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Abiotic status of Song river and its relations to zoo and phytoplankton at Nepali farm (Dehradun)

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Abstract

Water sample were collected from Song River during pre-autumn to post-autumn seasons 2006. This study indicates the direct relationship among various physico-chemical parameters like water temperature, free carbon di oxide, Transparency, DO, BOD, COD, Hardness and Phosphate, an inverse relationship was found between, DO and BOD, DO and COD during course of the study.

Introduction

In the lotic system, the significance of physico-chemical and biological data for the assessment of water quality has been recognized. The studies consider water quality usually involve physico-chemical and biological variables.

The song River is a tributary of River Ganga. It is a spring fed River. It originates from near Dehradun.The river ultimately mixed in to Ganga near Raiwala. The present investigation was carried out to study the abiotic characteristics in relation with Planktonic diversity.

Number of workers have carried out their work on aquatic quality of different River. Khanna (1993), Khanna (2003) of River Ganga and Badola and Singh (1982), studied about the abiotic and biotic factors of River Alakhnanda. Where as the study about the Song River is seanty therefore the study will be helpful for other workers.

Methodology

Water sample were collected fortnightly during paddy in different season (Pre-autumn , post-autumn) in plastic containers and analyzed for abiotic characteristics by standard methods (APHA, 1998).Plankton were collected by filtering the water through a planktonic net and identified with the help of Jhingran (1975), and Khanna (1993) .

Results and discussion

The physico-chemical parameter and planktonic fluctuation obtained during the study period are tabulated in table 1 to 3. The temperature showed a negative relationship with the dissolved oxygen. Water is often attributed to the fact that the oxygen is dissolved more during the period of active photosynthesis. Hutchinson (1957) concluded that cold water has greater capacity for holding dissolved gases. The maximum dissolved oxygen was recorded (9.13 mg/l±0.12) in pre-autumn and minimum (8.68 mg/l± 0.30) in post-autumn. It was also reported by Badola and Singh (1982). The maximum total solids was observed (210 mg/l pre-autumn 10) in post-autumn and minimum(155 mg/l±5) in pre-autumn. The value of the total solids is increased from pre-autumn to post-autumn as also reported by David (1956) in Bhadra River (Mysore) .

The maximum value of pH was observed (8.33 mg/l ± 0.16) in pre-autumn and minimum (7.91 mg/l ± 0.01) in post-autumn . Maximum value of pH in winter might be due to increase in algal population in the river. pH and DO showed a positive relationship to one another as also found by Ali *et al.* (1988) in a eutrophic lake.

The minimum value of free carbon di oxide was found (1.33 mg/l ± 0.16) in pre-autumn and maximum(1.50 mg/l ± 0.14) in post-autumn. Free carbon di oxide and DO showed a negative relationship to one another. The maximum value of alkalinity was (168.33 mg/l ± 6.66) in pre-autumn and minimum (140.83 g/lm ± 9.16) in post-autumn. It was also observed by Venkateswarlu and Jayanti (1968) in the River Sabarmati.

The lowest chloride value was observed (16.68 mg/l ± 0.12) in pre-autumn and highest in post-autumn (17.80 mg/l ± 1.47). It showed the positive relationship with temperature also studied by Mohanty 1981 in Bhubaneswar.

The sulphate value was minimum (1.07 mg/l ± 0.07) in pre-autumn and maximum (1.20 mg/l ± 0.02) in post-autumn are also observed by Singh 1988. The maximum value of biochemical oxygen demand was recorded (3.33 mg/l ± 0.37) in post-autumn and minimum (2.15 mg/l ± 0.35) in pre-autumn. Biochemical oxygen demand and DO showed negative relationship which is in agreement to Verma *et al.* (1984) as reported in eastern Kalinadi .

The COD was highest (3.45 mg/l ± 0.5) in post-autumn and lowest (2.15 mg/l ± 0.17) in pre-autumn. Biochemical oxygen demand and COD showed a positive relationship with one another also observed by Chopra and Patrick (1994) in the river Ganga at Rishikesh. COD showed a negative relationship with DO as reported by Verma *et al.*(1984) in eastern Kalinadi. The total planktonic concentration was maximum (977.50 mg/liter ± 96.77) in pre-autumn and minimum(787 mg/liter ± 19.76) in post-autumn. There was a inverse co-relation in the temperature and the phytoplankton and zooplankton production. Whereas increase in temperature causes reduction in plankton production. Badola and Singh (1982) reported high value of plankton during pre-autumn in the River Ganga of Garhwal Himalaya.

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Table-1 Seasonal Variations in Physico-Chemical Parameters of Song River

Parameters	Seasons			
	Pre-autumn	Autumn	Post-autumn	Average
Temperature (°C)	19.0 ± 0.57	19.9 ± 0.16	22.0 ± 0.50	20.3 ± 1.70
Total solid (mg/l)	155.0 ± 5.0	185.0 ± 15.0	210.0 ± 10.0	183.3 ± 22.4
pH	8.33 ± 0.16	8.10 ± 0.10	7.91 ± 0.01	8.11 ± 0.12
Free CO_2	1.33 ± 0.16	1.39 ± 0.07	1.50 ± 0.14	1.40 ± 0.07
Dissolved Oxygen (mg/l)	9.13 ± 0.12	8.72 ± 0.22	8.80 ± 0.30	8.88 ± 0.30
Alkalinity (mg/l)	168.33 ± 0.66	142.50 ± 8.30	140.81 ± 9.16	150.55 ± 12.58
Chloride (ppm)	16.68 ± 0.12	17.33 ± 1.41	17.80 ± 1.47	17.27 ± 0.45
Sulphate (mg/l)	1.07 ± 0.01	1.26 ± 0.02	1.29 ± 0.02	1.20 ± 0.09
BOD (mg/l)	2.15 ± 0.35	2.13 ± 0.25	3.33 ± 0.37	2.53 ± 0.56
COD (mg/l)	2.15 ± 0.17	2.54 ± 0.27	3.45 ± 0.05	2.71 ± 0.54

Table-2 Seasonal Quantitative Analysis of the Plankton of the River Song

Seasons	Plankton		
	Phytoplankton (u/l)	Zooplankton (u/l)	Total Plankton (u/l)
Pre-autumn	929.5 ± 61.50	98.0 ± 6.32	977.5 ± 96.17
Autumn	832.5 ± 53.5	83.5 ± 2.5	916.0 ± 56.0
Post-autumn	719.5 ± 27.5	67.5 ± 2.5	787.0 ± 19.7
Average	827.1 ± 85.81	83.0 ±12.45	827.1± 85.81

Table-3 Number of different groups among Phytoplankton of the River Song during different Seasons

Seasons	Phytoplankton		
	Bacillariophyceae(u/l)	Chlorophyceae(u/l)	Myxophyceae (u/l)
Pre-autumn	598.0 ± 42	226.5 ± 18.5	105.0 ± 1.0
Autumn	528.0 ± 42	204.5 ± 10.5	100.0 ±1.0
Post-autumn	437.5 ± 21.5	186.0 ± 4.0	96.0 ± 1.4
Average	521.16 ± 6.80	205.66±16.55	100.33 ±6.37