Y.Seeta et al. International Journal of Recent Research Aspects ISSN: 2349-7688, Vol. 5, Issue 1, March 2018, pp. 70-73

Diversity of Diatoms in the Rivers of Telangana

Y.Seeta[1] and P. Manikya Reddy[2]

[1]Research Scholar, Department of Environmental Science, Osmania University, Hyderabad-500007, Telangana, India.

[2]Professor, Department of Botany, Osmania University, Hyderabad-500007, Telangana, India.

Abstract: **The diversity of diatoms in the rivers has been investigated for a period of two years (May-2015 to April-2017). Collection of algal samples from Krishna, Godavari and Manjira rivers covering a distance of 20 km. has been carried out. Three sampling stations were selected along with each river, in Manjira near Singur reservoir, in Krishna near Gadwal and in Godavari near Basara. Surface water and algal samples were collected seasonally. Samples were collected randomly from different spots. Water samples were analysed some important nutrient parameters by following the standard procedures APHA, 2005. Uniform size pebbles were collected for benthic algae. In the rivers diatoms showed rich species diversity. Diatoms maximum growth and development was observed during winter months and minimum during summer and rainy seasons. Among the diatoms the species of Cymbella showed rich diversity and variation.**

Key words: **Diversity, Diatoms, Krishna, Godavari and Manjira.**

I. INTRODUCTION

The diverse use of freshwater is based on its unique physico-chemical and biological properties. The healthy aquatic ecosystem is depended on the physico-chemical and biological characteristics (Venkatesharaju et al., 2010). The quality of water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem. Good quality of water resources depends on a large number of physico-chemical parameters and biological characteristics (Narwade et al., 2015).The diatoms constitute an important component of the fresh water or marine plankton, the environmental factor such as physico-chemical and biological factors influence the abundance and species richness of diatoms, which is reflected in their seasonal variations (Mahajan, 2001 and Tiwari et al., 2006). Study of planktonic diversity contributes to an understanding of the environmental status of a water body. The present paper deals with the diversity of diatoms in the rivers of Krishna (near Gadwal), Godavari (near Basara) and Manjira (near Singur reservoir) in Telangana.

II. MATERIAL AND METHODS

The river Krishna is 1300km long, rises near Mahabaleshwar in the Western Ghats and transverses through the states of Maharastra, Karnataka, Andhra Pradesh and Telangana. Godavari enters in to Telangana in Adilabad district at Basara. The river flows along the border between Adilabad in the north and Nizamabad, Karimnagar districts to its south. About 12 km (7.5 mi) after entering Telangana it merges with the back waters of the Sriram Sagar Dam. Manjira is the main river which its origin is near the Gaukhadi village of Beed district. The river flows from the northern boundaries of the Osmanabad district and cutting across the Latur district goes to Karnataka State, Telangana and finally Andhra Pradesh.

Three sampling stations, covering a distance of 20 km were selected. Surface water and algal samples were collected seasonally and analyzed for the period of two years (May-2015 to April-2017).Water samples were analysed some important nutrient parameters by following the standard procedures APHA, 2005.Collections were made using plank tonic net (pore size 40 µm) in open water. All the collected water samples were fixed with 4% formaldehyde. For benthic algae small pebbles coated with brown or green scum were picked up from all the stations along with 100ml surface water. After returning to the laboratory the algal material was scraped and preserved.

III. RESULTS AND DISCUSSION

The average values of physico-chemical parameters were presented in table: 1

The river water was alkaline with pH always above 8.5.Carbonates were recorded throughout at all the stations carbonates ranged from 19-25 mg/L in all the rivers. Bicarbonates were fluctuated between 180-205 mg/L at all the stations. In the rivers the chlorides were present in 20-32 mg/L at all the stations. Dissolved oxygen always above 6 mg/L. It is an essential indicator of water quality and determines the diversity and distribution of algal population. Organic matter and nitrites were recorded in very low concentrations throughout the period of investigation. Total hardness ranged from 110-130 mg/L. Calcium was always higher than the Magnesium. Silica fluctuated in a range of 5-

8 mg/L. Phosphates were present in between 0.01 to 0.03 mg/L throughout the period of investigation. Phosphates were recorded in traces, whereas silica fluctuated between 5-10 mg/L. Sivakumar and Karuppasamy, 2008 also reported similar findings in the rivers Krishna, Godavari and Manjira Rivers.

Algae:

Both phytoplankton and benthic algae have been studied at all the rivers investigated. In all the stations the diatoms were dominated followed by blue-green algae and green algae. Diatoms maximum growth and development was observed during winter months and minimum during summer and rainy seasons. The diatoms were dominant in these rivers and this is in agreement with the findings of earlier workers (Venkateswarlu, 1981 and Manikya Reddy and Chandra Shaker, 2008).

Higher level of DO, alkaline pH has favored the growth and multiplication of diatoms. The present findings are in accordance with the findings of Zafar, (1964) and Najeeb, (2012). The most important nutrients like nitrates, phosphates and silica and dissolved oxygen also affect the growth of algae in particular diatoms. Iyengar and Venkatraman (1951) and Tiwari and Shukla (2007) have pointed out the importance of silica in the diatoms periodicity and observed that with the increase in diatom population causes the increase in silica content in the waters.

In the river Krishna among diatoms *Cymbella aspera, C.tumida,C. cymbiformis, C.affinis, C.tumidula, C.cistula, Gomphonema montanum, G. constrictum var. capitatum, G. gracile, G. lanceolatum, Stauroneis phoenicenteron, Navicula cuspidate* and *Mastogloia smithii* mainly formed the bulk of populations.

In the river Godavari the bulk of the diatom population was made up of species belonging to *Melosira granulata, Synedra ulna, Cymbella aspera, Gyrosigma acuminatum Naviculacryptocephala, Anomoneis sphaerophorum, Amphora ovails, Gomphonemamontanum, Nitzschiadenticula* and *Surirellaoveta*. In the river Manjira also the diatoms constituted the bulk of algal populations which included the species of *Diploneis ovalis, Cymbelladelicatula, Mastogloia smithii, Pinnularia biceps, Gyrosigma acuminate, Achnanathesmicrocephala, Rhapalodiagibba, Navicula rhynchocephala* and *Synedra tabulate* (Plate:1). Among the three rivers Krishna River shows rich species diversity, particularly *Cymbella* species, whereas Godavari river shows rich in *Gomphonema* and *Pinnularia*species and Manjira river shows rich diversity in *Navicula* and *Cymbella*. This is mainly due to its topography and climatic conditions of the rivers.

IV. CONCLUSIONS

The physico-chemical parameters in the rivers reveal that the water is unpolluted as the dissolved oxygen content was high and organic matter, phosphates and nitrites were present in very low concentration. The water was always alkaline. Carbonates and bicarbonates were present in considerable quantities. The hardness of water appears to be temporary which is mainly due to the carbonates and bicarbonates of calcium and magnesium. Silica was present considerable quantities. In the rivers the diatoms constituted the main bulk of benthic algal populations at all the stations. Similarly biological flora indicates that the species were represented by unpolluted nature of the water. All the three rivers show rich species diversity of diatoms. The species belongs to very good indicators of water quality in the rivers. The river waters can be safely used for drinking and irrigation purposes.

ACKNOWLEDGMENTS

One of the author is highly thankful to DST, New Delhi for providing Inspire fellowship. The authors are thankful to Head, Department of Botany, Osmania University for providing laboratory facilities.

REFERENCES

[1]. APHA, 2005. Standard Methods for the Examination of Water and Wastewater. 21st Edn. APHA, AWWA,WPCF, Washington DC, USA.

[2]. BrijNandan Kumar and Sunil Kumar Chowdary. 2010. Phytoplankton species - diversity of Bhagalpur wet land, Bhagalpur, Bihar (India). J. Indian bot. soc.89 (3 & 4)358-363.

[3]. Iyengar, M.O.P., and Venkataraman, G.S., 1951. The ecology and seasonal succession of the river Cooum at Madras with special reference to the Diatomaceae, J.Madras Univ. 21: pp. 140 - 192.

[4]. Mahajan SR, 2001. Ecological studies of algae from certain lakes of Jalgaon district of North Maharashtra University, Jalgaon.

[5]. Manikya Reddy P. and Chandra Shekar P., 2008. Ecophycological Studies in the river Krishna (A.P.) with reference to water Quality. J. Indian. Bot. Soc. 87(1 & 2) 111-115.

[6]. Najeeb, A. B. 2012. phytoplankton diversity in relation to physicochemical characteristics of upper basin (Bhoj wetland), bhopal, India. International Journal of Geology, Earth and Environmental Sciences. Vol. 2 (3) September - December, pp.147-153.

[7]. Narwade K.B., Mulani R.M., Bhosle A.B., Yannawar V.B. 2015. Identification of Fresh Water Algae from Sahastrakund Waterfall, Nanded [MH]. sciencepub.net/report. 7(4): 9-15.

[8]. Sivakumar, K. and Karuppasamy, R. 2008. Factors affecting productivity of phytoplankton in a reservoir of Tamilnadu, India. American Eurasian Journal of Botany 1(3); 99-103.

[9]. Tiwari, D. and Shukla, M. 2007. Algal biodiversity and trophic status of some temporary water bodies

of Kampur. Nat. Environ. Pollut. Technol., 6, 85-90.

[10]. Venkateshraju K., Ravikumar, P., Somashekar, R.K and Prakash, K.L. 2010. Physico-chemical and Bacteriological Investigation on the river Cauvery of Kollegal Stretch in Karnataka. Journal of Science, Engineering and Technology. 6(1): 50-59.

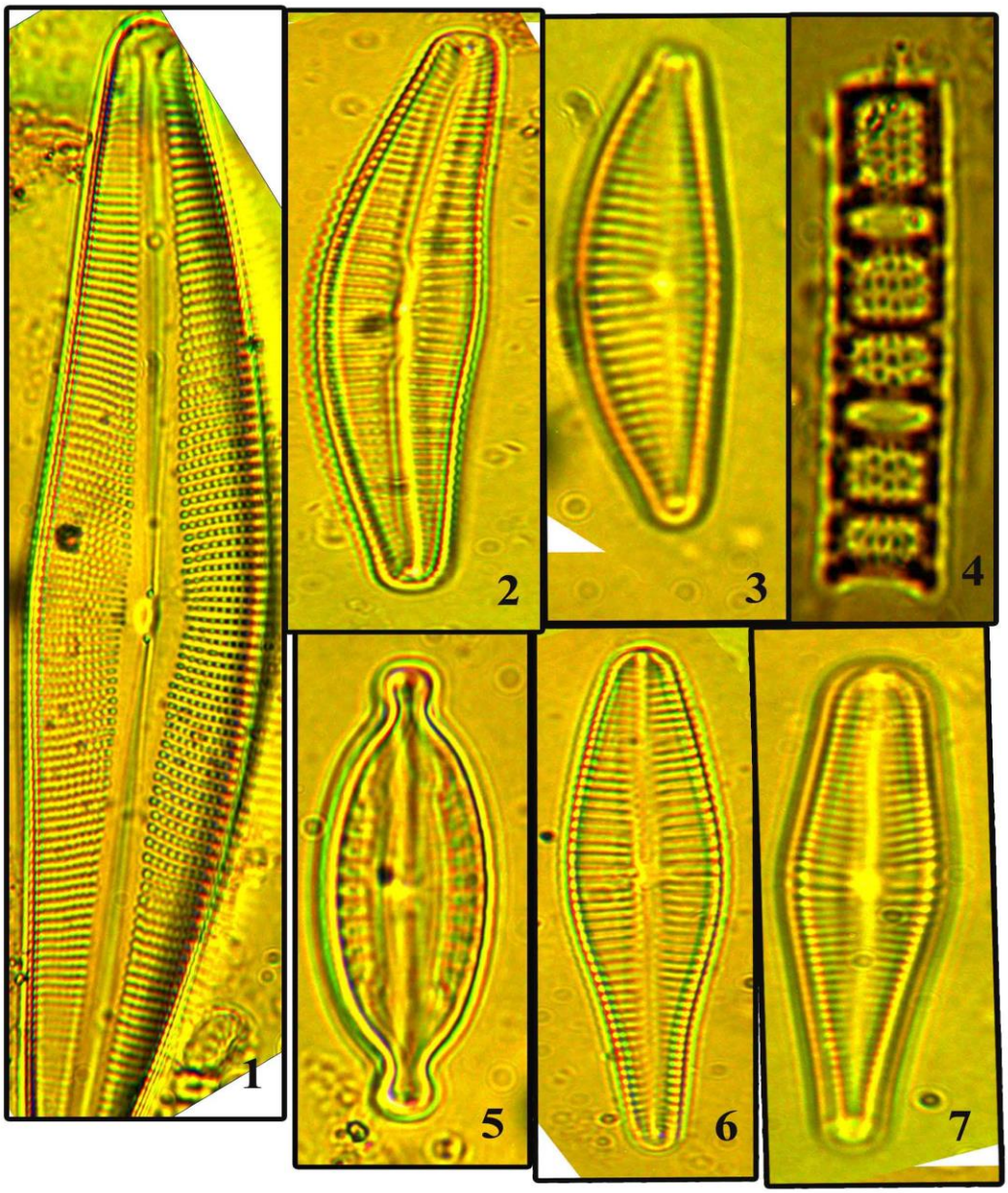
[11]. Venkateswarlu, V. 1969. An ecological study of the algae of the River Moosi, Hyderabad (India) with special reference to water pollution. Hydrobiologia, 34(3-4): 533-560.

[12]. Zafar AR. 1964. On the Ecology of the Algae in certain fish ponds of Hyderabad, India, I. Physico-chemical complexes, Hydrobiologia 23, 179-195.

Table 1: Two years average values of physico-chemical parameters
All the parameters are expressed in mg/L except pH

Factors	Krishna			Godavari			Manjira		
	Station-I	Station-II	Station-III	Station-I	Station-II	Station-III	Station-I	Station-II	Station-III
pH	8.57	8.52	8.64	8.52	8.66	8.52	8.5	8.5	8.6
Carbonates	19.76	24.46	22.76	21.35	22.45	20.24	21.80	23.66	22.73
Bicarbonates	192.56	178.00	186.54	190.12	201.52	174.76	192.03	183.33	187.68
Chlorides	27.86	22.58	28.86	30.16	26.54	31.16	27.81	22.88	25.35
DO	7.92	7.78	7.54	7.62	7.34	7.54	7.47	7.87	7.67
Organic matter	0.54	1.14	0.88	0.97	1.14	0.86	1.20	0.86	1.03
Total hardness	112.9	110.80	116.46	101.56	122.58	118.34	122.25	126.68	128.24
Calcium	32.36	33.26	29.76	33.26	28.78	32.22	33.26	29.26	34.26
Magnesium	18.56	19.58	18.46	14.58	13.26	15.56	12.54	11.24	12.86
Phosphates	0.018	0.016	0.017	0.005	0.006	0.004	0.014	0.021	0.018
Sulphates	16.58	15.54	16.44	14.12	12.24	15.46	10.14	15.42	12.46
Silica	7.80	7.42	7.50	5.32	4.82	5.79	6.67	7.27	6.97
Nitrites	0.019	0.011	0.029	0.005	0.009	0.003	0.019	0.004	0.011

PLATE - 1



1) *Cymbella aspera* (Ehr) *2) C. affinis* (Kutz) *3) Cymbella turgidula* Grun. 4) *Melosira granulata* (Ehr) 5) *Mastogloia smithii* 6) *Gomphonema montanum* schum. var. *genuinum* Mayer. 7) *Gomphonema constrictum* (Ehr) var. *capitatum*

