

Ecological Study of Khushalsar Lake, Kashmir : III. Nekton

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Of the various biota inhabiting lake waters, nekton is completely animal and made up of relatively large consumers, some of which occupy top trophic levels in an aquatic ecosystem (Cole, 1989). The nekton community comprises of invertebrates and vertebrates (fishes). While the fish fauna of many freshwater bodies of Kashmir have been worked out (Raina, 1987; Yousuf and Pandit, 1989; Yousuf, 1996; Yousuf and Firdous, 1997; Kullandar et al, 1999; Enderlein and Yousuf, 1999; Yousuf and Firdous, 2001), the nektonic invertebrate community has largely remained unexplored.

During a detailed study of Khushalsar Lake (a shallow water body situated at an altitude of 1584m ASL) by the Post Graduate students of Department of Environmental Science, various limnological parameters were worked out. The present communication deals with the invertebrate nekton of the lake, which acts as a link between Dal Lake and Anchar Lake. The lake supports large uninterrupted stands of macrophytes dominated by *Nelumbo* sp, *Salvinia* sp, *Lemna* sp, *Trapa natans*, *Myriophyllum* sp and *Potamogeton* sp.

Samples were collected from April 2003 to September 2003 on monthly basis employing quadrat method and identified with the help of standard works (Edmondson, 1959; Pennak, 1978 and APHA, 1998).

A total of five genera belonging to three orders of Class Insecta and one genus from Acari (watermites) were recorded during the study. Data on the population density of different genera are given in Table I. The percentage contribution of each group to the total population in the lake is given in Table 2.

The total population density of nektonic invertebrates fluctuated from a minimum of 60 ind/m² in September to a maximum of 6183 ind/m² in May. For all invertebrate groups, summer was recognized as the period of peak population density due to profuse growth of macrophytes, especially *Myriophyllum* sp and *Potamogeton* sp, which offer provisions of suitable breeding and sheltering sites (Omke, 1987)

Higher population densities of Hemipteran bugs were recorded in areas with dense strands of macrophytes like *Myriophyllum* sp, *Potamogeton* sp, *Phragmites* sp. Again, high densities of this group were recorded at places where the depth was less than 1m. No or very few individuals were recorded near the inlet and outlet of the lake, where the water was deeper. Such high specificity of

Table 1. Population density (Ind/m²) of invertebrate nekton in Khushalsar Lake

S.No.	Species	Apr	May	Jun	Jul	Aug	Sep	Mean
HEMIPTERA								
1.	<i>Sigara</i> sp	-	26	23	200	35	7	48.50
2.	<i>Neoplea</i> sp	50	20	10	56	7	-	23.83
	TOTAL	50	46	33	256	42	7	72.33
COLEOPTERA								
1.	<i>Dytiscidae</i> spp	13	3	3	13	16	3	5.17
2.	<i>Dytiscidae</i> larvae	-	13	7	7	-	-	4.50
	TOTAL	13	16	10	20	16	3	9.67
DIPTERA								
1.	<i>Chironomus</i> sp	141	6013	390	130	39	33	1124.33
ACARI								
1.	<i>Acari</i> sp	16	8	14	27	107	7	29.50
	TOTAL	220	6083	447	433	204	60	1317.83

Table 2. Contribution (%) of different groups to the total nekton population in Khushalsar Lake

S.No.	Group	Apr	May	Jun	Jul	Aug	Sep
1.	Hemiptera	50	46	33	256	42	7
	%	22.73	0.74	7.38	59.12	20.59	11.67
2.	Coleoptera	13	16	10	20	16	3
	%	5.91	0.26	2.24	4.62	7.84	5.00
3.	Diptera	141	6013	390	130	39	33
	%	54.09	97.25	87.25	30.02	19.11	55.00
4.	Acari	16	8	14	27	107	7
	%	7.27	0.13	3.13	6.23	52.45	11.67
	TOTAL	220	6183	447	433	204	60

these organisms for depth and the type of vegetation has also been reported by Mecan (1965) and Ward (1992). The distribution of aquatic beetles was largely influenced by presence of *Lemna* sp and *Salvinia* sp mats. Lower density was recorded under the mats as the thicker mats hinder the access of nektonic organisms to the air-water interface that they need to break frequently to renew their air stores (Pennak, 1978).

Consistent population densities of *Chironomus* sp (Order Diptera) were recorded throughout the study period, with the highest density of 6013 ind/m² in May which corresponds to emergence

period for this genus (Carrilo, 1974). This is further confirmed by the fact that the major contributors at this time were pupae and adults. An overall high population density of *Chironomus* sp recorded during the entire study period seems to be related to high organic nutrient concentration which is congenial for its growth (Bay et al, 1966; Hilsenhoff, 1966; Kaushik et al 1991; Pandit, 1992). Water mites also showed consistent population densities throughout the lake except near the inlet where the depth was slightly more than the other areas (David et al, 1994).

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* Non seen in original