RESEARCH ARTICLE

Physico-Chemical parameters of Nizam sagar dam with respect to fish production Phytoplankton, Zooplankton

Totawar DV and Tamlurkar HL

P.G. Dept. of Zoology, Yeshwant Mahavidhylay, Nanded, MS, India

Manuscript details:

Received: 12.07.2017
Accepted: 13.08.2017
Published : 27.09.2017

Editor:
Dr. Arvind Chavhan

Cite this article as:
Totawar DV and Tamlurkar HL (2017) Physico-Chemical parameters of Nizam sagar dam with respect to fish production Phytoplankton, Zooplankton; *International J. of Life Sciences*, 5 (3): 451-454.

Acknowledgements
Authors are thankful to the Head, Department of Botany for providing facilities and the financial assistance of UGC is gratefully acknowledged.

ABSTRACT

The main purpose of Nizam sagar dam is fish culture, irrigation, drinking, agriculture and also for domestic purpose. The present investigation deals with the physica-chemical parameters of Nizam sagar dam for fisheries management and culture of fish. The study was carried out for a period of twelve months during the academic year 2014. The parameters such as water temperature. pH, total alkalinity, dissolved oxygen and carbon dioxide were estimated. The pH shows alkaline trend in Nizam sagar dam. The water of Nizam sagar dam is found to be more suitable for fish culture.

Key words: Reservior, Physico-chemical parameters, and fish culture.

INTRODUCTION

The fresh water bodies of India includes a large number of rivers, ponds, dams, impoundments and lakes. The riverine system, have ideally the quality of water should be assessed on the basis of physic-chemical and biological parameters on order to provide the complete spectrum of information of the purpose fisheries management. Nizam sagar dam is located near Nizam sagar village at the border of Maharashtra of Nizamabad district. Dam is constructed on Manjira. a major source for irrigation and fish production and also beneficial for drinking, agriculture purpose. It is a deep reservoir with lot of submerged weeds and various species of fishes. The catchment area of the reservoir is about 312-84 sq. kms.

MATERIALS AND METHODS

For the purpose of study, the water samples were collected from the reservoir for a period of twelve months during the year 2014 from January to December. Four sampling spots namely A. B. C and D are selected for study. The temperatures were recoreded at the time of sampling, on the spot using centigrade thermometer. pH was measured with standard pH-meter. Other parameters were estimated by the procedures given in Trivedy and Goel (1984), also from methodology by Kodarkar.

RESULTS AND DISCUSSIONS

The physic-chemical parameters for 12 months recorded are given in the Table-1 The river water, which is lotic, becomes lentic in the reservoir. Hence the reverine fishery have different ecology compared to reservoir fishery. Thus to study the fish culture in a reservoir is important from the point of the ecology of the reservoir as said by Shrivastava (2000). The climatic factors such as rainfall, temperature, atmospheric pressure and humidity help in understanding the complex process of interaction between the climate and the biological process in water bodies. Impinging.

Solar radiation and atmospheric temperature bring about interesting changes in aquatic ecosystem, which play significant role in the fish culture. Many workers as, Pandey and Tripathi (1988), Pulle (2000); Pawar (2002), Wagh (1998) studied the role of climatic factors in understanding the ecology of aquatic ecosystem.

Temperature

It plays an important role in thermal stratification which have some effect on chemical and biological activities of aquatic media like dissolved oxygen, carbon-di-oxide, water and air temperature go more or less hand in hand. The water temperature recoreded at morning hour ranges between 17 to 39.3 ^{0}c at all the four station. Maximum temperature is recorded in the months of May and June 2014.

Hyderogen-concentration

pH is the scale of intensity of acidity and alkalinity of water and measures the concentration of H^+ ions. Most of the biological processes and biological reactions are pH dependent. Swingle (1967) stated that waters having a pH range of 6.5 to 9.0 as recorded before day break are most suitable for pond culture and those having pH values of more than 9.5 (alkanline) as unsuitable, because in the later, CO_3 is not available. Fish dies at pH 11. Acidic water's reduce the appetite of the fish. Their growth and tolerance to toxic substances. Acidic water, carries toxicity of H_2S_4 copper and other heavy metals.

Table 1. Monthly variations of physic-chemical parameters of Nizam sagar dam in 2014

Parameters	Spots	Months											
		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
Water Temerature (^{0}C)	A	21.60	25.50	26.00	30.10	39.20	38.00	31.00	28.00	22.00	21.00	19.00	18.00
	B	22.00	26.10	27.20	31.00	38.50	39.10	31.00	28.00	22.50	20.40	19.40	18.20
	C	22.50	27.00	27.50	31.50	39.00	38.50	31.00	28.50	22.00	20.20	19.60	18.60
	D	22.50	27.50	28.00	31.60	39.30	38.40	31.50	29.00	22.50	20.00	19.80	18.80
pH of Water	A	7.63	7.55	7.30	7.35	7.32	7.34	7.40	7.50	7.56	7.58	7.71	7.85
	B	7.64	7.56	7.32	7.35	7.32	7.35	7.40	7.52	7.55	7.58	7.70	7.86
	C	7.64	7.57	7.32	7.36	7.30	7.34	7.42	7.52	7.58	7.57	7.72	7.88
	D	7.63	7.56	7.30	7.38	7.30	7.34	7.42	7.42	7.50	7.57	7.70	7.87
Total alkalinity (mg/1)	A	134.0	130.8	129.9	131.0	132.2	132.8	136.2	139.9	138.1	137.9	128.0	131.3
	B	134.0	130.8	129.9	131.3	132.1	132.9	136.2	139.8	138.0	137.9	128.1	131.2
	C	134.2	130.7	129.8	131.5	132.1	132.7	136.4	140.0	138.1	137.8	128.1	131.5
	D	134.4	130.6	129.8	131.6	132.1	132.6	136.4	140.0	138.0	137.9	128.0	131.4
Dissolved Oxygen (mg/1)	A	9.50	9.10	6.00	6.40	6.10	7.20	8.50	9.80	8.90	8.86	8.90	9.33
	B	9.41	9.00	5.80	6.50	6.30	7.20	8.57	9.86	8.85	8.87	8.91	9.30
	C	9.50	9.10	6.10	6.80	6.60	7.00	8.54	9.79	8.89	8.88	8.89	9.25
	D	9.61	9.10	6.10	6.60	6.20	7.30	8.50	9.87	9.01	8.87	8.90	9.22
Carbon Dioxide (mg/1)	A	4.41	3.10	4.25	3.11	3.96	4.42	6.10	6.39	5.91	4.98	3.99	3.82
	B	4.60	3.12	4.32	3.10	3.97	4.45	6.99	6.30	5.99	4.11	3.10	3.10
	C	4.55	3.11	4.42	4.10	3.99	4.40	6.99	6.32	5.91	4.11	3.10	3.10
	D	4.48	3.11	4.35	4.41	3.10	4.32	6.10	6.41	5.99	4.99	3.10	3.10

The fish gets prone to attacks of parasites and diseases in acidic water. hence pH is considered as an indicator of overall productivity that causes habitat diversity (Minns, 1989). The pH recorded, ranged from 7.30 to 7.88 at all the four stations

Total alkalinity

The water that can neutralize the acid is called alkaline water. Acidic water is danger for fish growth, the reservoir or ponds should have alkalinity so that the acids can be neutralized and fish production is possible. The alkalinity might be due to the high pH or it may be caused by cations of Ca, Mg, na, k, NH and Fe combined either as CO3 or bicarbonate as hydroxides. At pH values less than 8.3 but more than 4.5 practically no CO_2 is present, but free CO_2 and CO_2 and bicarbonate may be present, (Jhingran, 1991). He also concluded that many fish ponds and rivers have the total alkalinity values equivalent to 10 to 50 ppm $CaCO_3$. According to Alikunhi (1967) in the highly productive water alkalinity reach to over 100 ppm and according to Schaperlaus (1933) most productive water is that which titrates 200 to 500 ppm equivalent $CaCO_3$. The total alkalinity values at Nizam sagar dam were found to be in the range of 128 mg/1 to 138 mg/1.

Dissolved oxygen

Do is one of the important parameter in water quality assessment. It's presence is essential to maintain the higher form of biological life in the water. The wastewater is determined largely by the oxygen balance in the system.

Oxygen is formed by absorption from the atmosphere at the surface of pond and by photosynthesis of the chlorophyll bearing organisms inhibiting in water body. Thus oxygen act as an indictor of planktonic development which has a significant role in growth of fish (Jayaraju et al. 1994), the high temperature and low dissolved oxygen during summer create favourable condition for the development of blue green algae. The salinity and oxygen are inversely proportion and therefore low oxygen results in high salinity, which affect the fish production. The dissolved oxygen recorded at four station of Nizam sagar dam, ranges between 5.60 to 9.80 mg/1.

Carbon dioxide

CO_2 is vital in the life of plant and micro organisms. It is produced as a result of respiration of aquatic organisms. As CO_2 is highly soluble in water, it is found to be in larger amount in polluted water compared to fresh water bodies. CO_2 has a great effect on on photosynthesis which effect again onfish growth. Dwivedi and Pandey (2002) found the free carbon dioxide high in pre-monsoon and monsoon period and low in winter. The values of CO_2 ranges from 3.81 to 6.81 mg/1 at all four stations. High concentrations of free carbon dioxide more than 20 ppm is toxic to fish.

CONCLUSION

The water of Nizam sagar dam is found to be more suitable for fish culture. The water is productive having the maximum Alkalinity 139 mg/1 also less than 8 pH, DO and CO_2 of the water is measured within the renge of 5 to 10 mg/1 which is th suitable condition for fish growth. Hence Nizam sagar dam having the large area for catchment can be utilized for the production of fish on a large scale and a variety of species can be cultured.

Conflicts of interest: The authors stated that no conflicts of interest.

REFERENCES

Alikunchi (1957) Fish culture in India. F.M. Bull. Indian Count Agri. Res. 20 : 144 p.

APHA (1985) Standard Methods for the examination of water and waste water. 16th edition. American Public Health Association, New York. PP : 1193.

Diwedi BK and GC Pandy (2002) Physicochemical factors and algae diversity of two ponds (Girija Kund and Maqbara pond). Faizabad, India. Poll. Res. 21 (3) : 361-370.

Jayaraju PB, Prasadrao GDV and Sharma SV (1994) Seasonal variation in physico-chemical parameters and diversity in Flora and Fauna of the river Manneru, a tributary to river Krishna, Andhra Pradesh, India J. Aqua Biol. 9 (1 & 2) 19-22

Kodrakar MS (Ed) (2006) Methodology for water Analysis Publ. 2 IAAB, Hyderabad. 3rd edition PP: 106.

Minns CK (1989) Factors affecting fish species richness in Ontario lakes. Transaction of the American Fisheries Society, 118 : 533-545.

Pandey SN and Tripathi AK (1988) Schizemeris Lubleoni (Kuetz) – An indicator of organic pollutin, Geobios.15 (6) : 277-278.

Pawar SK (2000) Hydrobiology of Sirur Dam near Mukhed in Nanded District Ph.D. Thesis, SRTM, Universtiy, Nanded.

Pulle JS (2000) Bio-monitoring of Isapur Dam water Ph.D. Thesis, SRTM University, Nanded.

Srivastava SC (2000) A text book of Fishery Science and Indian Fisheries Kitab Mahal Publishers.

Singhal RN, Swarnajeet and Devis RW (1986) The Physico-chemcial Environment and the Plankton of Managed Ponds in Haryana. India Proc. Indian Acad. Sci. (Sec B). 95 (3) : 253-263

Scharperclause W (1933) Text book of Pond culture : Rearing and keeping of Carp. Trout and allied fishes (Tr. Fhund). Fish Leaflet. Washington, (311) : 260 P.

Swingle HS (1967) Standardization of Chemical analysis for water and pond mud. FAO Fish. Rep. 44 (4) : 397-421.

Jhingran VG (1991) Fish and Fishries of India, Hindustan Publishing Corporation, (India) Delhi PP : 280.

.