

Review Article

A Review on the Aquatic Faunal and Floral Diversity of Diplai Beel Wetland of Bodoland Territorial Region (BTR) of Western Assam, India.

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Abstract: Beels or wetlands are considered as ecotonal habitats with rich biota which serves humanity in various aspects of livelihood. However, human encroachment, pollutions, and unsystematic fishing practices as well as poaching of avian species which are dependent on those wetlands poses significant threats to the wetland ecosystem. The current review work aims to provide a comprehensive overview of the biodiversity of Diplai Beel focusing on diversity of flora and fauna and the ecological significance of the wetland. The present paper provides an overview of rich flora and fauna of the wetland including 67 fish species, 27 species of aquatic insects, 99 bird species, 33 species of macrophytes, 7 phytoplankton species, 9 species of reptiles and 9 species of amphibians. This paper also highlights the immediate requirements for integrated wetland management strategies, habitat restoration and community-based conservation initiatives to sustain the ecological integrity of Diplai Beel. There is an urgent need of conservation, protection and management as this wetland is unscientifically used by the surrounding local people. Cutting of the forest area for agricultural practices in the catchment area by shrinking water area and converting fresh water ecosystem into commercial fisheries by local authorities, unwanted use of pesticides for cultivations, unsustainable collection of edible water plants for selling in the markets, cleaning of minor hydrophytes by fishing nets etc, are creating ecological imbalance in Diplai Beel. These are the collective effects showing variation in the water qualities of Diplai Beel. Field Surveys and Secondary data collection were conducted to document species richness and habitat conditions. Preliminary findings indicate the presence of diverse flora and fauna including fishes, zooplanktons, phytoplankton, reptiles, amphibians, aquatic flora, different avian species etc.

Keywords: Aquatic fauna, BTR, biodiversity, Diplai beel, floral diversity, wetlands

Introduction

Beels or wetlands are the water bodies with a depth of almost 6 meters (Gogoi *et al.*, 2019) which provide beneficial ecosystem services to the mankind. The floral and faunal components of these wetlands influence biomass production and nutrient retention (Khataniar & Ritchie, 2001). Wetlands occupy 1.5% of the total earth's surface and approximately 20% of India's total biodiversity is found in wetlands. Out of

these 20%, the entire Northeast India contains almost 7731 wetlands (Chowdhury A, 2015). Among these, three wetlands got the recognition as Ramsar sites of India namely Deepor beel (Assam), Loktok Lake (Manipur) and Rudrasagar Lake (Tripura). According to the report from a regional newspaper *Assam tribune* in 2010, Diplai beel of Bodoland Territorial Region (BTR), Assam is the proposed Ramsar site. The Diplai

beel fulfils all the nine criteria required to be declared as Ramsar site. According to Ramsar Convention (1998), “Wetlands are areas of marsh, fen, peatland and or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water, the depth of which at low tide does not exceed 6 meter” (Chowdhury M, 2009).

The Diplai beel is one of the major wetlands and second largest in the Bodoland Territorial Region (BTR) located in the Kokrajhar District of Assam. This wetland plays a crucial role in supporting the local biodiversity, livelihood and ecological balance. The total area of Diplai beel covers around 4.14 square kilometres. It remains filled with water during monsoon and dries out partially in winter season. It acts as home to varieties of rich aquatic plant life (macrophytes), aquatic insects, fishes, amphibians, reptiles, birds including migratory species, etc. The local human inhabitants depend on this wetland for fishing, farming, collecting edible aquatic plants for food as well as help them to develop a sustainable economy. However, in recent years, the wetland has been facing threats from encroachment, pollutions, and over use of its resources. According to the members of River Rejuvenation Committee, 2019 (RRC, 2019), the main contributor of pollution in that area is the municipal sewage. The sewages are dumped in open area thereby absorbed by the soil or ultimately finds their way to the water bodies causing land and water pollutions.

Study Area

The Diplai beel wetland is nestled within the Chakrasila Wildlife Sanctuary in Kokrajhar District of Assam (Fig. 1A & B). It is situated in the southern part of Kokrajhar town which is the major tourist attraction of the district. It also shares a close boundary with Chirang Reserve Forest, Chirang and is a part of the larger Manas River Basin ecosystem. It has a coordinate of approximately 26.425 °N and 90.296° E. As noted by Brahma (2013), Diplai Beel flanks world’s only Golden langur Sanctuary viz. Chakrasila Wildlife Sanctuary. It has been mentioned that this wetland is not only the storehouse of flora and fauna



Fig. 1A. Pictures of Diplai Beel. Kokrajhar.

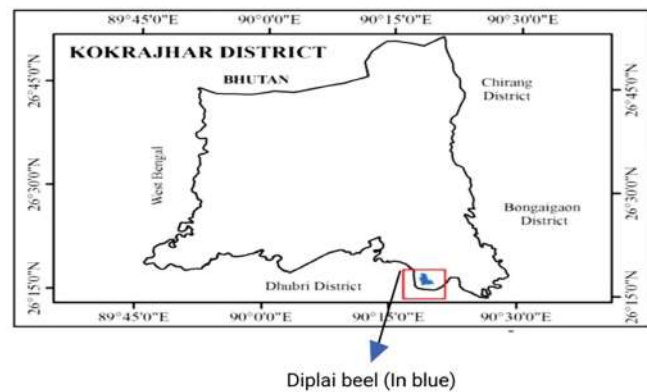


Fig. 1B. Map of Diplai Beel, Kokrajhar (Map Source: Action Plan For Diplai Beel- Priority V).

but also the prime wintering habitats of migratory birds. This wetland has a very large ecological significance supporting diverse aquatic flora and fauna.

Data Collection: This review paper is based on a secondary data analysis approach, aimed at assessing the biodiversity richness of Diplai Beel. Relevant data were collected from online research websites like Google scholar, Researchgate, e-bird survey, etc. The data were then categorized and summarized to identify overall species richness of the wetland. This methodology provided a comprehensive understanding of Diplai Beel’s biodiversity and helped to identify key species groups, conservation priorities and areas requiring further research or monitoring.

Fish Diversity of Diplai Beel

A study on the ichthyofaunal diversity of Diplai Beel by Singha et al., 2017 revealed that Diplai beel contains 67 fish species

that includes 4 exotic fishes, 25 families and 8 orders. The 25 different families recorded in the study are Amblycipitidae, Ambassidae, Anabantidae, Badidae, Bagridae, Belonidae, Chacidae, Channidae, Clariidae, Clupeidae, Cobitidae, Cyprinidae, Gobiidae, Heteropneustidae, Mastacembelidae, Nandidae, Nemacheilidae, Notopteridae, Osphronemidae, Pangasidae, Sisoridae, Tetraodontidae, Schilbeidae, Siluridae and Synbranchidae. The study also reveals that Cyprinidae (carps) was the most dominant family comprising 25 species, followed by Bagridae (catfishes).

Different fish species belong to these 25 different families include: *Acanthocobitis botia* (Hamilton, 1822), *Ailia coila* (Hamilton, 1822), *Amblyceps mangois* (Hamilton, 1822), *Amblypharyngodon mola* (Hamilton, 1822), *Anabas testudineus* (Bloch, 1792), *Badis badis* (Hamilton, 1822), *Bagarius bagarius* (Hamilton, 1822), *Botia dario* (Hamilton, 1822), *Cabdio morar* (Hamilton, 1822), *Chitala chitala* (Hamilton, 1822), *Cirrhinus mrigala* (Hamilton, 1822), *Cirrhinusreba* (Hamilton, 1822), *Ctenopharyngodon idella* (Valenciennes, 1844), *Cyprinus carpio* (Linnaeus, 1758), *Clupiso magarua* (Hamilton, 1822), *Clarias magur* (Linnaeus, 1758), *Chaca chaca* (Hamilton, 1822), *Chanda nama* (Hamilton, 1822), *Ctenops nobilis* (McClelland, 1845), *Channa gachua* (Hamilton 1822), *Channa marulius* (Hamilton), *Channa punctatus* (Bloch, 1793), *Channa striatus* (Bloch, 1793), *Danio devario* (Ham- Buch), *Danio rerio* (Hamilton, 1822), *Esomus danrica* (Hamilton, 1822), *Gudusia chapra* (Hamilton, 1822), *Gibelion catla* (Hamilton, 1822), *Glossogobius giuris* (Hamilton, 1822), *Heteropneustes fossilis* (Bloch, 1794), *Hypophthalmichthys molitrix* (Valenciennes, 1844), *Hypophthalmichthys nobilis* (Richardson, 1845), *Laubu calaubuca* (Hamilton, 1822), *Labeo gonius* (Hamilton, 1822), *Labeo calbasu* (Hamilton, 1822), *Labeo rohita* (Hamilton, 1822), *Labeo bata* (Hamilton, 1822), *Lepidocephalichthys guntea* (Hamilton, 1822), *Leiodon cutcutia* (Hamilton, 1822), *Macrognathus aral* (Bloch and Schneider, 1801), *Macrognathus pancalus* (Hamilton, 1822), *Mastacembelus armatus* (Lacepede, 1800), *Mystus bleekeri* (Day, 1877), *Mystus cavasius* (Hamilton, 1822), *Mystus tengara* (Ham.-Buch.),

Mystus vittatus (Bloch, 1794), *Notopterus notopterus* (Pallas, 1769), *Nandus nandus* (Hamilton, 1822), *Ompokpabo* (Hamilton, 1822), *Parambassis ranga* (Hamilton, 1822), *Pangasius pangasius* (Hamilton, 1822), *Pethia conchoniis* (Hamilton, 1822), *Pethiactico* (Hamilton, 1822), *Puntius chola* (Hamilton, 1822), *Puntius sophore* (Hamilton, 1822), *Puntius terio* (Hamilton, 1822), *Rasbora daniconius* (Ham.-Buch.), *Rita rita* (Hamilton, 1822), *Sperataaor* (Hamilton, 1822), *Sperata seenghala* (Sykes, 1839), *Systemus sarana* (Hamilton, 1822), *Trichogaster fasciata* (Bloch and Schneider, 1801), *Trichogaster lalius* (Hamilton, 1822), *Wallago attu* (Bloch and Schneider, 1801) and *Xenentodon cancila* (Hamilton, 1822).

Aquatic insect diversity of Diplai Beel.

Khaklary and Basumatary (2024) in their survey for aquatic insect diversity of Diplai and Dheer beel of Kokrajhar District revealed that Diplai beel comprises of 27 species of aquatic insects that includes 6 orders and 18 families. The study also reveals that the order Hemiptera has highest number of families and order Hymenoptera with the only one family. Some of the species' names are *Baetis sp.*, *Belostoma sp.*, *Chironomous species*, *Cloeon species*, *Culex species*, *Cybister fimbriolatus*, *Dineutus spinosus*, *Hydrophilus species*, *Ischnura species*, *Libellula lydia gerris species*, *Limnogonis nitidus*, *Mesovelia vittigera*, *Microvelia species*, *Micronectas cutellaris*, *Neogerris parvula*, *Neurothemis species*, *Notonecta undulate*, *Pelocoris femoratus*, *Plea liturata*, *Rana trafileiformes*, *Rana travaripes*, *Pantala flavescens* etc.

Bird diversity of Diplai Beel

According to an eBird Survey, a total of 99 species of birds has been recorded from 2011 to 2024 (<https://ebird.org/hotspot/L3154496/bird-list?rank=lrec>). The bird list includes *Acridotheres fuscus*, *Acridotheres grandis*, *Acridotheres tristis*, *Actitis hypoleucos*, *Aegithina tiphia*, *Aethopyga siparaja*, *Alcedo atthis*, *Amaurornis phoenicurus*, *Anas acuta*, *Anas crecca*, *Anas poecilorhyncha*, *Anastomusos citans*, *Anhingo melanogaster*, *Anthus rufulus*, *Ardea alba*, *Ardea coromanda*, *Ardea intermedia*, *Ardea purpurea*, *Ardeolagrayii*, *Argyastriata*, *Artamus fuscus*,

Athene brama, Aythya baeri, Aythya ferina, Aythya nyroca, Botaurus cinnamomeus, Centropus sinensis, Ceryle rudis, Cinnerys asiaticus, Cisticola juncidis, Copsychus saularis, Coracias affinis, Coracina javensis, Corvus splendens, Corvus macrorhynchos, Cuculus micropterus, Culicicapa ceylonensis, Cyornis rubeculoides, Cypsiurus balasiensis, Dendrocitta vagabunda, Dendrocygna javanica, Dicrurus aeneus, Dicrurus hottentottus, Dicrurus macrocercus, Egretta garzetta, Eudynamis scolopaceus, Eumyias thalassinus, Ficedula albicilla, Fulica atra, Gallicrex cinerea, Gallinago gallinago, Gallinula chloropus, Gracupica contra, Halcyon smyrnensis, Hierococcyx varius, Hirundo rustica, Hydrophasianus chirurgus, Icthyophaga ichthyaetus, Lanius cristatus, Lanius schach, Lanius tephronotus, Leptoptilos javanicus, Mareca strepera, Megalurus palustris, Metopidius indicus, Microcarbo niger, Microhierax caerulescens, Milvus migrans, Motacilla alba, Motacilla citreola, Nettapus coromandelianus, Oriolus xanthornus, Orthotomus sutorius, Pandion haliaetus, Parus cinereus, Passer domesticus, Phalacrocorax carbo, Phylloscopus fuscatus, Porphyrio poliocephalus, Psilopogon asiaticus, Psilopogon lineatus, Psittacula egyptiaca, Pycnonotus cafer, Rubigula flaviventris, Saxicola maurus, Spatula clypeata, Spilornis cheela, Spilopelia chinensis, Sturnia malabarica, Tachybaptus ruficollis, Tachys pizabadi, Treron phoenicopterus, Tringa ochropus, Upupa epops, Vanellus cinereus, Vanellus indicus, Zosterops palpebrosus.

Among them highest number of individual species recorded is *Dendrocygna javanica* (Lesser Whistling Duck). However, according to Asian Waterfowl Census (AWC) in the year 2016, Diplai beel holds a total of 150 avifauna. The census reported huge flocks of migratory and residential water birds. Among migratory birds, grey leg goose, mallard, wigeon, shoveler, and common pochard are common.

Reptiles and Amphibians

Besides fishes, birds, insects and macrophytes, Diplai Beel is also a shelter for varieties of reptiles like snakes, turtles, lizards, etc. Kaur *et.al.*, (2016) recorded Bengal Monitor lizard (*Varanus bengalensis*) at the Chakrasila Wildlife Sanctuary

which has Diplai beel as its part. Various snakes both venomous and non-venomous have been observed at the Diplai beel. Venomous snakes include Monocled Cobra (*Naja kaouthia*), Banded Krait (*Bangarus fasciatus*), Salazar's Pit Viper (*Trimeresurus salazar*), Common tree snake (*Dendrelaphis punctulatus*), etc and non-venomous snakes includes Rat Snake (*Pythas mucosa*), Assam's Kukri Snake (*Oligodon catenatus*), Buff striped keelback (*Amphies mastolatum*), Common water snake (*Nerodia sipedon*), etc. Das and Narzary, 2019 listed some of the names of amphibians found in Diplai beel which includes *Duttaphrynus melanostictus* (Schneider, 1799), *Euphlyctis cyanophlyctis* (Schneider, 1799), *Fejervarya nepalensis* (Dubois, 1984), *Fejervarya ataraiensis* (Dubois, 1984), *Haplobatrachus tigerinus* (Daudin, 1803), *Microhyla ornata* (Dumeril and Bibron, 1841), *Uperodonta probanicus* (Parker, 1934), *Hylarana humeralis* (Boulenger, 1887) and *Polypedates taraiensis* (Dubois, 1987).

Macrophytes diversity of Diplai beel

Choudhury *et al.*, 2016 recorded 33 species of macrophytes in Diplai beel out of which, 6 species are free floating, 4 species submerged anchored-macrophytes, 2 species submerged suspended, 7 species rooted with floating leaves, 1 species rooted with floating shoot, 4 species submerged anchored and 13 species emergent macrophytes. *Alternanthera philoxeroides*, *Cyperus bravifolius*, *Cyperus compressus*, *Cyperus corymbosus*, *Echinochloa astagnina*, *Eichhornia crassipes*, *Nymphaea lotus*, *Nymphaea rubra*, *Nymphaeoides cristatum*, *Nymphaeoides indicum*, *Trapa natans*, are some of the dominant macrophytes found in Diplai beel.

Phytoplanktons and Zooplanktons

Recent preliminary study conducted has shown that there are huge numbers of phytoplankton like *Chlorella*, *Euglena*, *Fragilaria*, *Navicula*, *Oscillatoria*, *Pediastrum*, *Scenedesmus*, etc. The zooplanktons observed are Rotifers, Water Fleas, Seed shrimps, Copepods, etc.

Discussions:

As per the recent report mentioned by Vanshika *et al.*, 2025, India encompasses the largest area covered by wetlands in Asia comprising 23295 wetlands and 85 Ramsar sites. It was also mentioned that there are total of 720 species of plants found in the wetlands of India. In the wetlands of north east region of India, nearly 290 fish species, 70 molluscs, 135 amphibians and 608 aquatic plant species have been reported (Arya A.K. *et al.*, 2020). As of June 2025, the number of Ramsar site has increased to 91 (MoeEFCC, 2025). Bhattacharjya *et al.*, 2022, has mentioned in his report that the Deepor Beel, the lone Ramsar site of Assam has very rich floral and faunal diversity that includes 58 species of aquatic macrophytes, 65 species of diatoms, 171 species of Zooplanktons, 5 species of bryozoans, 15 species of molluscs, 55 numbers of aquatic insects, 3 species of prawns, 2 species of crabs, 68 species of finfish, 11 species of amphibians, 33 species of reptiles, 234 numbers of birds and 24 species of mammals. Comparatively, from all the collected data in the present study, the Diplai beel of Bodoland Territorial Region of Western Assam may also be recognized as an ecologically important wetland that supports large variety of flora and fauna including 67 fish species, 27 species of aquatic insects, 99 bird species, 33 species of macrophytes, 7 phytoplankton species, 9 species of reptiles and 9 species of amphibians. Although preliminary studies indicate that Diplai Beel could be biologically rich wetland ecosystem, the available literature is limited in scope and depth. While the wetland has been relatively well-documented in terms of its avifaunal, fish diversity and aquatic floras, most planktons, reptiles and amphibians remain significantly under-researched. Therefore, future studies must prioritize comprehensive studies on planktons, reptiles, and amphibians so that this would fulfil a significant knowledge gap and contribute to better understanding of this wetland's biodiversity. Diplai beel has an important role in flood regulation and water management in Kokrajhar district of Assam. The wetland absorbs the excess water during heavy rainfall and gradually releases water back into the local rivers during dry seasons.

Choudhury *et al.*, 2016 mentioned that unsustainable fishing culture of local people near Diplai Beel has a large impact to all the fish species available and the environment thereby decreasing locally available fishes. Eutrophication in this wetland cause imbalance in wetland's ecosystem leading to dissolved oxygen (DO) depletions, large area algal blooms that blocks the sunlight preventing underwater plant's photosynthesis and reducing oxygen production ultimately killing the aquatic organisms. Controlling of invasive species like Water Hyacinth is also of utmost requirements for conservations of the flora and fauna of Diplai Beel. Water Hyacinth is a free-floating perennial aquatic plant that is considered the world's worst aquatic weed. It produces a large amount of biomass and greatly influences the floristic characteristics of aquatic plants such as plant density, frequency, diversity, evenness and dominance (Lahon *et al.*, 2023). After reviewing all the available secondary data, it can be stated that proper wetland management and strategies must be implemented to conserve the biodiversity of Diplai beel, which is a home to many biological species.

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