Life Science Informatics Publications
Research Journal of Life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences
Journal Home page http://www.rjlbpcs.com/
RJLBPCS
ISSN 2454-6348

Original Research Article **DOI: 10.26479/2018.0406.41**

LIMNOLOGICAL STUDY OF NAGARAL DAM CHINCHOLLI, KALABURAGI, KARNATAKA, INDIA

Anita S M[1], Shankerappa S. Hatti[2*], Shashikanth Majagi[2]

1.Department of Zoology, Gulbarga University, Kalaburagi, Karnataka, India.

2.Department of UG & PG Studies and Research in Zoology, Government College, Sedam Road, Kalaburagi, Karnataka, India.

ABSTRACT: Physico-chemical analysis is the prime consideration to assess the quality of water for its utilization like drinking, irrigation, domestic and helpful in understanding the complex interaction between the climatic and biological process in the water [27]. The present study is carried out on the water quality of Nagaral dam of Chincholli Taluk, Kalaburagi district, Every month water samples were collected from the different sampling sites of the dam from December 2015 to November 2017 and subjected to physico-chemical analysis and heavy metal analysis. All the values of the physico-chemical parameters are within the permissible limit.

KEYWORDS: Nagaral dam, Water quality, Heavy metals, physico-chemical parameters. Kalaburagi, Chincholli.

Corresponding Author: Dr. Shankerappa S. Hatti* Ph.D.

Department of UG & PG Studies and Research in Zoology, Government College, Sedam Road, Kalaburagi, Karnataka, India. Email Address: hattishankerappa@gmail.com

1.INTRODUCTION

Increasing population growth and rising living standards in many countries necessitate higher quality water resources for various uses as agriculture, industry and drinking [28]. Water represent one of the basic elements supporting life and the natural environment, a primary component for industries, a consumers item for human and animals and a vector for domestic and industrial pollution. The nature and distribution of flora and fauna in a water body is mainly controlled by the fluctuations in the physico-chemical characteristics of water. Since 'good' water quality will produce healthier humans than one with the 'poor' water quality, an analysis on the physico-chemical

parameters of a water body was made. The findings of the water body will prove to be quite informative to the daily consumers of the water, as the Nagral dam is of significant importance to the entire Chimmanchod village and Chincholli dwellers. The study of inland water bodies has gained immense importance in recent years because of their multiple uses for human consumption, agriculture and industry. Thus, demand for water has increased with the increase in human activities and therefore, have been the subject of detailed investigations. Several of the important concepts in ecology have been developed from studies of the aquatic ecosystems and organisms. This has been suitably understood by going through the literature especially of [1-5] represent most important milestone in the overall development of the science of ecology. These tanks are constructed for irrigation purpose, however, in the passing time the water use pattern has changed from agriculture to domestic purpose such as drinking, washing , bathing, fishing etc.. There is lack of baseline data on Physico-chemical characteristics of the perennial water bodies of this region. Therefore, present study has been carried out on of Nagral dam for two years December 2015 to November2017 to record the physico-chemical parameters.

1.Documentation of seasonal variation of meteorological conditions of the study area.

2.Monthly and seasonal variations of physico-chemical parameters of water samples of reservoir

2.MATERIALS AND METHODS

Every month water samples were collected from the study area from December 2015 to November 2017. The Atmospheric and water temperature pH and free CO 2 were measured in the field and samples collected for further physico-chemical analysis according to [6] and [7].

STUDY AREA

Nagaral dam is located 5 km away from Chimmanchod Village of Chincholi Taluk, Kalburgi district, situated in the northern part of Karnataka state, which falls 77^0 25’48” E longitude and 17^0 28’ 12” N latitude.

3. RESULTS AND DISCUSSION

Fig 1: Showing the Study area of Nagral dam of Chincholli taluka

Table 1: Monthly average values of Physico-chemical parameters of Nagaral dam

Months	At. Temp^{O} C	Water Temp^{O} C	pH	Alk Alinity	DO	Free CO2	TDS	TH	Ca	Mg	Chlori de	Nitrate
December 2015	24	21	7.9	210	5.2	0.6	202	198	98	32	86	20.2
Jan 2016	27	22	7.8	252	6.2	0.8	198	202	102	44	92	20.4
February	33	28	7.9	305	7.2	0.8	120	316	152	56	98	15.7
March	36	29	8.0	328	8.8	0.9	132	292	156	48	114	14.2
April	38	32	8.1	358	8.2	1.2	142	360	164	65	104	12.4
May	39	33	8.2	362	7.8	1.6	152	338	168	68	110	13.4
June	36	30	7.3	193	3.0	1.8	256	264	120	58	56	29.6
July	33	27	7.3	158	4.2	1.5	266	286	124	48	58	34.5
August	31	27	7.6	130	3.8	0.6	232	254	108	46	62	26.7
September	29	26	7.6	151	3.9	0.5	205	188	122	38	62	23.4
October	30	26	7.6	282	4.6	0.6	260	152	88	32	72	19.6
November	26	22	7.8	290	5.8	0.4	256	166	92	28	76	18.6
December 2016	25	21.8	8.0	210	6.0	0.6	210	182	88	56	96	26.8
Jan 2017	32	26.6	7.9	278	6.4	0.8	122	190	92	54	112	32.4
February	35	29.2	7.8	368	7.2	1.0	128	385	112	56	102	22.0
March	36	30.5	8.3	372	8.2	1.2	102	302	134	72	110	21.2
April	38	30.1	8.2	396	8.4	1.4	114	312	138	60	125	18.4
May	39	30.3	8.4	354	8.0	1.4	138	342	142	68	132	19.6
June	36	30.3	8.3	182	4.0	1.6	256	310	116	42	144	32.4
July	32	26.3	7.7	156	4.4	1.2	332	265	114	48	72	35.8
August	31	27.6	7.2	142	4.6	0.8	346	322	98	44	78	36.8
September	29	26.3	7.3	158	4.4	0.6	310	165	98	36	52	32.2
October	27	22.7	7.8	172	4.6	0.8	204	142	76	38	55	24.8
November	26	21.8	7.8	262	5.5	0.6	212	166	70	32	62	20.2

Note: All Values are expressed in mg/l. Except Atmospheric and water temperature

The Atmospheric temperature and water temperature were recorded highest 39^{0}C and 33 ^{0}C during May 2016 and lowest 24 ^{0}C and 21^{0}C in the month of December 2015. It must be due to the presence of cloudy weather according to [8] long rains responsible for following temperature during south west monsoon and north east monsoon season. Temperature fluctuation in water are influenced considerably by meteorological factors such as air temperature, humidity, winds and solar radiations.

[9] reported direct relationship between bright sunshine and air temperature. Similar pattern of changes in the air and water temperature was reported by [10]. The pH values highest observed in the month of May and minimum 7.3 in June and July. pH remained alkaline throughout the study period. Annual fluctuations are small indicating good buffering capacity. Higher pH is normally associated with Photosynthetic activity in water [11]. The increase and decrease in summer and monsoon respectively have been reported from a number of lakes of Australia [12] and tropical India [13]. The high pH in summer observed in present investigations may be due to increased Photosynthesis. The photosynthetic assimilation of dissolved inorganic carbon can increase pH [14]. [15] have reported the similar results on seasonal variation of physic-chemical parameters in Perrenial tank of Talsande, Maharashtra. Total Alkalinity values ranged between 130-362 mg/l during August and May respectively. The higher alkalinity in summer may be attributed to increased rate of decomposition, during which carbon dioxide is liberated which reacts with water to form HCO_3 increasing the total alkalinity in summer. Similar results were reported by [16] and [17]. The Dissolved oxygen concentrations are noticed highest 8.8 mg/l. in March 2016 and lowest 3.0 mg/l in the month of June. The amount of oxygen dissolved in water depends upon several factors such as partial pressure of the gas in air close to the water surface, rate of photosynthetic activity in the ecosystem, decomposition of organic matter and oxygen holding capacity of water. Although the oxygen holding capacity of water reduces at high temperature [18], yet high dissolved oxygen values in summer and lower values in monsoon in Nagral dam served to emphasise the overriding influence exerted by factors (other than temperature) such as great abundance of photosynthesising organisms. [19] have recorded maximum recorded in summer and minimum in monsoon. Similar observation were made by [15] [20] [28]. Contrary results were observed by [29] and [30] Total dissolved solids are recorded highest 266 mg/l in July 2016 and lowest 120mg/l in February. Total hardness, Calcium hardness and Magnesium hardness concentrations were noticed highest 360 mg/l in April, 168 mg/l and 68 mg/l in the month of May respectively, similarly lowest concentrations of Total hardness and calcium hardness observed 152 mg/l and 88 mg/l in October magnesium hardness 28 mg/l in November. Higher values of total hardness during summer season can be attributed to decrease in water volume and increased rate of evaporation. [21] have also recorded higher hardness in summer and lower in winter. Chloride concentrations were maximum in 114 mg/l in March and minimum 56 mg/l. in June. The chloride reached maximum during summer when the water level was low. Such condition was also observed by [22] and reported raise of chlorides may be due to increased summer temperature and evapo-transpiration. The chloride level concentration decreased steadily through winter and reached minimum in rainy season. Nitrate concentration recorded 34.5 mg/l in July and minimum 12.4mg/l in April. Highest values of nitrate recorded during rainy season and lowest during winter season. Generally, water bodies polluted by organic matter exhibit higher values of nitrates [23]. The prominent rise of NO_3 –N during rainy season seemed to be a common

features of Mc. [24] observed nitrate peak in early rainy season in lake [25] reported from Tungabhadra reservoir that nitrate was enriched when flood water entered in lake. Similarly, nitrates were added in the form of surface run off from catchment area. The decrease of nitrate in winter and summer may be due to the photosynthetic activity of the algae and macrophytes. These observations are in agreement with that of [26].

4. CONCLUSION

It could be concluded that all the physicochemical parameters of the Nagral dam are within the permissible limit. Good for drinking, agricultural and other purposes.

CONFLICT OF INTEREST

We have no conflict of interest.

REFERENCES

1. Mobius, K.. Die Auster and die austern wirts chaft. Berlin. 1877; Pp.683-751.
2. Forbes, S. A.. The lake as a microcosm, Bull. Peoria(III) Sci. Assoc.1887.Reprinted in Bull.111.Nat. Hist. Surv. 1887;15:537-550.
3. Gause, G. F. Ecology of Population.Quart. Rev.Biol. 1932; 7:27-46.
4. Lindeman, R. L. The trophic dynamic aspects of ecology. Ecol. 1942; 23:399-418.
5. Odum, H. T.. Trophical structure and productivity of Silver Springs of Florida. Ecol. Monorgr. 1957: 27: 55-112.
6. APHA: Standards Methods for the examination of water and wastewater 1998
7. Trivedi, R. K. and P. K. Goel. Chemical and biological methods for water pollution studies. Environmental publications. 1986; Pp. 34-96.
8. Uyeno.. Nutrient and energy cycle in an estuarine oyster area M.P Proc. Nat. Acad. Sci. India. 1966; 52(B) ;IV Pp. 189.
9. Munawar, M.. Limnological study of freshwater ponds of Hyderabad, India II. The biocenose distribution of unicellular and colonial phytoplankton in polluted and unpolluted environments. Hydrobiologia. 1970; 36(1):105-128.
10. Sathe, S. S. Khabade Suresh and Hujare Milind. Hydro-biological studies on two manmade reservoirs from Tasgaon tahsil (Maharashtra) India. Ecol. Environ. Conserv. 2001; 7(2):211-217.
11. King, D. L. The role of carbon in eutrophication. J. Water Pollution Control Federation 1970;42:2035-2051.
12. Ferell, T. P., Finiarson C. M. and Griffiths D. J. Studies on the hydrobiology of a trophical lake in north-western Queensland 1.Seasonal changes in chemical characteristics Australian J .Marine Freshwater Res. 1979; 30:579-595.

13. Rao, D. S. And Govind, B. V. Hydrobiology of Tungabhadra Reservoir. Indian. J.Fisheries 1964: 11(1):321-344.
14. King, D. L.1970 The role of carbon in eutrophication. J. WaterPollution Control Federation 42:2035-2051.
15. Milind S. Hujare, and Mule, M. B. Seasonal variation of physic-chemical parameters in the perennial tank of Talsande, Maharashtra. J. Ecotoxicol. Environ. Monit. 2008; 18(3)233-242.
16. Harshey, D. K. Shivastav,A, K.and Patil, S. G. Studies on the ecology of freshwater ostracoda part II. Population ecology in Balsagar Tank, Jabalpur, M.P.India.J.Curr.Biosci. 1987: (4):127-134.
17. Kaur, H. Bath, K. S. Mander, G. And Jerath, N. Physico- chemical status of Kanjli Wetland (Punjab.India).J. Environ.poll. 2000; 7(1):39-42.
18. Welch, P. S. Limnology. II ed. McGraw Hill book Co. N. Y. 1952.
19. Ahmed Masood and Krishnamurty R.. Hydrobiological studies of Wohar reservoir Aurangabad(Maharashtra State) India. J. Environ. Biol**.** 1999; 11(13)**:**335-343
20. Gaur Rajeevkumar and Khan Asif , A. Physico-chemical characteristics of an eutrophic lentic environment with a permanent bloom of a cyanobacterium Microcystis aeruginosa. Ecobiol. 1995; (4):263-267.
21. Saify Tayyab,Chaghtai, S. A. Alvi, P. and Durrani. Hydrobiology and periodicity of phytoplankton in the sewage fed Motia pond, Bhopal (India). Giobios. 1986; 13(5):199-203.
22. Swarnalatha, N. and Rao, A. N.. Ecological studies of Banjara lake with reference to water pollution. J. Environ. Biol. 1998; 19(2): 179-186.
23. Kodarkar, M. S. And Chandrasekhar, S. V. A. Conservation of lakes. Indian Association of aquatic Biologists(IAAB) Hyderabad Pub.p 1995; 3:1-82.
24. Mc. Lachin, S. M.. The influence of lake level fluctuation and the thermocline on water chemistry in two gradually shelving areas in lake Kariba Central Africa. Archive. Fuer. Hydrobiologia 1970; 66 (4):499-510.
25. Rao, D. S. And Govind, B. V. Hydrobiology of Tungabhadra Reservoir. Indian. J.Fisheries1964. 11(1):321-344.
26. Munawar, M.. Limnological study of freshwater ponds of Hyderabad, India II. The biocenose distribution of unicellular and colonial phytoplankton in polluted and unpolluted environments. Hydrobiologia. 1970 36(1):105-128.

27. Rahmani A. Study of groundwater quality changes trend (case study: Qaemshahr – Joybar, Mazandaranprovince). MS Thesis, Natural Resources Faculty of Sari. 2010. 69-93.
28. Majagi S. H., Vijaykyumar K and Vasantkumar B.. Concentration of Heavy metals in Karanja Reservoir in Bidarr district. Envt. Mont. & Asess. 2008. 138: 273-279.
29. Gonzolves E. V. and Joshi D.R.. Freshwater algae near Bombay I. The seasonal succession ofthe algae in tank in Banda. Journal of the Bombay Natural Hktory Society, 1946. 46. 154-176.
30. Jain, K Bhatia, K. K.S. and Kumar, S. R. Groundwater contamination in greater Guwahati, Assam. Indian Journal of Environmental Protection 2000. 20(9), 641-648.
31. Adak D. M. and Purohit. K. M..Correlation co-efficient of some physico-chemical characterstics of surface and groundwaters of Rajgangapur Part-I Indian Journal of Environmental protection 2000. 20 (9) 681-687.