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Full Length Research Paper

Biodiversity of Diatoms and Assessment of Water Quality of Tunga Bhadra River at Honnali. Davangere District

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ARTICLE DETAILS

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ABSTRACT

Fresh water bodies are important assets of a nation, which fulfill various needs of society like drinking water as well as water for irrigation and industrialization. But due to rapid industrialization, urbanization and swelling human population, these water bodies are subjected to various loads of pollution. Tunga river water from Shivamogga city to Honnali town confluence was monitored for one year to assess the water quality and biodiversity of diatoms. During investigation period in all 35 taxa of diatoms belonging to 15 genera were recorded. Water flow, light penetration, temperature and raised values of alkalinity, pH values and organic matter influences the growth of diatoms. Domestic waste & municipal sewage of Shivamogga city cause the organs pollution of river, which favours the growth of diatom. Most pollution tolerant forms according to Palmer's Index recorded were. *Nitzschiaacicularis, Synedra ulna, Cyclotella meneghiniana, Navicata cupsadaza,Navicula cryptocephala, Fregilaria capecina and Cecconett placentals Raiset* values of physico-chemical parameters and pollution tolerant taxa of diatoms dueling the saprobe nature of river water.

1. Introduction

Tunga river is well known globally for its sacred nature is one of the largest rivers flowing through south Karnataka. It emerges out at Varaha Parvata at a place called Gangamoola in Western Ghats and Bowing through Karnataka and Andhra Pradesh, it empties in Krishna River. Monitoring of river water quality was carried out from Shivamogga city to Honnali confluence for one year (Feb 2004 to March 2005). River serves as main source of drinking water for Hareri city and neighboring towns, villages as well as for agricultural purposes. But due to swelling human population and industrialization, this fresh water body in being deteriorating day by day in the river water due to addition of huge quantity of domestic waste of Shivamoga city and thermal power effluents resulted the organic pollution Enrichment of minerals in river water resulted in flourishing different algal groups. Among them diatoms play very important role as bio-Indicator of pollution. Many workers like Gurbuz and Kivrak (2002), Devaraju et al. (2004), Venkateswarlu (1983), Sankaran (2005) studied the water quality of different rivers and diatom biodiversity. But not much attention was paid to Godawari river. Therefore, the present investigation was undertaken to assess the water quality and diatom biodiversity of Godawari river.

2. Materials and methods

Water samples were collected monthly from 4 sampling sites for one year (Feb. 2023 to March 2024). For physicochemical analysis, water samples were collected in plastic containers. For study of diatom biodiversity water samples were collected separately and preserved in 4% formaldehyde and Lugol's solution. Physico-chemical parameters like pH, light penetration and temperature were analyzed at sampling sites while remaining parameters and diatom study was carried out in the laboratory. For physico-chemical analysis of water, standard methods prescribed in APHA (1985) and Trivedi

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and Goel (1986) were followed. Using the Marathe and Kamat (1984) Prescott (1962) and other available standard literature, identification of Diatoms was done.

3. Results and Discussion

Seasonal variations in the physico-chemical parameters were depicted in Table No 1. It showed that light penetration values were low during summer and winter seasons due to algal blooms and flooding condition during monsoon period. During summer season temperature values were more as compared to monsoon and winter seasons. EC values were observed up to 1.39 m mho/cm, which were beyond the permissible limit. Higher values of E.C. recorded might be due high chloride contents. Declined pH values up to 6.1, during summer season were might be due to discharge of industrials waste.

Table 1: Seasonal Variation in Physico-Chemical Parameters of Godawari river (Feb. 2023-March. 2024).

Sl.no	Parameters	Summer	Monsoon	Winter
1.	Light penetration in cm	40 - 129	15 - 80	13-168
2.	Temp(°C)	17 - 26	16 - 23	16-30
3.	E. C. m. mho/cm	0.65 - 1.04	0.24 – 1.13	0.26-1.39
4.	pH	6.1 - 7.8	7.1 – 8.2	7.0-8.4
5.	Chlorides	124 - 250	85 - 190	47-215
6.	Nitrates	0.39 -1.98	0.98 – 1.98	0.01-2.04
7.	Phosphates	0.90 - 3.1	1.1 – 2.33	0.98-1.9
8.	Alkalinity	40 - 102.3	38.1 - 320	58-252
9.	Hardness	69 - 144	64 - 218	69-200
10.	BOD	24.1 – 72.8	1.28 – 54.3	7.2-39
11.	D.O.	1.3 – 6.7	0.9 – 1.8	2.2-11
12.	CO_2	1.1 - 11	5.1 – 6.4	1.1-8.1

All values expressed in mg/lit except light penetration, temperature and E.C.

Table 2: Diatoms encountered during investigation period (Feb. 2023-March. 2024)

Sl.no	Name of Algae
1	*Melosira jurgensii Agardh*
2	*Melosira species.*
3	*Diatoma species*
4	*Fragilaria intermedia Grun.*
5	*Fragilaria construens Grun*
6	*Fragilaria capucina Desm var. artica A. Cl.*
7	*Cocconeis placentula Ehr.*
8	*Frustulia jogensis Gandhi*
9	*Nitzschia imemissa Cholnoky*
10	*Nitzschia thermalia Kutz*
11	*Nitzschia vermicularis (Kg) Grun*
12	*Nitzschia aciculans W.sm*
13	*Synendra acus (Kuetz)*
14	*Synendra uina var. donica (Kuetz). Grun*
15	*Navicula rhynchocephala Kuetz var. elongata, Mayer*
16	*Navicula cupsidata Kuetz*
17	*NavicufaradiosaKuetz*
18	*NaviculamufticaKuetz*
19	*Navicula pupula Kuetz*
20	*Tabellaria species*
21	*Gomphonema augur Ehr*
22	*Gomphonemaconstrictum Ent. Var. Capitata Cleve*
23	*Gomphonema gracile Ehr*
24	*CymbellabengalensisGrun*
25	*Pinnulariamolaris, Grun*
26	*SurirellacaproniBreb.*
27	*SurirellabengalensisGrun*
28	*Sunirella ovata Kutz*
29	*SunirellarobustaEhr.*
30	*Achnanthes brevipes (Breb)*

31	*Achnanthes minutissima (Kuetz) Grun*
32	*Mastogloia blatica Grun*
33	*MastogloiadolosavarambiguaGonzalves& Gandhi*
34	*Cyclotella glomerata Bachn*
35	*Cyclotella meneghiniana*

Chloride values reached up to 250 mg/lit. during summer which were higher than the permissible limit suggest by WHO i.e., 200 mg/lit. It may be due to stagnant water condition and discharge of more amount of sewage (Venkateswarlu and Jayanti, 1968). Nitrate values reported were also higher during winter and summer seasons at stations which caused the eutrophic condition and favor growth of diatoms. Alkalinity and hardness was also higher during winter and summer diatoms. Alkalinity and hardness also showed increased values, which were higher than the permissible limit suggested by WHO.

Raised BOD values during summer and winter sea sons indicated the high rate of organic pollution. D.O. values were decreased at all stations during summer and winter which might be due to increase in temperature (Ragothaman an Jaiswal, 1995) and release of effluents. Free CO values were also recorded more during summer and winter seasons.

In all 35 species belonging to 15 genera of diatoms were encountered during investigation period as listed Table No., 2. Present investigation showed that distribution and density of diatoms were variable at three different sampling stations during different seasons. Due to high values o BOD, E.C. and low level of D.O. favors the growth of diatom Most pollution tolerant species of diatoms according Palmer's Index are *Gomphonema, constictum, Naviculacuspidata, Navicula cryptocephala, Nitzschia acicularis, Cyclotella meneghiniana, Surirella ovata, Fragilaria capucina, Synedra ulna, Synedra acus, Cocconeis placentula, Melosira sp.*

Due to discharge of municipal sewage as well as industrial effluents in river water, pollution tolerant taxa were flourished at study area. Similar results were obtained b Kelley (1998) and Rajkumar (2005). In present investigations were recorded at all sampling sites during winter seasons, which favor the growth of *Diaaria, Cymbella and Synedra*. Our investigation he results of Sankaran (2005).

Investigation period it was observed that diagram abundantly during winter season and then gradually declines during summer. Similar results were obtained by Lakshminarayana (1965). This also is attributed due to that cold conditions and lower values of D.O. favors the growth of diatoms Jaiswal, (1995). Our results were identical (1983), which was of opinion that decrease high oxidisable matter, raised values of chlorides and nitrates favors the growth of diatoms *Acicularis, Achnanthus species, Navicula, Cyclotella meneghiniana and Gomphonema.*

4. Conclusion

The present investigation, it was concluded that chemical parameters of water from study area values than the prescribed limit of WHO. Acmer's Index, 11 most pollution tolerant species it all 4 stations. On the basis of physicochemical- and pollution tolerant species of diatoms, it that water of Tungabhadra river was more poor for drinking purpose.

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