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A study on macrophyte diversity in Dipai Beel, Kokrajhar district, BTAD, Assam.

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Abstract

Aquatic macrophyte diversity and its role in understanding the wetland ecosystem dynamics, have tremendous significance. Macrophytes may be used as ecological indicators for assessing and predicting environmental changes in water. The perennial species are continuously exposed and able to integrate environmental conditions over a large period. Dipal Beel is a natural fresh water body in Kokrajhar district. The species composition status of aquatic macrophytes in Diplai Beel is studied and recorded in 2014-15. After collection, the species are categorized on the basis of ecological habits into seven types such as i. Free floating- 6 species, ii. Submerged anchored- 4 species, iii. Submerged suspended- 2 species, iv. Rooted with floating leaves- 7 species, v. Rooted with floating shoot-1 species, vi. Submerged anchored- 4 species, vii. Emergents-13 species. The study reveals enumeration, effect of abundance and rareness of macrophytes in Diplai Beel ecosystem.

Keywords: macrophytes, Diplai Beel, enumeration, abundance and rareness, effects.

1. Introduction

The World Conservation Union adopted the definition of wetland at the first meeting of conservation in a small town of Ramsar, in Iran in 1971. The definition stated that 'Areas of marsh, fen, peat land, or water, where 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 meters.' By 2002, more than 133 countries joined this convention and agreed to accept a number of its obligations. India joined the convention in 1982. Wetland flora in particular is able to sink nutrients and contaminants.

Many researchers documented their studies on aquatic plants in India such as Biswas & Calder (1937), Subramanyum (1962), Majumder (1965), Bhaskar & Razi (1973), Kachroo (1984), Lavania *et al* (1990), Bhowmick *et al* (2008) and Chowdhury and Das (2010-11). There is no report on aquatic macrophytes of Kokrajhar district is available in the recent past. So work has been initiated to keep records on water plants grown in this district.

Macrophytes are most conspicuous component of water ecosystem. From biological standpoint, wetland plants have multiple roles in the functioning of wetlands. They, like all photosynthetic organisms are crucial in fixing the energy that powers all other components of the system. They supply oxygen to other biota and contribute to the physical habitat. They represent diverse assemblages of species with different adaptations, ecological tolerance, and life history strategies that enable their survival in saturated and flooded soils. These differences have implications for their conservation, management and restoration.

2. Study area

Diplai Beel (26 19 N-26 44 N) latitudes and (89 45 E – 91 00 E longitudes) is the biggest natural water body, a place of tourist spot, situated 6 Km away from Kokrajhar town towards southern direction. It is an area of about 3.96 sq Km having a length of 3.30 Km (North to South) and wide of about 1.20 Km (East to West). It has an average shoreline length of 9.27 Km. It is a place of rich aquatic biodiversity. It is a eutrophic

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beel due to growth of abundant hydrophytes. It is an irregular in shape and having projected lobes. The Beel is almost surrounded by villages with thin population, hills and hillocks in the North, South and East but plains in the South. The average depth of the Beel varies from monsoon (23 ft approx.) to winter (12 ft approx.). The Diplai Beel is connected by several streams namely Sindurjhora, Borojhora, Bamuni (North to South direction) and Hawhawijhora (East to West direction) which help sedimentation in the Beel.

3. Material and methods

The concept of a 'water plant' is a matter of convention. It is difficult to build a coherent definition of these groups of organisms due to the connection of both higher and lower water plants with various transitory forms of land plants. Water plants as organisms, by way of natural selection are adapted to a water environment. Another term of these plants defines water plants, as macrophytes. Macrophytes are quite differentiated group of plants from morphological point of view, Pawel, K., Malgorzata, R., Maria,W. and Andrzej, K., (2013). Raunkiaer (1934) says hydrophytes have vegetative parts submerged or floating on the water surface and which survive in unfavourable seasons as submerged buds attached to the parent plants or lying free on the substrate. The absence of aquatic flora may lead to absence of fauna. Abundance of macrophytes indicates the water quality of a water body

A quadrate of 2 sq.m. in size is made by PVC pipes with PVC angle joints. In 2014-15 every month ten quadrates readings are taken within 50 sq.m. area in six selected sites of the Beel. Plants are collected by free hand and sometimes by hooks or by nets of different mesh size from over a boat. Date, site name and time of collection are recorded in log book. Macrophytes thus collected are placed in herbarium sheets by following the methods of Jain and Rao (1977). The plant specimens are identified based on books of Hooker 1872-1897; Cook 1996 & Fassett 2000. Identification is done referring literatures of Dowson and Robintion, 1984 too.

Table 1 : List of macrophyptes collected from Diplai Beel in different months of the year 2014-15

	Plant type	**Scientific Name and *Assamese Local Name (ALN)***	**Family**	**Habit**	**Life Span & Flowering cum fruiting**	**Dominant/ Rare/ / Moderate**
1	Free Floating	*Eichhornia crassipes* (Mart)Solm(ALN-Pani meteka)	Pontedariaceae	Herb (Monocotyledon)	Perennial(generally grow in summer)	Dominant
2	„	*Pistia stratiotes* Linn. (ALN-Bar puni)	Araceae	Herb (Monocotyledon)	Annual (June-Oct.)	Rare
3	„	*Lemna perpusilla* Torry (ALN-Saru puni)	Lemnaceae	Herb (Monocotyledon)	Annual (Aug.- Oct.)	Rare
4	„	*Azolla pinnata* R.Br (ALN- puni)	Azollaceae	Herb (fern)	Annual (Nov.-Oct.)	Rare
5	„	*Salvinia natans*(L) All.(ALM-Pani dhekia)	Salvinaceae	Herb (fern)	Annual (Nov.-Feb.)	Rare
6	„	*Spirodela polyrrhiza* (L) Schleiden (ALN-Maju Puni)	Lemnaceae	Herb (Monocotyledon)	Annual (Sept. - Oct.)	Moderate
7	Submerged (anchored)	*Hydrilla verticillata*(L.f.) Royle (ALN-Patal khar/ panibirina)	Hydrochari-taceae	Herb (Monocotyledon)	Annual (Oct.-Feb.)	Moderate
8	„	*Potamogeton Crispus* (pond weed)	Potamoge-tonaceae	Herb (Monoco-tyledon)	?+Annual (round the year)	Moderate

9	„	*Potamogeton nodosus poir*	Potamogeton-aceae	Herb (Monocotyledon)	Annual (round the year)	Moderate
10	„	*Vallisneria natans* (Lour) H. Hara (ALN-pataghah)	Hydrochari-taceae	Herb (Monocotyledon)	Perennial (Oct.-Feb.)	Moderate
11	Submerged (suspended)	*Cerratophyllum demersum* Linn.(ALN-Sialvobora)	*Cerratophy-llaceae*	Herb (Monocotyledon)	Perennial (Jan.-June)	Moderate
12	„	*Utricularia exoleta* R.Br.	Lentibulari-aceae	„	Annual	Moderate
13	Rooted Floating shoot	*Ipomoea aquatica* Forsk (Kalmou sak)	Convolvulaceae	„	Annual (Oct.-April)	Moderate
14	Rooted Floating Leaves	*Aponogeton natans*(L) Engl.	Aponoge-tonaceae	„	Annual (May-Sept.)	Moderate
15	„	*Hydrocharis dubia*(B1) Backer	Hydrochari-taceae	Dicotyledon	Annual	Moderate
16		*Nymphaea lotus* Linn.(ALN-Boga bhet)	Nymphaeceae	„	Perennial (June-Oct.)	Dominant
17		*Nymphaea rubra* Roxb. Ex Salibs (ALM-Ranga bhet)	Nymphaeceae	„	Perennial (June-Nov.)	Dominant
18		*Nymphoides cristatum* (Roxb.) O.Kuntz	Hydrochari-taceae	„	Perennial (June-Nov.)	Dominant
19		*Nymphoides indicum* (L.) O.Kuntz (ALN-Borachuli)	Hydrochari-taceae	„	Perennial (June-Nov.)	Dominant
20		*Trapa natans* (L)var bispiinosa Roxb. (ALN-Dangar singra)	Trapaceae	„	Perennial (July-Dec.)	Dominant
21	Emergents	*Alternanthea philoxeroides* (Mart) Griseb. (ALN-helesi sak)	Amaranthaceae	Herb (Dicotyledon)	Perennial (April- May)	Dominant
22		*Cyperus bravifolius(*Rottb.*)* Hassk(Jota ghah)	Cyperaceae	Herb (Monocotyledon)	Perennial (March-Nov.)	Dominant
23		*Cyperus compressus* Linn.(ALN-Mutha bon)	„	„	Annual (May-Dec.)	Dominant
24		*Cyperus corymbosus* Rottb.	„	„	Perennial (May-Jan.)	Dominant
25		*Echinochloa stagnina* Retz	Poaceae	„	Perennial	Dominant
26		*Ipomoea fistulosa* Mart. Ex.Choisy (ALN-amorlota)	Convolv-ulaceae	„	Perennial (June-Oct.)	Rare

27		*Ipomoea aquatica* Forsk (ALM-Kalmou)	Convolv-ulaceae	„	Annual (June-Oct.)	Rare
28		*Leersia hexandra* Forsk.(ALN-Eralibon)	Poaceae	Herb (Dicotyledon)	Perennial	Rare
29		*Marselia quadrifolia* L. (Panitengesi)	Marseliaceae	Pteridophyte	Annual (May-Sept.)	Rare
30		*Monochoria hastata*(L) Solm. (ALN- Khar meteka)	Pontedariaceae	Herb (Monocotyledon)	Perennial (May-Aug.)	Rare
31		*Polygonum barbatum* Linn.	Polygonaceae	„	Annual (Jan.-April)	Rare
32		*Polygonumhydropiper* Linn.(ALM-Bihlagoni)	Polygonaceae	Herb (Dicotyledon)	Annual (Jan.-April)	Rare
33		*Sagittaria trifolia* L. (ALN-Kanmeteka)	Alismataceae	Herb (Monocotyledon)	Perennial (July-Sept.)	Rare

4. Results and discussion

The aquatic macrophytes collected from Diplai Beel of Kokrajhar district are shown in the table. Plants are grouped into Free floating, Submerged anchored, Submerged suspended, Rooted floating shoot, Rooted floating leaves, Emergents. Among the collected plants 29 species are angiosperms (dicotyledons- 08 and monocotyledons-21) and 3 species are found to be under pteridophytes. At the end of the study it is found that the yearlong comparative distribution of the macrophytes in Diplai Beel deserves keen observation. It is found to be distributed 8 species rare, 13 species dominant and 9 species moderate types of aquatic macrophytes in Diplai Beel.

After yearlong observation on macrophytes of Diplai Beel it has been a reason of discussion as to why some macrophytes are being rare and dominant species and where risk of biodiversity availability is prevailed. Complete conversion of this natural wetland into commercial fisheries may lead to the degradation of the fresh water ecosystem. The exotic species in the plant communities may be invaded the wetland and restrict the growth of the native aquatic flora by their luxuriant growths. Eutrophication, siltation, sedimentation may release ammonia and phosphorous which raises the nutrient concentration in the overlying water and oxygen consumption in the chemical and biological decomposition process decrease the DO level in the overlying water as well as sediments (Jewell,1971; Pereira et al.,1994). The physic-chemical characters of water may influence in the growth and species distribution in the water (Narayana and Somashekar, 2002). Time has come to undertake constructive measures towards protection and management of this wetland and to conserve its rich flora and fauna to keep the ecosystem balanced too.

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