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PHYTOPLANKTON DIVERSITY IN TWO MAJOR FRESH WATER DAMS OF NORTHERN TELANGANA

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Abstract

In the present investigation, the diversity of planktonic algae of selected fresh water dams of Northern Telangana region was studied. Samples were collected from six sampling sites of two major freshwater systems of North Telangana region namely Sri Ram Sagar Project (SRSP) and Lower Manair Dam (LMD). A total of 59 species of algae belonging to four classes were identified. Class Bacillariophyceae dominated in all the sites. The diversity of Chlorophyceae and Cyanophyceae were less which clearly indicates that the fresh water systems under investigation were not polluted.

Keywords: Diversity, Planktonic algae, Freshwater ponds, Telangana

Introduction

Fresh water algae constitute a highly diverse group of organisms visible mostly with the help of a microscope (Bellinger *et al*. 2010). They have a wide range of size from less than one micrometer to several centimetres. Algae are important primary producers in both fresh water and marine systems. In many lakes and rivers they generate biomass which is the foundation of inverse food chains (Aruna *et.al* 2018), Although algae have beneficial impacts on aquatic ecosystems they can also have adverse effects; produce 'blooms' that, on decomposition, deoxygenate the water causing fish death and other ecological problems. It is important to be aware of these impacts and to monitor waters for the presence of these potentially harmful organisms. (Prescott, 1951) Algal flora constitutes about 1.6 % of the total biodiversity. They are represented by about 1800 genera and 21000 species. The algae are one of the least known and less documented groups of lower plants (Easa, 2004). Since indigenous fresh water systems are the hotspots of diverse and rare algal components, the studies of local aquatic systems like ponds, pools, rivers etc. are of very much relevance. A review of the literature on phycological studies of Telangana region showed that only scanty information is available. It is confined to the studies on algae associated with the rhizosphere of *Funaria hygrometrica* and Cyathodium cavernarum by Girish Kumar *et al*. (2010) made a preliminary study on the planktonic algae of wetland habitats. Gopinathan and Sivadasan (2012) have studied the microalgae of Mahe estuary. Girishkumar *et al.* (2014) reported the diversity of planktonic algae of selected dams of Telangana. In order to elaborate the database on the diversity of planktonic algae of fresh water systems of NorthTelangana region the present study was undertaken.

Material and Methods:

Samples were collected from selected sampling sites of both the fresh water system i.e. Sri Ram Sagar Project (SRSP) and Lower Manair Dam (LMD) during the period 2018-2020. Morphometric features of the selected sites were studied by visual observations. Samples were collected from selected sampling sites by following standard procedures. Specific mesh net of size 10 micron was used for separating the algal components. The algal components were filtered from the water surface. A sterile container of one litre volume was used and sample collections full of surface water from different locations of the sites were filtered through the mesh which was placed over a sieve. The algal sediment collected over the mesh was immediately transferred to the sterile sample bottle by using a funnel and sealed along with the pond water. Collected algal samples were stored in refrigerator. The bottled algal samples were centrifuged at 6000 rpm in a centrifuge and the upper filtrate was discarded. The sediment was collected with the help of a dispenser and mounted in Glycerin. The photographs were taken and the dimension of the algae was measured using micrometer. The whole process was repeated thrice for accurate results. Algal species were identified with the help of Prescott (1968), Krishnamurthy (2000), Bellinger *et al.* (2010), John J. & Francis (2013) etc.

Fig:1 Selected fresh water systems for study (Sri Ram Sagar Project& Lower Manair Dam)

SRI RAM SAGAR PROJECT (SRSP) **LOWER MANAIR DAM (LMD)**

Results and Discussion: In the present investigation, six sampling sites were selected three each from Sri Ram Sagar Project and Lower Manair Dam (Table- 1) for observing the diversity of planktonic algae.

Table 1. Selected sampling sites from two major fresh water systems of North Telangana region.

Sl.No	Sampling Site	Fresh Water System	Location
1.	SRSP1	Sri Ram Sagar Project	Nizamabad District
2	SRSP2	Sri Ram Sagar Project	Nizamabad District
3	SRSP3	Sri Ram Sagar Project	Nizamabad District
4	LMD1	Lower Manair Dam	Karimnagar District
5	LMD2	Lower Manair Dam	Karimnagar District
6	LMD3	Lower Manair Dam	Karminagar District

The algal components of phytoplanktonic community, collected from two major fresh water systems in the study area, were highly diverse. A total number of 59 different algal species were recorded (Table- 2). These planktonic algae belong to 4 different classes (Fig 2), namely Bacillariophyceae, Cyanophyceae, Chlorophyceae and Euglenophyceae. Out of these, 24 belong to Bacillariophyceae, 11 species belongs to Cyanophyceae, 21 species belongs to Chlorophyceae and three species belongs to Euglenophyceae. Members of Bacillariophyceae are dominant in all the sampling locations followed by Chlorophyceae and Cyanophyceae (Table 2)

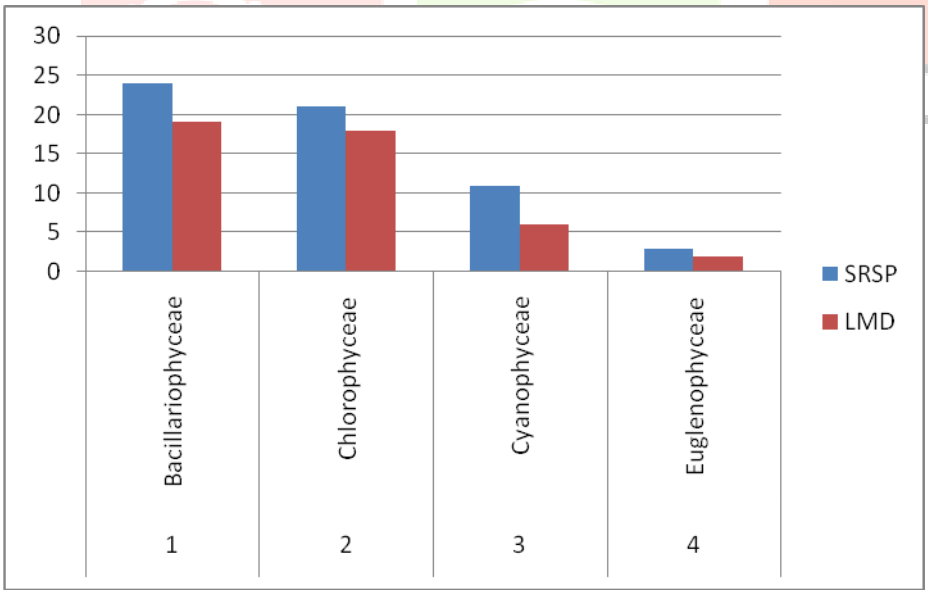
Table 2. Algal species identified from different sampling sites of selected fresh water systems

SL.NO	SPECIES NAME	CLASS	S1	S2	S3	L1	L2	L3
1	*Achanthes microcephala ((Bremekamp)*	Bacillariophceae	+	+	+	+	-	-
2	*Anabaena cercinalis (Rabenhorst)*	Cyanophyceae	-	+	+	-	+	+
3	*Ankistrodesmus falcatus (Corda)*	Chlorophyceae	--	+	--	+	--	--
4	*Arthospira(Gomont)*	Cyanophyceae	+	--	--	--	--	--
5	*Amphora ovalis(Kutzing)*	Bacillariophceae	--	--	+	--	+	--
6	*Anabaena(Bory de saint)*	Cyanophyceae	-	-	+	+	+	-
7	*Bulbocheate (S Naz)*	Chlorophyceae	+	+	+	--	--	--
8	*Cymbella aspera(Cleve)*	Bacillariophceae	+	+	+	--	+	+
9	*Closterium turgidum (Ehrenberg)*	Chlorophyceae	+	+	+	--	+	--
10	*Cosmarium margaritatum(Reinsch)*	Chlorophyceae	+	+	+	+	--	+
11	*Cosmarium pseudonitidulum(Nordstedt)*	Chlorophyceae	+	+	+	+	+	+
12	*Cosmarium varilatum (P.Lundell)*	Chlorophyceae	+	+	+	--	+	--
13	*Cosmarium subroomii (Nordstedt)*	Chlorophyceae	+	+	+	--	--	+
14	*Cosmarium granatum(Brebisson)*	Chlorophyceae	+	+	+	+	+	+
15	*Cymbella affinis (Kutzing)*	Bacillariophyceae	+	-	-	--	+	--
16	*Cymbella aspera(Ehrenberg)*	Bacillariophyceae	+	-	-	--	--	--
17	*Chrorococcus turgidis(Kutzing)*	Chlorophyceae	+	-	+	+	--	--
18	*Chrorococcus minutes(Kutzing)*	Chlorophyceae	-	+	+	--	+	--
19	*Coelastrum cambricum (W.Archer)*	Chlorophyceae	-	+	-	+	+	-
20	*Cyclotella meneghiniana(F.Stoermer)*	Bacillariophyceae	-	-	+	+	--	--

21	*Cyclotella stelligera (Van Heurck)*	Bacillariophyceae	-	+	-	+	+	+
22	*Cymbella Helvetica (Kutzing)*	Bacillariophyceae	+	-	+	-	+	-
23	*Cocconeis placentula (Ehrenberg)*	Bacillariophyceae	-	-	+	+	-	-
24	*Cymatopleura solea (W.Smith)*	Bacillariophyceae	-	+	-	+	-	+
25	*Euglena acus (Ehrenberg)*	Euglenophyceae	+	+	+	-	+	-
26	*Euglena minuta (Presscot)*	Euglenophyceae	+	+	+	-	-	+
27	*Euglena polymarpha (P.A. Dangeard)*	Euglenophyceae	+	+	+	-	-	-
28	*Euastrumin spinlosum –(Eichler)*	Chlorophyceae	+	+	+	--	+	+
29	*Gomphonema intricatum(Kutzing)*	Bacillariophyceae	+	+	+	+	--	--
30	*Gomphonema lancepolata (Ehrenberg)*	Bacillariophyceae	+	+	+	--	--	--
31	*Gomphonema montanum (Schumann)*	Bacillariophyceae	+	+	+	+	--	+
32	*Gomphonema lanceolatum (Ehrenberg)*	Bacillariophyceae	+	-	+	--	+	--
33	*Gleotrichia raciborskii (Var.Kashiensis)*	Cyanophyceae	+	+	+	--	+	--
34	*Gomphospharia aponia (Kutzing)*	Cyanophyceae	-	+	-	--	--	--
35	*Melosira Granulata (Ehrenberg)*	Bacillariophyceae	+	+	+	+	--	+
36	*Melosira Varians (C.Agardh)*	Bacillariophyceae	-	-	-	+	-	+
37	*Merismopedia Glauc(Ehrenberg)*	Cyanophyceae	+	+	+	-	-	+
38	*Navicula Rhynocephala (Kutzing)*	Bacillariophyceae	+	+	+	-	-	-
39	*Navicula cuspidata (Kutzing)*	Bacillariophyceae	+	+	+	-	+	+
40	*Navicula protracta (Grunow)*							
41	*Nitzschia denticula (Grunow)*	Bacillariophyceae	+	+	+	-	-	+
42	*Mastogloea smithii (Thwaites)*	Bacillariophyceae	-	-	+	-	-	-
43	*Oedogonium globosum (Nordstedt)*	Chlorophyceae	+	+	-	-	+	-
44	*Oscillatoria quadripunctulata(Vaucher)*	Cyanophyceae	+	+	+	-	-	-
45	*Oocystis Elliptica (West)*	Chlorophyceae	+	--	-	+	-	-

46	*Oscillatoria Formosa(Bory)*	Cyanophyceae	-	+	-	+	-	-
47	*Pediastrum simplex(Meyen)*	Chlorophyceae	-	+	-	-	+	+
48	*Pediastrum duplex(Meyen)*	Chlorophyceae	+	+	+	+	-	-
49	*Pleurotaenium (Eheren berghii)*	Chlorophyceae	+	+	+	-	-	-
50	*Rhopalodia gibba (Ehr. O.Mull)*	Bacillariophyceae	+	+	+	+	+	-
51	*Rhopalodia gibba var. ventricosa (Her Grun)*	Bacillariophyceae	+	+	+	-	-	+
52	*Rivularia aquatic(De Wildeman)*	Cyanophyceae	+	+	+	-	+	+
53	*Synedra ulna (Nitzsch)*	Bacillariophyceae	+	+	+	-	+	+
54	*Scenedesmus quadricauda (Brebisson)*	Chlorophyceae	+	+	+	+	-	-
55	*Staurastrum tetracerum (Meyen)*	Chlorophyceae	+	+	+	-	-	-
56	*Spirogyra (Marcus Merritt)*	Chlorophyceae	+	-	-	+	+	+
57	*Sururella (Grunow)*	Chlorophyceae	-	-	-	+	+	-
58	*Scenedesmus armatus(Gugliemetti)*	Chlorophyceae	-	+	-	--	-	-
59	*Tetraedron regulare (Kutzing)*	Chlorophyceae	+	-	-	-	-	-

Fig 2: Comparison of Phytoplankton species of two fresh water systems

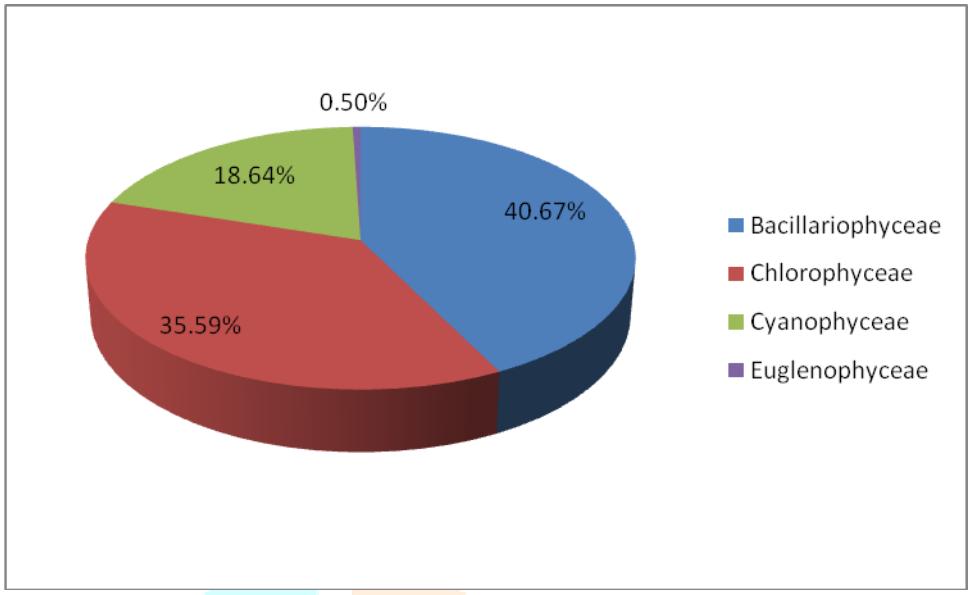


Among the total phytoplankton Bacillariophyceae is the dominating group followed by 35.59% of Chlorophyceae. The other groups are Cyanophyceae- 18.64%, Bacillariophyceae-40.67% and Euglenophyceae-0.50% during this study period respectively (Fig 3).

In this paper an effort has been made to study the diversity of phytoplanktons of two major fresh water systems of North Telangana region. During the present study the great diversity of phytoplankton were recorded. Similar studies have been made by various researchers in India, Mahajan and Nandan, 2005;

Shekhar *et al.*, 2008; Arulmurugan *et al.*, 2011; Das S.K and Adhikary S.P 2014*;* Ragland A. *et al.,2014;* Sonam Sharma and VK Yadav,2020.

Fig 3: Percentage of Phytoplanktonic Classes found in the two fresh water systems



CONCLUSION

Sri Ram Sagar Project (SRSP) and Lower Manair Dam (LMD) are two major fresh water systems of North Telangana Region. These two fresh water systems have varied diversity of Phytoplankton. Fresh water algae have numerous environmental functions and are playing vital role in the recycling of nutrients. Urbanization has led to the pollution of fresh water systems resulting in extinction of some species. On the other hand, few species have increased largely making water unfit for drinking and recreation. Enormous work is done either on taxonomic account or limnological account; but studies on the combined aspects is lacking. Information on the algal biodiversity and related aspects pertaining to the fresh water systems in Telangana state is unavailable. The present study reveals the algal biodiversity of two major fresh water systems of North Telangana region. Of 59 algal species, the Bacillariophyceae is the dominating group followed by 35. 59% of Chlorophyceae. The other groups are Cyanophyceae- 18.64%, Bacillariophyceae- 40.67% and Euglenophyceae- 0.50%. Interestingly, the members of Chrysophyceae and Dinophyceae were completely absent. Hence, in order to conserve the algal species, regular removal of bloom forming algae from both fresh water systems by algaecide application may be useful in controlling bloom which in turn may facilitate the growth of other algae and point to be noted that, “Preserving algal diversity" is the main significant out-put of the present study. The findings provide an important piece of information of planktonic algal distribution in in two major fresh water systems of North Telanagana region that had not been explored before.

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