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Phytoplankton Diversity of River Son of Bansagar Reservoir, Shahdol (M.P.): A Preliminary Survey

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Abstract

The river son is one of the major hot spot for aquabiodiversity in India. The presented study is conducted on the variable account of Phytoplankton. Algal communities possess many attributes as biological indicators of spatial and temporal environmental changes. A total 38 algal taxa belonging to 16 genera have been collected and identified. Chlorophyceae was the most diverse class having 14 taxa followed by Bacillariophyceae with 9 taxas. The algal communities correlated with water pollution. The algal community correlated with water pollution. The total biodiversity shows a drastic decrement caused by globalization and human interference in the nature. Present studies examined the potential for algal bio-monitoring across a gradient of agriculturally impacted streams.

Introduction

Algae are major producer of organic compounds. It has an important position in aquatic food chain. Since algae indicate the levels of pollution in water bodies as bio indicator and it also helps to determine the quality and conservation of water (Palmer, 1980), but not much attention has been paid with reference to their occurrence and distribution in different lotic and lentic water bodies. India is a land of many rivers. Rivers are the most important water resource in the world in general and in India in particular. Great civilizations developed along the bank of the river and even today most of the development has taken place in the cities or in the areas located near the rivers. The river provides water for the industry, agriculture, commercial, aquaculture and domestic purpose. Unfortunately the same rivers are being polluted by indiscriminate disposal of sewage and industrial waste and a plethora of human activities. River pollution has already acquired a serious dimension in India, with most its India's fourteen major, 55 minor and several hundred small rivers are facing acute water pollution problem. In India, the studies on riverine ecosystems have attracted the attention of quite a few investigators in last few decades, *e.g.* Roy (1955), Choko and srinivasan (1955), Kudesia and Sharma (1981) and Mathur (1990). Algae play an important role to purify the water by photosynthesis. In other words it

helps in the process of rejuvenation of rivers (Sharma, 2005).

In central India, Bansagar reservoir is a multipurpose river valley project on Sone River situated on Ganga basin in Madhya Pradesh. Intense farming has led to severe disturbance of watersheds throughout the world, resulting in fundamental changes in the structure and functioning of stream ecosystems. Modern intensive agriculture is responsible for chemical and physical alterations such as increased contaminant and nutrient runoff, an increase in suspended solids due to erosion, and changes in discharge and channel morphology. The traditional physico-chemical measurements used in water quality monitoring programs such as total phosphorus and suspended sediment load are an important guide to environmental change. However, they are only representative of short-term conditions found at the instant of sampling and do not provide information about the effects of these changes on biological communities.

The need for a better comprehension of interactions between environmental quality and ecosystem integrity has increased the interest in finding biological indicators that provide a more accurate guide to changes in ecological conditions. From the earliest years of the last century, periphytic (benthic) algae have been identified as a valuable option for the biomonitoring of stream and river ecosystems (Kolkwitz and Marsson, 1908 cited by Hill et al., 1999). More recently, this approach has been applied with success to evaluate a variety of water quality problems (Rott et al., 1998; Hill et al., 1999; Winter and Duthie, 2000a; Potapova et al., 2005). Periphytic communities provide an integrated measurement of waterquality as experienced by the

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aquatic biota and have many biological attributes that make them ideal organisms for biological monitoring. Algae lie at the base of aquatic food webs and therefore occupy a pivotal position at the interface between biological communities and their physico-chemical environment. Furthermore, benthic algae have short life cycles and can therefore be expected to respond quickly to changes in the environment (McCormick and Stevenson, 1998). However, few studies to date have examined the potential for algal bio-monitoring across a gradient of agriculturally impacted streams.

Algae are involved in water pollution in a number of important ways. Due to the enrichment of inorganic phosphorous and nitrogen is responsible for the growth of algae in water bodies. Research in the freshwater ecology of algae related to water pollution is sparse, and it is necessary of detailed study for searching indicator species. The uses of algal communities correlating water pollution (Sonneman et al., 2001). Algae are one of the most rapid bioindicator of water quality changes due to their short life spans, quick response to pollutants and easy to determine their numbers (Plafkin et al., 1989).

Material and Methods

Study Area

The present study is based on study the Phytoplankton population. In central India, Bansagar reservoir is a multipurpose river valley project on Sone River situated on Ganga basin in Madhya Pradesh. The study area is coordinated at 24°11'30"N 81°17'15"E, i.e., 51.4 km away from Rewa.

Sample collection

The points of study at the river where water samples were collected are referred as stations. The hydro biological study of the son river at the stretch selected has been done for round the year, by taking the samples monthly with a view to assess the nature and degree of pollution. The sampling was done usually in morning hours between 8 a.m. to 11 a.m. and samples were collected from just below the water surface. At each of the station, three types of water samples, first from 200 m upstream, second from the confluence and third from 200m downstream were collected, for all biological analysis.

Biological analysis

Each of the 1 Litre samples collected was centrifuged to concentrate the plankton organisms. Every one of these samples was made up to 100 ml after removing the surface water in the centrifuge tube. General Phytoplankton was studied for quantitative and qualitative details. The identification of phytoplankton species was done with the help of literature of Fritsch (1959), Desikachary (1959) and APHA (1998).

Result and Discussion

A total 38 algal taxa belonging to 16 genera have been collected and identified from different session. The number of various member of class *Chlorophyceae* with 14 taxa (37%), *Euglinophyceae* with 3 taxa (08 %), *Bacillariophyceae* with 9 taxa (24%), *Trebouxiophyceae* with 2 taxa (5%), *Ulvophyceae* with 2 taxa (8%), *Zygematophyceae* with 2 taxa (5%) and *Cyanophyceae* with 5 taxa (13%) are as shown in Table 1, Fig I and Fig II.

Table 1
Composition of Phytoplankton

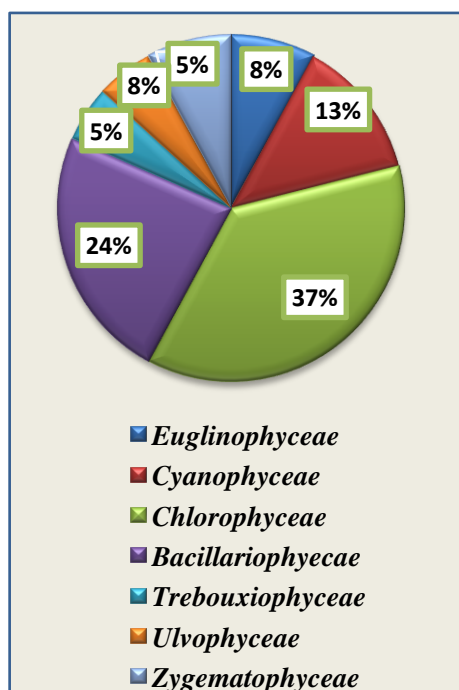| No.	Algal groups	Composition of phytoplankton during study period	
		GENERA	TAXA
1.	*Euglinophyceae*	2	3
2.	*Cyanophyceae*	4	5
3.	*Chlorophyceae*	5	14
4.	*Bacillariophyecae*	2	9
5.	*Trebouxiophyceae*	1	2
6.	*Ulvophyceae*	1	2
7.	*Zygematophyceae*	1	3
	Total	**16**	**38**

Figure I
Algal compositon in river Son, Bansagar

Figure II
Alage taxa in River Son Bansagar

The present investigation had been discussed to the Phytoplankton frequency of the aquatic environment. Most of the algae were planktonic, free floating and few are epizootic. The availability of phytoplankton in the reverie ecosystem depends upon its physiographic. Reduced numbers of phytoplankton had been reported from acidic water and it was supported by Lewitus et al., (1998). The maximum phytoplankton population found form post monsoon, it may be due to the favourable condition of the water Sharma et al., (2005). In monsoon season the population was low, probability due to increased rainfall, increase turbidity runoff and dilution effect of flood. Species of *Chlorophyceae* were maximum in early summer while the species of *Cyanophyceae* were highest in late summer. However *Euglenophycae* are rarely found in fast flowing water but few species were observed in early winters. Similarly, members of *Bacillariophyceae* were dominated during late winter (Mathur, 1990). Thus, the algal spectrum of river Narmada showing the oligotrophic nature at certain sites and due to dominance of filamentous green algae, the river Narmada can be classified under "Zygnema type of river" (Blum, 1956). At polluted water, a large number of algae tolerating organic pollution were reported, mostly belonging to Chlorococcales, Euglinoids, Desmids and few members of Cyanophyceae (Kapoor, et al., 1992; and Bowling, 1994).

Conclusion

Biological monitoring using algae is a useful alternative tool for assessing the water quality of any aquatic ecosystem, as it can help in evaluation of enviro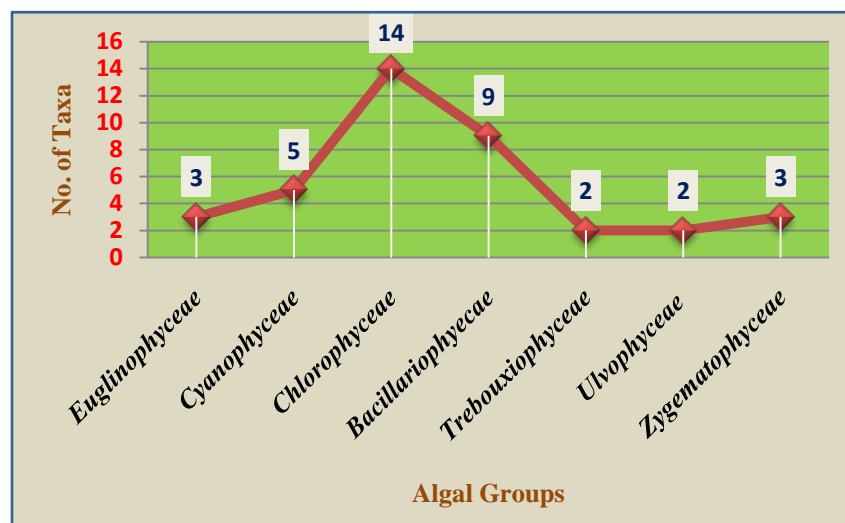nmental changes in the water bodies. The most convincing reason for including algal indicators in environmental monitoring programs is that changes in both algal production and taxonomic composition can greatly affect food web interactions and ecosystem dynamics and also biomonitoring using algae is less expensive, more informative and convincing. The algal communities correlated with water pollution. The total biodiversity shows a drastic decrement caused by globalization and human interference in the nature. Biomonitoring results can be used to identify the water body ecology problems and establish priorities for pollution control efforts. Among taxonomic analysis of algal assemblage, Community study are capable of measuring ecosystem changes in response to broad range of impact scenario, but require a suitable reference condition to be set up.

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