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COMPARATIVE ANALYSIS OF ALGAL COMMUNITIES IN POLLUTED WATER BODIES OF MARATHWADA, MAHARASHTRA

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ABSTRACT

In present investigation six different polluted sites of Renapur city were selected for collection of water and algal samples at monthly intervals from March 2024 to February 2025. The quantitative and qualitative study of four groups of algae viz. Chlorophyceae, Cyanophyceae, Bacillariophyceae and Euglenophyceae was made for a years. Palmer's pollution indices were calculated for assessing the organic pollution of six selected polluted sites of Renapur city. All indices of pollution with relation to algae hold good for assessing the water quality of these sites. At all the selected sites 38 pollution tolerant genera were recorded. By using Palmer's index for rating of water samples as high or low organically polluted sites were examined. The total score of each site was greater than 20, indicating the confirmed high organic pollution,thus, algal communities were used as indicators of organic pollution of selected sites in present study.

KEYWORDS: Algae, Pollution, Palmers index, Renapur city, Marathwada region, Maharashtra.

INDRODUCTION

Algae are natural inhabitants of water. It is an important group of plant organism. Algae are involved in water pollution in number of significant ways. They may be discouraged from growing as a result of being deprived of sunlight; the substances may be toxic or may ecologically modify the physical or chemical environment sufficiently to retard or prevent growth and multiply. A change may also occur in the individual types or groups of organism, since algae may also form blooms. The total algae population may be increased or decreased.

The oxygen production and utilization of nutrient substances by algae may be greatly modified and algae may change the colour, odour or taste of the water.

As in Maharashtra state very few workers have paid attention on ecology of algae with relation to water pollution (Gunale and Balkrishnan, 1978; Pingale, 1981; Patil and Nandan, 1994; Jagdale 1987; Trivedi1990; More and Nandan, 2000.), to fulfill this lacuna it was thought worth to study the water pollution of six different polluted sites of Renapur city in the Marathwada region of Maharashtra (India).

MATERIALS AND METHIDS

The six different polluted sites of Renapur city were selected for the investigation. Renapur city is located at coordinates 18.52704°N latitude and 76.59537° E longitude in the Latur district of Marathwada region of Maharashtra, India, sitting about just 15 km away from the Latur city. The samples of water and algae were collected at monthly intervals from six selected sites of Renapur city. The analysis of water samples, for physicochemical parameters were followed according to APHA (1975). A quantitative and qualitative study of 4 groups of algae was made. The pollution tolerant genera were recorded for six selected sites. The assessment of water quality of six sites each of these sites was made by algal communities.

RESULTS AND DISCUSSION

The pollution tolerant genera and species of four groups of algae from six sites each of these sites are listed in descending order according to Palmer (1969). In present study 32 pollution tolerant species of algae and 23 pollution tolerant species of algae from six sites were observed (Table 1 & 2). The pollution tolerant species of Oscillatoria were recorded more in present investigation as com-pared to the species of *Navicula* (Table-2). By using Palmer's index of pollution for rating of water samples as high or low organically polluted at six sites were tested. The results are as shown in Table-3. Out of 20 genera, 19, 17, and 16 genera were observed at sites S-I, S-II, S-III respectively (Table-3). Likewise out of 20 genera 17, 16, and 15 genera were observed at Sites IV- V and S-VI respectively (Table-3). The degree of organic pollution was to decrease from station S-1 onwards. The total score of each station was greater than 20 indicating the confirmed high organic pollution. Palmer (1969) has shown that genera like *Euglena, Microcystis,Oscillatoria,Navicula,Nitzschia,Scenedesmus* etc. are the species found in organically polluted waters supported by Goel (1986). Similar genera are recorded in the present investigation. In the present study blooms of *Microcystis aeruginosa* was observed in late summer. Palmer (1969) suggested that algae are reliable

indicators of water pollution as it was true in present study. The degree of organic pollution was increased at S-I site and S-IV site. *Oscillatoria* and *Euglena* were recorded at S-I and S-IV indicating the highest degree of pollution. The similar observations were encountered by Hosmani and Bharti (1980), Trivedi (1988), and More and Nandan (2000).

Table.1.Pollution tolerant genera of algae from six stations each of Renapur city in order of decreasing emphasis. (Palmer-1969)

Sr.No.	Genus	Group	Total points	Renapur city selected sites			Renapur city selected sites		
				S-I	S-II	S-III	S-IV	S-V	S-VI
1	Euglena	F	172	+	+	+	+	-	-
2	Oscillatoria	B	171	+	+	+	+	+	+
3	Scenedesmus	G	112	+	+	+	+	+	+
4	Chlorella	G	103	+	+	+	-	+	-
5	Nitzschia	D	98	+	+	+	+	+	+
6	Navicula	D	92	+	+	+	+	+	+
7	Synedra	D	58	+	+	-	+	+	+
8	Ankistrodesmus	G	57	+	+	-	+	+	-
9	Phacus	F	57	+	+	+	+	+	+
10	Phormidium	B	52	+	+	+	+	+	+
11	Melosira	D	50	+	+	+	+	+	+
12	Gomphonema	D	48	+	+	+	+	+	+
13	Cyclotella	D	47	+	+	-	-	+	+
14	Closterium	G	45	+	+	+	+	+	+
15	Pandorina	G	42	+	-	-	-	-	+
16	Microcystis	B	39	-	-	+	+	-	+
17	Spirogyara	G	37	+	+	+	+	+	+
18	Anabaena	D	36	-	-	-	+	+	-
19	Pediastrum	G	35	+	+	+	+	+	+
20	Trachelomonas	F	34	-	+	+	-	+	-
21	Fragillaria	D	33	+	+	+	+	+	+
22	Ulothrix	G	33	+	-	+	-	-	-
23	Suriella	D	33	+	+	-	+	+	+
24	Lyngbya	B	28	+	+	+	+	+	+
25	Oocystis	B	28	+	-	+	+	-	+
26	Spirulina	B	25	+	+	-	-	-	-
27	Cymbella	B	24	+	+	+	-	+	+
28	Coelastrum	G	24	-	-	+	+	+	-
29	Cladophora	G	24	-	+	-	-	-	+
30	Hantzschia	D	21	+	-	-	-	-	-
31	Achnanthus	D	19	-	+	+	+	-	-
32	Pinullria	D	18	-	+	+	-	+	+
33	Cocconeis	D	17	+	+	-	+	-	-
34	Cosmarium	G	17	+	+	+	+	+	+
35	Gonium	G	16	+	-	-	-	-	-

36	Stauroneis	D	16	+	-	-	-	-	-
37	Selanastrum	G	15	+	+	-	-	-	+
38	Crucigenia	G	14	-	+	+	-	+	+

Group: B: Blue greens, D: Diatoms, G: Green, E: Euglena

Table 2: Pollution tolerant genera of algae from six sites of Renapur city in order of decreasing emphasis. (Palmer-1969)

Sr.No.	Algal species	Group	Total points	Renapur city selected sites			Renapur city selected sites		
				S-I	S-II	S-III	S-IV	S-V	S-VI
1	*Nitzschia palea*	D	45	+	+	-	+	+	-
2	*Oscillatoria limoa*	B	42	+	-	+	+	+	-
3	*Scenedesmus quadricauda*	G	41	+	+	+	+	+	+
4	*Oscillatoria tenuis*	B	40	+	+	+	-	-	-
5	*Synedra ulna*	D	33	+	+	+	+	-	+
6	*Pandorina morum*	G	30	+	-	-	-	-	+
7	*Chlorella vulgaris*	G	29	+	+	+	-	+	-
8	*Cyclotella meneghiniana*	D	27	-	+	+	-	+	+
9	*Navicula cryptocephala*	D	25	-	+	+	-	-	+
10	*Oscillatoria princeps*	B	24	-	+	-	+	+	-
11	*Gomphonema parvulum*	D	23	+	+	-	-	-	+
12	*Oscillatoria chalybeanema*	B	22	+	+	-	-	-	-
13	*Closterium acerosum*	G	21	-	+	-	+	+	+
14	*Scenedesmus obliquas*	B	20	+	-	-	-	-	+
15	*Oscillatoria formosa*	B	19	-	-	+	-	-	-
16	*Phacus pyrum*	F	18	+	-	-	-	-	-
17	*Melosira granulata*	D	17	+	+	+	+	+	+
18	*Phacus pleuronectus*	F	16	+	-	-	-	-	-
19	*Navicula viridula*	D	16	+	-	+	-	-	-
20	*Phormidium autumnale*	B	15	-	-	+	-	-	-
21	*Synedra acus*	D	14	-	+	+	-	+	+
22	*Cocconeis placentula*	D	14	-	+	-	-	-	-
23	*Closterium microporum*	G	14	-	-	+	+	+	-
24	*Scenedesmus*	G	13	+	+	+	-	+	+

	dimorphus								
25	*Navicula cuspidata*	D	12	+	-	+	+	+	-
26	*Scenedesmus acuminatus*	G	12	+	+	+	-	-	-
27	*Pediastrum duplex*	G	12	-	-	+	-	+	+
28	*Closterium leiblenii*	G	11	-	+	-	-	+	+
29	*Oscillatoria brevis*	B	11	+	-	-	-	-	-
30	*Cladophora glomerata*	G	11	-	+	-	-	-	+
31	*Gonium pectorale*	G	10	+	-	-	-	-	-
32	*Tetraedron muticum*	G	10	+	-	-	-	+	-

Group: F-Flagellates, D: Diatoms.B: Blue greens: G: Green

Table-3: Pollution index of Algae genera (Palmer, 1969) at six sites of Renapur City.

Sr.No.	Group/Genera	Palmers Pollution Index Numbers			Palmers Pollution Index Numbers		
		S-I	S-II	S-III	S-IV	S-V	S-VI
I	**Chlorophyceae**						
	1.Ankistrodesmus	2	2	-	2	2	-
	2.Chlorella	3	3	3	-	3	-
	3.Closterium	1	1	1	1	1	-
	4.Pandorina	1	-	-	-	-	1
	5.Scenedesmus	4	4	4	4	4	4
	6.Pediastrum	1	1	1	1	1	1
	7.Spirogyara	1	1	1	1	1	1
II	**Cyanophyceae**						
	8.Oscillatoria	4	4	4	4	4	4
	9.Phormidium	1	1	1	1	1	1
	10.Microcystis	-	-	1	1	1	1
	11.Lyngbya	1	1	1	1	1	1
III	**Bacillariophyceae**						
	12.Cyclotella	1	1	1	-	-	1
	13.Gomphonema	1	1	1	1	1	1
	14.Melosira	1	1	1	1	1	1
	15.Navicula	3	3	3	3	3	3
	16.Nitzschia	3	3	3	3	3	3
	17.Synedra	2	2	-	-	2	2
IV	**Euglenophyceae**						
	18.Euglena	5	5	5	5	-	-
	19.Phacus	2	2	2	2	2	2
	20.Trachelomonas	1	-	-	1	-	-
	Total Score	**38**	**36**	**33**	**34**	**31**	**27**

REFERENCES

1. APHA. (2017). Standard Methods for the Examination of Water and Wastewater (23rd Ed.). American Public Health Association. New York.
2. Adoni, A. D. (1985). Work Book on Limnology. Pratibha Publishers, Sagar, India.
3. Anand, N. (1998). Indian Freshwater Microalgae. Bishen Singh Mahindra Pal Singh, Dehradun.
4. Bhattacharya, S., & Ghosh, A. (2023). Cyanobacteria as ecological indicators in Indian freshwater ecosystems.
5. Bharathi, M. D., & Ramachandran, T. V. (2016). Phytoplankton diversity as indicators of water quality in freshwater reservoirs of India.
6. Bhosle, S. A., Shivanikar, S. V., & Ashturkar, A. R. (2026). Ecological and bio monitoring studies of freshwater with reference to selected phytoplankton species of Manar Reservoir, Maharashtra. Research & Reviews: Journal of Ecology, 15(1), 1–16.
7. Desikachary, T. V. (1959). Cyanophyta. Indian Council of Agricultural Research, New Delhi.
8. Dora, S. L., Martin, S. K., Tiwari, R. K., & Singh, A. (2015). Algae as bio-monitors for Damodar River water pollution. Current World Environment, 10(3), 884–894
9. Goel, P.K., Khatavkar, S.D., Kulkarni, A.Y. and P.K. Trivedi, (1986) Limnogical studies of a few freshwater bodies in south-western Maharashtra with special reference to their Chemistry and Phytoplankton. Pollution Research 5 (2): 79-84.
10. Gunale, V.R. 1991. Algal communities as indicators of Pollution. J. Environ. Biol. Pp. 223-232.
11. Gunale, V.R. and M.S. Balkrishnan, (1981) Bio monitoring of eutrophication in the Pavana, Mula and Mutha rivers flowing through Poona. Indian Journal of Environmental Health 23 (4): 316-322.
12. Gonzalves, E.A. and D.B.Joshi 1946. Freshwater algae near Bombay-l. The Seasonal succession of algae in a tank of Bandar. J. Bp, B. Nat. Hist. Soc. 46:144-176.
13. Hosmani, S.P. and S.G. Bharati 1980. Algae as indicators of organic pollution. Phykos. 19(1):23-26.
14. Hosmani S.P., and S.G. Bharti, (1986) Limnological studies in ponds and lakes of Dharwar, Comparative phytoplankton ecology of four water bodies. Phykos, 19 (1): 27-43.
15. Jagdale M.H., Salunke M.M., Yabhute Y.B., Ghuge K.N. and S.N. Kodasker (1984) Pollution of Godavari River water at Nanded. Pollution Research, 3: 83-84.

16. Jafri, N. G., & Gunale, V. R. (2006). Algal community used for assessment of water quality of Haranbaree Dam and Mosam River of Maharashtra. Journal of Environmental Biology, 27, 223–227
17. Joshi, M., & Kaur, H. (2023). Algal diversity and physicochemical characteristics of freshwater lakes of western India.
18. Kant, Shashi 1985. Algae as indicators of organic pollution. Proc. All India Applied Phycological Congress, Kanpur77-86.
19. Karthick, B., Hamilton, P. B., & Kociolek, J. P. (2010). Diatoms as indicators of water quality in Indian aquatic ecosystems.
20. Karthick, B., Taylor, J. C., & Ramachandran, T. V. (2013). Freshwater diatoms of India and their application in bio monitoring.
21. Karthick, B., Kociolek, J. P., & Taylor, J. C. (2021). Freshwater diatoms of India: Applications in environmental biomonitoring.
22. Karthick, B., & Ramachandran, T. V. (2020). Diatom assemblages as indicators of ecological health in Indian freshwater ecosystems.
23. Khanna, D. R., & Bhutiani, R. (2008). Water quality assessment using plankton diversity in freshwater ecosystems.
24. Kumar, A., & Singh, H. R. (2015). Studies on diversity and abundance of freshwater diatoms as indicators of water quality in India. International Research Journal of Environmental Sciences, 4(4), 80–85.
25. Kumar, R., Singh, S., & Mishra, P. (2024). Assessment of reservoir water quality using algal indicators and multivariate statistics
26. More, Y.S., and S.N. Nandan (2000) Hydro biological study of Algae of Panzara river (M.S.) Ecology, Environment and Conservation, 6 (1): 99-103.
27. Mishra, S. R., & Saksena, D. N. (1993). Planktonic indicators of water pollution in Indian reservoirs.
28. Mishra, D., Sahu, N., & co-authors. (2021). Continuous and synoptic assessment of Indian inland waters for harmful algal blooms using the CyanoKhoj platform. Journal of Environmental Management.
29. Munshi, J. S. D., & Munshi, J. D. (1995). Fundamentals of Freshwater Biology. Narendra Publishing House.
30. Nandan, S. N., & Aher, N. H. (2005). Algal diversity and water quality of freshwater reservoirs in Maharashtra.

31. Nandan, S.N. and RJ.Patel 1986. Assessment of water quality of Vishwamitri River by algal analysis. India.J.Environ. Hlth. 29(2):160-161.
32. Nandan, S.N. and R.J. Patel (1985). Pollution studies of Vishwamitri river flowing through Baroda. Biovigyanum, 11 (2): 209-210.
33. Palmer C.M. (1969) A composite rating of algae tolerating organic pollution, Journal of Phycology, 5: 78-82.
34. Patil S.S. and S.N. Nandan (1994) Limnological studies of Nakana lake of Dhule (M.S.) Proceedings of National Symposium on Eco-environmental Impact and Organism response, pp.9.1-9.4.
35. Patil, S. G., & Gyananath, G. (2002). Seasonal variation in phytoplankton of freshwater reservoirs in Maharashtra.
36. Prasad, B. N., & Singh, R. B. (2003). Phytoplankton diversity in relation to water quality in Indian reservoirs
37. Pingale S.D. (1981) Studies on the algae of impoundments and streams in Maharashtra, Ph.D. Thesis, Poona University.
38. Rao, C. B. (1992). Freshwater algae and their ecological significance in India.
39. Rana, S., Purohit, S., Singh, M., Wadhu, A. M., Hande, O. M., & Khan, Y. D. I. (2025). Phytoplankton diversity and its relationship with physicochemical variables: A case study of a semi-arid reservoir in the Deccan Plateau, Telangana, India.
40. Sarode, P. T., & Kamat, N. D. (1984). Freshwater Diatoms of Maharashtra. Saikrupa Prakashan, Aurangabad.
41. Saha, S., Das, P., & Roy, S. (2024). Algal community composition and nutrient dynamics in tropical freshwater reservoirs.
42. Sharma, B. K., & Sharma, S. (2010). Algal diversity and trophic status assessment of Indian freshwater bodies.
43. Sharma, R. C., Singh, N., & Chauhan, A. (2022). Phytoplankton diversity and trophic status assessment of freshwater reservoirs in northern India.
44. Singh, M. R., Gupta, A., & Beeteswari, K. H. (2014). Phytoplankton diversity as an indicator of water quality in Loktak Lake, Manipur.
45. Singh, V.P. 1960. Phytoplnkton ecology of the Inland water of U.P. Proc. Syhmp. Algol. ICAR, New Delhi.243-271.
46. Singh, P., Kumar, A., & Verma, S. (2021). Cyanobacterial diversity as an indicator of nutrient enrichment in Indian reservoirs

47. Trivedi, R. K., & Goel, P. K. (1986). Chemical and Biological Methods for Water Pollution Studies. Environmental Publications, Karad.
48. Venkateswarlu, V. 1969. An ecological study of the algae of the river moosi, Hyderabad (India) with special reference to water pollution-III. The algal periodicity, Hydrobiologia 33:533-560.
49. Venkatachalapathy, R., & Karthikeyan, P. (2015). Application of diatom-based indices for monitoring environmental quality of riverine ecosystems. Springer
50. Weilgolaski, F.E. 1975. Biological indicators of pollution, Urban Ecol. 1:63-69.
51. Wetzel, R. G. (Referenced extensively in Indian limn logical studies for algal ecology and water quality assessment.)
52. Yadav S.G.2011. Studies on Algal Taxonomy of Polluted Water passages in Beed District.(M.S.) Life Science Bulletin, Volume 8 (01) January 2011.pp.59-60.
53. Yadav S.G.2014. Physico-Chemical Parameters and Seasonal Algal periodicity of Mahapur Reservoir Latur, Maharashtra, Vision Research Journal for Pure Sciences, Volume 1 (2) January to June 2014pp.36-44
54. Yadava, Y. S., & Singh, P. K. (2012). Phytoplankton diversity in relation to physicochemical characteristics of Indian reservoirs.
55. Zafar, A. R. (1967). Ecology of algae in Indian freshwater ecosystems.