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Species composition of aquatic macrophytes in kandulijaan beel of dhemaji district, Assam in relation to fishery: A case study

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Abstract
Extensive survey was done in Kandulijaan beel to enlist the aquatic macrophytes. The study was conducted between March 2018-February 2019. 31 species belonging to 31 genera, 16 families and 13 orders have been recorded. The Poaceae family was found to be most dominant with 29% composition represented by 9 species followed by Asteraceae with 16% having 5 species. The Order Poales was found to be most abundant with 9 species followed by Asterales having 6 species. The Shannon Diversity index and Simpson value was found to be 2.385 and 0.837. The species richness value was 4.368 and the eveness value was 0.679. The Plant groups were found belonging to Monocots, Dicots and also Pteridophytes. Many of the macrophytes recorded act as breeding habitat for various fishes found in the beel.

Keywords: aquatic macrophytes, composition, kandulijaan beel

Introduction
The wetlands of Assam are either oxbow or compact types, which are locally known as Beel". The beels haven a wide diversity of aquatic flora and fauna. Most of the water-bodies in Assam are at risk due to natural and anthropogenic factors that suggests scientific study and records of biodiversity in the wetlands of Assam to be done urgently, as these data are required in planning suitable scheme to safeguard them from further decline. Gogoi (2003, 2006) [1, 2] have done considerable work in this regard on Deepar Beel, a Ramsar site in Kamrup district of Assam.
Aquatic macrophytes role in freshwater ecosystems is extremely important. It provides food and refuge to the invertebrate organisms [3], assets of food medicine for rural population [4] and also improves the sediments & banks which help in reducing the turbidity of aquatic systems [5]. The aquatic plants provide food, shelter and also breeding habitat for many fishes and other aquatic organisms [6]. To sustain a healthy fish stock in natural water bodies, aquatic macrophytes are very essential. Opuszynski and Shireman in 1995 [7] stated that some or combination of plant species acts as better fish habitats than others. Hence, the aquatic macrophytes density is of utmost importance in determining the presence of fish species.
Aquatic macrophytes are an important component of an aquatic ecosystem and play a key function in primary productivity of that aquatic body. Study describing aquatic and wetland flora have been done by several workers in different parts of the country [8, 9, 10, 11, 12] Although a extensive amount of work on general flora of Assam has been carried over by a number of workers [13, 14] there are only a few contributions on aquatic and wetland flora of Assam as a whole [15].

Study Site
The Kandulijaan Beel is situated in Kulajaan village of Dhemaji district. The beel is a rainfed one. The beel remains covered by water along with its aquatic vegetation almost throughout the year. The wetland covers a total area of more than 20 hectres during the dry season which increases to 25.2 hectres during the rainy season. Both sides of the beel is a cultivable area with soil and clay at substratum. The positioning of the sampling site was recorded with the help of Global Positioning System (GPS). The latitude is 27º52'09.6'' N and Longitude 94º73'34.5'' E.

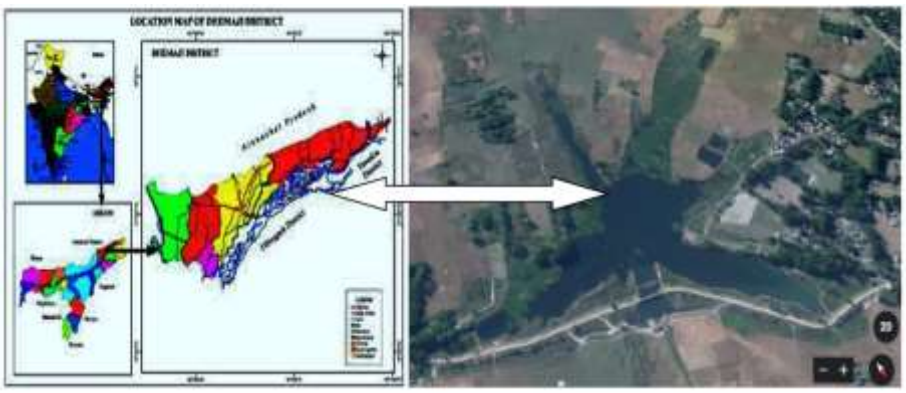

Fig 1: Satellite map showing the Kandulijaan Beel.

Materials and Methods

The study area was explored thoroughly and detailed observation on the vegetation and flora was made. Macrophytes were collected and preserved according to the conventional herbarium techniques [16]. Collected species were identified with the help of standard key and literature like Flora of British India [17]; Flora of Assam [18, 19]; Aquatic and Wetland Plants of India [20]. For the study, sampling was done on monthly basis and the macrophytes collected from the sampling sites of the beel were recorded.

Result

Table 1

Sl. No.	Name of the plant species	Family	Order	Plant Group
1.	*Amaranthus viridis*	Amaranthaceae	Caryophyllales	Dicotyledons
2.	*Centella asiatica*	Apiaceae	Apiales	
3.	*Enhydra fluctuans*	Asteraceae	Asterales	
4.	*Spilanthus paniculata*			
5.	*Grangea maderaspatana*			
6.	*Mikania micrantha*			
7.	*Ageratum conyzoides*			
8.	*Nymphoides indica*	Menyanthaceae		
9.	*Ipomea carnea*	Convolvulaceae	Solanales	
10.	*Senna tora*	Fabaceae	Fabales	
11.	*Oxalis corniculata*	Oxalidaceae	Geraniales	
12.	*Leucas aspera*	Lamiaceae	Lamiales	
13.	*Dentella repens*	Rubiaceae	Rubiales	
14.	*Saccharum spontaneum*	Gramineae	Cyperales	Monocotyledons
15.	*Pistia stratiotes*	Araceae	Alismatales	
16.	*Alocasia indica*			
17.	*Colocasia esculanta*			
18.	*Potamogeton nodusus*	Potamogetonaceae		
19.	*Auxonopus compressus*	Poaceae	Poales	
20.	*Eleocharis acutangula*			
21.	*Fimbristylis dichotoma*			
22.	*Hygroryza aristata*			
23.	*Scirpus articulatus*			
24.	*Aeschynomene aspera*			
25.	*Cynodon dactylon*			
26.	*Leersia hexandra*			
27.	*Sacciolepsis interrupta*			
28.	*Monochoria hastata*	Pontederiaceae	Commelinales	
29.	*Eicchornia crassepes*			
30.	*Marsilea minuta*	Marsileaceae	Salviniales	Pteridophytes
31.	*Salvinia molesta*	Salviniaceae		

In Kandulijaan beel, 31 species belonging to 31 genera and 16 families and 13 orders have been recorded. The Poaceae family was found to be most dominant one having 29% with 9 species followed by Asteraceae with 16% having 5 species, Araceae with 10% having 3 species, Pontoderiaceae with 6% having 2 species, and Amaranthaceae, Apiaceae, Convolvulaceae, Fabaceae, Gramineae, Lamiaceae, Menyanthaceae, Oxalidaceae, Potamogetonaceae, Rubiaceae, Marsilaceae, Salviniaceae, with 3% having 1 species each.

The 36 species recorded from the beel belonged to 13 Orders. The Order Poales was found to most abundant with 9 species followed by Asterales having 6 species. The third most abundant Order was found to be Alsimatales having 4 species followed by Salviniales, and Commelinales with 2 species and Cyperales, Caryophyllales, Apiales, Solanales, Lamiales, Fabales, Geraniales and Rubiales having 1 species each. The Shannon Diversity index and Simpson was found to be 2.385 and 0.837. The species richness value was 4.368 and the evenness value was 0.679.

Monocots were found to be dominating with 52% composition and Dicots with 42% whereas Pteridophytes were found with only 6% population in the study conducted in the beel. The natural topography of Kandulijaan Beel and its adjoining villages near the study sites lead to flow excess rain water into these beel during rainy season and get stored there. Thus the beel help to mitigate flood hazards or reduce the intensity of flood in the area. The aquatic plants of the beel are used as vegetable, herbal medicine, fodder by the local inhabitants eg. Tender shoots of *Ipomoea* etc. The beel harbors more than 30species of fishes and also many molluscan species. The domestic animals graze in and around the beel. Many of the species recorded from the beel viz., *Enhydra fluctuans, Ageratum conyzoides, Centella asiatica and Ipomea sp*. etc. are found to have high dietary as well as medicinal values [24, 25, 26, 27 & 28].

Discussion

Study on the diversity of aquatic macrophytes is significant for estimating the physico-chemical parameters of water and also ichthyofaunal production in the beel. Bhupendra and Mani in 2008 [29] reported 178 species in the study done on floral diversity in Baanganga Wetland in Uttarakhand. 25 macrophytes species was recorded from Gujrat Tal, Jaunpur [30], 15 species from Bhadra Fish Farm in Karnataka [31] 20 species were recorded from the Moirang River in

Manipur[32] and 19 macrophytes from the waterbody of Chandrapur district in Maharastra [33].

From the study done, it is hereby concluded that the beel has richness of macrophytes species and many of them possess several rich medicinal properties. The communities residing in the adjoining areas are to some extent dependent on this beel for the protein diet. Many of the macrophytes recorded act as breeding habitat for various fishes found in the beel. Common carp fishes lay eggs in the roots of *Eicchornia crassepes.* Therefore, the aquatic macrophytes in context to fish resources are of utmost importance. The study reveals that species diversity is a helpful factor for the assessment of communities under the pressure of anthropogenic disturbances. The Community characteristics that includes Species richness, diversity, evenness act in response to environmental as well as anthropogenic and biotic trouble viz, uninhibited serious seasonal grazing, trampling, harvesting of the species having medicinal values and negligence of both the local community as well as Govt. authorities. All these factors are attributed to cause potential threats that include degradation and retrogression of the aquatic macrophytes. As a result, the diversity as well as community structure of this fragile ecosystem is greatly affected. Hence, it is necessary to control the degradation and disturbances caused and conserve the community structure and plant biodiversity of this beel. However, this is a preliminary study and suggests for detailed socio-economic and other related studies in these beel. Hence, it becomes imperative to arouse awareness among the local community residing beside the beel about the nutritional, medicinal and also benefits in terms of protein diet that could be derived for long if used sustainably.

References

1. Gogoi R. Macrophytic diversity of Deepar Beel, Assam. In Baruah, P.P. (ed.) Biodiversity of Eastern Himalayas Protected Areas. Handique Girl's College, Guwahati, 2003, 81-87pp.
2. Gogoi R. Macrophytic diversity of Deepar Beel with special reference to seasonal variation. Ph.D. Thesis (Unpublished) Gauhati University, 2006.
3. Rejmankova E. The role of macrophytes in wetland ecosystems. Journal of Ecology and Field Biology. 2011; 34(4):333-345.
4. Khan MS, Halim M. Aquatic Angiosperms of Bangladesh. Bangladesh National Herbarium, Dhaka, 2011.
5. Bamidele JF, Nyamali B. Ecological studies of the Ossiomo River with reference to the macrophytic vegetation. Research Journal Botany. 2008; 3(1):29-34.
6. Lancer L, Krake K. Aquatic Weed and their Management. International Commission on Irrigation and Drainage, 2002, 65pp.
7. Opuszynski K, Shireman JV. Herbivorous Fishes: Culture and Use for Weed Management. CRC Press, Boca Raton, Florida, 1995, 223 pp.
8. Biswas K, Calder C. Handbook of common water and marsh plants of India and Burma. Re-printed by: Bishen Singh & Mahendra Pal Singh, Dehradun, 1937.
9. Mirashi MV. Studies in the hydrophytes of Nagpur I. Apreliminary survey. J Indian Bot. Soc. 1954; 33:299-308.
10. Vyas LN. A study of hydrophytes and marsh plants of alwar and environs. J Indian Bot. Soc, 1964; 43:7-30.
11. Singh KK, Tomar RPS. The aquatic and marshland flora of Kheri District Uttar Pradesh. Journal of the Bombay Natural History Society, 1982; 79:261-274.
12. Samant S, Dhar U, Palni LMS. Medicinal Plants of Indian Himalaya: Diversity Distribution Potential Values. Nainital: Gyanodaya Prakashan, 1998.
13. Kanjilal UC, Das A, Kanjilal PC, De RN, Bor NL. 1934-1940. Flora of Assam (Vols.I – IV). Govt of Assam Press, Shillong.
14. Rao AS, Rabha LC. Contribution to the botany of Kamrup District (Southern Part) Assam. Bulletin of Botanical Survey of India. 1966; 8(3&4):296-303.
15. Baruah PP, Baruah CK. Study of the Hydrophytic flora of Kaziranga National Park, Assam, India. Ann. For. 2000; 8(2):170-178.
16. Jain SK, Rao RR. Field and Herbarium technique. Today and Tomorrow Publ., New Delhi, 1977.
17. Hooker JD. The Flora of British India. 7 Vols. London, 1872.
18. Kanjilal UN, Das A, Kanjilal PC, De RN, Bor NL. Flora of Assam. Vols. 1-5. Shillong, 1940.
19. Bor NL. The Flora of Assam 5 (Gramineae). Calcutta, 1940.
20. Cook CDK. Aquatic and Wetland plants of India: a reference book and identification manual for the vascular plants found in permanent or seasonal fresh water in the subcontinent of India South of the Himalayas. Oxford University Press, Oxford, New York, Delhi, 1996.
21. Shannon CE, Weiner W. The Mathematical Theory of Communication. University of Illinois Press, Urbana, Illionis, 1949, 1-117.
22. Simpon EH. Measurement of diversity. Nature, 1949; 163:688.
23. Menhinick EF. Ecology, 1964; 45:858-862.
24. Huang DJ, Chen HJ, Lin CD, Lin YH. Antioxidant and Antiproliferative Activities of Water Spinach (Ipomoea aquatica Forsk) Constituents. Botanical Bulletin of Academia Sinica, 2005; 46:99-106.
25. Mandal RN, Saha GS, Sarangi N. Harvest and Processing of Makhana (Euryale ferox Salisb.) - A Unique Assemblage of Traditional Knowledge. Indian Journal of Traditional Knowledge. 2010; 9(4):684-688.
26. Mohan VR, Kalidass C. Nutritional and Antinutritional Evaluation of Some Unconventional Wild Edible Plants. Tropical and Subtropical Agroecosystems, 2010. 12:495-506.
27. Shalabh B, Jain A, Chaudhary J. Trapa natans (Water chestnut): An Overview. International Research Journal of Pharmacy. 2012; 3(6):31-33.
28. Sarma U, Borah V, Saikia KK, Hazarika NK. Enhydra Fluctuans: A Review on its Pharmacological Importance as a Medicinal Plant and Prevalence and Use in Northeast India. International Journal of Pharmacy and Pharmaceutical Sciences. 2014; 6(2):48-50.
29. Bhupendra A, Mani B. Floral diversity of Baanganga Wetland, Uttarakhand, India. Check List. 2008; 4(3):279-290.
30. Ambasht RS. Macrophytes limnology in the Indian subcontinent. Ukaaz Publication, Hyderabad, 2005, pp. 58
31. Kiran BR, Patel AN, Kumar V, Putalah ET. Aquatic macro-phytes in fish culture ponds at Bhadra fish farm,

Karnataka. Journalof Aquatic Biology. 2006; 21(2):27-30.
32. Suma SR, Rajeshwari K, Shanta Kumar M. Studies on physico-chemical characteristics, fish and fishery resource potential and diversity of macrophytes of Moirang river, Manipur. Biological Forum–An International Journal. 2013; 5(1):27-32.
33. Harney NV, Dhamani AA, Andrew RJ. Biodiversity of Macrophytes of Three Water Bodies near Bhadrawati, DistrictChandrapur (M.S.), India. International Journal of Scientific Research. 2013; 2(9):437-439.