

RESEARCH ARTICLE

Determination of physico-chemical parameters of Vishnupuri Dam, Nanded District, Maharashtra, India.

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ABSTRACT

The present study was conducted to assess the Physico-chemical Parameters of Vishnupuri dam water in Nanded district Maharashtra, India, during the year June 2015 to May 2016. Analysis was performed on 05 different parameters. The monthly Variation in the physical and chemical parameters such as Chloride, Phosphate, Nitrate, Biochemical Oxygen Demand and Chemical Oxygen Demand. Were investigated. All the parameter were beyond on the permissible limits. Aquatic ecosystem monitoring has been carried out in India based on either chemical or biological analysis. The result revealed that there was significant seasonal variations in some physico-chemical parameters and most of the parameters were in the normal range and indicated better quality of dam water.

Keywords : Vishnupuri Dam, Chloride, Phosphate, Nitrate, BOD, COD.

INTRODUCTION

An essential resource for human life, freshwater has no substitutes. Freshwater is also essential for many natural systems that support human wellbeing. Expanding human activity has extensively altered the planets freshwaters, with modifications impacting the physical, chemical and biological features of aquatic system [1]. Dissolved Oxygen refers to the level of free, non-compound oxygen present in water of other liquids. It is an important parameter in assessing water quality because of its influence on the organisms living within a body of water. Dissolved Oxygen levels are typically measured using "rugged dissolved oxygen" (RDO) equipment which measures luminescence quenching ability of a sample. Increased oxygen level result in increased quenching which is well characterized and allows accurate measurements to be made with a probe which requires minimal maintenance. Dissolved Oxygen (DO) is a measure of how much oxygen is dissolved in the water the amount of oxygen available to living aquatic organisms [2].

Manganese Sulfate and potassium hydroxide are added to the sample, forming manganese hydroxide. This reduces the dissolved oxygen, forming a brown precipitate. Alkaline iodide as a reagent is added to correct for the presence of nitrates found in wastewater samples that can interfere with the oxidation procedure [1,3,4].

Adequate dissolved oxygen is necessary for good water quality. Any decrease in dissolved oxygen can cause changes, usually negative, in an aquatic system. Significant death rates occur when dissolved oxygen remains above 115% to 120% air saturation for a period of time. In limnology, dissolved oxygen is an essential factor second only to water itself. A dissolved oxygen level that is too high or too low can harm aquatic life and affect water quality. Dissolved oxygen is the presence of these free O₂ molecules within water. Biological Oxygen Demand (BOD) is a measure of the oxygen used by microorganisms to decompose this waste when BOD levels decrease because the oxygen that is available in the water is being consumed by the bacteria. All living organisms on the earth need water for their survival and growth. As of now only earth is the planet having about 70% of water [2,5,6].

Physico-chemical analysis is the prime consideration to assess the quality of water for its best utilization like drinking, irrigation, fisheries and helpful in understanding the complex processes, interaction between the climatic and biological processes in the water. The aim of this study was to develop a pan-European model to assess current BOD fluxes in freshwater systems. Chemical Oxygen Demand is a measurement of the oxygen required to oxidize soluble and particulate organic matter in water [7]. The BOD and COD their co-efficient of correlation were studied. Many researchers have done studies on Physico-Chemical and Biological Characters of River and Dam Water as reported by Lende [1], Joshi *et al.* [2], Pawar [3, 6], Lubal [7], Harney *et al.* [8], Manjare *et al.* [9], APHA [10], Salve and Hiware, [11], Wankhade *et al.* [12], Simpi *et al.* [12], Kuzbali *et al.* [14], Basavaraja *et al.* [15], Alka [16, 17], Tiwari *et al.* [18].

The present study was to assess the ecosystem of Vishnupuri dam in Nanded District Maharashtra by estimating the various physico-chemical parameters like Chloride, Phosphate, Nitrate, Biochemical Oxygen Demand and Chemical Oxygen Demand.

MATERIALS AND METHODS

The water samples were collected for physico-chemical analysis from the dam. At regular intervals of one month a period of one year from June 2015 to May 2016. The samples are well mixed and stored in two litre plastic cans. Sample collection was usually completed during morning hours between 6:00 a.m. to 9:00 a.m. every for further analysis. Parameters were estimated in the laboratory. Standard methods as prescribed by APHA [10], BIS, [19], Saxena [20] were followed for examination of various Physical and Chemical Parameters of water.

RESULT

The seasonal variation in physico-chemical parameters are given in table respectively.

Chloride:-

The chloride value ranged from 41.5 to 74.5 mg/l. The maximum values were during summer while minimum values were during winter. The aquatic bodies in due to rainfall and substances carried from catchment. Chloride salts such as sodium chloride are often very soluble in water. It is an essential electrolyte located in all body fluids responsible for maintaining acid / base balance, transmitting nerve impulses and regulating fluid in and out of cells. Mohammad *et al.* [21], by the analysis of water of Palar Reservoir at Khammam District of Telangana Reported that the Chloride Concentration was Ranged between 100 mg/l. to 180 mg/l.

Phosphate :-

The phosphate value ranged from 0.28 to 0.89 mg/l. The maximum values were during summer while minimum values were during winter. In water bodies phosphate occurs both in its inorganic and organic forms as organic phosphorous and orthophosphate, phosphate plays a dynamic role by acting as the limiting nutrient. Presence of phosphate in water and waste water analysis has a great significance. Phosphate is well known to have a significant impact on ecosystem and can damage the health of rivers and lakes. What ultimately happens to phosphate after leakage is currently unknown. Phosphate is an essential element for plant life but when there is too much of it in water, it can speed up eutrophication of rivers and lakes. High concentrations of phosphates can indicate the presence of pollution and are largely responsible for eutrophic conditions, WHO [22].

Table 1 : Determination of Physico-Chemical Parameters of Vishnupuri Dam Water during the year 2015-2016.

Period	Chloride mg/l				Phosphate mg/l				Nitrate mg/l				Biochemical Oxygen Demand mg/l				Chemical Oxygen Demand mg/l			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
June	70.3	70.8	71.6	72.2	0.62	6.68	0.71	0.74	38.5	38.9	39.2	39.5	19.5	19.9	19.7	20.1	135	138	140	143
July	61.5	63.3	65.1	64.4	0.49	0.51	0.53	0.57	34.3	34.5	34.7	34.9	17.2	17.7	18.6	18.1	121	127	129	132
August	58.2	59.1	60.1	60.3	0.43	0.46	0.48	0.45	32.2	32.6	32.9	33.1	13.5	13.9	14.1	14.3	110	118	120	115
September	49.5	50.2	51.3	53.4	0.40	0.42	0.41	0.44	23.6	23.9	24.1	24.7	9.1	9.6	9.9	10.2	97	99	102	105
October	44.1	44.8	45.6	43.9	0.35	0.38	0.39	0.37	18.1	18.6	18.4	18.9	7.6	7.9	7.12	7.18	82	84	88	81
November	42.3	42.7	42.9	43.1	0.31	0.33	0.35	0.34	16.5	16.9	17.1	17.3	5.12	5.21	5.34	5.41	71	73	76	78
December	41.5	42.3	43.1	41.8	0.28	0.29	0.31	0.32	15.8	16.2	16.5	16.9	3.24	3.27	3.41	3.58	64	66	69	71
January	45.7	46.2	46.6	45.9	0.34	0.38	0.39	0.41	18.4	18.9	19.1	19.3	7.11	7.14	7.31	7.40	70	74	78	80
February	48.8	49.1	49.8	51.2	0.41	0.43	0.48	0.50	20.1	20.7	21.1	21.8	12.6	12.3	12.9	13.1	81	87	89	91
March	51.3	51.9	52.2	52.5	0.68	0.69	0.71	0.75	31.7	31.9	32.3	32.8	17.5	17.9	18.5	18.7	90	94	98	101
April	60.1	60.7	60.9	61.3	0.72	0.74	0.77	0.79	40.2	40.7	41.3	41.6	20.1	20.5	20.7	20.9	120	123	128	131
May	73.6	73.8	74.2	74.5	0.82	0.84	0.87	0.89	42.1	42.3	42.7	42.9	21.12	21.23	21.40	21.80	147	149	152	155

Nitrate :

The Nitrate value range from 15.8 to 42.9 mg/l. The maximum values were during summer while minimum values were during winter. Nitrogen is less soluble in water than oxygen. Nitrogen is important as it is a necessary element in the structure of protein there is an entry of detergents in the water body and less water quantity and during summer season the relatively low level of phosphate have been reported which may be attributed to abundance of phytoplankton. Nitrate helps plants develop and produce seeds. Most of the generic fertilizers have high concentration of nitrate, which are essential for plant growth and survival. Nitrates can make it so that less oxygen is available for the body to function properly. Rana *et al.* [23], recommended that it should not exceed 0.2 mg L⁻¹ in fresh water and 0.125 mg. L⁻¹ in seawater.

Biochemical Oxygen Demand:-

The BOD value ranged from 3.24 to 21.80 mg/l. The maximum values were during summer while minimum values were during winter. While the BOD tests is performed by using a population of bacteria and other microorganism to attempt to duplicate. When result of a COD test is more than twice that of the BOD test, there is good reason to suspect that a significant portion of the organic material in the sample is not biodegradable by ordinary microorganisms. Biochemical Oxygen Demand (BOD) is the amount of oxygen used by organisms to consume oxidisable organic matter in a give time. BOD is an indicator of organic pollution in fresh water bodies. BOD is the amount of oxygen required by the living organisms engaged in the utilization and ultimate destruction or stabilization of organic water (Hawkes 1993), The biodegradation of organic materials exerts oxygen tension in the water and increases the biochemical oxygen demand, Abida [24].

Chemical Oxygen Demand :-

The COD value ranged from 64 to 155 mg/l. The maximum values were during summer while minimum values were during winter. The Chemical Oxygen Demand (COD) is the total amount of oxidisable organics measured by the amount of oxygen in the form of oxidizing agent required for the oxidation of organic matters by heating the sample in strong sulphuric acid containing potassium dichromate. Chemical Oxygen Demand is an important water quality parameter because, similar BOD, it provides an index to assess the effect discharged wastewater will have on the receiving

environment. Chemical Oxygen Demand is a measure of the capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic chemical such as Ammonia and Nitrite. WHO [22], suggested the value of COD should be 10 mg/l. but in the present study the value exceed the desirable limit. So the water of these ponds in not suitable for drinking purpose.

CONCLUSION

The result suggested that the protein content of fish greatly various during the different season. It may be due to the physiological condition and Environmental condition that is spawning breeding, migration & heavy feeding.

This study provides valuable information on variations in protein content of fish species studied in order to take necessary precaution in processing from manufacturer point of view. Biochemical studies of fish tissue are of considerable interest for their specificity in relation to the food values of the fish and for the evaluation of their physiological needs at different periods of life. It is also necessary. Biochemical studies of fish tissue are of considerable interest far their specificity in relation to the food values of the fish and for the evaluation of their physiological needs at different periods of life.

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