

Fluctuation in the Population Density of Macro-invertebrates of River Ganga at Pashulok Barrage, Rishikesh. (Uttranchal, India)

D.R.Khanna, Tarun Chugh, Praveen Sarkar

Department of Zoology and Environmental Sciences, Gurukul Kangri University Hardwar, 249404 (U.A.) India

Abstract

The present paper describes fluctuation in the population density of Macro-Invertebrates of river Ganga at Pashulok Barrage, Rishikesh. This investigation was carried out between September 1998 and Feb 1999. Total Eight groups of Macro-invertebrates were observed. Out of which, Diptera (33.52%), Ephimeroptera (30.62%), Gastropoda (13.65%) and Trichoptera (10.59%) dominated over the other groups. The population of Macro-Invertebrates found maximum in the month of February, whereas the minimum values were recorded in September.

Key Words: Macro-Invertebrates, River Ganga

Introduction

The population density of any ecosystem, not remains static, while changes with time. The Macro-invertebrates are one of the important parts of the aquatic ecosystem. These Macro-invertebrates provides food to the aquatic ecosystem. These Macro-invertebrates provide food to the aquatic fauna and also acts as an indicator of natural water quality. The Macro-invertebrates change their population density with the change in physico-chemical characteristics of water. Therefore, macro-invertebrates are the important constituents of aquatic food web. The study on the macro-invertebrates of the Ganga River at Rishikesh has not received proper attention. However, some workers studied the macro-invertebrates of Ganga River and its tributaries at different places (Khanna 1993 and Joshi *et al.* 1996). The present paper describes fluctuation in the population density of macro-invertebrates in the river Ganga at Pashulok barrage, Rishikesh.

Materials and Methods

The study was conducted between September 1998 and February 1999 on the river Ganga at Rishikesh (U. A.). The sampling station was selected at the right bank of the Ganga River which is 500 meter down stream Pashulok Barrage.

The macro-invertebrates were collected each month between 7 am to 11 am. All the macro-invertebrates were collected using 1m² quadrat having a fine net. Analysis was done following the standard methods of APHA 1976 and Needham and Needham 1972.

Results

The data is showing monthly fluctuation of different macro-invertebrate groups in their population density is tabulated in Table 1. Total eight groups of macro-invertebrates were counted. The macro-invertebrates population mainly constituted of the Diptera, Ephimeroptera, Gastropoda and Trichoptera, whereas Plecoptera, Odonata, Hemiptera and Coleoptera were found less in density. The population of macro-invertebrates was dominated by the Diptera (total average 67.50 units/m² \pm 56.49) and Ephimeroptera (67.67 units/m² \pm 37.36) followed by Gastropoda, (27.5 units/m² \pm 21.44), Trichoptera (21.33 units/m² \pm 18.57), Plecoptera (7.11 units/m² \pm 5.35). Coleoptera (5.33 units/m² \pm 4.50). Hemiptera (3.60 units/m² \pm 1.67) and Odonata (3.40 units/m² \pm 2.51). The macro-invertebrates showed their highest average value in the month of February (45.38 units/m² \pm 51.76), and lowest average value in September (3.17 units/m² \pm 4.92). The total percentage of different macro-invertebrate groups was recorded as Ephimeroptera 30.62 %, Trichoptera 10.59 %, Diptera 33.52 %, Gasopoda 13.65 %, Hemiptera 1.769 %, Odonata 1.68 %, Plecoptera 5.46 % and Coleoptera 2.65 %) Table 1.

Table 1. Macro-invertebrate population in the river Ganga between September 1998 and February 1999 at Pashulok barrage, Rishikesh

Months	Parameters								Average
	Ephemeroptera	Plecoptera	Odonata	Trichoptera	Hemiptera	Coleoptera	Diptera	Gastropoda	
September, 1998	12	-	1	1	-	1	1	3	3.17 ± 4.92
October, 1998	26	-	2	4	2	1	14	11	8.57 ± 9.97
November, 1998	55	5	2	12	4	2	55	19	19.25 ± 24.63
December, 1998	90	8	-	30	4	9	70	40	35.86 ± 36.44
January, 1999	80	16	7	48	2	11	138	30	41.50 ± 50.25
February, 1999	107	15	5	33	6	8	127	62	45.38 ± 51.76
Average	61.67 ± 33.58	11.0 ± 5.69	3.4 ± 2.71	21.33 ± 19.75	3.60 ± 1.15	5.33 ± 4.82	67.5 ± 54.1	27.5 ± 14.74	27.90 ± 19.96

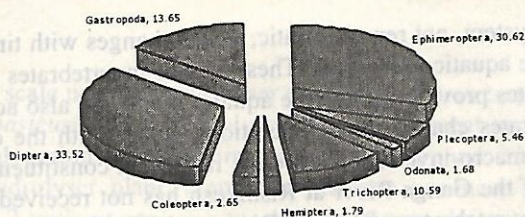


Fig. 1: Percentage of macro-invertebrates in River Ganga at Pashulok Barrage, Rishikesh

Discussion

The minimum population density of macro-invertebrates was found in the month of September and the maximum population density was observed in the month of February. The macro-invertebrates showed fluctuation in their population density because as it is directly influenced by the biotic and abiotic factors. Pratt *et al.* 1981, Singh 1997 and Vig 1998 also showed the same Phenomena. In Rishikesh the rainy season was between late June and September. During these months there was a large amount of water with high velocity, which wash away the eggs and larval of macro-invertebrates. Richardson 1921 and Khanna 1993 has reported this activity in their work and shown that scarcity of food as another factor causing retardation in their population density during rainy season.

Due to high velocity of water, the plankton and other food material washed away. The temperature and total solids were found high in rainy season which retards the growth of biotic community of water. In this study macro-invertebrate population showed a continuous increase from September onwards, which was due to availability of food to them. There was a good planktonic population due to active photosynthesis during winter months. Thus, the macro-invertebrates are positively related to plankton population. Therefore, it may be concluded from the above study that the population density of macro-invertebrates fluctuates due to the influence of several biotic and abiotic components.

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Material and Methods

Investigation on the surface benthos of Copetara tank was made on 10 and 11 April. Samples were collected from different sites (station A, Copetara village side and station B, Canal side) at an interval of 2 weeks starting at 9 AM on Feb. 09, 2001. Standard methods by APHA (1983) and Vig and Singh (1998) were followed for the analysis of physico-chemical factors and Plankton studies. The water sample was collected from the shore and 100 cm below the surface. The water was filtered on pump filter, for bacteriological. The qualitative and quantitative analysis of plankton was made in Sedgewick rafter counting chamber.

Results and Discussion

The results are shown in Figure 1 and 2 and Table 1 and 2. The details are given in following paragraphs.

Physico-chemical factors

Water Temperature

The water temperature varies from 12.5°C (at station A) to 29.5°C (at both stations) being maximum on 10 Feb. 2001 at station A and minimum at 07.00 hours on Feb. 11, 2001. The maximum temperature was observed during noon and minimum in the forenoon temperature, which was also highest during the day and lowest during night. Sample results were obtained by Sumpta (1971), Mishra et al (1979) and Sharma and Gupta (1984) and Chandra and Singh (1974). The maximum temperature observed during noon can be attributed to the effect of cooling and heating of water temperature depends upon atmospheric temperature.