

Macrobenthic Fauna of a Local Stream, Ghomanhasan (Jammu)

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ABSTRACT

Stream Gho-Manhasan is analysed for physical, chemical and biological status of its water. Variations both in water and benthic life inhabiting the stream were noted down.

Key words: Physico-chemical parameters, Benthos.

INTRODUCTION

The nature of flora and fauna in any water body is mainly controlled by the fluctuations in the physical and chemical characteristics of its water. Moreover physico-chemical aspects are pre-requisite for the assessment of potentialities and to understand the realities between trophic level food webs.

Gho-Manhasan, one of the tributaries of Chenab drainage system before its entry into Pakistan passes through the North of Jammu province. This stream acts as a recipient of various effluent from villages located on its sides. Besides this, stream water is also used for washing of clothes by local inhabitants. A large number of cattle also visit for drinking or bathing purposes. All the effluents entering the stream are liable to deteriorate its water quality thereby making it unfit for drinking and other purposes.

Keeping in view the above factors, a maiden attempt has been made to study its status thereby determining the impact of anthropogenic influence on the biotic life inhabiting this water body.

Study area and Material & Methods

The stream has been divided into three stations along the longitudinal profile. Station I & II are slightly polluted while station III is heavily polluted and receives effluent from the village Gho

Manhasan. Monthly samples were collected. The study period comprised of 6 months from December 2004 – May 2005 thereby constituting winter/summer/spring seasons. Water samples were analysed following APHA (1985).

Soil samples were taken from 3 different stations with a sieve of known mesh size and brought to laboratory. Samples were washed and macrobenthos were taken out with the help of brush and preserved in 5% formalin. These organisms were then identified following Ward and Whipple (1959), Needham and Needham (1962), Adoni (1985) and Pennak (1989).

RESULTS AND DISCUSSION

Water Quality

Water sample has been analysed for temperature, speed, depth, Dissolved Oxygen, Free Carbon dioxide, Calcium, Magnesium, Bicarbonate, Carbonate and Chloride. The results as presented in Table I show minor variations in their mean value at different stations. Station I experiences highest speed and lowest depth while its speed goes on declining with an increase in depth downstream. pH does not show much fluctuation, CO_3^{2-} remains absent throughout study period. Other parameters like HCO_3^- , Mg^{++} , Ca^{++} and Cl^- experience slightly increased values downstream and their highest concentration is recorded at station III.

Table 1: Showing mean variation in physico-chemical parameter at different stations of stream Gho-Manhasan (December 2004 - May 2005)

Parameters	Station-I	Station-II	Station-III
Air temperature(C°)	26.6	26.6	26.6
Water temperature (C°)	22.5	22.5	22.5
Speed (m/sec.)	0.18	0.2	0.36
Depth (cm)	31.5	37.5	43.3
pH	7.85	7.86	7.9
FCO ₂ (mg/l)	1.94	2.0	2.55
DO (mg/l)	11.2	8.3	7.3
Co ₃ ²⁻ (mg/l)	Absent	Absent	Absent
HCo ₃ ⁻ (mg/l)	500.6	518	548
Ca ⁺⁺ (mg/l)	31.84	32.12	34.8
Mg ⁺⁺ (mg/l)	14.20	15.9	17.3
Cl ⁻ (mg/l)	32.02	34.5	36.24

Table 2: Qualitative representation of Macrobenthos along various stations of stream Gho-Manhasan during December 2004 – May 2005

	Station-I	Station-II	Station-III
Annelida Oligochaeta <i>Tubifex</i> sps.	+	+	+
<i>Lumbriculus</i> sps.	+	+	+
<i>Chaetogaster</i> sps.	+	+	-
Arthropoda Diptera			
<i>Tabanus</i> sps.	+	-	-
<i>Chironomus</i> sps.	+	+	+
<i>Forcipomyia</i> sps.	-	+	+
<i>Tipula</i> sps.	-	+	+
Odonata <i>Anax</i> sps.	+	+	+
Molluscs Gastropoda <i>Lymnea</i> sps.	+	+	+
<i>Gyraulus</i> sps. Pelecypoda	+	+	+
<i>Unimerous</i> sps.	+	+	+

Table 3: Seasonal mean variation in the benthic population (n/m²) of stream Gho-Manhasan (December 2004 – May 2005)

Months	Oligochaetes	Diptera	Odonata	Molluscs
December	4.6	31.5	0.3	4.6
January	9.6	19.0	2.6	6.0
February	13.3	17.0	4.6	11
March	88.3	32.6	1.3	68.6
April	128.3	56.0	Absent	104.3
May	136.6	43.3	absent	63.3

Macrobenthic community

The stream is populated mainly by Annelida, Arthropoda & Mollusca. Among the three groups, Arthropods dominated qualitatively and Annelids quantitatively. Different stations of the stream exhibit varied diversity at the sps. level (Table 2).

The seasonal variation in macrobenthic community along with maxima & minima has been depicted in the Table 3.

Oligochaetes

Highest number of oligochaetes (Table 3) in summer months may be associated with organically rich bottom and increased temperature which enhances organic production. Sunder and Subla (1986) also linked their abundance with rising temperature. Its decline in winter months may be attributed to the low temperature (Pennak, 1989).

In stream Gho-Manhasan, three sps. of oligochaetes have been reported viz, *Tubifex*, *Lumbriculus* and *Chaetogaster*. *Tubifex* and *Lumbriculus* are found abundantly at station III (Table 4) through out the study period that may be attributed to the organically rich bottom. Moreover this station is also under the influence of anthropogenic factors which lead to the increase in the apparent pollution level. These observation are also supported by Gopal and Sah (1993) and Sharma (1999) who also reported their abundance in polluted zone.

Diptera

The summer peak of dipterans (Table 3) can be attributed to the reduced flow and high water temperature. Present findings are supported by Stehr and Branson (1938) and Gopal and Sah (1993). The winter rains during February are found responsible for their less number as they wash away

Table 4 :Total benthic population (n/m²) along different stations of stream Gho-Manhasan (December 2004 – May 2005)

Groups	Station-I	Station-II	Station-III
Oligochaeta			
<i>Tubifex</i> sps.	17	20	21
<i>Lumbriculus</i> sps.	325	357	396
<i>Chaetogaster</i> sps.	2	2	-
Total	344	379	417
Arthropoda			
Odonata			
<i>Anax</i> sps.	18	6	4
Total	18	6	4
Diptera			
<i>Tabanus</i> sps.	6	-	-
<i>Chironomus</i> sps.	150	186	232
<i>Forcipomyia</i> sps.	-	2	2
<i>Tipula</i> sps.	-	2	4
Total	156	190	238
Mollusca			
Gastropoda			
<i>Lymnea</i> sps.	85	124	141
<i>Gyraulus</i> sps.	33	37	57
Pelecypoda			
<i>Uniomorous</i> sps.	84	97	120
Total	202	258	318

the substratum along with the benthic fauna {Pennak and Gerpan, (1947), Nelofar (2003) and Sawhney (2004)}.

Dipteran are represented by four species viz. *Tabanus* sps, *Chironomus* sps, *Forcipomyia* and *Tipula*. Station III recorded the highest number of *Chironomus* (Table 4). The water quality of the station favour their abundance as the water receives effluents from various sources and pollutants get stranded on its bank thereby making it rich in organic matter and Carbondioxide and poor in Oxygen. A decline in DO level also favours the healthy growth of *Chironomus* sps (Sharma 1999 and Sawhney 2004).

Odonata

The maximum production of odonates during winter months (Table 3) can be attributed to low temperature as it favours the abundance of their larvae by inhibiting metamorphosis. Such finding are in concordance with Anwar and Siddiqui (1988) and Chopra *et al.* (1993).

Molluscs

Summer peak of molluscs show direct relationship with high concentration of bicarbonate and calcium (Table 1). Increasing water temperature

during summers is also advantageous to the rich population of molluscs. Present findings also get support from the observation already recorded by Stout and Vandermeer (1978), King (1983) and Rosillion (1985).

Their minimum density can be attributed to low temperature as has already been discussed by Dutta and Malhotra (1986) and Thakial (1997).

Molluscs are represented by three species with their maximum abundance at station III, their increase in number can be related to increasing concentration of bicarbonate, calcium and chloride which favour high population of Molluscs. Present findings are also in concordance with the findings made by David and Ray (1968) and Sunder and Subla (1986). In addition to these factors low speed and high depth at Station III also lead toward its pooled nature and there by supporting the rich population of molluscs.

On the basis of the above discussion it can be concluded that pollution has direct effects on physico-chemical quality of water which ultimately affect the benthic life thereby causing their population to appear or disappear from a water body.

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