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Physico-chemical characteristics and macro, micro algal observations of Kolleru Lake, Andhra Pradesh, India

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SUMMARY

Kolleru (16º 15´ and 16º 30´ N and 81º 00´ and 81º 25´ E) is located the deltas of Godavari and Krishna rivers. The drainage area of this lake has been identified as the area pesticides and fertilizers are intensively used. In turn the ecosystem of the lake gradually degraded. In the present study hydrographical and climatic observations were made at 4 different stations of the lake during various seasons of 2007. Physico- chemical studies reveals that accumulation of high amount of nitrogen and phosphorus in the Kolleru lake. 49 algal forms including micro algae and macro algae reported in this study. Dominant forms in macro algae were *Chara, Oedogonium, Spirogyra, Ulothrix* and *Zygnema*. In microalgae, *Chlorella, Scenedesmus, Volvox, Pediastrum, Melosira, Navicula, Nostoc* and *Spirulina* were dominant forms during winter season. Among the algal flora, some pollution indicator species were also reported in this lake. Presence of increased amount of N and P and pollution indicator species reflects some levels of pollution in the lake, if it continues further without any control, it may leads to eutrophication

Key words : Kolleru lake, Hydrography, Macro and micro algae

Algae are the primary producers of the aquatic ecosystem. Fluctuations in temperature and nutrients conditions influence the algal biomass of the aquatic ecosystems (Kumar, 1991), algal forms may be used for indicators (Schubert, 1984).The algal forms and their response to environmental changes and nutrient fluctuations have been suggested in several studies (Tilman *et al.,* 1982; Sudhakar *et al.,*1991) Studies related to ecology and tropical lakes in India by Singh and Swaroop (1979), Parvateesam *et al.* (1991).Kolleru is one of the largest fresh water lakes in India. So far no authentic report was available on the algal population of Kolleru Lake. In this present study information was collected on Physico-chemical parameters and composition of macro and micro algal flora of Kolleru Lake.

MATERIALS AND METHODS

Kolleru Lake is one of the largest fresh water lakes in India. It is an important sanctuary for indigenous and for migratory birds, particularly in water seasons. Kolleru is located between Krishna and Godavari delta. The lake is fed directly by water from the seasonal rain fed drains such as Badameru and Tammileru.The Lake is connecting Krishna and Godavari systems by over 68 inflowing drains and channels. The wild life sanctuary covers and area of 308 km rich in flora, organic matter and fauna, it attracts migratory birds from northern Asia and Eastern Europe between October and March. In the present study five study sites were selected at different regions of lake. Data were collected on temperature, pH, turbidity, dissolved oxygen and nutrients of the lake during different seasons (monsoons, winter and summer) in 2007. A preliminary survey was conducted on the algal flora of the lake at different stations.

Surface water samples were collected in 250 ml sampling bottles for chemical analysis and phytoplankton identification. Algal samples were fixed in 4% formalin, and samples were identified by following the standard references of Prescott (1951), Desikachary (1959). Fritsch (1979). Water samples were analyzed by the standard methods of APHA (1985).

RESULTS AND DISCUSSION

Data was collected in 4 different stations of the lake. But, no significant variation in Physico-chemical parameters was noticed among these stations, and data along with ranges in each parameter are presented in Table 1. Maximum air and surface water temperature of the lake was observed during summer months and minimum values were reported in winter months. pH values were ranged from 7.0 to 8.4 with maximum values in winter and minimum valves were observed in summer months. Turbidity values of the lake reveals that during monsoon months due to runoff from drains and other irrigated fields lake waters became more turbid than winter and summer months (Table 1). Dissolved oxygen

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Table 1 : Physico-chemical parameters of Kolleru Lake

	Monsoons	Winter	Summer
Air temperature (^{0}C)	28-29	22-24	35-38
Water temperature	23-25	17-19	26-28
Turbidity	15-20	25-35	35-45
pH	7.0-7.6	7.1-8.4	7.2-7.4
Dissolved oxygen	6.5-7.2	6.0-7.4	6.6-7.8
Phosphorus	0.08-0.11	0.10-0.14	0.09-0.10
Nitrates	0.80-0.94	0.65-0.89	0.65-0.84

valves were varied from 6.0 to 7.4; maximum values were recorded in summer and minimum in winter months. Concentrations of nitrates and phosphate were more in monsoon months and minimum in winter months. The present results on Physico-chemical characteristics of the Kolleru Lake are coincidence with the results of studies on tropical lakes in India (Singh and Swaroop, 1979; Srivastava and Odhwani, 1993).

In the present study 49 algal species belongs to Chlorophyceae (37), Bacillariophyceae (4) and Cyanophyceae (8) have been reported (Table 2). Nutrients enrichment in lakes promoted the growth of algal bloom such as *Anabaena, Microcystis Oscillatoria, Scenedesmus, Pediastrum* and *Melosira*. In the present study abundant growth of algal blooms was noticed during the monsoon and winter months. Cyanophyceae members were poor in summer; Chlorophyceae and Bacillariophyceae members are dominant in winter and monsoon months. Physical factors such as temperature and light intensity also regulated seasonal appearance of algal forms (Goldman and Home, 1983). In the present study, maximum growth of the algal blooms in winter and monsoon months might be due to more concentrations N:P ratio and low temperature and light intensity of the Kolleru lake. Further, results of this study reveals that accumulation of more nutrients led to subsequent growth of algal blooms and deterioration of water quality and responsible for eutrophication of the Kolleru Lake.

Table 2 : Seasonal distribution of algal flora of Kolleru Lake during 2007

Sr. No.	Name of the species	Monsoon	Winter	Summer
1.	*Ankistrodsmus convolutes*	+	+	--
2.	*Chalmydomonas globosa*	+	+	--
3.	*Chlorella vulgaris*	--	+	+
4.	*Chlorococcum infusionum*	+	--	+
5.	*Closterium ehrenbergii*	+	+	--
6.	*Closterium parvalum*	--	+	+
7.	*Closerium moniliferum*	+	--	+
8.	*Cosmarium obsoletum*	+	+	+
9.	*Cosmarium obsoletum*	+	--	--
10.	*Cosmarium contractum*	--	+	+
11.	*Cosmarium pseudobiramum*	+	+	+
12.	*Cladophora glomerata*	+	+	+
13.	*Cladophora sps.*	+	+	+
14.	*Chara sps*	+	+	+
15.	*Chaetophora attenuate*	+	--	--
16.	*Chaetophora elegans*	+	+	--
17.	*E udorina elegans*	+	+	+
18.	*Eudorina pectnalis*	+	--	+
19.	*Hydrodictyon reticulam*	+	+	+
20.	*Oedogonium globosum*	+	+	+
21.	*Oedogonium biforme*	+	+	+
22.	*Pandorina morum*	+	+	--
23.	*Pediastrum ovatum*	+	--	+
24.	*Pediastrum simplex*	+	+	+
25.	*Scenedesmus dimophus*	+	--	+
26.	*Scenedesmus abundans*	--	+	--
27.	*Scenedesmus denticulatus*	--	+	--
28.	*Spirogyra occidentals*	+	+	+
29.	*Spirogyra singularis*	+	--	+
30.	*Spirogyra communis*	+	+	+
31.	*Tetraspora cylindrical*	--	+	--
32.	*Ulotrix zonata*	+	+	+
33.	*Ulotrix cylndricum*	+	--	+
34.	*Ulotrix variabilis*	+	+	+
35.	*Zygnema pectinatum*	+	+	+
36.	*Zygnema sterile*	+	+	+
37.	*Zygnema gangeticum*	+	--	+
38.	*Navicula cincta*	+	+	--
39.	*Navicula bacilloides*	_	+	+
40.	*Fragilaria intermedia*	+	+	--
41.	*Melosira sps.*	--	+	+
42.	*Anabaena constricta*	+	+	--
43.	*Chroococcus varians*	--	+	+
44.	*Gloeocapsa granosa*	+	+	--
45.	*Microcystis elabens*	+	+	--
46.	*Nostoc commune*	--	+	+
47.	*Oscillatoria chlorine*	+	+	--
48.	*Oscillatoria cortiana*	+	+	+
49.	*Lyngbya epiphytica*	+	+	+

REFERENCES

A.P.H.A. (1985). *Standard methods of the Examination of Water and Waste Water*, 16th ed. A.PH.A, A.W.A.A W.PC.F. Washington, D.C. pp 1-1268

Desikachary, T.V. (1959). *Cyanophyta*. Pub. Indian Council of Agricultural Research, New Delhi. pp. 1-686.

Fritsch, F.E. (1979). *The structure and reproduction of the algae.* Vikas Publi. House Pvt. Ltd. New Delhi. pp. 1-687.

Goldman,C.R. and Home, A.J. (1983). *Limnology*. Pub. McGraw Hill, Inc. Japan. pp.1-464.

Kumar, H.D. (1991). *Introductory Phycology*. Pub. Affiliated East-West Press.Pvt.Ltd. New Delhi pp. 1-336.

Parvateesam, Mathur, M. and Shama, N. (1991). Influence of physicochemical characteristics on the periodicity of algal flora in a fresh water lake. *J. Phytol. Res.*, **4** : 33-40.

Prescott, G.W. (1951). *Algae of Western Great Lake Areas*. Pub. Cranbrook Institute of Science Bulletin No. 33. pp. 1-496.

Singh, S.R. and Swaroop,K. (1979). Limnlogical studies of Suraha lake (Ballia) 11. The periodicity of planktons. *J. Indian Bot. Soc.*, **58** : 319-329.

Schubert, L.E. (1984). Algae as Ecological Indicators Pub. Academic Press, London.

Srivastava, P.N. and Odhawani, B.R. (1993). Some interesting algae from Bijolai lake, Jodhpur, *Phykos*, **32** : 121-124.

Sudhakar,G., Jyothi, B. and Venkateswarlu, V. (1991). Metal pollution and its impact on algae in flowng waters in India. *Arch. Environ. Contam. Toxicol.*, **21** : 556- 566.

Tilman,D., Kilham, S.S. and Kilham, P. (1982). Phytoplankton community ecology: The role of limiting nutrients. *Ann. Rev. Ecol. Syst.*, **13** : 347-372.

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