



Analysis of Water Quality Using Physio-Chemical Parameters from Jamwadi Dam at Yavatmal District

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Abstract

Quality of water is an important criterion for evaluating the suitability of water for irrigation & drinking. An investigation was carried out to monitor the water. That water get contaminated by industrial waste, domestic waste insecticide etc. such water is harmful for domestic use. This study was aimed to estimate current status of physico-chemical characteristic of Lower Jamwadi Reservoir at Yavatmal District, Maharashtra. Monthly changes in physico-chemical parameters such as water temperature, pH, Colour, Acidity, Alkalinity, total dissolved solids, total solids, total hardness, chlorides, dissolved oxygen and Chemical oxygen demand were analyzed for a September 2014. The results indicated that physico-chemical parameters of the water were within the permissible limits and can be used for domestic, irrigation and pisciculture.

Keywords: Physico-chemical parameters, irrigation, BOD, COD, Jamwadi.

Introduction:

Water is life If you have water you think of future “Water is the universally solvent .Water is mostly essential for plant growth and play an n important role living system nearly 3/4th earth surface is covered by water. Water is precious resource for human being and we are perhaps aware that 22nd march is celebrated as the world water day.” Water resources are of critical importance to both natural ecosystem and human development. It is essential for agriculture, industry and human existence. The healthy aquatic ecosystem is depended on the physico-chemical and biological characteristics. The quality of water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem. Good quality of water resources depends on a large number of physic-chemical parameters and biological characteristics. Due to Increased Human Population, Industrialization, Use of Fertilizers in Agriculture and Man-made activity. The Natural Aquatic Resources are causing Heavy and varied Pollution in aquatic Environment Leading to water Quality and Depletion of aquatic Biota. It is therefore Necessary that the Quality of Drinking water should be checked at regular time interval because due to use of Contaminated Drinking water, Human Population Suffers From a variety of Water Borne Diseases.

Materials and method:

Study area: To evaluate the water quality an effort was made to investigate the water in Lower Jamwadi Reservoir, Yavatmal District, and Maharashtra, India. Yavatmal district is one of the eleven districts of

Vidarbha region of Maharashtra. The district lies between 19°26' and 20°42' north latitudes and 77°18' and 79°9' east longitudes. Jamwadi Dam was constructed as part of Irrigation Projects by the Government of Maharashtra in the year 1977. It is built on and impounds a local Nallah. Nearest city to dam is Yavatmal in Yavatmal District of Maharashtra. The dam is an Earth fill Dam. The purpose of the dam is for Irrigation. The Length of dam is 398 m (1305.77 Feet), while the Height of the dam above lowest foundation is 12.95 m (42.48 Feet). The Project has other type of Spillway. However any other information about the spillway is not available at all. Length of the spillway is not known. The Dam has ungated spillway. Dam's catchment area is not known. Maximum / Gross storage capacity is 2.36 MCM. Live storage capacity is 2.16 MCM. Now a day's almost all the water bodies make for good picnic spots. Jamwadi Lake is also a popular picnic spot for its scenic beauty.



Figure 1: Map of the study area showing the different sampling stations.

Collection of sample:-

In order to determine the water quality index five stations were chosen for sample collection from the Reservoir during September 2014 in the first week. Water samples were collected in clean and dry polyethene bottles of one liter capacity. We have collected five samples from different places. All the water samples, after measuring temperature on spot, were Immediately transported to the laboratory for analysis and stored in cool place away from light.

In the present investigation we have studied the following parameters such as Temperature, pH, Acidity, Alkalinity, Chloride, Total hardness, Total dissolved solids, Total solids, Dissolved oxygen, and Chemical oxygen demand to study the quality of water. All chemical used in this investigation were of AR grade. Standard methods were used for the Analysis of samples. Temperature was taken on spot while collected the sample. pH meter Equip DELUX0001, model make was used for determination of pH. Colour



of water sample was determined with the help of Hach 2700DR Meter at wavelength (λ) 465nm. Determination of chloride was done by a Mohr's method. The total hardness was determined titrimetrically by EDTA method. Alkalinity of water sample was estimated by titrating with standard sulphuric acid solution. Determination of total dissolved solids (TDS) was done gravimetric method. The Winkler method was adopted for determination of Dissolved Oxygen.

Results and Discussion:-

The present study was carried out to find the suitability of industrial effluents for irrigation purpose and to study the physico- chemical characteristics during a month of September 2014

Temperature

Temperature affects chemical, biological reactions in water. In the present study, it varies from 25 to 26.9 °C

pH:

pH can be viewed as an abbreviation for power of hydrogen or more completely, power of the concentration of hydrogen ion. Most natural water is alkaline in nature due to presence of bicarbonates and carbonates formed due to dissolution of atmospheric Carbon dioxide. pH can be drastically change due to prevailing biochemical activities undergoing in water. Photosynthetic activity increases the pH due to consumption of free CO₂ and dissociation of bicarbonates into carbonates. pH was found in water sample 6.12 to 7.54.

Colour:

Pure water has no colour. The presence of humic acids, fulvic acids, metallic ions suspended matter, phytoplanktons, weed, and industrial effluents may give colour to natural water.

Alkalinity:

Alkalinity is measure of solution's capacity to react with a strong acid (H₂SO₄) to a determined pH. Alkalinity of water is due to the presence of hydroxides, carbonates and bicarbonates. Higher alkalinity, more neutralized agent needed to counteract it

Chloride:

Almost all natural water contains chloride and sulphate ions. Their concentrations vary considerably according to the mineral content of the Earth in any given area. In small amount they are not significant. In large concentrations they present problem. Usually chloride concentration is low. Sulphates can be more troublesome because they generally occur in great concentrations. Low to moderate concentrations of both chloride and sulphate ions add palatability to water.

Total Hardness:

Hardness is caused by divalent metallic ions that are capable of reacting with soaps to form ppt. And with certain anions present in the water to form scale. There are two types of hardness-temporary hardness is

also known as carbonate hardness and it is mainly due to presence of carbonate and bicarbonates of Ca and Mg which is removed by boiling or by adding Ca(OH)_2 to it. The permanent hardness is also known as non-carbonate hardness and is due to the sulphate, chlorides and nitrates of calcium and magnesium.

Dissolve oxygen:

Adequate dissolve oxygen is necessary for the life of fish and other aquatic organism. The D.O concentration may also be associated with corrosives of water, photosynthetic activity simplicity. The D.O test used in the biological oxygen demand determination as carried out by the dilution method.

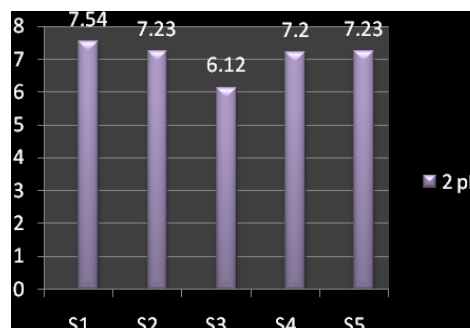
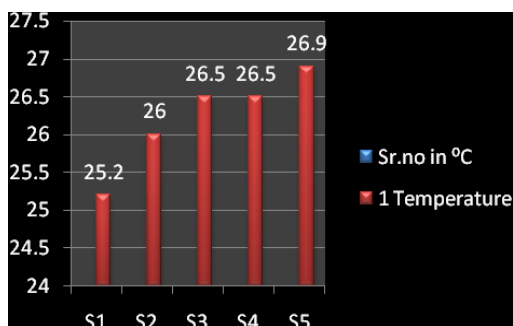
Chemical Oxygen Demand:

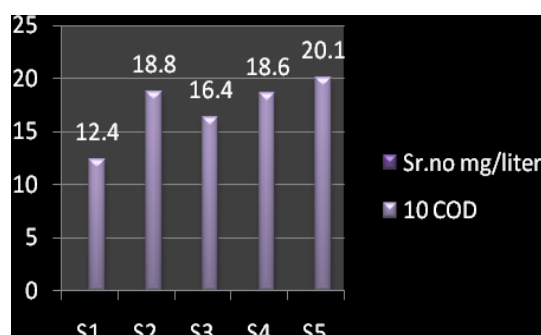
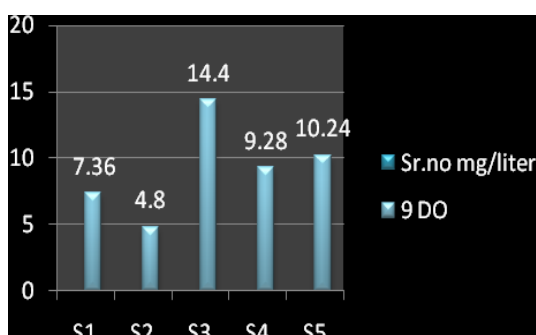
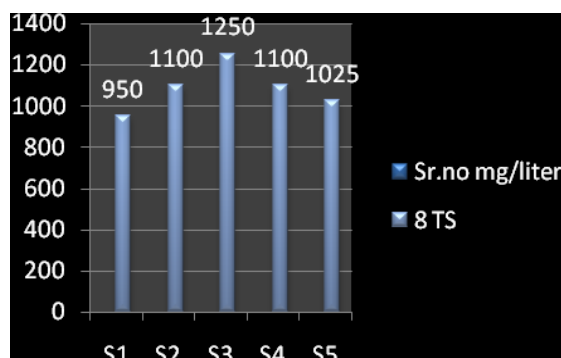
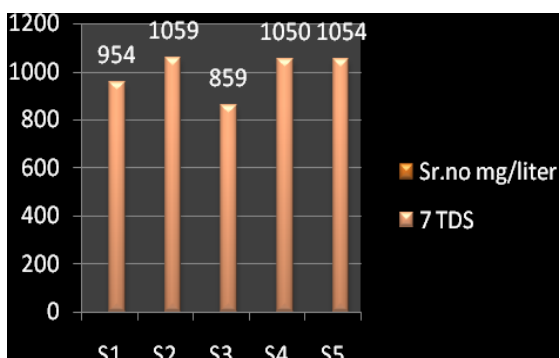
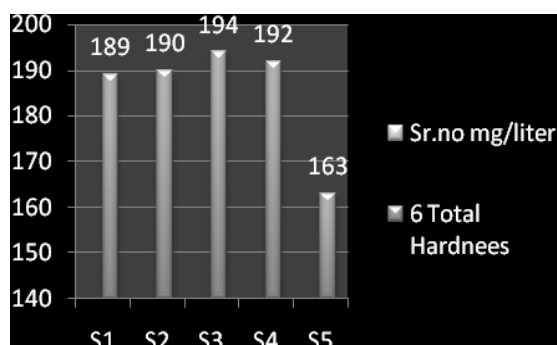
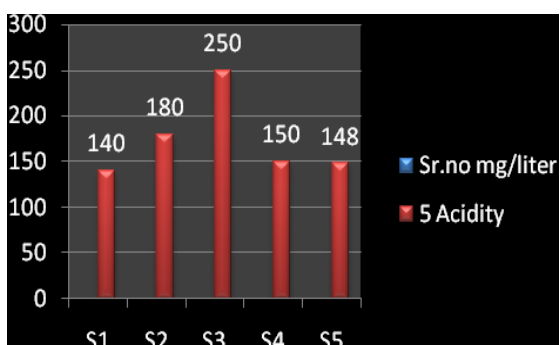
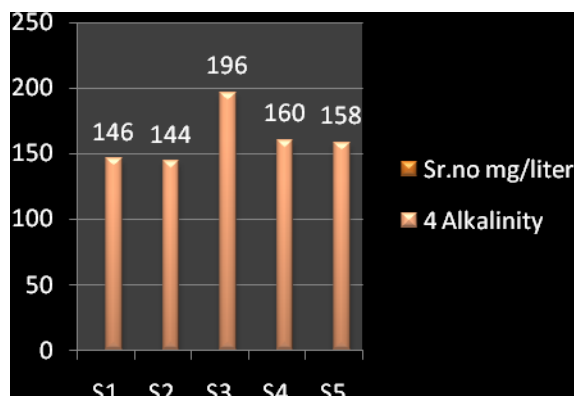
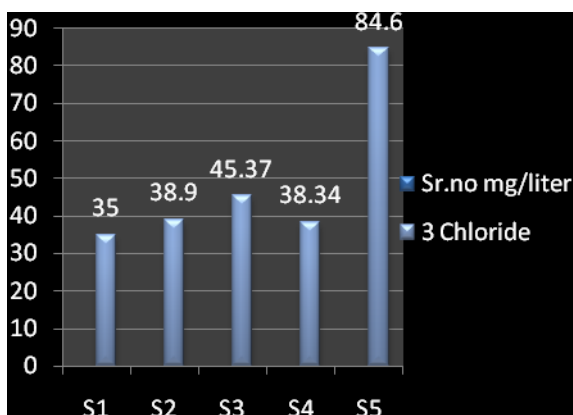
Chemical Oxygen Demand (COD) test determined the oxygen required for chemical oxidation of organic matter with the help of strong chemical oxidant. The test can be employed for the same purpose as the BOD test taking into accounts its limitations. COD determination has an advantage over BOD determination in that the result can be obtained in about 5 hour as compared to 5 days required for BOD test.

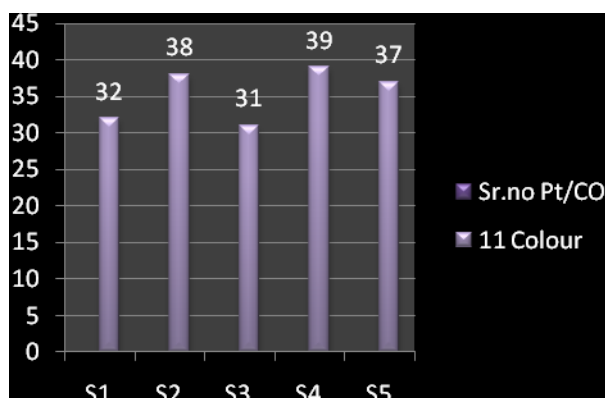
Report of analysis of water samples in September (2014)

Sr.	Parameters of water						Permissible Limit IS-10500		
		S1	S2	S3	S4	S5	WHO	Desirable	Maxi.
1	Temperature	25.2	26	26.5	26.5	26.9	.....	.....	.....
2	pH	7.54	7.23	6.12	7.2	7.23	6.5-9.2	6.5-8.5	6.5-8.5
3	Chloride	35	38.9	45.37	38.34	84.6	200	250	1000
4	Alkalinity	146	144	196	160	158	....	200	600
5	Acidity	140	180	250	150	148	...	...	...
6	Total Hardness	189	190	194	192	163	200-600	300	600
7	TDS	954	1059	859	1050	1054	500	500	2000
8	TS	950	1100	1250	1100	1025	500	500	1500
9	DO	7.36	4.8	14.4	9.28	10.24	>6	...	...
10	COD	12.4	18.8	16.4	18.6	20.1	100	...	...
11	Colour	32	38	31	39	37	5.0-50.	5.0	25.0

All parameters are in mg/L except pH, temperature ($^{\circ}\text{C}$).







Conclusion:

All the physical and chemical properties of Jamwadi Reservoir water were within desirable limits. The results obtained from the present investigation shall be useful in future management of the reservoir. The physico-chemical characteristics of reservoir water suggested that there was no harmful to pisciculture, irrigation and drinking water

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