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## The Physico-Chemical Parameters of Mandavi Water Reservoir In Dist. Chhindwara (Madhya Pradesh).

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**ABSTRACT:**The present paper is the study report about the analysis of various physico-chemical parameters of the water of Mandavi water reservoir situated in Pandhurna tehsil of Dist. Chhindwara, Madhya Pradesh. The Physico-chemical parameters Air Temperature, Water Temperature, Secchi Transparency, DO, BDO, CDO, pH, CO<sub>2</sub> Alkalinity, Turbidity, Sulphate, Chloride and Total Nitrogen from four points of the reservoir are measured during July 2018 to June 2019. The physico-chemical parameters indicates that the reservoir is oligotrophic in nature. This study indicates that the oligotrophic nature of reservoir is responsible for the rich fish diversity. The Physico-chemical factors are influence the survivability of fishes to a better level.

**Key Word:**Physico- chemical Parameters, Oligotrophic, Water reservoir

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### Introduction:

Mandavi dam is constructed in 2001, for irrigation purpose on the local river Jam by WRD, Govt. of M. P. in Pandhurna tehsil of Chhindwara Distt., located at 21° 39'53" N latitude and 78° 24' 45" E longitude with the catchment area of 10.24 km<sup>2</sup>. Maximum depth of the pond was found to be 16.5 m, whereas average depth was 16.50±1.08 m during the period of study. Very rich agricultural activities have been situated in surround areas of water reservoir and all agricultural wastes including Pesticidal residues, organic wastes and other pollutants were disposed by man and runoff water in rainy season and during irrigation in the reservoir. It is well known that water bodies have played a crucial role in the growth and development of society. Urban growth, increased industrial activities, intensive farming and over use of fertilizers in agricultural productions some identified factors responsible for degradation of an aquatic ecosystem. Water of good quality is required for living organisms. the quality of water is described by its physical, chemical and microbial characteristics and these characteristics are also correlated to each other. The limnological study gives the proper direction in decision making process for problems like pollution control in aquatic ecosystem. The main purpose of analysis physical and chemical characteristics of water is to determine its nutrient status. Since, the water contains dissolved and suspended materials in various proportions, its physical and chemical characteristics differ along with its biological characteristics.

## Water Reservoir Data:

- I. Hydrological Data
  1. Mean Rainfall (over 24 years)  
Average- 1274.60 mm/58.18”  
Maximum- 1734.82 MM/68.30”  
Minimum- 823.21 MM/32.41”  
75% Dependable rainfall- 1041.40 MM/41.00”
  2. Flood  
Maximum observed – 87.65 cum / 3096 cusec.
- II. Reservoir Data
  - a) Catchment area – 10.24 Sq. Km/4.00 Sq miles
  - b) Geology – Hilly terrain  
Mean monsoon yield 90% - 4.399 M.cum/ 155.206 Mcft.  
Full Tank Level – 588.40 M.  
Top of bank level – 591.70 M.  
Maximum water level – 589.90 M.  
Lowest sill level – 579.20 M.  
Water Spread Area – 49.00 Hact.

The climate of the study area is tropical monsoon with three distinct seasons. The atmospheric temperature ranged between a minimum of 10°C in December and January, and maximum of 47°C in June during the study period. The maximum rainfall (538.65mm) occurred in July, whereas the humidity ranged from 16% (April) to 99% (July and August).

## Material and Methods:

The water sample is collected in the month July 2018 to June 2019. Four sites were selected viz; station - 1, Station - 2, Station - 3 and Station - 4 from the reservoir. Water temperature, Air temperature, Secchi transparency and pH reading were got in the location. Water temperature was measured by mercury filled thermometer, pH measured by pH meter, and Secchi transparency was measured by Secchi Disk having a diameter of 20 cm and alternate white and black quadrates. Alkalinity, DO, BOD, COD, Turbidity, CO<sub>2</sub> Total Nitrogen, Chloride and Sulphate were determined in laboratory. The Alkalinity of water sample is determined by titration against phenolphthalein and methyl orange. D.O. was fixed immediately and determined by Winkler's method. The BOD was determined by direct method with undiluted and without seeded the sample. The sample was incubated for five days at 20 degree centigrade. The COD is measured by Reflux Digestion Method (Maiti, 2004). Turbidity was measured by Nephelometer using 0.02 NTU standard. Chloride is determined by titration the water sample against 0.02M silver nitrate solution using potassium as an indicator. Free carbon dioxide was analysed by titrating the water sample using 0.05 N sodium hydroxide solution as titrant, and phenolphthalein was used as an indicator. Total Nitrogen test is performed with digestion of sample and distillation of sample by using a Kjeldahl digestion apparatus, the sulphate is estimated by Gravimetric method (Maiti, 2004).

**Observation:Table 1:**Shows Physico-chemical parameters of water samples of twelve months. Given readings are average from the three stations viz. stn.-1 to stn.- 4 of the reservoir.

Parameters	Unit	Monsoon	Post Monsoon	Pre Monsoon
Air Temperature	DC	28.537	25.99	37.375
Water Temperature	DC	25.68	23.57	29.05
pH	pH	7.88	7.79	7.3
Alkalinity	mg/l	178.31	178.06	170.375
Dissolve Oxygen	mg/l	7.4	6.70	6.425
B.O.D.	mg/l	0.55	0.789	2.1
C.O.D.	mg/l	0.5	0.469	1.3
Secchi Transparency	Cms	34.5625	43.06	35
Turbidity	NTU	2.731	2.07	2.706
CO <sub>2</sub>	mg/l	11.119	11.118	11.106
Cl	mg/l	14.831	11.262	11.318
SO <sub>4</sub>	mg/l	27.056	26.375	24.27
N <sub>2</sub>	mg/l	0.93	0.703	0.65

### Result and Discussion:

The maximum temperatures of reservoir water were observed in the pre monsoon and the minimum temperatures of reservoir water were observed in post monsoon period respectively on all the sites. There is a very close similarity between the temperature of atmosphere and water due to the depth of reservoir. The pH of the water is 7.88 indicates slightly base saturation in the water. The obtained pH of water decreases the possibility to dissolve metals or high organic contents in the water body. Maximum values of alkalinity are 178.06 mg/l in post monsoon period and minimum values of alkalinity is 170.375mg/l in pre monsoon period. Concentration of DO is an important parameter to indicate water purity and to determine the distribution and abundance of various aquatic plants and autotrophic groups. Dissolve oxygen is found in an adequate range for the health of aquatic ecosystem. BOD is used as the index of organic pollution of wastewater that can be decomposed by bacteria under anaerobic conditions (Sladeck *et al.*, 1982). The BOD ranged between 0.55 mg/L to 2.1 mg/L shows medium decomposition of organic matter and less decay of vegetation. The COD level was in range of 0.469 mg/L to 1.3 mg/L that is indicating an appropriate quality of water for aquatic life. Higher concentration of COD in the pre monsoon may be due to high temperature and higher concentration of suspended and dissolved solids. The maximum value of turbidity was recorded during July to September (monsoon period) and minimum during winter period. The increased turbidity during rainy months may be attributed to soil erosion in the nearby catchment area. The CO<sub>2</sub> value is observed in very suitable range maximum 11.119 mg/l in monsoon and minimum 11.106 mg/l in pre monsoon season. The value of chloride concentration in the present study was highest 14.831mg/l in monsoon period. The highest concentration of sulphates is 27.056mg/l observed during monsoon period, which was caused by the surface run-off bringing into the river more suspended solids along with organic matter and soluble salts from the catchment area. Total kjeldahl nitrogen (TKN) is a total of organic nitrogen and ammonical nitrogen. The values of total nitrogen are 0.65 to 0.93 mg/l which indicated that the water has not been

organic polluted. This hydrological study indicates that the limnological conditions of the water reservoir is well suitable for aquaculture. The annual range of productivity by fish culture is only effects by the limited area of reservoir.

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