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Research Article

DIVERSITY AND DISTRIBUTION OF MACROPHYTES IN CHATLAM WETLAND- A FRESH WATER WETLAND IN KASHMIR HIMALAYAS

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ABSTRACT

A thorough investigation of macrophytes in Chatlam wetland during March to October 2008 was undertaken to evaluate the major quantitative characteristics like Frequency, Density, Abundance and Important Value Index (IVI). Consequently 21 species of macrophytes were recorded from the wetland of which 10 species were emergents, 4 species were rooted floating, 5 species were submerged and 2 species were free floating. Due to continuous siltation from adjacent saffron fields, the submerged growth is declining while making more niches available for emergent and floating leaf types.

Keywords: *Macrophytes, Important Value Index, Chatlam Wetland*

INTRODUCTION

Wetlands are amongst the most productive ecosystems on earth which play a vital role in stabilizing the microclimate of the area, recharging the ground water aquifers, cleaning the polluted waters, protecting shorelines, supporting biodiversity by being a habitat for a wide variety of flora and fauna. Inspite of the tremendous importance, wetlands are under sustained anthropogenic threats especially in the Himalayan state of Jammu and Kashmir. Moreover due to rapid economic growth coupled with industrial revolution has not only increased water demand but has also led to disturbances in hydrological balances in catchment areas. As a matter of fact, wide spread pollution practices has degraded the water quality of these important reservoirs of water.

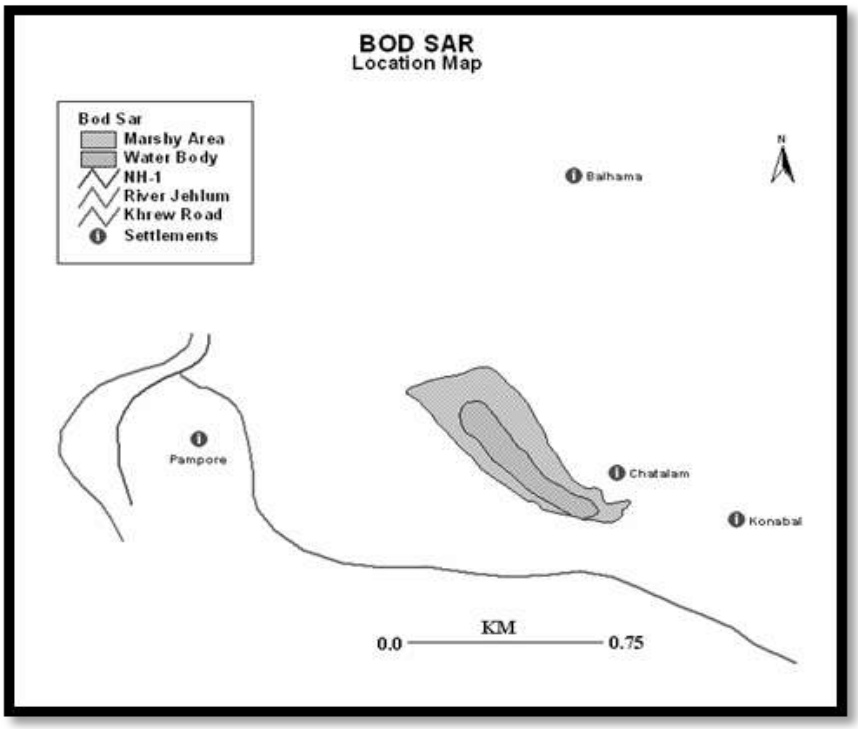
Aquatic plants and their communities are an important component of the littoral zone in various types of lakes. They form spatial characteristic patterns (Hutchinson, 1975; Spence, 1982; Klosowski, 1992) which often constitute a transitional boundary between open water and reed swamp communities. Macrophytes are involved in several feedback mechanisms that tend to keep the water clear even in relatively high nutrient loadings (Moss, 1990). Moreover macrophytes have been reported to affect the lake nutrient status, resuspension of bottom materials and water turbidity (James and Barko, 1990; Sand-Jensen and Borum, 1991; Horppilla and Nurminen, 2001). Aquatic plants and their communities may furthermore be good indicators of the changes occurring in lakes because of human induced acidification and eutrophication (Roelofs, 1983; Lehman and Lachavanne, 1999).

Macrophytes constitute an important component of wetland ecosystems which sustains a number of food chains in the water body. The macrophytes determine the overall ecosystems physiognomy indicating the degree of pollution and hence they are responsible for biogeochemical cycling of nutrients (Wetzel, 1975). Macrophytes contribute major portion of primary production in shallow lakes and wetlands and therefore perform a vital role in determining the structure and functioning of these ecosystems (Kumar, 2007). Expanding urbanization and unchecked population are responsible for the degradation of these water bodies by causing a negative effect on the limnological profile which in turn affects the dominant components of water body- macrophytes. Though the wetlands of Kashmir were evaluated for limnology and anthropogenic effect (Khan, 2001; Khan and Shah, 2004; Rather and Pandit, 2007; Zuber, 2007; Parray *et al.*, 2008) yet very little information is available till date on the quantitative analysis of

macrophytes. Present study was therefore undertaken to determine the community structure of macrophytes inhabiting Chatlam wetland.

MATERIALS AND METHODS

Chatlam wetland locally called as BODSAR with total basin area of 2.1Km^2 lies between 34^{0}1$^/$ latitude and 75^{0}58$^/$ longitude in the south of the Srinagar City at a distance of 16 Km. Out of total 2.1Km^2 basin area that is bounded by a vast catchment area extending from Pampore and Bagi-inayatullah in the west and Konibal to Wuyan in the east, it has 0.7Km^2 surface area and 1.4 Km^2 marshy area. The wetland is a permanent but relatively shallow water body with fluvial origin and enjoys a sub-mediterranean climate. The catchment of the wetland houses 12 villages having a total population of 33,000 which use this wetland for fishing, hunting, irrigation and domestic purposes. Besides about 11,805 cattle head count dwells in the catchment area which poses grazing pressure on the wetland. The incessant increase in the agricultural activities in the catchment area is marked by various land use practices dominated by saffron and rice cultivation. Since the impact of human intervention on the part of the wetland is growing, so present limnological investigation of the wetland was carried out.



The vegetation survey was carried out for a period of 8 months (March to October, 2008) and subsequently submerged, emergent and floating leaf type macrophytes were collected from the wetland and transferred in a bucket to its bank where species wise sorting was done. Quadrant method was used to study the community structure of macrophytes. The macrophytes falling in each quadrant were sorted species wise to work out the frequency, density, abundance and important value index (Mishra, 1968).

RESULTS AND DISCUSSIONS

The present investigation revealed the presence of 21 species of macrophytes. The range of frequency, density, abundance and important value index are furnished in the Table 1.

Table 1: Macrophytic community features of Chatlam wetland

Name of the Species	Frequency	Density	Abundance	IVI
	Emergents			
Ranunculus aquatilis	13	1.3	2.8	3.8
Polygonum amphibium	19	1.5	4.4	5.6
Myosoton spp.	18	1.4	5.3	4.9
Carex phacota	11	1.2	3.9	4.3
Menyanthes trifoliata	16	1.5	6.2	6.0
Juncus articulata	14	1.4	3.72	3.8
Typha angustifolia	54	3.2	50.2	33.5
Sparginium erectum	30	2.2	29.6	19.8
Phragmites communis	58	3.4	38.7	24.5
Mentha piperata	21	0.8	1.4	3.5
	Submerged			
Ceratophyllum demersum	45	5.6	10.8	18.8
Potamogeton lucris	22	2.6	6.9	10.5
Potamogeton crispus	55	1.9	3.6	13.1
Utricularia aurea	36	1.2	1.9	9.3
Myriophyllum verticillatum	85	7.5	15.4	29.6
	Floating Leaf Types			
Nymphaea alba	30	4.2	11.6	13.5
Nymphaea stellata	35	2.4	16.7	15.4
Nymphoides peltata	54	12.6	34.6	42.2
Trapa natans	36	1.8	4.1	10.2
	Free Floating Types			
Lemna spp.	17.6	1.7	10.2	24.5
Salvinia natans	20.2	1.4	6.8	19.5

Of the total 21 species of macrophytes recorded during the present study, 10 were emergents, 4 were rooted floating, 5 were submerged and 2 were free floating (Fig. 1). But Zuber (2007) recorded 56 species of macrophytes belonging to 20 different families of angiosperms (Dicots-13 families, 21 species; Monocots-7 families, 31 species), one family each of pteridophytes and macroalgae were recovered from the Lake Mansar. Moreover Pirini *et al.*, (2010) recorded 49 hydrophytic taxa belonging to 28 families and 35 genera in Lake Vegoritida.

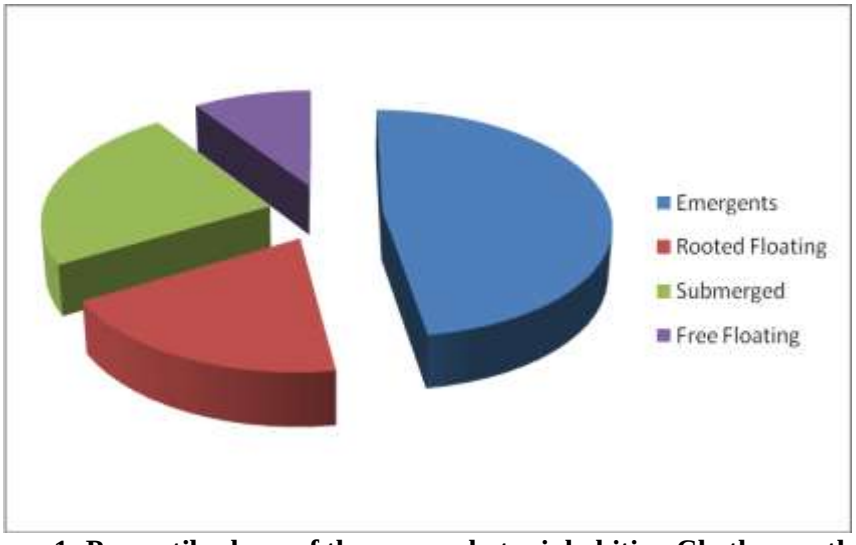


Figure 1: Percentile share of the macrophytes inhabiting Chatlam wetland

Perusal of Table 1 and Figure 2 reveals that *Phragmites communis*, *Typha angustifolia* and *Sparganium erectum* dominated the emergent type of macrophytes in terms of frequency of occurrence, density and abundance. Likewise, *Myriophyllum verticillatum*, *Potamogeton crispis* and *Ceratophyllum demersum* recorded highest mean frequency values of 85, 55 and 45 respectively among submerged macrophytes. While among floating leaf types, *Nymphoides peltata*, *Trapa natans* and *Nymphaea stellata* dominated the community structure, *Salvinia natans* dominated among floating leaf types.

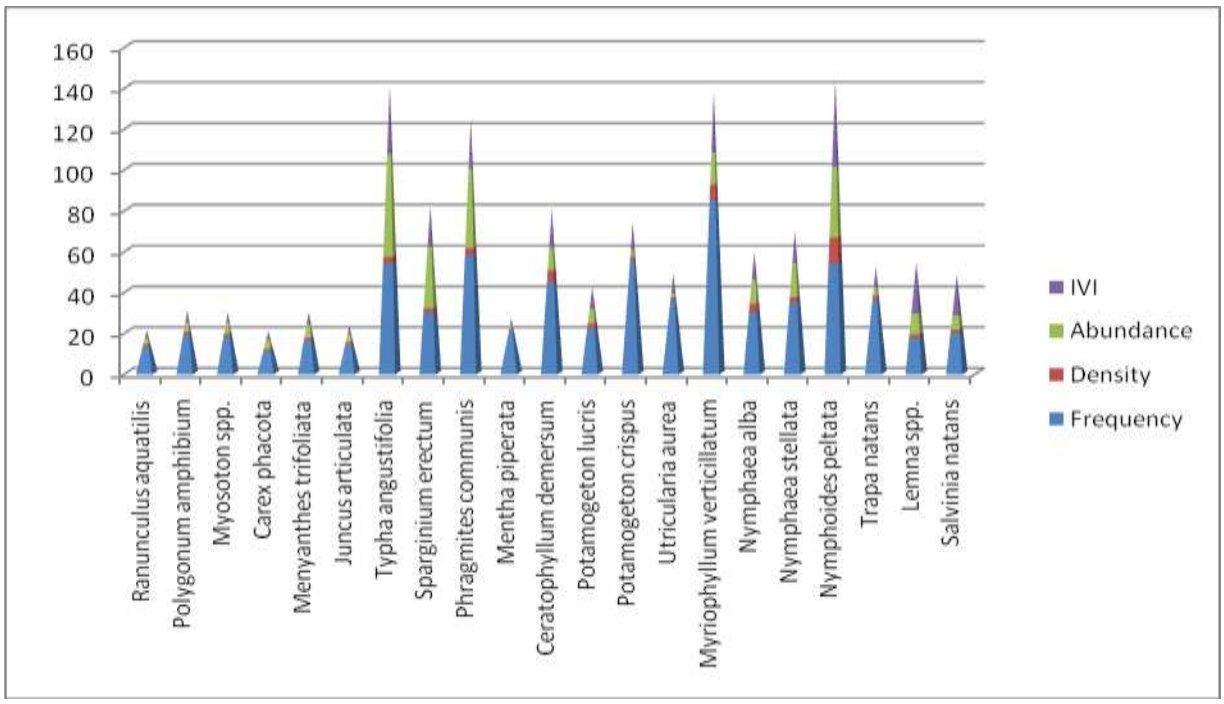


Figure 2: Frequency, Abundance, Density and IVI of the Macrophytes inhabiting Chatlam Wetland

The occurrence and distribution of macrophytes is governed by a number of environmental factors prominent among them being water depth and transparency, turbidity, atmospheric temperature etc whose periodic fluctuations have been postulated to be the most important regulating factors governing the distribution of both submerged and emergent communities (Zutshi and Gopal, 1990).

The comparatively low abundance of submerged vegetation in the lake corresponds to the increased coverage of emergents and submerged macrophytes besides being the manifestation of eutrophication (Sand-Jensen *et al.*, 2000).

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