AQUATIC PHYTODIVERSITY IN KAPTAI LAKE, RANGAMATI, BANGLADESH

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Abstract

The present study was conducted to assess phytodiversity in the Kaptai Lake of Rangamati Hill Tract, focusing on their variation during the periods of December 2007 to November 2008. A total of 35 aquatic plant species was recorded belonging to 23 families during the experimental period. The highest number of species recorded under Hydrocharitaceae, followed by Poaceae, Cyperaceae, Araceae, Pontederiaceae, Menyanthaceae and Lemnaceae. Three pteridophytic plants (viz. *Azolla pinnata*, *Salvinia cucullata* and *Salvinia natans*) were also recorded and studied. Among the recorded plant species, eighteen were monocot and fourteen were dicot. The seasonal occurrence of the plants was also recorded round the year. Maximum number of plant species was found in the winter season. The value of equitability was found to fluctuate in different seasons. The highest fluctuation was observed in late monsoon.

Keywords: Phytodiversity, habitats, seasonal occurrences, Kaptai Lake.

INTRODUCTION

Kaptai Lake is a unique water reservoir for aquatic bio-diversity. The lake was created with a view to produce hydro-electricity through building a dam on the Karnaphuly river near Kaptai in 1962. Due to the creation of this lake 54,000 acres of lands went under water which is about 64.77% of total area of Rangamati Hill district (Rangamati Porichoy 2007). It also affected the land of 103 mouzas directly or indirectly. About one lac people became homeless (Chowdhury and Majumder 1981). Though the creation of the lake causes sufferings to the local people to some extent, it provides hydro electricity and huge potentials for fish resources, phyto-diversity, irrigation and navigation facilities to the local people. The lake has immense resources of phyto-diversity or aquatic plants. Aquatic plants uptake their essential nutrient from the water of the lake. Normal growth and development of aquatic plants are largely dependent on water quality, nutrient status and other abiotic conditions (Odum 1971). Water contains various macro and micro nutrients. The amounts of these elements may vary in different sites of the lake. The aquatic resource of the lake is declining in recent years (Chowdhury and Majumder 1981).

The main cause of resource depletion includes degradation of soil, deforestation, jhum cultivation or land use changes (Chowdhury and Majumder 1981). The amount of phyto-biomass productivity depends on seasons and chemical nutrients. Phytodiversity directly or indirectly depends on water quality. Water quality of the lake has been influenced by various factors, such as soil erosion, precipitation and siltation etc. The depth of the Kaptai Lake has been decreased due to siltation of soil and deposition of other organic and inorganic substances. Thus, there may be other anthropogenic impacts on the population of different plant species. But, there is no comprehensive base line information on the aquatic flora of the Kaptai Lake. Considering the fact, an attempt was made to assess the phytodiversity of the Kaptai Lake.

MATERIAL AND METHODS

The study was conducted in two sites of two upazilas of Rangamati Hill District. One is in Longadu Uapzila, nearest to Longadu cantonment and another is in Kaptai Upazila which was the front site of

Kaptai hydro-electricity project area, located in the western part of the Kaptai Lake (Fig. 1). Total area of the lake is 254 square miles. During the rainy season it extends to cover an area of 400 square miles. The location of the study area lies between 22°30′ and 22˚40′N latitude, and between 92˚04′ and 92˚22′E longitudes. The Kaptai Lake is the largest lake of the South Asia. Each selected site was divided into three sub-sites on the basis of degree of disturbances and human interferences. These were distinguished as Disturbed, Less disturbed and Undisturbed sites. Data were collected in four seasons, like early monsoon (March-May), monsoon (June-August), late monsoon (September-November) and winter (December-February). Random quadrat method was followed for sampling the phytodiversity and in this respect $2\times2m^2$ sized quadrats were applied. A total of twenty quadrats (five quadrats during each season) were used in each site. All collected plant materials were processed and herbarium sheets were prepared for identification and preservation. Finally, the specimens were identified by following relevant literatures including Khan and Halim (1986), Hooker (1877), Sharma (2004) and Huq (1986), and also cross-matching the specimens with the specimens preserved in the Bangladesh National Herbarium. All the collected and identified plant samples were preserved as herbarium specimens in Plant Ecology Laboratory, Department of Botany, Jahangirnagar University.

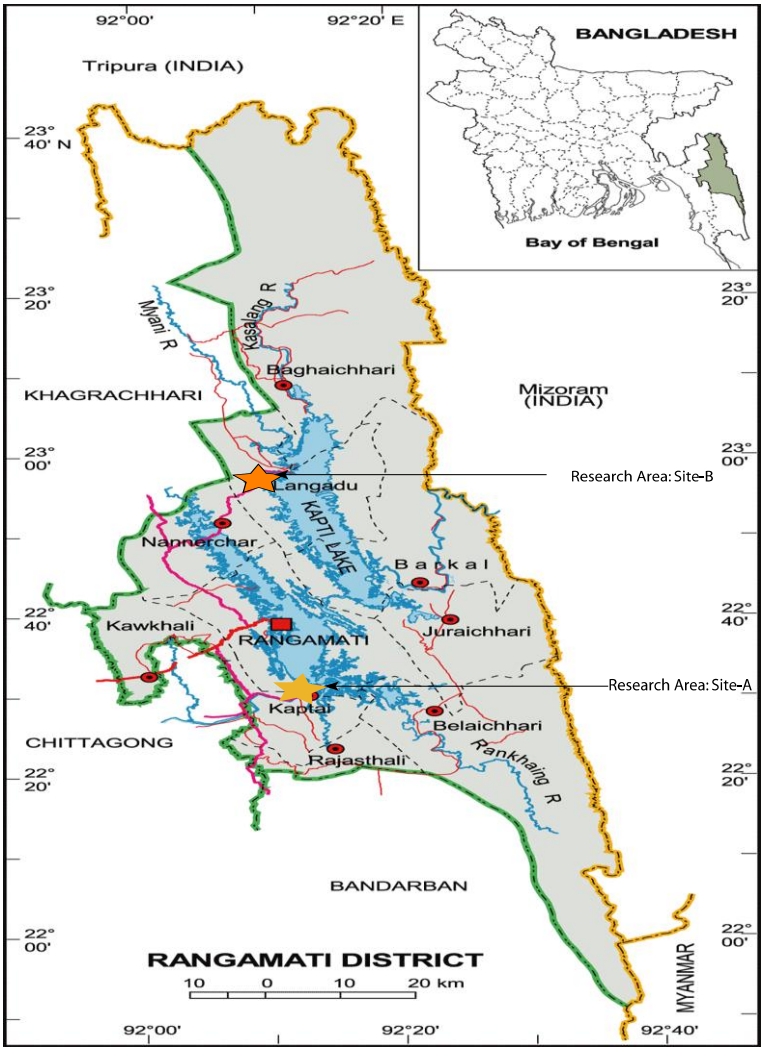

Fig. 1. Map showing the locations of the study area (source: Banglapedia 2003).

RESULTS AND DISCUSSION

A total of 35 aquatic plant species belonging to 23 families was recorded which also included three pteridophytic plants. Hydrocharitaceae and Poaceae dominated in the aquatic area containing four and three species, respectively, followed by Cyperaceae, Araceae, Pontederiaceae, Menyanthaceae, Lemnaceae (two species each) and Najadaceae, Alismaceae, Typhaceae, Trapaceae, Scrophulariaceae, Onagraceae, Nymphaeaceae, Elatinaceae, Lentibulariaceae, Ceratophyllaceae, Fabaceae, Mimosaceae, Ruppiaceae, Convolvulaceae and Polygonaceae contained one species each. Three pteridophytic plants were also recorded of which two belonged to the family Salviniaceae and the other was to the family Azollaceae. Among the total plant species, eighteen were monocots and fourteen were dicots (Table 1).

Table 1. List of aquatic plants recorded during different seasons from December 2007 to November 2008 in Kaptai Lake.

Sl. no.	Scientific name	Family	Plant types	Seasonal occurrence
1	*Alisma plantago-aquatica* L.	Alismataceae	Monocot	EM, M, LM, W
2	*Blyxa aubertii* Rich.	Hydrocharitaceae	Monocot	EM, M, LM, W
3	*Blyxa japonica* (Miq.) Maxim.	Hydrocharitaceae	Monocot	M, LM
4	*Coix aquatica* Roxb	Poaceae	Monocot	M, LM
5	*Cyperus compactus* (Retz.) Bold	Cyperaceae	Monocot	EM, M, LM
6	*Cyperus platystylis* R. Br.	Cyperaceae	Monocot	EM, M, LM
7	*Eichhornia crassipes* (Mart.) So.	Pontederiaceae	Monocot	EM, M, LM, W
8	*Hydrilla verticillata* (L.f.) Royle	Hydrocharitaceae	Monocot	EM, M, LM, W
9	*Hygroryza aristata* (Retz.) Nees.	Poaceae	Monocot	M, LM
10	*Lemna purpusilla* Torre.	Lemnaceae	Monocot	EM, M, LM, W
11	*Limnocharis flava* (L.) Buchenau	Limnocharitaceae	Monocot	EM, M, LM, W
12	*Monochoria hastata* (L.) Solms.	Pontederiaceae	Monocot	EM, M, LM, W
13	*Monochoria vaginalis* (Burm.f.) C.Presl.	Pontederiaceae	Monocot	EM, M, LM
14	*Najas graminea* Delile.	Najadaceae	Monocot	EM, M, LM, W
15	*Panicum peludosum* Roxb.	Poaceae	Monocot	EM, M, LM
16	*Pistia stratiotes* L.	Araceae	Monocot	EM, M, LM
17	*Sagittaria sagittafolia* L.	Alismataceae	Monocot	EM, M, LM
18	*Typha elephantina* Roxb.	Typhaceae	Monocot	M, LM
19	*Aschynomene aspera* L.	Fabaceae	Dicot	EM, M, LM
20	*Ceratophyllum demersum* L.	Ceratophyllaceae	Dicot	EM, M, LM, W
21	*Elatine triandra* Schkuhr.	Elatinaceae	Dicot	EM, M
22	*Enhydra flactuans* Lour.	Asteraceae	Dicot	EM, M, LM
23	*Hydrocharis dubia* (Bl.) Bac.	Hydrocharitaceae	Dicot	EM, M
24	*Ipomoea aquatica* Forssk.	Convolvulaceae	Dicot	EM, M, LM
25	*Limnophila cana* Griff.	Scrophulariaceae	Dicot	EM, M, LM
26	*Ludwigia adscendens* (L.) Ha.	Onagraceae	Dicot	M, LM
27	*Nymphaea nouchali* Burm.f.	Nymphaeaceae	Dicot	M, LM
28	*Neptunia oleracea* Lour.	Mimosaceae	Dicot	EM, M, LM
29	*Nymphoides indica* (L.) Roxb.	Menyanthaceae	Dicot	M, LM
30	*Persicaria hydropiper* L.	Polygonaceae	Dicot	EM, M
31	*Trapa bispinosa* Roxb.	Trapaceae	Dicot	EM, M, LM
32	*Utricularia stellaris* L.f.	Lentibulariaceae	Dicot	M, LM
33	*Azolla pinnata* R. Br.	Azollaceae	Pteridophyte	EM, M, LM
34	*Salvinia natans* (L.) All.	Salviniaceae	Pteridophyte	EM, M, LM, W
35	*Salvinia cucullata* Roxb.	Salviniaceae	Pteridophyte	EM, M, LM, W

EM-Early Monsoon; M-Monsoon; LM-Late Monsoon; W-Winter

In the present study plant species diversity varied with seasons. Shannon Wiener index (H) showed the highest value in the monsoon and the lowest in the winter following the trend as M>LM>EM>W (Fig. 2). Simpson's index of Diversity (D) also showed the similar trend of M>LM>EM>W.

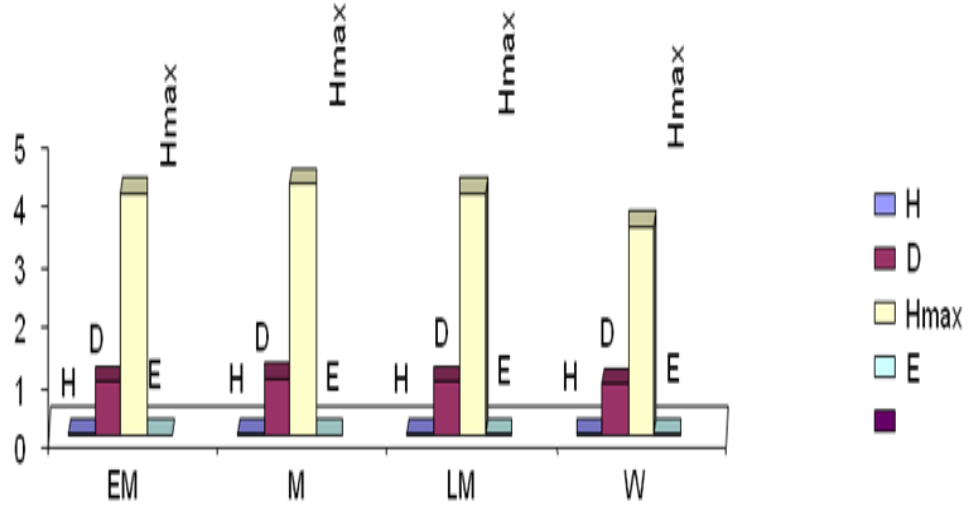

Fig. 2. Variation of species diversity in different seasons.

Shannon Weiner's function (H), Maximum species diversity (Hmax), Simpson's Index of Diversity (D), Equitability (E).

Maximum species diversity (Hmax) was observed in the monsoon and the minimum in the winter following trend as M>EM>LM>W. Equitability (E) also slightly differed and followed the sequence as LM>W>M>EM (Fig. 2). Rahman *et al.* (2014) opined that the water quality of the lake is still suitable for the survival and development of aquatic flora and fauna. But, the presence of excess amount of suspended solids in the reservoir of Kaptai Lake is at alarming condition and the urban pollution has threatened the water quality (Karmakar *et al*. 2011) which ultimately may affect this aquatic ecosystem and deteriorate the association of floral diversity. The findings of the present study are the baseline information on the present status of aquatic floral diversity which will be helpful for the future conservation and eco-friendly management of the Kaptai Lake.

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