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Ecological Study of Khushalsar Lake, Kashmir : I. Macrozoobenthos

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The present article on macrozoobenthic community is based on a part of data collected by the postgraduate students of Department of Environmental Science on the ecological status of the Khushalsar Lake, Kashmir during 2003. The lake is situated within the geographical coordinates of 34° 06' – 34° 08' N latitude and 74° 47' – 74° 49' E longitude at an altitude of 1584 m (a.m.s.l). Regular monthly sampling of zoobenthos was done using Ekman's dredge (15.5 x 15.5 cm^2) during April – September 2003 from four sites (Fig. 1). Site I represented the open water expanse of the lake, close to the feeding channel of the lake at its northern end. Site II was located in the northern area of the lake, which remains covered with a thick growth of macrophytes. Site III was located in the central zone, while Site IV was located close to the outlet in the west. The qualitative analysis was made with the help of Pennak (1978). The density was calculated as individuals/m^2.

The benthic organisms collected during the present investigation belonged to three major groups: Mollusca, Annelida and Arthropoda. Within these major groups animals representing 10 taxa were recorded. The macrozoobenthic communities of the four study sites belonged to more or less similar taxonomic groups, although the number of individuals within each group varied considerably. The presence or absence of few scattered organisms, accounted for the differences in the total number of benthic organisms. The data on density of macrozoobenthos is provided in Table 1. An overall view of the lake macrozoobenthos on the basis of relative density reveals the greatest contribution of arthropods (67.56%), followed by annelids (19.75%) and molluscs (12.75%) in a decreasing order (Fig.2).

The present observation of population density of the macrobenthic fauna showed values above 2000 ind./m^2 at most of the sites, although a minimum of 499 ind./m^2 were recorded at site III in June. Thienemann (1925) has regarded a lake bed producing 2000 ind./m^2 as highly productive and as such Khushalsar can be considered as highly productive. Hayes (1957) has mentioned that the shallowness of the waterbody is responsible for high productivity as it creates optimal conditions for productivity; Khushalsar being a shallow waterbody (maximum depth- 3m) can thus be included in this category. The density of molluscs was observed to be greater at site II which had a denser growth of macrophytes as compared to other sites. This is in confirmation with the observations of other investigators who have opined molluscs as one of the most dominant groups in macrophyte dwelling invertebrate macrofauna (Soszka, 1975; Dvorak and Best, 1982). The importance of aquatic macrophytes in providing substrate and shelter for aquatic invertebrates has also long been recognized (Krecker, 1939; Pandit *et al.*, 1985). During the present investigation the most common

Fig. 1. Map of Khushalsar lake showing the study sites

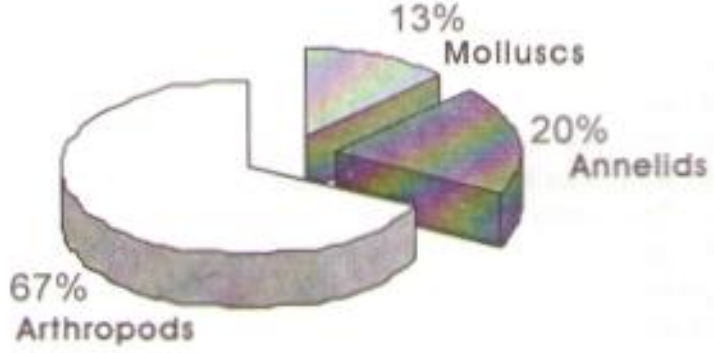

Fig. 2. Percentage composition of various macrozoobenthic groups.

Table 1. Population density (ind./m²) of macrozoobenthos in Khushalsar lake

Taxonomic Groups	Sites	Apr	May	Jun	Jul	Aug	Sep
Mollusca	S-I	83.24	457.84	166.49	208.11	124.86	41.62
	S-II	749.21	-	416.22	1082.16	457.84	374.60
	S-III	-	41.62	208.11	124.86	541.09	957.32
	S-IV	-	416.23	-	83.24	83.24	-
Lymnaea sp.							
	S-I	83.24	124.86	166.49	83.24	41.62	41.62
	S-II	291.36	-	291.36	416.23	374.60	332.98
	S-III	-	41.62	83.24	83.24	249.73	332.98
	S-IV	-	-	-	41.62	41.62	-
Planorbis sp.							
	S-I	-	332.98	-	124.86	83.24	-
	S-II	451.85	-	124.86	665.96	83.24	41.62
	S-III	-	-	124.86	41.62	291.36	624.34
	S-IV	-	416.23	-	41.62	41.62	-
Annelida							
	S-I	1331.93	124.86	832.45	41.62	-	-
	S-II	83.24	83.24	332.97	1082.19	541.09	116.49
	S-III	41.62	41.62	41.62	41.62	41.62	-
	S-IV	541.09	3413.08	4120.67	1666.49	416.22	665.96
Tubifex tubifex							
	S-I	166.49	83.24	624.34	-	-	-
	S-II	41.62	-	249.73	832.46	541.09	116.49
	S-III	-	-	-	41.62	41.62	-
	S-IV	541.09	3413.08	41.62	1666.49	374.60	624.34
Unidentified Oligochaete							
	S-I	1165.44	-	166.49	-	-	-
	S-II	-	-	41.62	-	-	-
	S-III	41.62	-	-	-	-	-
	S-IV	-	-	-	-	-	-
Hirudinea							
	S-I	-	41.62	41.62	41.62	-	-
	S-II	41.62	83.24	41.62	249.73	-	-
	S-III	-	41.62	41.62	-	-	-
	S-IV	-	-	4079.05	-	41.62	41.62
Arthropoda							
	S-I	2538.93	5036.28	2871.93	2830.24	2497.38	2622.23
	S-II	1248.61	1082.12	124.12	291.35	208.11	291.35
	S-III	11612.78	7200.69	249.73	2663.83	1581.66	1373.54
	S-IV	582.71	832.36	547.84	1664.91	1082.18	8241.34
Chironomus sp.							
	S- I	665.96	1456.80	41.62	41.62	-	-
	S-II	374.60	41.62	-	-	-	-
	S-III	-	-	-	41.62	83.24	116.49
	S-IV	457.85	416.23	-	41.62	41.62	6451.56

(Contd.)

***Ephydra* sp.**							
	S-I	832.4	707.5	1706.5	499.47	541.09	665.96
	S-II	124.8	124.8	41.62	41.62	41.62	-
	S-III	1123.8	332.9	41.6	291.36	208.11	124.86
	S-IV	-	166.4	83.24	83.24	83.24	83.24
***Scatella* sp.**							
	S-I	1040.57	2830.36	957.32	2164.39	1914.65	1873.03
	S-II	149.21	915.70	41.62	208.11	83.24	83.24
	S-III	10364.12	6867.79	208.11	2289.26	1290.31	1082.19
	S-IV	124.86	249.73	41.62	1540.05	915.70	957.32
Rhagionidae							
	S-I	-	41.62	124.86	124.86	41.62	83.24
	S-II	-	-	-	-	-	-
	S-III	124.86	-	-	-	-	-
	S-IV	-	-	-	-	-	-
Acari							
	S-I	-	-	41.62	-	-	-
	S-II	-	-	41.62	41.62	83.24	208.11
	S-III	-	-	-	41.62	-	-
	S-IV	-	-	332.98	-	41.62	-
Total number of macrozoobenthos	**S-I**	3954.1	5618.98	3870.86	3080.07	2622.24	2663.85
	S-II	2081.06	1165.36	874.05	2455.7	1207.04	782.44
	S-III	11654.4	7283.93	499.46	2830.34	2164.37	2330.86
	S-IV	1123.8	4287.06	4578.51	1914.64	1518.64	8907.3

organisms were *Chironomus* sp., *Tubifex tubifex* and *Ephydra* spp., which were encountered at all the sites. The occurrence of these animals has been attributed to their tolerance to pollution, which reduces competition and saves them from predation as the predatory animals and fish feeding on zoobenthos generally avoid polluted biotopes (Pandit, 1980). The greater abundance of these organisms at most of the sites suggests the highly eutrophic condition of the lake.

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