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Physicochemical and Biological studies of Benisagar Dam, Turki, Satna (M.P.) India

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Abstract
Physicochemical parameters of water are of extreme significance in the distribution of aquatic life and also in the breeding of aquatic life. Monthly Changes In Physical and Chemical Parameters Such as Water Temperature, Transparency, Turbidity, Total Dissolved Solids, pH, Dissolved Oxygen, Free Carbon dioxide, and Total Hardness, Chlorides, Alkalinity, Phosphate and Nitrates. Were analyzed for a periods of one year from January 2013 to December 2014. All Parameters were within the Permissible limits. The results indicate that the Dam is Non-polluted and can be used for Domestic, Irrigation and Pisciculture.

Keywords: Physico-Chemical Parameters, Monthly variation, Benisagar dam, Turki, Satna district

1. Introduction
Water is one of the most Important Compound to the Ecosystem. Better Quality of water Described by its Physical, Chemical and Biological Characteristics. But some Correlation was Possible among these Parameters and the Significant One would be Useful to Indicate Quality of water. 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. It is difficult to understand The Biological Phenomena fully because the Chemistry of water reveals much about the Metabolism of The Ecosystem and explain the General Hydro Biological Relationship. The Physico-chemical Parameters of water and the dependence of all life process of these factors make it desirable to take as an environ In Present Study involves the Analysis of Water Quality in Terms of Physico-chemical Parameters of Benisagar dam, Turki, Satna (M.P.). The dam water is basically used for Domestic, Agriculture Purpose and Fisheries Activity. In India Still now several Researchers have done Study on Physicochemical and Biological characteristic of Standing and Running Water Resources (Pandey, *et al.* 1993, Trivedy and Goel, 1986, Kushram, 2016, Meshram, 2015) [1-4].

Study site
Geographical distribution of plankton plays an important role in the aquatic ecosystem. For the convenience of the description of the dam, the planktonological biomass with special reference to zooplankton, it is essential to give the geographical status of Benisagar dam, Turki, Satna (M.P.). The district Satna of M.P. is located on the South West part of Madhya Pradesh. It is an important district of ex-Vindhya Pradesh state and part of Baghelkhand rule of second century A.D. Satna district is a pilgrim and an industrial place and area rich in Limestone, Bauxite, White clay, Geru, Ramraj and Flagstones. It is also famous for its religious places of Distt. The district Satna is the central part of Vindhya region which is situated at 18^0 9' N latitude and 24^0 4' E longitude. It is 365.7 above the mean sea level.

2. Material and Methods
The methodology of present study is according to the procedure recommended in APHA (2005) [5] and NEERI (1991) [6]. Guidelines for water quality. The Water Samples from Benisagar dam were collected from four Different Stations in the Morning Hours between 10 am to 12pm, in Polythene Bottle Regularly for Every Month. The Water samples were immediately brought in to Laboratory for the Estimation of various Physico-chemical Parameters like Water Temperature, Transparency and pH were recorded at the time of Sample Collection, by using Thermometer and Pocket Digital pH Meter. Transparency was measured with the help of secchi disc while other Parameters Such as DO, TDS, Free CO_2, Hardness, Chlorides, Alkalinity, Phosphate and Nitrate were Estimated in the Laboratory By using Standard Methods as Prescribed By Trivedy and Goel (1986) [2] and Kodarkar (1992) [7].

3. Result and Discussion
In this study, samples have been collected in Monthly Variation in Physico-chemical Parameters is Presented in Table.

Table 1: Physical parameters of Benisagar dam, Turki, Satna (M.P.)

Month	Temperature °C	Transparency cm	Turbidity NTU	TDS gm/lit	pH
Jan	22.9	14.1	11.1	0.39	8.1
Feb	23.6	12.3	10.3	0.27	8.6
Mar	26.2	9.4	12.1	0.30	8.7
Apr	23.3	8.1	9.1	0.10	8.2
May	24.6	6.3	7.3	0.60	8.1
Jun	23.4	10.3	12.6	2.00	8.3
Jul	24.1	55.1	1.2	1.13	8.2
Aug	25.4	61.3	3.3	0.20	8.2
Sep	25.3	52.4	4.0	0.40	7.8
Oct	25.8	91.1	0.4	0.40	7.6
Nov	24.8	79.3	1.8	1.80	7.5
Dec	21.6	64..3	2.3	0.40	8.1
Min.	21.6	6.3	0.4	0.10	7.5
Max.	26.2	91.1	12.6	2.00	8.7
Mean	24.3	36.3	6.3	0.67	8.1
SD	1.347	32.282	4.598	0.633	0.354

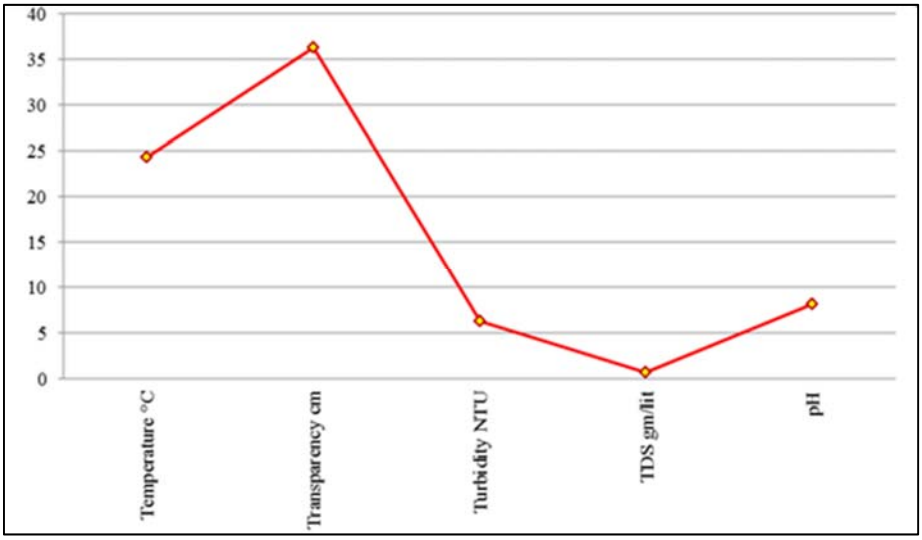

Fig 1: Graphics analysis of average monthly analysed result of the Physical

Water Temperature

In the present study of the Water Temperature Ranges from 21.6 °C to 26.2 °C. The Maximum (26.2 °C) Temperature wasrecorded in the Month of March, minimum (21.6 °C) in the month of December and Standard diviation 1.347 °C. It showed that Higher Temperature in summer and relatively lowers in winter. Similar study, Jayabhaye *et al.*(2006) [8], Salve and Hiware (2008) [9] and Kushram, (2016) [3], Observed that during Summer, Water Temperature was high due to Low Water Level, High Temperature and clear atmosphere. Water Temperature Plays an Important Factor which Influences the chemical, Biochemical and Biological characteristics of water body.

Water transparency

Transparency of Water Fluctuates from 6.3 cm to 91.1 cm. The Maximum (91.1cm) was recorded in the month of October, minimum (6.3cm) in the month of May and Standard diviation 32.282cm. Khan and Chowdhury (1994) [10] reported that higher transparency occurred, during winter and summer due to absence of rain, runoff and flood water as well as gradual settling of suspended particles. Meshram, 2015 [4], also reported similar observation from Tandula dam.

Turbidity

The turbidity of water fluctuates from 0.4 NTU to 12.6 NTU. The maximum values (12.6 NTU) was recorded in the month of June. It might be due to human activities, decrease in the water level and presence of suspended particulate matter, minimum value (0.4NTU) in the month of October and Standard diviation 4.598NTU.

Total dissolved solids

The total dissolved solids fluctuate from 0.1g/l to 2.0g/l. the maximum value (20g/l) was recorded in the month of June. It is due to heavy rainfall and minimum value (0.1g/l) in the month of April and Standard diviation 0.633 g/l.

pH

The pH was alkaline values ranges from 7.5 to 8.7. The maximum pH value (8.7) was recorded in the month of March, minimum (7.5) in the month of November and Standard diviation 0.354. The factors like air temperature bring about changes the pH of water. Most of bio-chemical and chemical reactions are influenced by the pH. The reduced rate of photosynthetic activities reduces the assimilation of carbon

dioxide and bicarbonates which are ultimately responsible for increase in pH, the low oxygen values coincided with high temperature during the summer month (Kamble, *et al.* 2009 [11], Meshram, 2015 [4] and Kushram, 2016) [3].

Table 2: Chemical parameters of Benisagar dam, Turki, Satna (M.P.)

Months	Dissolved oxygen	Free CO_2	Hardness	Chloride	Alkalinity	Phosphate	Nitrate
Jan	7.60	4.43	80.31	41.58	119.30	1.94	8.05
Feb	9.05	3.14	80.32	30.31	122.00	3.33	10.82
Mar	12.41	4.14	102.03	44.14	181.20	3.38	12.04
Apr	12.00	5.43	170.04	45.41	150.01	4.13	24.06
May	12.60	3.42	141.06	56.13	200.03	4.81	33.30
Jun	12.02	8.54	156.10	41.00	170.00	11.13	13.04
Jul	10.14	9.74	74.50	44.00	155.01	10.68	35.71
Aug	9.68	6.03	91.10	47.57	190.07	12.38	12.03
Sep	9.03	20.10	103.40	37.14	190.01	4.57	4.86
Oct	8.81	13.24	70.30	42.60	170.03	0.13	4.41
Nov	6.41	15.13	109.10	44.56	150.05	0.18	4.41
Dec	9.22	22.56	89.14	48.64	139.03	5.51	5.23
Min.	6.41	3.14	70.30	30.31	119.30	0.13	4.41
Max.	12.60	22.56	170.04	56.13	200.03	12.38	35.71
Mean	9.91	9.66	105.62	43.59	161.40	5.18	14.00
SD	1.98	6.67	32.98	6.27	26.63	4.12	11.05

Dissolved Oxygen

The values of DO fluctuates from 6.41 mg/l to 12.60 mg/l. The maximum value (12.60 mg/l) was recorded in the month of May, and minimum value (6.41 mg/l) in the month of November and Standard Devation (1.98 mg/l). The high DO in summer is due to increase in temperature and duration of bright sunlight has influence on the % of soluble gases (O^2 & CO^2). The long days and intense sunlight during summer seem to accelerate photosynthesis by phytoplankton, utilizing CO2 and giving off oxygen. This possibly accounts for the greater qualities of O2 recorded during summer. The quality is slightly lesser during winter, reported by (Parimala, *et al.* 1994[12] and Masood and Krishnamurthy, 1990) [13].

Free Carbon dioxide

The value of free CO_2 ranges from 3.14 mg/l to 22.56 mg/l. The maximum value (22.56 mg/l) was recorded in the month of December, minimum value (3.14mg/l) in the month of February and and Standard Devation (6.67 mg/l). This may be depends upon alkalinity and hardness of water body. The value of CO2 was high in December. This could be related to the high rate of decomposition in the warmer months.

Hardness

The value of hardness fluctuates from 70.30 mg/l to 170.04mg/l. The maximum value (170.04 mg/l) was recorded in the month of April, minimum value (70.30 mg/l) in the month of October and Standard Devation (32.98 mg/l). Hujare, 2008 [14], Meshram, 2015 [4] and Prajapati, 2016 [15] was reported total hardness was high during summer than monsoon and winter. High value of hardness during summer can be attributed to decrease in water volume and increase of rate of evaporation of water. Similar results were obtained in the present study.

Chlorides

The values of chlorides range from 31.31 mg/l to 56.13 mg/l. The maximum value (56.13 mg/l) was recorded in the month of May, minimum value (31.31 mg/l) in the month of February and Standard Devation (6.27 mg/l). In the present study maximum value of chloride reaches in summer. Similar results were reported by Swarnalatha and Narsing Rao (1998) [16].

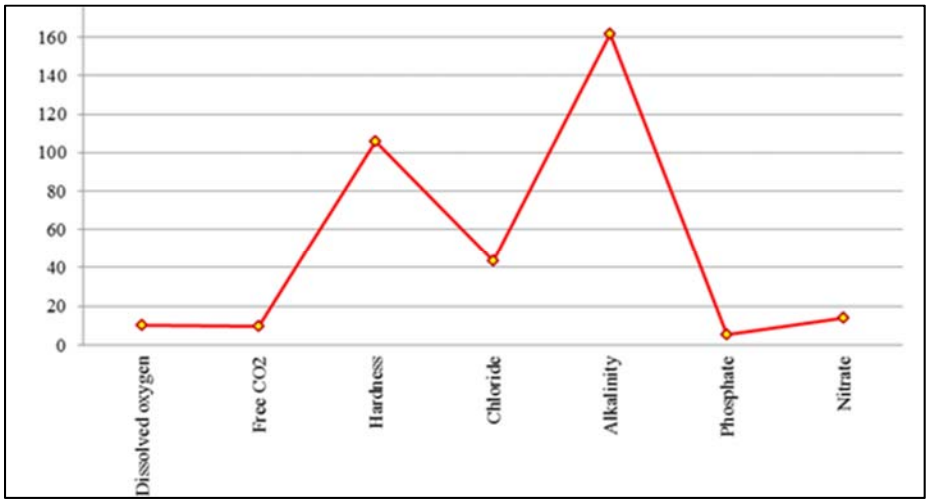

Fig 2: Graphics analysis of average mounthly analysed result of the Chemical parameters of Benisagar Dam, Turki, Satna (M.P.)

Alkalinity
Total alkalinity ranges from 119.30 mg/l to 200.03mg/l. the maximum value (200.03 mg/l) was recorded in the month of May, minimum value (119.30 mg/l) in the month of January and Standard Devation (26.63 mg/l). Alkalinity was maximum value in April due to increase in bicarbonates in the water. Hujare (2008) [14]. And Kashyap (2016) [17]. Also reported similar results that it was maximum in summer and minimum in winter due to high photosynthetic rate.

Phosphate
The value of phosphate fluctuates from 0.13mg/l to 12.38 mg/l. the maximum value (12.38mg/l) was recorded in the month of August, minimum value (0.13mg/l) in the month of October and Standard Devation (4.12 mg/l). The high values of phosphate in August months are mainly due to rain, surface water runoff, agriculture run off; washer man activity could have also contributed to the inorganic phosphate content. Similar results reported by Arvindkumar (1995) [18] and Sharma (2015) [19].

Nitrates
The values of nitrate ranges from 4.41mg/l to 35.71 mg/l. the maximum value (35.71mg/l) was observed in the month of July, minimum (4.41mg/l) in the month of November and Standard Devation (11.05 mg/l).

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

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