International Journal of Aquatic Science
ISSN: 2008-8019
Vol 12, Issue 02, 2021

Phytoplankton Diversity of Cauvery River With Reference To Pollution

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ABSTRACT: The Cauvery River is the main water source for many places of Tamil Nadu. It is highly polluted in Erode district due to improper management of textile effluents. This study was carried out to analyse the phytoplankton diversity of Cauvery River in TamilNadu, India. Planktons are the basic food source of aquatic ecosystem. Phytoplankton diversity is one of the most important ecological indicators for assessment of water quality. This study was designed to analyse the phytoplankton during period of June 2019 to November 2019 and the results were recorded periodically. The results revealed that the diversity of Phytoplankton is good indicators for the river ecosystem and influenced by quality of river water.

Keywords: River Cauvery ,Phytoplankton, Diatoms, Pollution .

1. INTRODUCTION

Phytoplankton is the primary produces forming the first tropic level in the food chain. Diversity of planktonic organism is quite high in fertile standing water bodies. Phytoplankton forms the vital sources of in the fresh water environment they initiate the afresh water foodchain, by serving as food to primary consumers, which include zoo plankton. Increases the river discharge is believed to decrease Phytoplankton biomass by shortening residence time consequently, the available for plankton to develop Baker and Baker (1979). Phytoplankton community structure, composition and species diversity in aquatic ecosystem are determined by several physic-chemical parameters (Sin et al., 1999). Spatial and temporal variations in phytoplankton distributions are widely affected by the hydrochemical and physical factors.The influence of these factors on phytoplankton community alters species composition and their diversity in the marine ecosystem(Durate et al., 2006; Madhu et al., 2007). Aquatic ecosystem monitoring has been carried out in India based on either chemical or biological analysis. The chemical approach is useful in order to determine the levels of nutrients, metals, pesticides,(Tamizhazhagan & Pugazhendy, 2016). Freshwater mussels play a number of important roles in aquatic ecosystems. As sedentary suspension feeders, unionoids remove a variety of materials from the water column, including sediment, organic matter, bacteria, and phytoplankton.

The water quality of rivers is a serious concern at present. Rivers are drastically affected by the discharge of domestic, agricultural, municipal and industrial effluents (Tiwari et,,at.,2016 Matta 2014; Matta et al., 2015a).Phytoplankton diversity is one of the most important ecological indicators for assessment of water quality. Environment is the sum total of water, air and land interrelationships among themselves and also with the human being, other living organisms and other property (Pichaimani,2017). As Phytoplankton species have different physiological requirements show diverse responses to physic chemical parameters (Rawat and Seema Trivedi 2018). Changes in the phytoplankton populations were clearly related more with physical than with chemical conditions of the water changes in water level, nutrient contents and temperature affected the growth of the phytoplankton.

2. MATERIALS AND METHODS

Study area

The water samples were collected from three different sampling stations. During January to December 2019.The water samples were collected with the help of a glass samples which consisted of a glass bottle and a cork tired to a lid.

Station 1 – Mettur (Free from Pollution)
Station 2 – Bhavani (Less Polluted)
Station 3 – Pallipalayam (Polluted)
Station 4 - Kumarapalayam (Highly Polluted)

The Sampling station could be considered as source point. The samples where collected june 2019 to November 2019.

Phytoplankton samples were collected between 8.0 AM to 9.30 AM, at every selected sampling Stations. Plankton net of botling silk no.25 was used for sampling purpose. Samples were taken at mid stream 0.5 to 1m below the surface of water. Collected concentrated plankton samples (10ml) were fixed and preserved in 5% formalin. Plankton samples were examined under high power microscope and identified upto genus and species level with the help of standard books and monographs (Prescott, 1962; Adoni, 1985 for plankton and Battish, 1992 for Zooplankton).

3. RESULTS AND DISCUSSION

The phytoplankton fluctuates monthly and its productivity was high during June And low during October as evidenced earlier by Sadguru et al.(2002). Adesalu and Nwankwo (2008) reported that *Closteriumsp.* as bacterial indicators of long standing pollution or hazardous pollution and increase with an increase in nutrients. In the study period chlorophyceae was dominated over rest of the phytoplankton population . Population of chlorophyceae gradually rised from February onwards and touched peak level in may and june .Shinde et al.,(2012) have noticed maximum number of chlorophyceae in same where and maximum during monsoon season. This finding is coinciding with the present work. The recorded genera of Euglenophyceae was lowest density was observed in rainy season and highest density was noticed in summer season. Present work is in conformity with the observation made by other researchers. Shinde et al., (2012) recorded maximum genera of Euglenophyceae in summer and minimum during monsoon. Maximum genera ofBacillariophyceae during summer and minimum during monsoon. The present works is in conformity with the work of other researches. Thirugnanamoorthy and Selvaraju (2019) has reported that maximum density of cyanophyceae members occurred from April to June and density was gradually decreased during winter and rainy seasons, Shinde (2012) havea recorded maximum number of Cyanophyceae in summer and minimum during monsoon season.Sirajunisa (2014) recorded highest Cyanophycese counts in june.

Present findings are in accordance with the findings of other workers. Singh, (1990) reported that plankton populations showed bimodal, pattern of fluctuation with one peal on pre winter and other in summer. Hassan et al., (2010) observed minimum density of phytoplankton during monsoon and maximum during summer.

STATION – 1 FREE FROM POLLUTION JUNE 2019- NOV 2019

MONTH	CHLOROPHYCEAE	BACILLARIOPHYCEAE	EUGLINIAE	MYXOPHYCEAE	CYANOPHYCEAE	TOTAL PHYTOPLANKTON
JUNE	39	11	4	33	37	124
JULY	38	7	5	30	35	115
AUGUST	38	8	8	29	30	113
SEPTEMBER	35	9	5	26	20	95
OCTOBER	34	12	4	24	18	92
NOVEMBER	32	7	6	22	16	83

STATION-II LESS POLLUTION FROM JUNE 2019 – NOV 2019

MONTH	CHLOROPHYCEAE	BACILLARIOPHYCEAE	EUGLINIAE	MYXOPHYCEAE	CYANOPHYCEAE	TOTAL PHYTOPLANKTON
JUNE	35	12	4	22	26	99
JULY	34	8	6	20	27	95
AUGUST	34	9	8	21	29	101
SEPTEMBER	30	7	7	18	26	88
OCTOBER	33	11	5	16	24	89
NOVEMBER	31	6	8	15	20	80

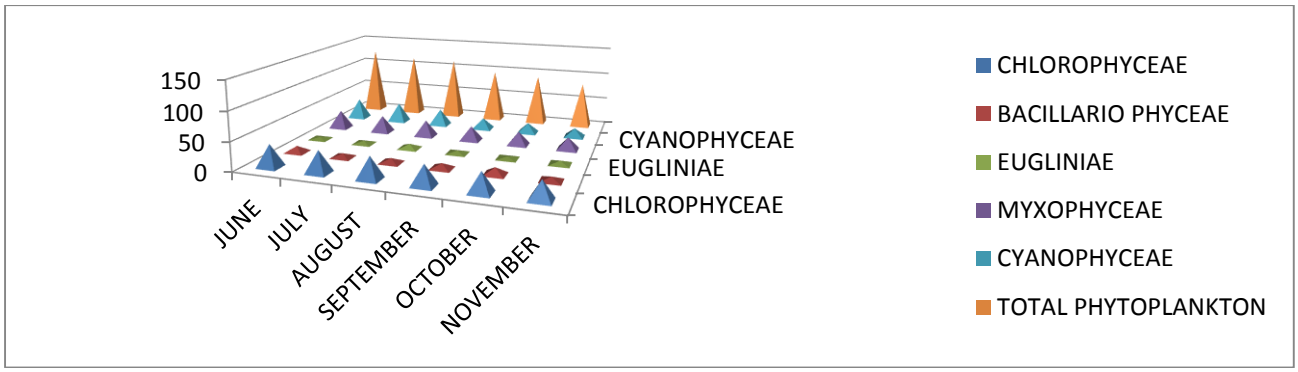
STATION – III JUNE 2019- NOV 2019 POLLUTED AREA

MONTH	CHLOROPHYCEAE	BACILLARIOPHYCEAE	EUGLINIAE	MYXOPHYCEAE	CYANOPHYCEAE	TOTAL PHYTOPLANKTON
JUNE	28	10	4	22	25	89
JULY	25	9	5	22	25	86
AUGUST	24	8	4	17	22	75
SEPTEMBER	22	6	3	19	18	68
OCTOBER	19	8	3	14	17	61
NOVEMBER	18	6	5	24	26	79

STATION – IV- JUNE 2019- NOV 2019 HIGH POLLUTED AREA

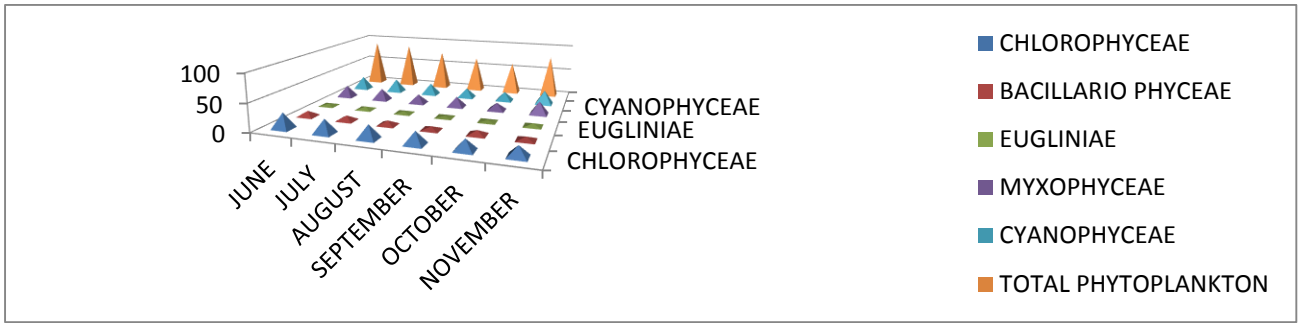
MONTH	CHLOROPHYCEAE	BACILLARIOPHYCEAE	EUGLINIAE	MYXOPHYCEAE	CYANOPHYCEAE	TOTAL PHYTOPLANKTON
JUNE	26	7	3	21	24	81
JULY	24	6	3	20	21	74
AUGUST	21	6	2	18	20	67
SEPTEMBER	17	4	2	15	16	54
OCTOBER	16	3	1	11	14	45
NOVEMBER	15	3	1	9	13	41

STATION – 1 FREE FROM POLLUTION JUNE 2019- NOV 2019

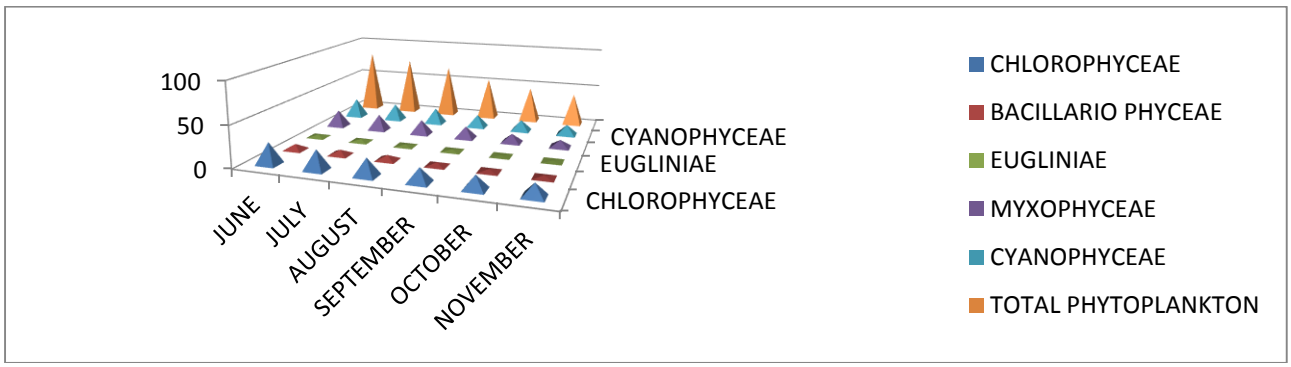


STATION-II LESS POLLUTION FROM JUNE 2019 – NOV 2019

STATION – III JUNE 2019- NOV 2019 POLLUTED AREA



STATION – IV- JUNE 2019- NOV 2019 HIGH POLLUTED AREA



Phytolankton Analysis

Surface water samples were collected with the help of a satin net (pore diameter 4.5 m) fitted to an aluminium frame around 8:00 a.m. for a period of two years (2016-17 and 2017-18). Collection was done on a monthly basis. The counting of algae was done using a Sedgwick-Rafter Counting Cell (Saxena, 1987). Samples were isolated and identified by standard manuals (Geitler, 1932; Desikachary, 1959; George, 1962; Starmach, 1966; Pennak, 1978; Rippka*et al*., 1979; Adoni and Vaishya, 1985; Trivedy*et al*., 1987; Sridharan, 1989; Kanungo*et al*., 2005). While phytoplankton population density was estimated by drop method as described by Pearsall *et al*. (1946), counting and identification of algae and euglenoids were done by following Pennak (1978), Prescott *et al.* (1982), Adoni and Vaishya (1985), Trivedy*et al*. (1987) and Sridharan (1989). In addition, diversity indices were also calculated following Trivedy*et al*. (1987). Finally, the results obtained in the present study were statistically treated for a meaningful discussion.

4. CONCLUSION

Clean and adequate freshwater is vital to survival of all living organisms and the smooth functioning of ecosystems, communities and economies. Declination in water quality has become a global issue of concern as human population grow, industrial and agricultural activities expand and climate change threatens to cause major alterations to the hydrological cycle. During the study of River Cauvery in Tamilnadu.It is clearly found that due to large number of human activities the river water is flowing towards the declination. Not only the domestic and commercial but in last decade industrial setups has also increased in areas near to water body in this region, increasing the load of pollution on the River. The present study

concluded that physico-chemical and phytoplanktonic characteristics of River Cauvery showed seasonal variation. Appropriate biological and chemical treatment of domestic sewage and industrial effluents before discharge to river system is suggested. Hence it is essential to undertake regular monitoring and surveillance of important aquatic ecosystems.The recent years it has been yielding from various problems like urbanization and growth of various small scale industries near by leading to its pollution.

Acknowledgement
My Sincere thanks to professor Dr.G.Jagadeesen Professor and Head .Department of Zoology Annamalai University and thanks to all my professors for the encouragement of this work.

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