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# Physico Chemical Study of Erai Dam in District Chandrapur, M.S. India

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#### Abstract:

The present study was undertaken to estimate present status of Physico-chemical characteristic of Erai dam, District Chandrapur, Maharashtra (M.S.) Monthly changes in Physico-Chemical parameters such as water temperature, free carbon dioxide, pH, total hardness, chlorides, dissolved oxygen, alkalinity were analyzed and correlated with the standard values of water quality proposed by ICMR, WHO and APHA. Keywords: Dam, DO, BOD, Physico-chemical parameters, chlorides.

#### **INTRODUCTION:**

Water being the elixir of life and is the most essential commodity for all living creatures. All living things need water for survival. Water is one of the most essential constituents of the human environment. Man's existence on earth indicates the presence of water. It is the source of energy which is widely used for irrigation, drinking, hydro powers and many more. Water is in abundance 93.7% of world's water i.e, 1.45 billion cubic Kms. Sea water being salty cannot be used for domestic and agriculture purpose. The healthy aquatic ecosystem depends on the physico-chemical and biological characteristics (Venkatesharaju et al 2010). The quality of water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem. Thus to assess that monitoring of all these parameters are important to identify the magnitude and origin of any pollution load. Many researchers have being carried out till date. The plan to carry this work is to determine the pollution status of this river. The present study was conducted to study the monthly changes in physico-chemical properties of water in the Erai dam.

# MATERIAL AND METHODS:

#### Work plan-

Erai river is one of the important river in Chandrapur district of Maharashtra. The total length of Erai river is 25 km from origin to confluence into Wardha river near Hadasti Village .The river originates near Kasarbodi village of Chimur taluka and meets Wardhariver near Hadasti village. It has a total length of 78 km and lies entirely within Chandrapur district. This river is head water of Wardha river. Dam is located over Erai river which provide the supply for Chandrapur city and to Chandrapur Super Thermal Power Station. The study area is located at 20.52°N 79.23°E of geographical location.

The thermal power station of Chandrapur gets the water supply from the dam constructed by MSEB. Their colony and the Chandrapur Municipal Council pumps the water for Chandrapur town and lifts about 54,0,30 CMD of water and generated 37,800 CMD of sewage. (Erai and Zarpat river action plan). Chandrapur has no sewage treatment plant and there is no underground sewage system so all the sewage is discharged through different sewage streams into river, thus polluting the river. These effluents are partly discharged into river water and some part is used by the thermal power station itself for different purposes. The water samples were collected from the site of Erai dam from January 2017 to June 2017. The samples were then collected and processed for the analysis of Physico-chemical analysis and characteristics. All the samples were collected from morning hours i.e, between 9.00 am to 10.00 am. The temperature and pH parameters were recorded on the site. Samples were collected in cleaned acid washed plastic bottles and sterilized plastic bags and stored at 40°C. The water samples were analysed for various parameters as pH, lime, organic matter etc. as per the standard methods of APHA (2005).

#### **Collection of sample**

In order to determine the water quality of Erai dam, from January 2017 to June 2017 in the first week of every month. The sampling locations are shown in a Some of the results were recorded at the sampling station whereas the others were recorded in the laboratory, according APHA, 2005, (Kodarkar et al, 2008).

## **RESULT AND DISCUSSION:**

### Temperature-

Temperature is an important physical parameter which directly influences some chemical reactions in aquatic ecosystem. In present assessment, the temperature of water range between 35°C to 42.2°C.The temperature of water totally depends upon the environmental factors and the temperature of the effluents discharged into the river (Jayaraman et al., 2003).

### Dissolved Oxygen-

Dissolved oxygen (D.O.) is an important parameter regulating survival of aquatic life. Rao et.al.(1998) found the D.O. range between 3.7 mg/L to 5.72 mg/L in water ponds and 3.02 mg/L is observed an annual range. Similarly present study shows that the D.O. ranged between 3.26 to 4.2 mg/l. This D.O values differ on the basis of respiration and decomposition of organic matter. As the pollution increases the dissolved oxygen decreases (Mason, 1989).

### Free Co<sub>2</sub>-

The free carbon dioxide increases due to mixing of discharge and sewage in the stream. Thus it is observed that upstream station reports high values and downstream station reports low values (Hosetti et al., 1994). The present studies show that the values range from 0.32 to 1.67mg/l.

### pH-

From the data harvested, it is observed that the pH ranges from 7.22 to 8.12. The pH of the water sample indicates that the water is alkaline in nature. For the growth of diverse bacterial population a pH value near neutral is suggested and is suitable for them (WHO, 1984). The most appropriate range for bioremediation has been suggested to be 6-8 (Saxena, 1990 & Mane et al, 2006; Ghonmode S.V. 2014).

## Alkalinity-

The values of alkalinity showed that ranges from 77 to 97 ppm. The increase in the alkalinity may be due to the death and decomposition of microorganisms (Sarkar and Haldar, 2010). The alkalinity of the water is due to the carbonates, bicarbonates and hydroxyl ions.

# Total Hardness-

The total hardness of this water ranges from 64 to 74 mg/l. The increase in hardness may be due to the sewage, detergents or may be due to the utilization of carbonate and bicarbonates by aquatic plants. As we all are well aware that hardness of water does not cause any harm to the human body is not suitable for domestic purpose (Wolf et al., 2013). The water of this

river is suitable for drinking purposes as it possess less alkalinity.

## Chloride

The chloride has the highest concentration and this may be attributed to human activities. Although the chlorides are not harmful concentration beyond 250 mg/lit.The chloride content ranges from 12 to 17 mg/l. Sewage discharge in river may result in the increase in the chloride content (Khanna and Bhutani, 2003).

## Table. 1- Monthly change in Physico-Chemical Properties of water (mg/l) in Erai Dam, District Chandrapur.

Paramete rs → Months↓	Tempe r- ature (°C)	Dissolv ed Oxygen (mg/l)	Free CO <sub>2</sub> (mg/ 1)	pH	Alkali nity (ppm)	Total Hardne ss (mg/l)	Chlori de (mg/l)
January 2017	35.0	3.46	1.54	7.61	92	64	17
February 2017	35.0	4.14	0.32	7.22	91	69	12
March 2017	38	3.84	1.21	7.73	77	74	12
April 2017	39.1	4.2	0.66	7.94	95	66	14
May 2017	41.0	4.0	1.67	7.98	94	68	12
June 2017	42.2	3.26	1.3	8.12	97	69	16









Above study infers that pH, alkalinity, phosphate, total hardness, Dissolved oxygen, Chloride, temperature and Free Co<sub>2</sub> are in the prescribed range. The increased pH and alkalinity increases the alkaline nature of the water due to which the life of benthic organisms is adversely affected. All the physical and chemical properties of Erai dam, District Chandrapur, Maharashtra (M.S.) water were within desirable limits. The results obtained from the present investigation shall be useful in future management of river. The physicochemical characteristics of reservoir water suggested that there was no harm to fish rearing, irrigation and drinking water.

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