

Seasonal Distribution of Micro Algae in Kondakarla Ava/Lake, Visakhapatnam District, Andhra Pradesh, India

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Abstract

Present investigation aims to study the seasonal fluctuations of micro algae in Kondakarla Lake (Visakhapatnam district, Andhra Pradesh) for a period of one year from March 2024 to February 2025. A total of 115 species were reported which belongs to different categories of algae such as Chlorophyceae (46), Bacillariophyceae (34) Cyanophyceae (27) and Euglenophyceae (8). It was observed that species diversity and abundance of micro algae varied seasonally. Pre monsoon and post monsoon seasons recorded a greater number of species than monsoon season.

Keywords: Micro algae, Seasonal distribution, Kondakarla Ava/Lake, Visakhapatnam District.

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INTRODUCTION

Lakes and ponds are lentic or lacustrine ecosystems which accommodate diversified flora and fauna. The plant species inhabiting in the aquatic ecosystem are algae and angiosperms. Phytoplankton and algae are playing important role for converting the light energy into chemical energy in aquatic ecosystems which ultimately a crucial role in the food chain. physico-chemical parameters of water bodies influence the phytoplankton productivity (Narasimha Rao, 2009). In recent years application of algae in different research fields are progressing such as bio monitors for aquatic pollution (Nandan and Patel, 1992), commercial applications (Jyothi and Narasimha Rao, 2020) and bioactive compounds for drug discovery (Jyothi *et al.*, 2022). Studies on lentic water bodies especially on micro algae in reservoirs of North Coastal Andhra Pradesh by Renuka and Narasimha Rao (2013), Jyothi and Narasimha Rao (2013A and 2013B), research studies on micro algal communities in lakes by Bhanu Prakash *et al.*, (2014), Jyothi and Narasimha Rao (2015 and 2016) Jyothi *et al.*, (2016). Studies on aquatic algae in artificial lakes by Jyotsna *et. al* (2014, 2015 and 2016) and studies on algae of temple ponds by Madhava Rao and Narasimha Rao (2016, 2020 and 2023). Narasimha Rao (2024) studied the seasonal distribution and abundance of micro algae in Konam reservoir, Visakhapatnam district. In the present study an attempt was made to observe the distribution and abundance of micro algal populations in different seasons of one year, from March

2024 to February 2025 at Kondakarla Ava/Lake, Visakhapatnam district, Andhra Pradesh. Water samples were collected from center of the Lake for collection of data and assessing the composition and density of micro algae at Kondakarla Ava/Lake.

MATERIALS AND METHODS

Kondakarla village is located 49 KM away from Visakhapatnam city and Kondakarla Lake popularly known as Kondakarla Ava, a well know bird sanctuary and a tourist place which nestled along the foot hills of Eastern Ghats of India. The water spread area of the lake is around 6.5 km and the lake is mostly fed by hill stream and supply channel from river Sarada. The geographical coordination of Kondakarla lake is 17° 36' 03" N and 82° 59' 53" E. In this present investigation micro algal samples were collected for a period of one year from March 2024 to February 2025 during the pre-monsoon, monsoon and post-monsoon (October, November, December and January) seasons. Phyto plankton net (mesh size 25 µm) used to swept on surface waters of the reservoir and micro algae was collected, transferred into 500 ml containers and fixed in 4% formalin. These samples were centrifuged at 1500-2000 rpm for 8 to 10 min. The phytoplankton settled were diluted to a desirable concentration in such a way that they could be easily counted individually using compound microscope and micro algae were measured with help of Sedgwick Rafter cell, APHA (2005) and multiplied with the dilution factors was described by Kodarkar *et al.*,

(1991). The micro algae were identified by referring the Prescott (1951) and Desikachary (1959).

RESULTS AND DISCUSSION

In the present investigation on seasonal distribution of micro algae at Kondakarla Lake was observed that there were four major groups of algae consisting of 115 species (Table 1), in which 46 algal forms belong to class Chlorophyceae, 34 algal species belong to class Bacillariophyceae, 27 species related to class Cyanophyceae and remaining 8 species belongs to class Euglenophyceae. Maximum abundance of the species (82) was reported in pre monsoon season while minimum abundance of the micro algae (65) was observed in monsoon season and during the post monsoon season 76 species were observed in this present investigation.

Species of the class Chlorophyceae recorded in this present investigation were *Asterococcus palmella*, *Ankistrodesmus falcatus*, *Chlamydomonas polypyrenoides*, *Chlorella vulgaris*, *Chlorogonium euchlorium*, *Coenococcus planctonicus*, *Closterium acutum*, *Cylindrocapsa geminella*, *C. geminella wolle*, *Cosmarium* sps., *Eudorina elegans*, *Eudorina illinoensis*, *E.indica*, *Euastrum bidentatum*, *E.didelta*, *Gloeocystis* sp., *Hydrodictyon* sps, *Micrasterias mahabuleshwariensis*, *Micractinium* sp., *Oedogonium princeps*, *Pandorina elegans*, *Pandorina morum*, *Pleodorina illinoisensis*, *P.californiae*, *Pediastrum boryanum* (Turp) *meneghini*, *P.tetras*, *P.tetras* var.*tetrahedron*, *P.boryanum* var.*undulatum*, *Pediastrum boryanum*., *Scenedesmus obliquus*, *Scenedesmus bijugatus*, *Spirogyra condensate*, *Spirogyra daedaleoides*, *Spirogyra setiformis*, *Staurastum anatinum*, *S.habeebensis*, *S.manfeldtii*, *S.muticum*, *S.turgescens*, *Tetraspora* sps, *Tetraedron trigonum*, *Ulothrix tenerrima*, *U.variabilis*, *Volvox aureus*, *Volvox tertius* and *Zygnema peliosporum*.

Members of the Bacillariophyceae reported in this study were *Achnanthes exigua*, *A.lanceolata*, *A.microcephala*, *A.minutissima*, *Cocconeis placetula*, *Anomoneis sphaerophora*, *Cymbella affinis*, *C. cesati*, *C. cymbiformis*, *C. delicatula*, *C. ehrenbergii*, *C. microcephala*, *C.turgidula*, *C. ventricosa*, *Calonies silicula*, *Diatoma vulgaris*, *Frustulia rhomboids*, *Fragillaria* sps., *Gyrosigma acuminatum*, *G. attenuatum*, *Meridion circulare*, *Navicula confervacea*, *N. cuspidata*, *Pinnularia acrosphaerica*, *Amphipleura pellucida*, *A. kutzing*, *Nitzschia hungarica*, *N.sublinearis*, *N.thermalis*, *N.tryblionella*, *Synedra tabulata*, *S.sulna* var.*aequalis*, *S.sulna* var.*splendens*, *Tabellaria flocculosa*. 27 species of the Cyanophyceae were *Aphanocapsa biformis*,

Aphanocapsa pulchra, *A.delicatissima*, *A.grevillei*, *Aphanothece clathrata*, *Chroococcus macrococcus*, *Chroococcus minutus*, *C. pallidus*, *Dactylococcopsis fascicularis*, *Gloeocapsa decorticans*, *G.polydermatica*, *G.rupestris*, *Lyngbya majuscula*, *Merismopedia glauca*, *M.punctata*, *Microcystis aeruginosa*, *Microcystis robusta*, *M.flosaquae*, *M.lamelliformis*, *Nostoc commune*, *Oscillatoria chalybea*, *O.rubescens*, *Pelogloea bacillifera*, *Peridinium anglicum*, *Snechocystis aeruginosa*, *S.devaleki*, *Spirulina gigantea*, And 8 species of Euglenophyceae such as *Euglena acus*, *E.gracillius*, *E.polymorpha*, *E.spirogyra*, *Phacus acuminatus*, *Phacus moniliatus*, *Trachelomonas hispida* *T.superba* were reported in this present investigation.

The present study on micro algae of Kondakarla Lake showed that Chlorophyceae class was dominant group with 46 number of algal forms followed by class Bacillariophyceae with 34 species, class Cyanophyceae with 27 species and Euglenophyceae with 8 algal forms. These results are agreeing with the earlier investigations of Balasingh and Shamal (2007), Laskar and Gupta (2009), Adesalu (2010) and Narasimha Rao (2024).

In this present investigation on micro algal distribution and abundance in Kondakarla Lake shows that maximum number of micro algae was observed in pre monsoon and post monsoon seasons and minimum number of species were observed in monsoon season (Table 1) as observed by Liu *et al.*, (2010) and Braich and Kaur (2015). Environmental parameters promote the growth and abundance of phytoplankton in pre monsoon and post monsoon seasons (Agale *et al.*, 2013; Madhava Rao and Narasimha Rao, 2016). Senthil Kumar and Siva Kumar (2008) observed that abundance of phytoplankton was declined slowly during pre-monsoon season and the lowest values were observed in monsoon as agrees with present trends of distribution of micro algae in Kondakarla Lake. During the post monsoon season turbidity of waters decreased gradually, increased transparency and abundant nutrient enrichment in waters promoted the growth of micro algae in ponds (Tarakeswar *et al.*, 2011). In this study micro algal abundance was fluctuates seasonally due to low transparency, cloudy weather and high water in put during monsoon season which declines the abundance of phytoplankton agrees with earlier observations of Devika *et al.*, (2006); Krishnamoorthy *et al.*, (2007), Hasan *et al.*, (2010) and Narasimha Rao (2024) while in summer season, increased temperature enhance the nutrient concentration as observed by Santhanam and Perumal (2003).

Table 1: Seasonal distribution of micro algae in Kondakarla Lake, Visakhapatnam district, AP

SL No	Name of the species	Pre monsoon	Monsoon	Post monsoon
1	<i>Achnanthes exigua</i>	+	--	+
2	<i>A.lanceolata</i>	+	--	--
3	<i>A.microcephala</i>	+	-	+
4	<i>Amphipleura pellucida</i>	--	+	--
5	<i>A. kutzing</i>	+	-	--
6	<i>A.minutissima</i>	--	+	+
7	<i>Ankistrodesmus falcatus</i>	+	--	+
8	<i>Anomoneis sphaerophora</i>	+	+	--
9	<i>Aphanocapsa biformis</i>	--	+	+
10	<i>A.delicatissima</i>	+	--	--
11	<i>A.grevillei</i>	+	--	+
12	<i>Aphanocapsa pulchra</i>	+	+	--
13	<i>Aphanothece clathrata</i>	--	+	+
14	<i>Asterococcus palmella</i>	+	--	+
15	<i>Chlorella vulgaris,</i>	+	+	+
16	<i>Cocconeis placetula</i>	+	--	--
17	<i>Chlamydomonas polypyrenoideum,</i>	+	--	+
18	<i>Closterium acutum</i>	+	+	+
19	<i>Chlorogonium euchlorium,</i>	+	--	+
20	<i>Chroococcus macrococcus</i>	--	+	--
21	<i>Chroococcus minutus</i>	+	--	+
22	<i>C. pallidus,</i>	+	+	--
23	<i>Coenococcus planctonicus</i>	--	+	+
24	<i>Cosmarium sp.,</i>	+	--	+
25	<i>Cylindrocapsa geminelle</i>	--	+	+
26	<i>C.geminella wolfe</i>	+	--	--
27	<i>Cymbella affinis</i>	+	--	+
28	<i>Cymbella cesati</i>	--	+	--
29	<i>C. cymbiformis</i>	+	-	--
30	<i>C. ventricosa</i>	--	+	--
31	<i>C. delicatula</i>	+	--	--
32	<i>C. ehrenbergii</i>	--	+	--
33	<i>C. microcephala</i>	--	--	+
34	<i>C.turgidula</i>	+	--	--
35	<i>Colonies silicula</i>	+	--	+
36	<i>Diatoma vulgaris</i>	--	--	+
37	<i>Dactylococcopsis fascicularis,</i>	+	+	+
38	<i>Eudorina elegans,</i>	+	--	+
39	<i>Eudorina illinoiensis,</i>	--	+	+
40	<i>E.didelta</i>	+	--	--
41	<i>E.indica,</i>	+	--	+
42	<i>Euastrum bidentatum,</i>	--	--	+
43	<i>Euglena acus</i>	--	+	+
44	<i>Euglena gracillus</i>	+	+	--
45	<i>E.polymorpha</i>	+	+	--
46	<i>E.spirogyra</i>	--	--	+
47	<i>Frustulia rhomboids</i>	+	+	+
48	<i>Fragillaria sps</i>	+	--	+
49	<i>Gloeocystis sp.</i>	--	+	--
50	<i>Hydrodictyon sp.,</i>	+	+	+
51	<i>Gloeocapsa decorticans</i>	+	+	+
52	<i>G.polydermatica</i>	+	--	+
53	<i>G.rupestris</i>	--	+	--
54	<i>Gyrosigma acuminatum,</i>	+	--	+
55	<i>Gyrosigma attenuatum</i>	--	+	+

SL No	Name of the species	Pre monsoon	Monsoon	Post monsoon
56	<i>Lyngbya majuscula</i>	+	+	+
57	<i>Melosira granulate</i>	+	+	+
58	<i>Merismopedia glauca</i>	+	--	+
59	<i>Meridion circulare</i>	+	+	--
60	<i>Micractinium</i> sp.	--	+	+
61	<i>Microcystis aeruginosa</i>	+	--	+
62	<i>Microcystis robusta</i>	+	+	--
63	<i>M.punctata</i>	+	--	+
64	<i>M.flosaquae</i>	+	+	+
65	<i>M.lamelliformis</i>	--	--	+
66	<i>Micrasterias mahabuleshwariensis</i>	+	--	+
67	<i>Navicula confervacea</i>	+	+	+
68	<i>N. cuspidata</i>	--	+	+
69	<i>Navicula</i> sps.	+	--	+
70	<i>Nitzschia hungarica</i>	+	--	--
71	<i>N.sublinearis</i>	--	+	+
72	<i>N.thermalis</i>	+	--	+
73	<i>N.tryblionella</i>	--	+	+
74	<i>Nitzschia</i> sp	+	--	--
75	<i>Nostoc commune</i>	+	+	+
76	<i>Oedogonium princeps</i>	+	+	+
77	<i>Pandorina elegans,</i>	+	+	+
78	<i>Pandorina morum,</i>	--	+	+
79	<i>Pediastrum boryanum</i>	+	+	+
80	<i>Pediastrum boryanum (Turp) meneghini</i>	+	--	--
81	<i>P.tetras</i>	+	+	--
82	<i>P.tetras</i> var.tetrahedron	+	--	--
83	<i>P.boryanum</i> var.undulatum	--	+	--
84	<i>Pleodorina illinoisensis</i>	+	--	+
85	<i>P.califorica</i>	+	+	+
86	<i>Peridinium anglicum,</i>	+	--	+
87	<i>Pelagloea bacillifera</i>	--	+	+
88	<i>Phacus acuminatus</i>	+	+	+
89	<i>Phacus moniliatus</i>	+	--	+
90	<i>Pinnularia acrosphaerica</i>	+	+	+
91	<i>Rhopalodia gibba</i>	+	+	+
92	<i>Snechocystis aeruginosa</i>	+	--	+
93	<i>S.devaleki</i>	--	+	+
94	<i>Scenedesmus obliquus,</i>	+	+	+
95	<i>Scenedesmus bijugatus</i>	--	+	+
96	<i>Spirogyra condensate</i>	+	+	+
97	<i>Spirogyra daedaleoides</i>	+	--	+
98	<i>Spirogyra setiformis</i>	+	+	+
99	<i>Synedra ulna,</i>	--	+	+
100	<i>S.ulna</i> var.splendens	--	+	--
101	<i>Synedra tabulata, var.aequalis</i>	+	--	+
102	<i>Staurastum anatinum</i>	+	--	--
103	<i>S.turgescens</i>	+	+	--
104	<i>S.habeebens</i>	+	--	+
105	<i>S.manfelditii</i>	--	+	+
106	<i>S.muticum</i>	+	+	--
107	<i>Tabellaria flocculosa</i>	+	--	--
108	<i>Tetraedron trigonum</i>	+	+	--
109	<i>Tetraspora</i> sp.,	+	+	--
110	<i>Trachelomonas hispida</i>	+	+	--
111	<i>Ulothrix variabilis</i>	+	--	+

SL No	Name of the species	Pre monsoon	Monsoon	Post monsoon
112	<i>Ulothrix tenerrima</i>	--	+	+
113	<i>Volvox aureus</i>	+	+	--
114	<i>Volvox tertius</i>	+	+	--
115	<i>Zygnema peliosporum</i>	+	+	+
		82	65	76

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