Research Paper Environment

The Study on Phytoplankton Diversity from Godavari River Water

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ABSTRACT

Phytoplankton is the pioneer of an aquatic food chain. The phytoplankton has great significance in the biology of the creek as they provide the food for the organisms, especially for Zooplankton. The Phytoplankton samplings on monthly basis were carried out for a period of one year from 2011 to 2012 from Godavari River water. Standard keys and other literature were used for identification of different species. Four major groups of phytoplankton (Chlorophyceae, Bacilloriophyceae, Cynophyceae and Euglenophyceae.) were studied for diversity and seasonal abundance. Among the groups of phytoplanktons, the population density showed variations due to their adaptability to seasonal changes in water quality. Some plankton population disappeared at a specified period and reappeared during other period. This disappearance may be due to the fact that some species occur in spores, under favorable conditions spore germinate and appear as plankton. Assessment of river water bodies with reference to species diversity of flora was done in three different seasons' summer, monsoon and winter.

KEYWORDS Godavari River Water, Phytoplankton diversity, Water quality and Aquatic food Chain

INTRODUCTION:

The planktonic study is a very useful tool for the assessment of water quality in any type of water body and also contributes to an understanding of the basic nature and general economy of the river. Plankton occurs in all natural water as well as in artificial impoundments like ponds, tanks, reservoirs, irrigation cannels, etc. Phytoplankton being the primary producer from the lowest trophic level in the food chain of fresh water ecosystem and plays a key role in fish culture. The number ad species of phytoplankton serves to determine the quality of water body. The structure of aquatic community is important in monitoring the water quality. The number of worker were studied the dynamics of Phytoplankton population. Haque et. al, (1989) studied the composition and seasonal abundance of phytoplankton in tropical fresh water pond at Aligarh. Many workers have published their work on aquatic environment and ecology of Phytoplankton in fresh water. Khan (1992) Yogesh Shastry et al., (1999), Dwivedi and Pandey (2002), More and Nandan (2003) Mazher Sultana and Dawood Sharief (2004), Sirsat et al., (2004). The man's influence on these water bodies caused by rapid cutting of surrounding vegetation, thus increasing silt and nutrient load, disposal of sewage and industrial waters, use for defecation, cultural activities, and agriculture chemicals greatly increased the quantity of nutrients and organic input into a water body (Patil. et.al. 2011, Patil and Ghorade, 2012). Considering ecological, economical and recreational promise of the water body, present work was undertaken to assess water quality in terms of seasonal diversity and population density of Phytoplankton. In the present study attempt was made to study eco-sustainability assessment of Godavari river water flowing in Maharashtra from Nasik to Nanded by studying phytoplankton quantification and their seasonal abundance and their seasonal diversity to indicate the sustainability of water from drinking point of view.

MATERIAL AND METHODS:

Survey of Godavari river water bodies was carried out to assess the phytoplankton quantification and their seasonal abundance for their seasonal diversity to indicate the sustainability of water quality. The water samples for phytoplankton analysis were collected from the Godavari river. Nearly of about 04 sampling stations were selected after survey such as Kopergaon Bridge-S1, Kaygaon Toka-S2, Jaikwadi Dam-S3, Kholi Naka-S4, from upper Godavari and lower Godavari river basin approximately at the distance of 50 km, as per the guidelines of Maharashtra Pollution Control Board and Central Pollution Control Board. The Phytoplankton sampling on monthly basis was carried out for a period of one year from October 2011 to September 2012 from Godavari river water. The samples were collected monthly in the morning between 6.00 a.m. to 10.00 a.m. For qualitative analysis a compound microscope was used. Standard key and other literature was used for identification of different species (Auti et. al. 2003, Patil et. al 2008). The analysis of samples was carried out in the research laboratory. The survey of Godavari river water is carried out with references to species diversity of flora such as location, nature of catchment area and main human activities.

RESULTS AND DISCUSSION:

In the present study among the group of phytoplankton's the Chlorophyceae were recorded maximum flowed by Bacilloriophyceae, Cynophyceae and Euglenophyceae (Table-1).

In summer, monsoon and winter at all stations the Chlorophyceae was maximum followed by Bacilloriophyceae, Cynophyceae and Euglenophyceae except S1 in winter, S2 in summer chlorophyceae was maximum followed by cynophyceae, bacilloriophyceae and euglenophyceae.

Some plankton population disappeared at a specified period and reappeared during other period. This disappearance may be due to the fact that some species occur in spores, under favorable conditions spore germinate and appear as plankton (Dahiwale, 2008). In the present study it is observed those 10 genera of Chlorophyceae, 6 genera of Bacilloriophyceae,

5 genera of Cynophyceae and 4 genera of Euglenophyceae. Chlamydomonas, Cladophora, Oedogenium and pediastream species were dominant from Chlorophyceae probably due to favourable environmental conditions (Kumawat and Jawale 2003; Yeole and Patil 2005; Pawar et.al. 2006) Low phytoplankton's especially Euglenophyceae was observed to be less in quantity in almost all the stations during all the seasons (Somani and Pejavar, 2003) (Table-3).

The Chlorophyceae was maximum in monsoon 38.88% (S4) and minimum in monsoon 29.50% (S1). The Bacilloriophyceae was maximum in monsoon 29.62% (S2) and minimum in summer 22.03% (S2). The Cynophyceae was maximum in winter 25.85% (S1) and minimum in winter 18.91% (S4). The Euglenophycea was maximum in summer 20.90% (S2) and minimum in winter 14.72% (S2).

The production of phytoplankton is directly correlated with phosphate, silicates as well as nitrogen (Borse et.al. 2000). Cynophyceae are found generally on rocks or soil forming a blackish crust when dried out. It contains Chlorophyll a Phycobicyanin and other pigments help the algae to synthesize their own food from carbon dioxide and water in presence of sunlight (Bhadran, 2001). The Euglenophyceae are in greater number at organically polluted water bodies. Munawar (1974) observed blue green algae and euglenoid flagellater's were mostly associated with organically rich effluents, low in dissolved oxygen. In the present study, Euglenophyceae was found to be maximum in summer and minimum in winter water in almost all stations due to sufficient amount of dissolved oxygen and good amount of nutrients (Pendse et.al. 2000). The temperature ranged 28-35^0 C, low pH and high iron content are also favorable factors for the growth of Euglenophyceae (Borse et.al. 2000; Pendse et.al. 2000; Bhadran, 2001).

The conservation of Godavari river water is in interest of man as it's ecological, cultural and tourist value is immense. This study will help in understanding the amount of toxic compounds being received in river and its biological magnification in animals particularly those at the lower level of food chain. This study will also help to make aware the local peoples for proper management of waste disposal and also to minimize the waste land and its biological magnification of toxic metals due to toxic compounds in food chain, which is a challenge to scientists, policy makers, administrators and all those involved in the conservation of the environment. Thus there is need to stop these ecologically destructive developments in the river and its environment.

Conservation of the fresh water bodies including all rivers must be considered as pious duty of the State and the citizens of the Country. The river must be conserved at any cost for the benefit of the present and future generations. No commercial and selfish interests should be allowed to play their diabolical role and the State should achieve the national goal of the potable water to all free of cost.

TABLE-1: Seasonal Variation in Phytoplankton's (per ml) at different stations along the bank of Godavari River from Maharashtra (2011-2012).

Phytoplanktons	S1			S2			S3			S4		
Seasons	S	M	W	S	M	W	S	M	W	S	M	W
Chlorophyceae	61 33.51%	54 29.50%	50 34.01%	56 31.63%	51 31.48%	47 36.43%	75 35.37%	61 29.61%	56 34.14%	62 34.25%	70 38.88%	55 37.16%
Bacilloriophyceae	50 27.47%	47 25.38%	34 23.12%	39 22.03%	48 29.62%	32 24.80%	56 26.41%	58 28.15%	46 28.04%	51 28.17%	47 26.11%	39 26.35%
Cynophyceae	37 20.32%	44 24.04%	38 25.85%	45 25.42%	37 22.83%	31 24.03%	41 19.33%	46 22.33%	33 20.12%	37 20.44%	36 20%	28 18.91%
Euglenophyceae	34 18.68%	38 20.76%	25 17%	37 20.90%	26 16.04%	19 14.72%	40 18.86%	41 19.90%	29 17.68%	31 17.12%	27 15%	26 17.56%
Total	182	183	147	177	162	129	212	206	164	181	180	148

(S1to S4 = Station 1 to Station 4). (S = Summer, M = Monsoon, W = Winter).

TABLE-2: Phytoplankton population of Godavari River Water (2011-2012).

Sr. No.	Phytoplankton	Species
1.	Chlorophyceae	Closterium
2.	Bacilloriphyceae	Cosmerium
3.	Euglenophyceae	P. Duplex
4.	Cynophyceae	Oedogonium patulum
		P. tetras
		P. simplex
		N. subtilis
		E. acus
		Nitzshia
		Navicula accomoda
		O. chlorine
		O. cortiana
		Spirulina
		E. granulate

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