



Hydrobiological Study of Sonala Dam, Sonala, Dist. Washim (M.S.) India

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Abstract:

The present study deals with the assessment of water quality of the Sonala Dam, Sonala, Dist. Washim (M.S.), India. The study area of dam is located at 77°, 12', 30" E Longitude and 20°, 19', 00" north latitude in Sonala village of Washim district in Maharashtra (India). Analysis of the physico-chemical characteristics was conducted from February 2013 to January 2014. Seasonal variations at six different sampling stations of Sonala Dam were observed Temperature, Conductivity, pH, Total Dissolved Solids (TDS), Dissolved Oxygen, Nitrate and Phosphate were studied during the study period. The results revealed that the different seasons showed fluctuations in physico-chemical parameters.

Keywords: Hydrobiological Study, Sonala dam, pollution, physico-chemical, management.

Introduction

Water is an indispensable part of biological life of mankind. Water has profoundly influenced life. Directly or indirectly, water affects all facets of life. Lakes, reservoirs and wetlands form the fresh water resource of the world which supplies water for the population in the whole year. The lakes and reservoirs represent very complex and fragile ecosystem. In many parts of the world fresh water bodies are dumped with highly toxic chemicals along with effluents to a dangerous level. Nutrients washed down from the irrigated fields and drainage channels reach our freshwater bodies. Anthropogenic activities have misused and abused natural resource water and resulted in breakdown of natural water cycle. Better quality of water is essential for living organisms, which man has exploited more than any other resources for the sustenance of life. Water quality provides current information about the concentration of various solutes at given place and time [Jayabhaye, 2008].

Analysis of quality of water is important to preserve and protect the natural ecosystem. To assess the quality of water, analysis of physico-chemical parameters of water is essential for the best usage like irrigation, drinking, bathing, fishing, and industrial processing and so on. Water quality deals with the physical and chemical and biological characteristics in relation to all other hydrological -properties [Shinde et. al, 2010]. Biological components of freshwater solely depend on the physico-chemical conditions of water and therefore, life is linked with the quality of environment. Natural and anthropogenic activities influence the quality of water including local climate, geology and irrigation practices, water regulates the earth's temperature [Ahamed, M. and Krishnamurthy, R. 1990].





Materials and Methods :-

Study area

Sonala Dam is an earthen dam with 19.20 metre maximum height and 446.90 hector submergence with 132.50 sq.km. of catchment area. Department of Irrigation, Government Maharashtra constructed this dam in the year 1981. Agricultural fields surround the reservoir. The reservoir is mainly used for drinking water supply to nearby villages and for irrigation. The nearby villages also use the water for bathing and washing purposes. The study area of dam is located at 77°, 12', 30" E Longitude and 20°, 19', 00" north latitude in Sonala village of Washim district in Maharashtra (India). The reservoir is constructed on the River Aran also known as River Adan a tributary of River Godavari. Adan River in its way runs through the Maraldoh village, before draining in the dam.

A limnological survey of Sonala dam was carried out from Feb 2013-Jan 2014. For physico-chemical analysis water samples were collected from six sampling stations every month in the forenoon (between 7 am to 9 am.). To study physico-chemical properties of water, water samples were collected in 5 liters plastic can, brought to laboratory and analyzed by standard methods. For Dissolved Oxygen, the water sample was taken in 300 ml capacity BOD bottles and fixed on the spot. The results were calculated as per standard formulas and methods APHA (1985), NEERI (1986), Kodarkar (1992).

Result and Discussion

Physico-chemical environment has tremendous influence on its biotic community. It controls diversity, biomass and distribution of biotic community in time and space. Water quality can be determined by the presence of living organism. The physico-chemical characteristics of Sonala dam were studied for the period of one year from February 2013 to January 2014 at regular monthly interval, and investigation were done for further conclusion.

Temperature:

Temperature is a fundamental environmental factor, as it has effects on biochemical reaction and population fluctuation of water body. Increase in temperature accelerates the biochemical reaction and reduces solubility of gases. Physiology of organism is greatly influenced by water temperature which varies according to availability of heat from the solar radiation as per month and season. The temperature trend was on expected lines that was low during winter and thereafter steadily increased till May. Highest temperature of 31.07 °C was recorded in the month May. High water temperature during summer season might be due to rapid water depletion, high solar radiation, clear atmosphere and long day duration. (Surve *et al.* 2004, Sharifun Nahar *et al.* 2007)

Conductivity:

Conductivity of water is a numerical expression of ability of water sample to carry an electric current. Maximum recorded value was 627.58 mg/l in the month of May. During the study period maximum value of conductivity was recorded during summer season and minimum during winter season. (Raut *et al.*, 2011). High values of conductivity may be attributed to the increased concentration of





salts in reduced quantity of water in dam. Lower values were due to more inflow of water which diluted the pollutant to some extent and lowered the ionic contents of water.

Total Dissolved Solids:

The density of water is greatly influenced by the presence of dissolved salts and which in turn affects the quality of aquatic environment. Maximum value of 561.24 mg/l was recorded in the month of August. Higher values during monsoon may be due to surface runoff soil, clay etc. and the enormous amounts of solid transferred it along with rain water. Lower values during winter may be due to settling of suspended particles and trapping of dissolved solids by organism. Manjare (2010) Tamdalge tank reported maximum value in the June due to heavy rainfall and minimum value in the month of April.

pH:

pH of water is an indicator of prevailing physico-chemical condition and measures the degree of acidity or alkalinity. Any change in pH of water is accompanied by changes in other physico-chemical characteristics of the medium. The pH of water tends towards alkaline nature during the study period. The maximum pH of 7.66 was recorded in the month of April. The maximum pH during summer was due to increased photosynthetic activities, which regulated the pH towards alkaline. The lower pH was recorded in winter season, may be due to short day period and decrease in photosynthetic activities. Highest value during summer and minimum pH during winter was also reported by Karuthapandi et al., (2013).

Dissolved Oxygen:

Dissolved oxygen is one of the important abiotic factors regulating the life of animals in water. Aquatic animals use dissolved oxygen for their respiration and metabolic processes. Alteration in dissolved oxygen may be due to production of oxygen by photosynthesis. The dissolved oxygen was recorded maximum during winter season and minimum in summer season. Maximum DO value of 10.37 mg/ l was found to be highest in the month of January. Increased value of DO in winter was due to high solubility of oxygen at low temperature. During summer season, depletion of DO in water is due to higher temperature and increased microbial activity. Mahadeo et al., (2010).

Phosphate:

Phosphate is a key nutrient that resulted in enrichment of natural water owing to its immense importance towards biological productivity. The droppings of large number of residential and migratory birds add to the phosphate content in water. Maximum phosphate value of 0.3220 mg/l was recorded in the month of September. Phosphate concentration was higher during monsoon season and lower during winter season.

Nitrate:

Nitrate is an essential nutrient that results in enrichment of natural water. Maximum nitrate values were recorded during monsoon season and minimum during winter season. Maximum nitrate values of 5.148 mg/l were recorded in the month of August. Higher values during monsoon season may be due to the use of chemical fertilizers in crop fields of catchment areas. Surface runoff during





monsoon carries nitrates into the dam water. Karuthapandi et al., (2013) Umdasagar (A.P.), observed maximum monsoon minimum summer and winter. From the above discussion it may be concluded that, on an average the water reservoir of Sonala dam is not significantly polluted. Comprehensive monitoring and proper management could be enough to make the water less polluted.

Table No. 1. Physico-chemical parameters of Sonala dam during 2013-2014

Months	Temp	Cond	TDS	pH	DO	PO ₄	NO ₃
Feb	24.14	588.61	270.02	7.517	6.59	0.1833	1.167
Mar	24.93	598.98	407.59	7.608	6.32	0.1915	1.285
Apr	28.10	609.13	432.95	7.668	6.02	0.2050	1.189
May	31.07	627.58	439.63	7.628	5.76	0.2265	1.177
Jun	28.51	540.65	342.18	7.548	5.66	0.2453	1.698
Jul	26.35	470.00	500.28	7.505	6.61	0.2708	4.638
Aug	25.21	512.35	561.24	7.603	7.45	0.2820	5.148
Sep	24.95	463.47	432.69	7.633	8.02	0.3220	4.056
Oct	23.11	411.36	340.01	7.355	8.53	0.1483	0.046
Nov	21.16	438.39	310.38	7.172	9.06	0.1595	0.052
Dec	19.69	440.63	238.32	7.240	10.12	0.1653	0.059
Jan	20.64	452.87	203.07	7.218	10.37	0.1592	0.051

References :-

Ahmed Masood and R.Krishnamurthy. (1990) : Hydrobiological Studies of Wohar reservoir Aurangabad, (Maharashtra State) India. *J. Environ. Biol.* 11(3) : 335-345.

APHA (1985): Standard Methods for Examination of Water and Waste water, 16th Edition, American Public Health Association, American Water Work Association water pollution control Federation, Washington D.C.

Jayabhaye U. M., Salve B. S. and Pentewar M. S. (2008): Some Physico-chemical aspects of Kayadhu river, District Hingoli, Maharashtra. *J. Aqua. Biol.* 23(1): 64-68.

Karuthapandi M., Rao D.V., Xavier Innocent B. and Deepa J. (2013) : Zooplankton diversity and trophic status of Safilguda tank, Hyderabad, *International Journal Of Advanced Life Science*, Volume(6), Issue-1.

Karuthapandi M., Rao D. V. and Xavier B. (2013): Zooplankton composition and diversity of Umdasagar, Hyderabad. *International Journal for Life sciences and Educational Research*, 1(1): 21-26.

Kodarkar M.S. (1992): Methodology for water analysis, physico-chemical, Biological and Microbiological. *Indian Association of Aquatic Biologists Hyderabad*, 2: 50.

Manjare S A, Vhanalakar S A and Muley D V., (2010): Analysis of water quality using Physico-chemical parameters Tamdalg tank in Kolhapur district, Maharashtra. *J. Ad. Biotech. And Research.* 1 (2): 115-119.





Mahadev, Hosamani S. P. and Syed Akheel Ahmed (2010): Statistical multivariate analysis of lakes water quality parameters in Mysore, Karnataka, India. *World Applied Sciences Journal* 8(11): 1370-2010.

NEERI (1986): Manual on water and Waste water Analysis. *National Environmental Engineering Research Institute. Nehru Marg, Nagpur, India.*

Raut K.S., Shinde SE, Pathan T.S. and Sonawane D.L. (2011) : Seasonal variations in physico-chemical characteristics of Ravivar Peth Lake at Ambajogai District. Beed Marathwada Region, India. *Journal of Research in Biology, Ficus Publishers, Vol 1 | No 4, 258-262 .*

Sharifun Nahar, Abdus Salam Bhuiyan. 2007. *Research J. Of Fisheries and Hydrobiology, 2(1): 18-20.*

Shinde S. E., Pathan T. S., Raut K. S., More P. R. and Sonawane D. L. (2010): Seasonal variations in physicochemical characteristics o Harsool-Savangi Dam, district Aurangabad, India. *The Ecoscan, 4(1):37-44.*

Surve PR. 2004. *Comp. Toxicol. Physiol. Vol. 1 (II), Shivneri Publisher and Distributors, Pp. 147-153.*

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