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Physico-chemical and biological status of Kutluq Lake, near Aurangabad (M.S.)

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Abstract
Seasonal changes in water quality parameters (Physico-Chemical and Biological) of a rain fed Kutluq Lake, Daultadabad Dist. Aurangabad (M.S.) were investigated to assess the suitability of this lake as a source of drinking water and fish culture. Several parameters such as rainfall, temperature, pH, DO, Total Alkalinity, Sulphate, and Phosphate have been studied for a period of one year i.e. from Sept. 2020 to August 2021. Various Physico-Chemical and Biological parameters determined, revealed that the fluctuation in water temperature, pH, DO and Sulphate but they were within the desirable limits. On the other hand, Total Alkalinity and phosphate were beyond the permissible limits in the lake water used for fish culture. This research paper throws a light on control of these high level parameters in the lake in order to confirm to the level suited for the fresh water fish culture.

Keywords: Kutluq Lake, physico-chemical parameters, fish culture

Introduction

The Physico-Chemical characteristics of a freshwater water body exert a great effect on its biota. The Physico-chemical parameters and biotic communities of lentic and lotic water bodies of India have been investigated extensively (Kaur and Mehara, 1997, Gopal and Zutshi, 1998, Esmaeili and Johal, 2005 Negi *et al* 2006) [3, 5, 8]. Fresh water source ecosystem represents an alternate avenue for culture fisheries. Fresh water resources in India are mainly contributing for augmenting the productivity of the crop in agriculture. Contamination of water bodies might lead to a change in their trophic status and render then unsuitable for aquaculture. Several Physico-chemical and Biological factors could act as stressors and adversely affect fish culture. Hence regular monitoring of Physico- chemical and biological water quality parameters is essential to determine status of water body. Earlier studies on water quality conditions of several fresh water bodies in relation to fresh culture have been made by Pawar and Mane (2006) [13] Usha *et al* (2006) [18] and Aher *et al* (2007) [1]. Present investigation encompasses investigation of various Physico-chemical and biological conditions of Kutluq Lake.

Material and methods

Kutluq Lake is located near Dualtabad Dist. Aurangabad in Maharashtra state. The lake is 13 km away from Aurangabad city. Various Physicochemical and biological characteristics of water of Kutluq Lake were studied for a period of one year i.e. from September 2020 to August 2021. Water samples were collected in the morning between 9-10 am. In the polythene bottles. Temperature and pH were recorded at the time of sample collection using portable kit. For determination of Dissolved Oxygen, water was fixed in the field and brought to the laboratory in an ice-box for further processing. Total alkalinity, sulphate and phosphate were determined in the laboratory, employing methods described by Golterman *et al* (1979) and APHA (1989). The rainfall data was collected from meteorological department Chikalthana, Aurangabad. The average (Mean + SD) for each parameter per season was computed.

Fig 1: Photograph showing the Kutluq Lake

Results and discussion

Kutluq natural lake is a rain fed water body, occupying nearly oval shaped area on the slope of hills. The depth of lake in the Centre is about 6 meter when the lake is full. The water level increases in monsoon owing to rainfall and decreases during summer due to evaporation and its utilization for drinking purpose. The bottom of the lake is with soil. The bottom of lake is muddy and consists of algae and other aquatic vegetation'. The lake water is extensively used for cattle and for other domestic purposes. The data on the Physico-Chemical characteristics of Kutluq Lake is presented in Table-and fig –

Table 1: Reveals seasonal variations in some Physico-chemical parameters of Kutluq Lake

Sr. No	Parameters	Post Monsoon	Winter	Summer	Monsoon
1.	Rainfall (mm)	26	-	-	60.30
2.	Temperature Air ^{0}C	24.12	23.15	24.45	25.65
3.	Temperature Water ^{0}C	25.0	22.2	27.75	23.05
4.	pH	8.4	7.2	8.3	7.6
5.	Dissolved oxygen (ml/lit)	7.8	5.8	4.0	4.6
6.	Alkalinity (mg/lit)	423.33	350	218.7	191
7.	Sulphate (mg/lit)	32.50	35.80	36.17	34.0
8.	Phosphate (mg/lit)	2.12	0.47	2.19	3.2

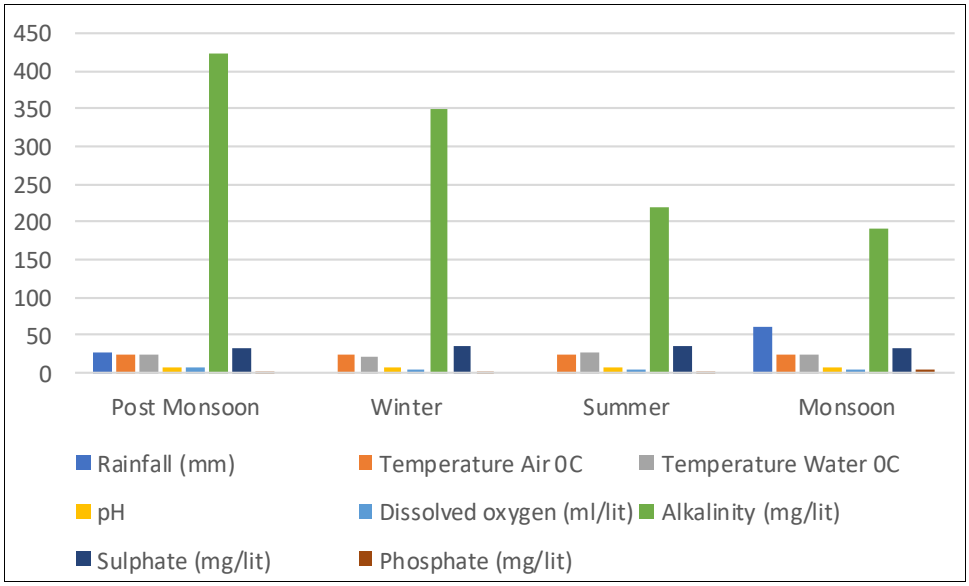

Fig 2: Seasonal variations in some Physico-chemical parameters of Kutluq Lake

During this study, it was observed that the lake received maximum rainfall (65.33 mm) in monsoon and minimum (26 mm) in post monsoon season, whereas during winter and summer there was no record of precipitation. The temperature record as shown in Fig 1A indicated that the atmospheric temperature was higher in summer while lower in winter. The surface water temperature was higher than that of atmospheric temperature during monsoon, post monsoon and winter.

Besides, the Physico- chemical parameters of water are important indicator of an aquatic ecosystem although they are greatly influenced and modified by climate and vegetation (Hutchineson 1975 and Aher 2007) [1].

Besides, the Physico- chemical parameters of water are important indicator of an aquatic ecosystem although they are greatly influenced and modified by climate and vegetation (Hutchineson 1975 and Aher 2007) [1]. The values of pH ranged from 7.60 to 8.50, being minimum in monsoon and maximum in winter. The low pH value, observed in the monsoon was owing to heavy inflow of fresh water in to the water body. The higher pH value in winter might be due to high photosynthetic activity. Similar observations were also reported by Roy (1955) [14], Tiwari and Chauhan (2006) [17] and Aher *et al* (2007) [1]. The content of Dissolved Oxygen (DO) in the water body of Kutluq Lake varied from 5.85 to 8.25 ml/ L, being minimum in summer and maximum in winter, as was recorded well above the minimum level to support pisiculture, throughout the year. Low content of the Dissolved Oxygen could be linked with the self-purification capacity of moving water, aquatic plants' photosynthetic efficiency and airflow etc. (Singh and Trivedi 1979) [15]. In the present study the total alkalinity ranged from 316.00 to 533.33 mg/L, being minimum in monsoon and maximum in summer season. Accumulation of large quantity of bicarbonate mighty be due to organic decomposition and decrease in water level. Decrease in alkality during monitoring month was obviously due to dilution (Mishra *et al* 1989) [10], Jhingram, (1982) stated that high productive water body has alkalinity over 100 mg/L. During the period of this investigation while analyzing the water samples of lake, the sulphate content showed its range between 1.82mg/L in winter and 36.37 mg/L in monsoon. Similar observations were made by Nagawanshi (1997) [11] and Aher *et al* (2007) [1]. Phosphate concentration ranged between 0.47 to 3.40 mg/L, being higher in monsoon low in winter season. The higher phosphate concentration in monsoon might be owing to influx through rain water as has already been reported by Munawar, (1970) [9] and Aher *et al* (2007) [1]. An assessment of Kagzipura lake water and its suitability for public domestic use and pisiculture was thought to be essential in present endeavor. Most of the Physico- chemical conditions of Kagzipura Lake described above exhibits some basic characteristics, which favors a successful in using the water for washing the cloths, bathing and also fish culture practice. Favorable range of temperature, alkaline pH and high values of DO are indicative of the productive and usable nature of Kagzipura Lake. The comparison of water quality of Kagzipura lake with limits laid down by fresh water quality criteria for public use i e. fisheries practices, bathing, washing cloths and animals etc. by Subbamma and Ramasarma (1992) and Chandra Prakash (2001) [1], suggest that the water parameters of the lake are within the permissible limits. However, very high level of phosphate

and alkalinity was recorded which needs to be managed to reach permissible limits. An assessment of Kagzipura lake water and its suitability for public domestic use and pisiculture was thought to be essential in present endeavor. Most of the Physico- chemical conditions of Kagzipura Lake described above exhibits some basic characteristics, which favors a successful in using the water for washing the cloths, bathing and also fish culture practice. Favorable range of temperature, alkaline pH and high values of DO are indicative of the productive and usable nature of Kagzipura lake. The comparison of water quality of Kagzipura lake with limits laid down by fresh water quality criteria for public use i e. fisheries practices, bathing, washing cloths and animals etc. by Subbamma and Ramasarma (1992) and Chandra Prakash (2001) [1], suggest that the water parameters of the lake are within the permissible limits. However, very high level of phosphate and alkalinity was recorded which needs to be managed to reach to permissible limits.

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References

1. Aher SK, Mane UH, Pawar BA. J Aqua Biol,2007:22(1):93.
2. Chandra Prakash. Status of soil and water quality parameters in brood stock management. In: Cause manual. CAS, Training programme on Brood stock Management and Genetic selection in Fish seed production, CIFE, Mumbai, 2001.
3. Esmaeili H, Johal MS. Proc Natl Seminar New Trends in Fishery Development in India, Punjab University, Chandigarh, 2005, 173.
4. Golterman HL, Chlymo RS, Ohanstand MAM. Methods for physical and chemical analysis of fresh water. IBP Handbook No. 8,2nd ed. Oxford: Backwell Scientific Pub, 1978, 172-178.
5. Gopal B, Zutshi D. Hydrobiologia,1998:384:267.
6. Hutchinson AH, Lucas SC, McPhail M. Seasonal variation in the chemical and physical properties of water in the Itrait of Georgia in relation to phyto-plankton. Trans R Soc Canada,1929:3:177-183.
7. Jhingran VG. Fish and fisheries in India. Delhi: Hindustan Publishing Corporation, 1982.
8. Kaur P, Mehra NK. Dr Hum Ecol,1997:8:77.
9. Munawar M. Limnological studies on fresh water ponds of Hyderabad, India. Hydrobiologia,1970:31:101-128.
10. Mishra PC, Dash MC, Dash RC, Chaudhary K. Effect of municipal waste on water quality and ecology of Burla Lake near Hirakud Dam reservoir. Poll Res,1989:8(3):145-152.
11. Nagawanshi M. Reproductive physiology of fresh water bivalve mollusks from Nandrabad pond, Aurangabad. PhD Thesis, Dr. B.A. Marathwada University, Aurangabad (MS), 1997.
12. Negi RK, Johal MS, Negi Tarana. Study of the physico-chemical parameters of water of Pong dam reservoir, Himachal Pradesh: A Ramsar site. Him J Env,2007:20(2):247-251.
13. Pawar BA, Mane UH. Hydrography of Sadatpur Lake near Pravaranagar, Ahmednagar District, Maharashtra. J Aqua Biol,2006:21(1):101-104.
14. Roy H. Plankton ecology of river Hoogli, West Bengal. Ecology,1955:36:169-175.
15. Singh SK, Tiwari RK. The impact of sewage water on the quality of Ganga river. Mendel,1979:6(10):99-101.
16. Subbama DV, Ramasarma DV. Studies on the water quality characteristics of a temple pond near Machilipatnam, Andhra Pradesh. J Aqua Biol,1992:7:22-27.
17. Tiwari A, Chauhan SVS. Seasonal phytoplanktonic diversity of Kitham lake, Agra. J Environ Biol,2006:27(1):35-38.
18. Usha R, Ramalingam K, Bharathi Ragan UD. Fresh water lake: A potential source for aquaculture activities—A model study on Perumal lake, Cuddalore, Tamil Nadu. J Environ Biol,2006:27(4):713-722.