Species Composition and Distribution of Rooted Floating-leaf Type Vegetation in Hokarsar Wetland of Kashmir Himalaya

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ABSTRACT

The present communication deals with the various quantitative and qualitative characteristics of the rooted floating-leaf type macrophytic community of Hokarsar wetland in Kashmir Himalaya. In general, a total of 7 species belonging to six families were recorded from the wetland with the maximum contribution to Importance Value Index (IVI) being made by *Nymphoides peltatum* (200.27), followed by *Trapa natans* (34.85) as against the minimum by *Marsilea quadrifolia* (7.17). There is an adaptive connection between the water level fluctuations and species establishment in the wetland.

Key words: Hokarsar, wetland, species richness, IVI, macrophytes

INTRODUCTION

Wetlands, the transitional systems between purely terrestrial and aquatic ones, are the most sensitive ecotones claiming a large area in Kashmir. These specialized ecosystems have remained the focus of scientific study during the last three decades and data on physico-chemical characteristics of water and sediments, flora, fauna, food chain structure etc. have been collected (Pandit, 1999). Hokarsar wetland, enjoying a special status as a waterfowl habitat, has received the attention of many workers in the past (Kaul and Zutshi, 1967; Handoo, 1978; Kaul *et al.*, 1978; Kak, 1978, 90; Kaul and Handoo, 1980; Handoo and Kaul, 1982; Kaul and Pandit, 1980; Kaul, 1982; Pandit, 1980, 84, 91, 96, 99, 2001, 2002; Pandit and Qadri, 1990; Rather and Pandit, 2000; Rather *et al.*, 2001; Bashir *et al.*, 2003. Ravinder *et al*, 2004; Ravinder and Pandit, 2005). The wetlands, being one among the most productive ecosystems, are highly infested with macrophytes which grow intermixed, thus giving rise to a complex physiognomy. All the four life-form classes viz. emergents, rooted floating-leaf type, free floating type and submergeds (classification after Arber, 1920 and Sculthorpe, 1967), usually determine the stages of succession in aquatic ecosystems. Minor fluctuations in water level have a marked influence on the growth and distribution of macrophytes especially rooted floating-leaf type vegetation (Gopal, 1994). Besides, this class of macrophytes, having an additional advantage of attached roots with the sediments, takes up

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the nutrients efficiently and at the same time have got well-developed broad leaves exposed directly to solar radiation for making bulk of photosynthesis. In view of the importance of rooted floating-leaf type vegetation in determining the hydrology of a system and their efficiency to act as nutrient pumps, the present investigation is focused on the composition and distribution of this particular class of macrophytes in Hokarsar wetland.

MATERIAL AND METHODS

Simple quadrat method (after Misra, 1968) was followed to determine the species composition, density, frequency, abundance and Importance Value Index (IVI) Quadrats of definite size (1m x 1m) were laid randomly, covering almost whole of the wetland. The species were brought in poly-bags, sorted out and identified upto species level. Species richness was worked out following Mehenick (1964) and Margalef (1969) indices.

STUDY AREA

Hokarsar is a perennial and protected wetland spread over an area of about 7.5 km^2. It is located at an altitude of 1584m (a.m.s.l), about 10 km in the south of Srinagar on Srinagar-Baramulla National Highway. Doodganga (from east) and Sukhnag Nallah (from west) are its two main feeding channels. A single outlet near Seizeath is provided with a weir and lock system in the Needle Gate, which regulates its water level especially during winter. There are about twelve (12) villages in its catchment being mainly comprised of agricultural land.

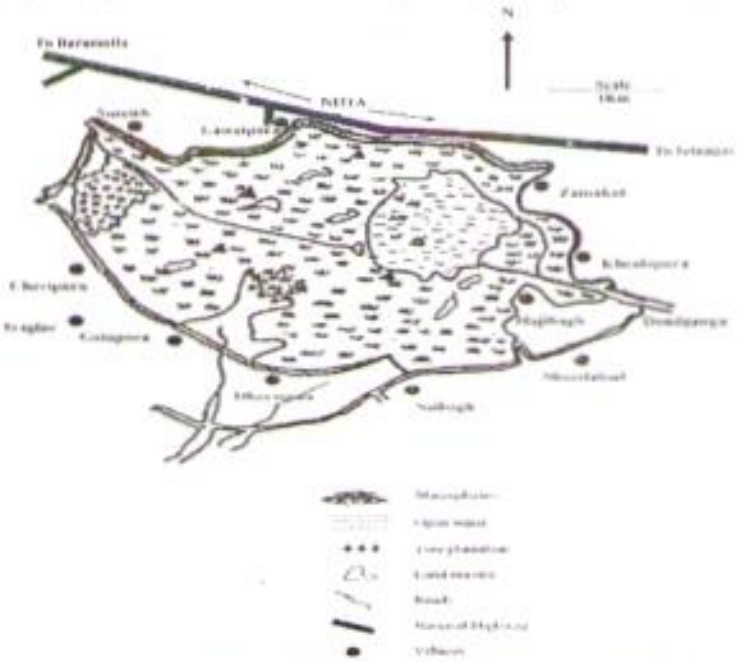

Fig. 1. Location map of Hokarsar wetland

RESULTS AND DISCUSSION

During the entire period of study lasting from January to December 2002, a total of seven species representing 6 families of rooted floating-leaf type class were recorded from the wetland (Table 1). Each family was represented by a single species excepting *Nymphaea* which was represented by two species. The number of species remained constant throughout the study period (07) except for April and May wherein *Marsilea quadrifolia* and *Hydrocharis dubia* were not recorded. There is no monospecific meadow formation in the wetland but all the species belonging to various life-form classes grow intermixed, rather in a positive co-relation, giving rise to the complex physiognomy of macrophytes in the wetland. However, the open water areas are mostly dominated by the floating-leaf type vegetation.

Table 1. Species composition of rooted floating-leaf type vegetation

S.No.	Family	Name of the species
1.	Hydrocharitaceae	*Hydrocharis dubia* (Blume) Bacquer
2.	Marsiliaceae	*Marsilea quadrifolia* Lin.
3.	Menyanthaceae	*Nymphoides peltatum* (Gmel) Kuntze
4.	Nymphaeceae	*Nymphaea alba* Lin and N. pygmea
5.	Potamogetonaceae	*Potamogeton natans* Lin.
6.	Trapaceae	*Trapa natans* Lin

Macrophytic community features with regard to their frequency and density depicted almost a similar trend with *Nymphoides peltatum* registering a maximum value of 90.38 and 36.80 respectively, followed by *Trapa natans* with the respective values of 48.58 and 1.97. *Nympheae alba* was the third frequent species (23.80). *Nymphoides peltatum* was recorded to be the most abundant species (40.35), followed by *Hydrocharis dubia* (4.28) and *Trapa natans* (4.08) during the study period (Table 2).

A perusal of data on community features when corroborated with IVI figures shows that the floating leaf-type vegetation was dominated by *Nymphoides peltatum* covering almost whole of the open water areas (Table 2). Thus, *Nymphoides peltatum* registered the highest IVI (200.27), followed by *Trapa natans* (34.85), *Nymphaea alba* (19.48), *Hydrocharis dubia* (19.36), *Potamogeton natans* (11.41), *Nymphaea pygmea* (7.37) and decreasing to the lowest for *Marsilea quadrifolia* (7.17). It is clearly revealed that *Nymphoides peltatum* contributes about 68% towards the IVI among the rooted floating-leaf type vegetation.

Table 2. Macrophytic community features (mean) of rooted floating-leaf type vegetation

Name of the taxa	Frequency	RF	Density	RD	Abundance	RA	IVI
Hydrocharis dubia	20.073	9.614	1.054	2.551	4.281	7.203	19.36
Marsilea quadrifolia	4.911	2.352	0.179	0.433	2.607	4.386	7.17
Nymphaea alba	23.834	11.416	0.886	2.144	3.520	5.923	19.48
Nymphaea pygmea	4.679	2.241	0.136	0.329	2.854	4.802	7.37
Nymphoides peltatum	90.386	43.293	36.800	89.073	40.353	67.904	200.27
Potamogeton natans	16.309	7.811	0.286	0.692	1.730	2.911	11.41
Trapa natans	48.581	23.269	1.973	4.775	4.081	6.807	34.85

RF = Relative frequency RD = Relative density RA = Relative Abundance

Species richness, irrespective of the index used, calculated over a period of seven months revealed the maximum values for June and the minimum for April (Fig.2). The lower values of species richness during spring can be attributed to the presence of lesser number of species and low abundance of individuals of various species in the wetland. Changes in species richness during summer and autumn, when the number of species remained constant, were due to the variations in abundance of individuals of all the recorded species (Fig. 2.)

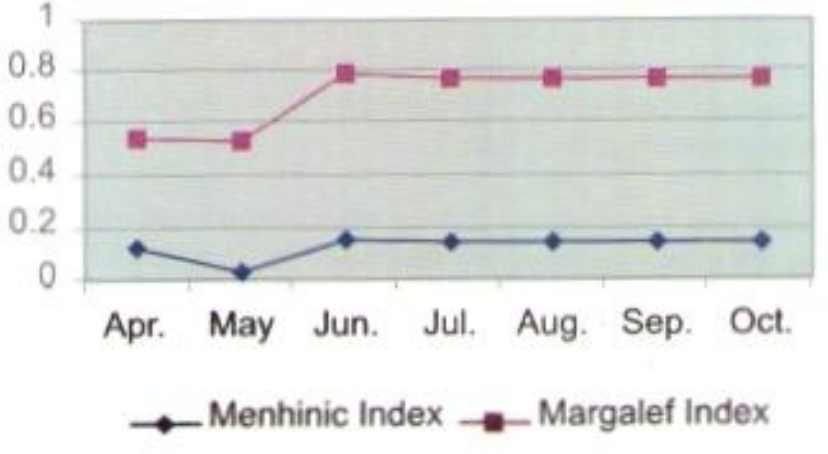

Fig. 2. Species richness of floating leaf species in Hokarsar wetland

According to the earlier studies conducted by Kaul and Zutshi (1967), Handoo (1978) and Pandit (1980) the wetland was dominated by rooted floating-leaf type vegetation probably because of the greater water depth. However, the present studies revealed this life-form class to be sub-dominant to the emergents which gained firm foot-hold as a result of gradual shallowing of the wetland being further attributed to the influx of heavy silt load. Such a relation between water depth and growth of rooted floating-leaf type vegetation has also been reported by Spence (1967) who suggested an adaptive connection between deep waters and broad-leaved vegetation. Further an adaptive connection of floating leaved vegetation with the hydrology of the system makes the floating leaf type class more important to assess the fluctuations in water depth and indicates the temporal changes in various community features of macrophytes in the wetland.

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