THINK INDIA JOURNAL

ISSN:0971-1260
Vol-22-Issue-10-November-2019

The Density of Floating-Leaved Aquatic Plants During the Monsoon Season: A Case Study of Maguri Motapung Wetland of Assam, India

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Abstract

Floating leaved aquatic plants refers to those aquatic plants that have root system attached to the substrate or bottom of the water body and with leaves that float on the surface of the water. The density and distribution of floating leaved aquatic plants play a significant role on the ecology of the aquatic ecosystem. There are six floating leaved aquatic plants viz. Nelumbo Nucifera, Nymphaeaceae, Brasenia Schreberi, Euryale Ferox, Hydrocharis Dubia and Trapa Natans were observed at four different Site in the Maguri Motapung wetland. Various factors such as water temperature, water quality, nutrients enrichment, sediments composition as well as water level fluctuation, etc. influence on the density and distribution of these aquatic macrophytes. The present study has been undertaken to identify the major floating leaved aquatic plants in Maguri Motapung wetland and analyze their density inside the wetland.

Key Word: Floating Leaved, Macrophytes, Density, Wetland, Aquatic, Ecology

1. Introduction

Aquatic plants also called as macrophytes are the key component of aquatic and wetland ecosystems that affect the physical, chemical and biological characters of the wetlands and are affected by a group of factors such as lake morphometry, water chemistry as well as biological characters of lakes or wetlands (Lacoul and Freeeman, 2006). It is not only primary producers within wetlands, with their growth being affected by multiple environmental factors of the habitats, they are also important indicators of the health of the ecosystem (Zhou, 2018). The diversity and distribution of aquatic plants are closely related to the environmental factors of the system (Heegaard et al., 2001). Aquatic plants have fascinated the attention of botanists since the early twentieth century. Studies of Aber (1919) and Sculthorpe (1967) given a sound background of aquatic plants and their biology. Cook's 'Aquatic plant book' (1990) and 'Wetland plants of India' (1996) are momentous contributions to the field of macrophytes study. Different work on macrophytes has been done by Botanist in Assam also. Macrophytes or aquatic plants can be broadly classified into four major types i.e. free-floating, floating leaved, emergent and submerged. Among them floating leaved aquatic plants are those plants which have root system attached to the substrate or bottom of the water body and with leaves that float on the surface of the water. In Maguri Motapung wetland, there are six floating-leaved macrophytes were observed viz. Lotus (*Nelumbo Nucifera*), Water Lily (*Nymphaeaceae*), Water-shield *(Brasenia Schreberi),* Prickly Water Lily (*Euryale Ferox*) Backer (*Hydrocharis Dubia*) and Water Chestnut (*Trapa Natans*). All these six plant species are widely distributed in the beel and play a vital role in the ecology of the wetland.

2. Methodology and Database

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2.1.Selection of Study Site

The Maguri Motapung wetland is one of the major floodplain wetland situated in the Tinsukia district of Assam, India with a latitudinal extension between 27º33′20″N and 27º35′0″N and longitudinal extension from 95º21′40″E to 95º25′50″ E. It is one of a large wetlands of Assam covering an area of 1000 ha, located about 3.8 km away from the Guijan Ghat, the gateway of Dibru- Saikhowa National park and biosphere reserve. Thousand migratory birds come to the wetland every year making it one of the most loved destinations for the birdwatcher from throughout the world. The Dibru-Saikhowa national park is situated to the south of the wetland while the six villages namely Baghjan gaon, Purani Motapung, Rangara Te Natungaon, Gotong Gaon, Na-Motapung gaon and Dhalakhat gaon are situated on its east, west and north sides. The beel was selected for the case study because of its ecological significance as well as its economic value for society. According to Census 2011, the total population of those villages is 10,688. It has grown importance because of its diverse aquatic life, plants species as well as various migratory birds. The wetland has been the main source of food and sustenance for the people who live around it. It nourishes, sustains and protects life in myriad ways.

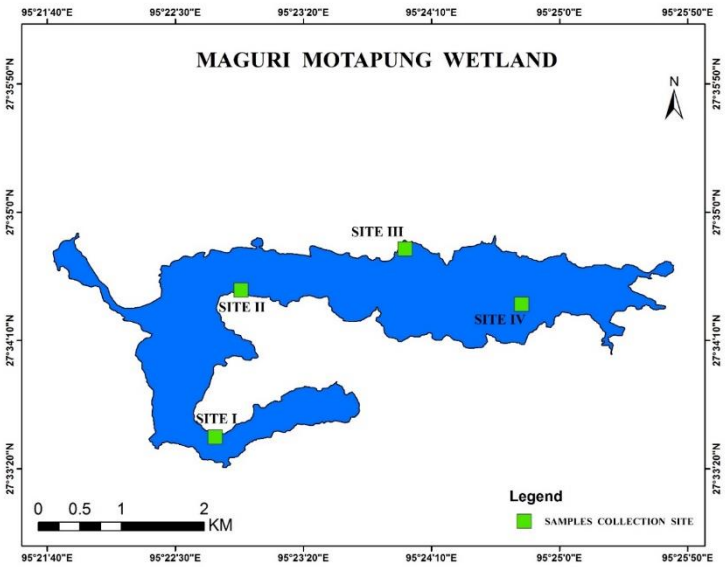

Fig 1: Map of Study Area

2.2.Data Collection and Analysis

The data has been collected from both primary and secondary sources. The primary data are collected by using different methods such as field observation, questionnaire as well as schedule method. To collecting the macrophytes data, the quadrat sampling method has been used. Plant density was measured by counting the number of individual plants of a species in uniform sizes of sample plots within a site. Density will be calculated by using the formula given by Misra, 1969.

$$\text{Density} = \frac{\text{Total number of individuals of a species in all the sampling units}}{}$$

ISSN:0971-1260
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Total number of sampling units studied

For gathering data, 20 quadrates of 1 square meter size were laid randomly within four different Site and the number of individuals of each species was recorded. The latitudinal extension of Site I is 27º33′28″N to 27º33′34″N and longitudinal extension is 95º22′43″E to 95º22′49″E, Site II is extended from 27º34′26″N to 27º34′34″N latitude and from 95º22′54″ E to 95º23′04″ E longitude. On the other hand, the Site III is extended between 27º34′41″ N and 27º34′50″ N latitude and 95º23′58″ E and 95º24′10″ E longitude. The latitudinal extension of Site IV is extended from 27º33′38″ N to 27º34′13″ N and longitudinal extension is between 95º25′39″ E and 95º26′27″ E After that, the total number of individuals of a species found in all the study plot was calculated and divided it by the total number of quadrats in order to calculate the density of plants species.

The data related to the economic aspect of the study area were collected using a survey schedule. Total of 50 houses were randomly selected near the wetlands for this purpose. The secondary data have been collected from different sources such as journals, books, reports, census data, the publication of national and international organizations, government publication and other documents available in the print media. This data help to know about the demographic composition, socio-economic status and physical as well as cultural setting.

3. Result and Discussion

Nelumbo Nucifera commonly known as Indian Lotus is an aquatic perennial plant belonging to the family of *Nelumbonaceae*. It grows up to a height of about 1.5 meters and a horizontal spread of up to 3 meters. The density of *Nelumbo Nucifera* was recorded maximum at Site III, i.e. 10 p/m^2 and it followed by Site IV (8.6 p/m^2), Site I (6.4 p/m^2) and Site III (6 p/m^2). The average density of this plant at the overall wetland was recorded as 7.8 p/m^2. *Nymphaeaceae* is an aquatic plant commonly known as water lily and they live as rhizomatous aquatic herbs in temperate and tropical climates around the world. It provides habitat for aquatic fish and aquatic invertebrate. The density of *Nymphaeaceae* was maximum at Site IV and minimum at Site II which was recorded to be 9.2 p/m^2 and 4.2 p/m^2 respectively. The density of the remaining two sites was recorded as 5 p/m^2 and 5.2 p/m^2 at Site I and Site III respectively. The overall density of the *Nymphaeaceae* at Maguri Motapung beel was 5.9 p/m^2. *Brasenia Schreberi* is commonly known as water shield perennial floating leaved aquatic herb that grows in ponds, lakes, wetlands as well as slow-moving water. As a valuable aquatic plant, it is characterized by its mucilage, which covers the submerged organs of the plant, including young stems, buds as well as leaves and becomes less abundant as leaves age. It is basically widespread in North America, South, and Central America, Africa, Eastern parts of Asia and Australia. The density of *Brasenia Schreberi* was recorded to be highest at Site III i.e. 5 p/m^2 and followed by study Site II (4.8 p/m^2), Site IV (3.4 p/m^2) and Site I (3.2 p/m^2). The overall density of the species at the wetlands was recorded as 4.1 p/m^2.

Euryale ferox is commonly known as prickly water lily is the only extant plant species in the genus Euryale. In India, it is also known as Makhana, a perennial plant native to eastern Asia and Southern Asia. It produces starchy white edible seeds and its leaves are large and round, often more than 3 feet across, with a leaf stalk attached in the center of the lower surface. *Euryale ferox*
is cultivated in lowland ponds in India, China as well as Japan because of its nutritional and medicinal properties. The density of *Euryale ferox* was recorded to be 7.2 p/m^2 at Site IV, 5.4

ISSN:0971-1260
Vol-22-Issue-10-November-2019

p/m^2 at Site I, 4.8 p/m^2 at Site II and 3.8 p/m^2 at Site III. The average density of *Euryale ferox* in the Maguri Motapung wetland is 5.3 p/m^2.

Table 1: Numbers of Individual Species in each quadrat.

Name of Species	Number of Individual Species																			
	Site I					Site II					Site III					Site IV				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
Nelumbo Nucifera	7	10	3	12	0	11	13	10	15	2	9	7	6	2	6	12	13	5	7	6
Nymphaeaceae	6	5	9	5	0	7	6	5	4	0	6	5	10	5	0	10	9	11	13	3
Brasenia Schreberi	4	7	5	2	0	5	0	7	2	10	9	7	0	4	5	5	7	3	2	0
Euryale Ferox	5	6	7	3	6	3	3	5	6	7	2	3	3	4	7	6	7	8	6	9
Trapa Natans	9	11	14	22	18	6	5	15	12	13	7	9	11	12	14	0	9	11	6	7
Hydrocharis Dubia	12	11	4	6	7	3	8	9	4	11	13	3	5	5	8	12	2	0	7	4

Sl No	Name of the Species	Density (plants/m^2)			
		Site I	Site II	Site III	Site IV
1	Nelumbo Nucifera	6.4	10.2	6	8.6
2	Nymphaeaceae	5	4.2	5.2	9.2
3	Brasenia Schreberi	3.2	4.8	5	3.4
4	Euryale Ferox	5.4	4.8	3.8	7.2
5	Trapa Natans	15.8	10.2	10.6	6.6
6	Hydrocharis Dubia	8	7	6.8	5

Table 2: Density of floating leaved macrophytes at all Site

P=Plant

Trapa Natans (Water chestnut) commonly known as singhara in India belonging to *trapaceae* family, a floating leaved aquatic plant that grow in shallow water, pond and swampy land. It is an annual aquatic plant found in the tropical, subtropical and temperate zone of the world. It is commonly grown in water with alkalinity ranging from 12 to 128 mg/l of calcium carbonate (O' Neill, 2006). The density of *Trapa Natans* is comparatively higher than the other macrophytes found in the wetland i.e. 10.8 p/m^2. It was recorded to be highest at Site I and lowest at Site IV i.e. 15.8 p/m^2 and 6.6 p/m^2 respectively. Similarly, the density of *Trapa Natans* at Site II and Site III was recorded as 10.2 p/m^2 and 10.6 p/m^2 respectively. *Hydrocharis Dubia*

ISSN:0971-1260
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(Blume) is an aquatic plant with a white flower widely found in eastern and southern Asia. It was also found in Maguri Motapung beel where the density was recorded to be 6.7 p/m^2. During the monsoon season. the density of *Hydrocharis Dubia* was recorded as 8 p/m2 at Site I, 7 p/m^2 at Site II, 6.8 p/m^2 at Site III and 5 p/m^2 at Site IV.

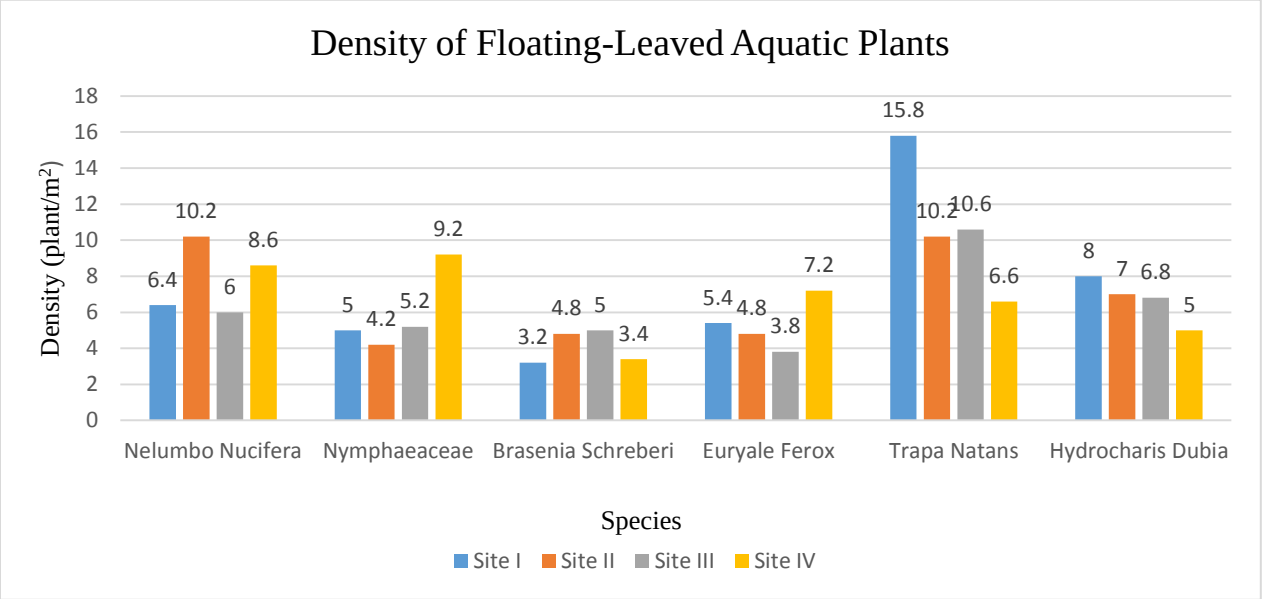

Fig 2: Density of floating-leaved aquatic plants at Maguri Motapung wetland

The present study has shown that the average density of *Trapa Natans* was recorded to be highest (10.8 p/m$^{2)}$ and *Brasenia Schreberi* was lowest, which is only 4.1 p/m^2 in Maguri Motapung wetland of Assam. The density of other four major floating-leaved macrophytes namely *Nelumbo Nucifera, Nymphaeaceae, Euryale Ferox* and *Hydrocharis Dubia* was recorded to be 7.8 p/m^2, 5.9 p/m^2, 5.3 p/m^2 and 6.7 p/m^2 respectively.

4. Conclusion

Floating leaved plants remain in place that they root on the bottom of the water body. In Maguri Motapung beel wetland, total of six numbers of floating leaved macrophytes were identified which provide shade and shelter for fish, and waterfowl often eat their seeds. They also provide various economic benefit for the local people. But the people who live in and around the wetland are still unaware of the importance of these plant species. Qualitative as well as quantitative floristic survey, constant monitoring and protection of lentic and lotic ecosystem are the need of the hour in order to save the native plants.

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ISSN:0971-1260
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