia crassipes* (Martius) Solms, *Lemna perpusilla* Torrey, *Spirodella polyrhiza* (Linnaeus) Schleid etc.]; (ii) *Submerged plants* [*Vallisneria spiralis* Linnaeus, *Nechamendra alternifolia* Thwaites, *Najas graminea* Delile, *Potamogeton crispus* Linnaeus, *Aponogeton natans* (Linnaeus) Engler & Krause, *Aponogeton crispus* Thunberg etc.]; (iii) *Rooted with floating leaved* [*Nymphaea nouchali* Burman f., *Nymphaea pubescens* Willdenow, *Nelumbo nucifera* Gaertner, *Nymphoides indica* (Linnaeus) Kuntze, *Nymphoides hydrophylla* (Loureiro) Kuntze etc.]; (iv) *Suspended* [*Ceratophyllum demersum* Linnaeus, *Utricularia aurea* Loureiro, *Utricularia gibbosa* Linnaeus ssp. *exoleta* (R. Brown) P. Taylor, *Utricularia inflexa* Forsskal ssp. *stellaris* (Linnaeus f.) Taylor etc.]; and

(v) *Amphibians* [*Sagittaria guayanensis* Humboldt, Bonpland & Kunth, *Sagittaria sagittifolia* Linnaeus, *Limnophila heterophylla* (Roxburgh) Benth, *Limnophila repens* (Benth) Benth, *Limnophila indica* (Linnaeus) Druce, *Limnophila sessiliflora* (Vahl) Blume, *Ammannia baccifera* Linnaeus, *Ammannia multiflora* Roxburgh, *Rotala rotundifolia* (Buchanan-Hamilton) Koehne, *Bergia ammannioides* Roxburgh, *Monochoria vaginalis* (Burman f.) K. Presl, *Monochoria hastata* (Linnaeus) Solms, *Monochoria vaginalis* (Burman f.) C. Presl ex Kunth etc.].

Semi-aquatic Plants (Helophytes):

Among the plants those are recorded from this area most of the plants are semi aquatic (220 species) and most dominating species are *Rungia pectinata* (Linnaeus) Nees, *Alternanthera paronychioides* St. Hilaire, *Alternanthera sessilis* (Linnaeus) R. Brown ex DC., *Amaranthus viridis* Linnaeus, *Amaranthus lividus* Linnaeus, *Celosia argentea* Linnaeus, *Digera muricata* (Linnaeus) Martius, *Vetiveria zizanioides* (Linnaeus) Nash, *Centipeda minima* (Linnaeus) A. Brown & Ascherson, *Gnaphalium luteo-album* ssp *affine* (D. Don) Koster, *Grangea maderaspatana* (Linnaeus) Poiret, *Thespis divaricata* DC., *Oenanthe javanica* Linnaeus, *Kyllinga brevifolia* Rottboell, *Fimbristylis littoralis* Gaudich, *Fimbristylis dichotoma* (Linnaeus) Vahl, *Bulbostylis densa* (Wallich) Handle-Mazzetti ex Karsten & Schenck, *Cyperus compactus* Retzius, *Desmostachya bipinnata* (Linnaeus) Stapf, *Leptochloa panicea* (Retzius) Ohwi, *Echinochloa colona* (Linnaeus) Link, *Echinochloa crus-galli* (Linnaeus) P. Beauverd, *Eragrostis unioides* (Retzius) Nees ex Steudel, *Mariscus compactus* (Retzius) Boldingh, *Cyperus digitatus* Roxburgh, *Cyperus difformis* Linnaeus, *Cyperus iria* Linnaeus, *Imperata cylindrica* (Linnaeus) Raeuschel, *Leersia hexandra* Swartz, *Sacciolepis interrupta* (Willdenow) Stapf, *Saccharum spontaneum* Linnaeus, *Eleocharis palustris* R. Brown, *Eleocharis tetraquetra* Nees, *Eleocharis atropurpurea* (Retzius) Kunth, *Schoenoplectus articulatus* (Linnaeus) Palla, *Schoenoplectus juncooides* (Roxburgh) Palla, *Schoenoplectus*

lateriflorus (Gmelin) Lye, etc.

Pseudo-wetland Plants:

Except few perennial water bodies most of the wetlands of Maldah district are seasonally waterlogged. During summer these areas are completely dried out and some species of upland plants start growing there. The dominating upland plants of these wetlands including *Amaranthus spinosus* Linnaeus, *Ageratum conyzoides* Linnaeus, *Blumea lacera* (Burman f.) DC., *Cirsium arvense* (Linnaeus) Scopoli, *Elephantopus scaber* Linnaeus, *Eupatorium odoratum* Linnaeus, *Mikania micrantha* Kunth, *Parthenium hysterophorus* Linnaeus, *Vernonia cinerea* (Linnaeus) Lessing, *Cyanoglossum lanceolatum* Forsskal, *Operculina turpethum* (Linnaeus) S. Manso, *Chrozophora rottleri* (Geiseler) Jussieu ex Sprengel, *Croton bonplandianus* Baillon, *Alysicarpus monilifer* (Linnaeus) DC., *Mimosa pudica* Linnaeus, *Senna sophera* (Linnaeus) Roxburgh, *Piper Longum* Linnaeus and *Solanum sisymbriifolium* Lamarck.

Plants of lowland crop fields:

Sallow-watered areas of wetlands are generally used for paddy and jute cultivation where submerged or dried floor are dominating with several weeds like *Digera muricata* (Linnaeus) Martius, *Caesulia axillaris* Roxburgh, *Cortula anthemoides* Linnaeus, *Eclipta prostrata* (Linnaeus) Linnaeus, *Enydra fluctuans* Loureiro, *Ixeris polycephala* Cassini, *Sonchus asper* (Linnaeus) Hill, *Centella asiatica* (Linnaeus) Urban, *Ipomoea aquatica* Forsskal, *Stellaria wallichiana* Benth ex Haines, *Lobelia alsinoides* Lamarck, *Bergia ammannioides* Roxburgh, *Fumaria indica* (Hausknecht) Pugsley, *Hydrolea zeylanica* (Linnaeus) Vahl, *Hypericum japonicum* Thunberg ex Murray, *Veronica anagallis-aquatica* Linnaeus, *Microcarpaea minima* (J. Koenig ex Retzius) Merrill, *Lindernia parviflora* (Roxburgh) Haines, *Phyllanthus amarus* Schumacher & Thonning, *Ammannia baccifera* Linnaeus.

Apart from above categories several interesting plants are also recorded. These include insectivorous plants like *Utricularia aurea*

Loureiro, *Utricularia gibbosa* Linnaeus ssp. *exoleta* (R. Brown) P. Taylor, and *Utricularia inflexa* Forsskal ssp. *stellaris* (Linnaeus f.) Taylor, which are growing there in wild. Some species like *Oryza rufipogon* Griffith, *Oryza nivara* Sharma & Shastry and *Rosa clinophylla* Thory var. *glabra* S.C. Ghora & G. Panigrahi are the wild relatives of rice and rose, respectively, are the common species of this area.

Faunal diversity in wetlands:

Wetland faunal diversity includes several species of aquatic birds, fishes, amphibians, reptiles, molluscas etc (Plate I). Detailed report on such faunal diversity from this region is not available. The present study recorded many important waterfowls from these wetlands among those Farraka barrage (Kaliachak 2), Nayabandh beel (Habibpur), Chatral – Gabgachi beel complex (Engraz bazaar), Sanak beel (Harischandrapur 2), Barbilla beel (Ratua 2), Boalia beel (Chanchal 1), Belatuli beel (Old Maldah) and Madhaipur beel (Old Maldah) are important. These natural wetlands are very rich in fish faunas as these are very old and with dense aquatic vegetation in most of the areas. But, almost every year, during floods fishes from nearby ponds and from rivers enter these beels. Some of the common fishes like *Catla catla*, *Labeo rohita*, *Chana punctata*, *Clarias batrachus*, *Heteropneustes fossilis*, *Oreochromis mossambicus*, *Trichogaster fasciatus*, *Puntius sarana*, *Channa striatus*, *Burbus tinto* (titputi), *Puntius ticto*, *Anabas testudineus*, *Collisa fasclata* (Khalisa) etc. are very common.

The rich avifauna also attracts the bird watchers and hunters of the region equally. During September to February, several species of waterfowls like large Pelican, Adjuvent, Heron, Stork, Kingfisher and some species of ducks remain there in large numbers. Few common avifauna includes *Aythya fuligula* (Tufted Duck), *Anas acuta* (Northern pintail), *Anas clypeata* (Northern Shoveler), *Anas strepera* (Gadwall), *Anas anser*, *Ardeola grayii*, *Ardea cinerea* (Indian Pond Heron), *Phalacrocorax niger*, *Phalacrocorax carbo*, *Leptoptilos javanicus* (Lesser Adjutant Stork), *Leptoptilos dubius* (Greater Adjutant Stork),

Anastomus osciyanus (Asian Openbill), *Helcyon capensis* (Stork Billed Kingfisher), *Alcedo atthis*, *Alcedo meninting*, *Ergetta garzetta* etc. are regular visitors in different wetlands of Maldah.

Other animal groups like some snakes (*Naja naja*, *Xenochrophis piscator* etc.), lizards (*Varanus benghalensis*, *V. salvator* etc.) tortoise like *Melanochelys trijuga indopenninsularis* and Moluscas (etc.) are common.

Dependence of local people:

The people of this region depend very much on these wetlands. They use wetland-water for irrigation during dry season. Several fishermen catch fishes from those wetlands to run their life. Several wild plant species, they collect from the wild and are used in various ways like medicine (33 species), food (26 species), fodder (>30 species), building materials, manure (9 species), fuel (8 species), etc (Chowdhury & Das, 2009).

Marketing of numerous species of plants, fishes and hunted birds from these wetlands are commonly sold in different local markets. Most of the wetlands are also used for the cultivation of Makhana (*Euryale ferox* Salisbury), water-chestnut (*Trapa natans* var. *bispinosa* (Roxburgh) Makino), Lotus (*Nelumbo nucifera* Gartner) for their market demand. The wetlands are the preferred areas for retting jute.

Status of conservation:

The continuous population growth and urbanization are gradually destroying the wetlands and, thereby biodiversity of the area is badly affected. The threats facing these wetlands are of two types. Natural threats include reduction of wetland depth by deposition of dead plant parts and siltation; and anthropological pressure includes rapid urbanization, industrialization, sewage discharge, cultivation etc. Both the natural and anthological pressure rapidly reducing the wetland depth and poisoning the water. All these facts are rapidly destroying the important wetland ecosystem. The wetlands of Maldah district deserve immediate protection to conserve the biodiversity in their natural conditions. To protect this wealth Government, NGOs and public should work together. For this public awareness is to be

generated fast through different public-contact programs, pin-pointed research activities, for mulation of proper management strategies, and strict implementation of existing conservation related rules of the land. However, declaring some of these wetlands as Ramsar Sites may improve the situation.

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