

# Plankton Diversity of Ganga Rivers in Haridwar District U.K.

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**Abstract**—The plankton of rivers were collected by fine plankton net. The known quantity of water was passed through filter and connected in desired quantity collection are done by Ganga river Haridwar. For a period of 2003-2005 total 8 species of plankton belonging to different taxonomic groups were identified. Phytoplankton belongs to diatoms; Blue green algae zooplankton belongs to Keretela vulga, Ceriodaphnia, Arcella, Crustacea Filinia-species. The phytoplankton productivity fluctuated seasonally and the maximum number of 2046.30 unit/l was recorded in the month of January and December minimum number of 129.65 unit/l during the month of December zooplankton shows maximum number in the month of January and minimum in June 2004-2005 varies from maximum 176.24 unit/l or minimum 186.35 unit/l and shows fluctuation during season and dominating each other.

## I. INTRODUCTION

Plankton is the ecologically and economically important heterogeneous groups living aquatic organism. That can move at the mercy of water current, they are the true power of locomotion and ecological growth in various species under limnology, in graphs and meteorology. There are changes in abundance and biological factors of water resources. They are the primary producers of consumers. They give life to an ecosystem in aquatic life the diversity is found in as impact factor. It indicates the nutrient status of water body. They are recorded in post monsoon and pre-monsoon seasons. In India, few detailed studies are available on the ecobiological characteristics of main stream of river Bhagirathi and Ganga river if mainly the tributaries in these Garhwal Himalayan catchment areas under Prayag and Rishikesh. Plankton is the heterogeneous assemblage of minute organisms which occur in the natural water and float by the wave action and movement of water. The quantitative and qualitative changes in the plankton constituents of the river system under this study revealed out. Water is precious for every living being on this planet.

## II. MATERIALS AND METHODS

The collection of planktons of river Ganga was collected from net. The samples are collected from three main sites 1,2,3, Khankhal, Missarpur, Katarpur. Sites are covering a stretch upto 1km to 3km in each village areas to its interior or rural areas. The known quantity of water was passed through filter and concentrated the desired quantity 1ml of the concentrate was taken and placed in a Sedwick rafter counting cell, Applying the following formula did counting of the organism.

$$\text{Plankton/l} = (a \times 1000) / l$$

Where, a= average no. of phytoplankton in one small counting chamber of Sedwick rafter counting cell.

C= ml of plankton concentrates

l= volume of original water filtered in litre.

## III. RESULTS AND DISCUSSION

A study on the plankton parameters of river Ganga includes the primary producers like phytoplanktons or primary consumers like zooplanktons. A revealed that the total plankton number per litre of water was maximum 3017.68 unit/l  $\pm$  477.20 in the month of January in the years 2004-2005 and minimum was 423.94 unit/l  $\pm$  209.82 in July in phytoplankton diatoms was dominated and class blue green algae was found least in both the years of study it is maximum in the month of January of 2003-2004. 2846.30 unit/l  $\pm$  720.00 l. and minimum in December month (129.65 unit/L  $\pm$  722.82) of 2003-2004 with average count of cells in 2003-2004 was 1151.77 unit/l  $\pm$  22.927 and green algae were found to be highest in the month of January 2003-2004. (364.86 unit/l  $\pm$  18.36) and lowest in December 14.15 unit/l  $\pm$  3.16. The average count of green algaee in 2003-2004 was 171.20 unit/l  $\pm$  33.48, blue green algaee showed optimum peak during the month January 162.36 unit/l  $\pm$  34.78 and least peak during the month of July of 2003-2004. 2.67 unit/l  $\pm$  5.64 average value of blue green algaee was 36.63 unit/l  $\pm$  17.31.

Zoo plankton was observed minimum in July of 2003-2004, 19.00 unit/l  $\pm$  17.46 and maximum 519.98 unit/l  $\pm$  100.22 and the average value 219.60 unit/l  $\pm$  51.87 in 2003-2004. Keretela vulga was maximum in the minimum was found 1.08 unit/l  $\pm$  5.64 in the month of June.

Ceriodaphnia was found to be highest in the month of January 2003-2004 186.35 unit/l  $\pm$  25.401 and lowest 5.26 unit/l  $\pm$  6.16 in the month of July. Arcella was observed optimum peak during 2004-2005 in March 112.16 unit/l  $\pm$  8.24 and in lowest peak during the month of August 1.00 unit/l  $\pm$  0.00 in the year 2003-2004. Crustaceans was maximum 106.00 unit/l  $\pm$  15.26 in 2004-2005.

February and minimum was found in the month of July 2003-2004 8.12 unit/l  $\pm$  2.62. Filinia sp. was 38.84 unit/l  $\pm$  9.61, Arcella 115.60 unit/l  $\pm$  3.22 Ceriodaphnia 77.96 unit/l Keretela vulga 55.65 unit/l  $\pm$  9.86 Filinia sp. 43.76 unit/l  $\pm$  11.10 and Arcella 37.51 unit/l  $\pm$  6.19.

TABLE I. Quantitative analysis of the plankton of the river Ganga during 2003-2005 at sampling station A.

Month	Number of Plankton per liter of water				Total Plankton	
	Phytoplankton		Zoo Plankton			
	2003-2004	2004-2005	2003-2004	2004-2005	2003-2004	2004-2005
January	3287.46±808.36	3297.70±376.98	347.85±78.66	519.98±100.22	3635.31±887.02	3817.68±477.20
February	1425.88±224.60	2470.34±232.63	304.14±47.95	439.17±67.18	1730.02±272.55	2909.51±299.81
March	1322.89±158.08	1247.33±182.42	450.90±117.63	437.56±41.03	1773.79±275.71	1684.89±223.45
April	1237.31±266.89	1192.22±201.99	425.11±80.36	214.76±39.36	1662.42±347.25	1406.98±241.35
May	939.85±111.60	1138.35±172.29	274.47±58.96	221.42±28.45	1214.32±170.56	1359.77±200.74
June	681.37±125.26	654.29±197.30	97.15±29.01	47.31±21.19	778.52±154.27	701.60±218.49
July	601.42±51.91	404.94±192.36	40.03±14.80	19.00±17.46	641.45±66.71	423.94±209.82
August	821.98±117.70	674.42±122.25	49.68±19.62	24.68±26.32	1071.66±137.32	699.10±148.57
September	1920.84±208.44	903.25±157.60	103.23±36.04	74.07±25.05	2024.07±244.48	977.32±182.65
October	2033.40±193.11	1067.24±94.51	146.82±34.23	121.51±31.79	2180.22±227.34	1188.75±126.30
November	1405.78±180.08	362.28±65.76	181.83±40.19	195.87±26.32	1587.61±220.27	558.15±9208
December	437.00±914.67	1894.48±234.46	214.03±65.01	263.53±38.52	651.03±979.68	2158.01±272.98
<b>Average</b>	<b>1359.60±280.06</b>	<b>1275.57±185.88</b>	<b>219.60±51.87</b>	<b>214.91±38.57</b>	<b>1579.20±331.93</b>	<b>1490.48±224.45</b>

TABLE II. Quantitative analysis of the plankton of the river Ganga during 2003-2005 at sampling station B.

Month	Number of Plankton per liter of water				Total Plankton	
	Phytoplankton		Zoo Plankton			
	2003-2004	2004-2005	2003-2004	2004-2005	2003-2004	2004-2005
January	4628.02±1381.92	2329.08±398.73	436.52±35.60	323.56±1260.20	5064.54±141.75	2652.64±1658.93
February	5166.47±300.43	2954.57±422.00	320.00±160.00	362.49±317.40	5486.47±460.43	3317.06±739.4
March	4085.41±340.21	2884.87±309.11	856.62±132.00	460.07±158.48	4922.03±472.21	3344.64±467.59
April	3508.19±291.61	2544.57±233.40	621.34±158.62	320.12±168.80	4129.53±450.23	2864.69±402.2
May	1440.25±702.29	2029.67±202.46	526.10±127.80	184.75±433.10	1966.35±830.09	2214.42±635.53
June	887.00±100.11	989.76±213.86	196.25±72.36	92.93±184.69	1083.25±172.47	1082.69±398.55
July	604.92±34.40	670.94±112.76	84.60±35.00	41.6±80.20	689.52±69.40	712.54±192.96
August	781.75±26.21	839.34±57.76	87.21±18.24	59.6±49.49	868.96±44.45	898.94±107.25
September	1136.10±221.74	959.07±97.14	95.27±31.00	136.39±110.65	1231.37±252.74	1095.46±207.79
October	1324.18±136.26	1002.73±113.74	132.16±56.06	183.7±68.83	1456.29±192.32	1186.43±182.57
November	147.87±146.14	1088.38±81.55	125.00±7.86	240.99±90.67	1596.87±154	1329.37±172.22
December	1458.17±274.17	2031.62±440.74	362.00±54.67	275.67±163.14	2569.69±384.27	2307.29±203.88
<b>Average</b>	<b>2207.69±329.62</b>	<b>1693.72±223.60</b>	<b>320.25±74.10</b>	<b>223.48±257.13</b>	<b>2588.73±302.03</b>	<b>1920.25±447.82</b>

TABLE III. Quantitative analysis of the plankton of the river Ganga during 2003-2005 at sampling station C.

Month	Number of Plankton per liter of water				Total Plankton	
	Phytoplankton		Zoo Plankton			
	2003-2004	2004-2005	2003-2004	2004-2005	2003-2004	2004-2005
January	3443.86±1260.20	2112.52±223.52	434.78±156.67	545.29±101.28	3878.64±1416.87	2657.81±324.80
February	4486.80±317.40	2596.35±279.51	390.89±141.65	405.67±75.17	4877.69±459.05	3002.02±354.68
March	3319.24±158.48	2544.81±208.72	503.56±144.84	509.67±98.28	3822.80±403.32	3054.48±307.00
April	2472.92±168.80	2325.52±296.28	507.89±74.74	182.83±35.93	2980.81±243.54	2508.35±332.21
May	2845.66±433.10	1853.00±191.67	279.55±132.74	265.16±55.98	3125.21±565.84	2118.16±247.65
June	1121.00±184.69	1093.19±48.38	100.36±43.77	69.99±23.46	1221.36±228.46	1162.18±71.84
July	659.03±80.20	710.35±137.07	29.69±15.11	15.61±12.42	688.72±95.31	725.96±149.49
August	854.22±49.49	761.04±46.18	37.64±21.04	31.66±17.06	891.86±70.53	792.70±63.24
September	1025.52±110.65	978.05±80.09	120.08±45.21	107.95±36.97	1145.60±155.86	1086.00±117.06
October	1237.19±68.83	1052.82±35.12	162.38±39.39	179.75±38.95	1399.00±108.22	1232.57±74.07
November	1225.09±90.67	1240.33±46.56	197.83±56.74	223.54±27.87	1422.92±147.42	1463.87±74.43
December	2471.62±163.14	1598.21±142.27	317.60±83.31	305.72±52.84	2843.22±246.45	1903.93±195.11
<b>Average</b>	<b>2096.85±257.14</b>	<b>1572.18±144.61</b>	<b>257.69±87.93</b>	<b>236.90±48.02</b>	<b>2358.20±345.07</b>	<b>1809.08±192.63</b>

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