

Investigation and Analyzing of Physico-Chemical Boundaries of Various Pond Water of Bilaspur District, Chhattisgarh, India

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ABSTRACT

This exploration composition deals with the study of quality of pond water. We were collect Pond water samples from 22 villages of District of Bilaspur, Chhattisgarh (India) in triplet. Samples were anatomized for physico- chemical parameters including pH, electrical conductivity (EC), total dissolved solids(TDS), temperature, saltiness and dissolved oxygen(DO). pH ranged from 6.50 –9.69, Electrical Conductivity ranged from 118.7 –206.6 μ mhos/ cm, TDS ranged from 165.5 –254.8 ppm, Temperature ranged from 20.9 –33.8 °C, saltiness ranged from 5.1 –6.9 ppt, Dissolved oxygen ranged from 2.41 –4.8 mg/l. Correlation measure(r) was set up significant at $p < 0.05$ position for the tasted parameters. The result of the proposed study will establish some data about the use of water for colorful purposes like domestic and husbandry.

Keywords: physico-chemical parameters; pH; EC; TDS; DO. Pond water

I INTRODUCTION

Water is the most necessary element for the living being. Life on the earth is no way possible without water. Water is one of the most vital elements of the mortal surroundings. It's being used for numerous purposes e.g., artificial water force, irrigation, drinking, propagation of fish and other submarine systems and generation of hydro- power shops. Water is the main source of energy and governs the elaboration on the earth. 71 of earth face is covered by water(CIA, 2008), 96.5 of the world's water is ocean water which is salty that isn't to be directly useful for irrigation, drinking, domestic and artificial purposes. 1.7 in groundwater, 1.7 in glaciers and the ice caps. lower than 1 water is present in ponds, lakes, gutters, heads, etc., which is used by man for Industrial, domestic and agrarian purposes. According to an estimate about 70 of all the available water in our country is defiled due to the discharge of backwaters from the diligence, domestic waste, land and agrarian drainage (Shrivastava and Kanungo, 2013). Chemicals are a major source of water impurity that introduced during water movement through geological accoutrements (Kataria et al., 2011). Diseases and fungicides are major contributors to water pollution. Riding of jewels, filtering of soils and mining processing, etc., these are contaminate natural water(Manjare et al., 2010). In the ecosystem water is considered to be the most important element for the life but day by day the quality of water come demoralized. There are several factors which are responsible for deterioration of water bodies similar as increased mortal population, industrialization, use of redundant diseases in the husbandry and other man- made conditioning etc. There are several conditions have been linked among the mortal beings, which are caused by using polluted water. Water born complaint infections do during washing, bathing and consumption of polluted water during food medications. thus it's necessary that the quality of water should be checked at regular time of

interval because the fiscal losses due to water born conditions have negative impact on the nation. Currently this is the major problem of developing countries throughout the world. The main end of the present study was to give an idea about the pollution position of pond water in terms of physico- chemical characteristics. There's no information is available in relation to physicochemical characteristics of pond water at Bilaspur. Many experimenters(Kiran, 2010; Raut et al., 2011; Naik et al., 2012; Bahekar and There, 2013; Mahajan and Tank, 2013) in different regions of India have been studied the physico- chemical parameters of the colorful water bodies.

II MATERIALS AND METHODS

- (a) **Area of Study** - This examination was completed to assess the situation with the pond/lake water in Bilaspur region. Bilaspur locale is arranged between 21° 47' to 23° 8' North Scope promotion 81° 14' to 83° 15'. East Longitude (Fig. 1). These Pond/lakes water is utilized for agribusiness, fisheries and to some extent homegrown exercises. The current review was conducted to analyze physico-substance/chemical properties of water in the time of one year from Dec 2020 to Dec 2021.
- (b) **Collection of Sample** - Water Samples from the pond of twenty seven named townlets of Bilaspur district were collected during Dec 2020 to Dec 2021. The pond Water samples were collected in bottles. All the preventives were taken during the slice. The collected water samples were anatomized for different physico- chemical parameters similar as for pH, electrical conductivity, total dissolved solid, temperature, saltness and dissolved oxygen by following the standard protocols(Table 1). All the below analyses were performed in triplet.

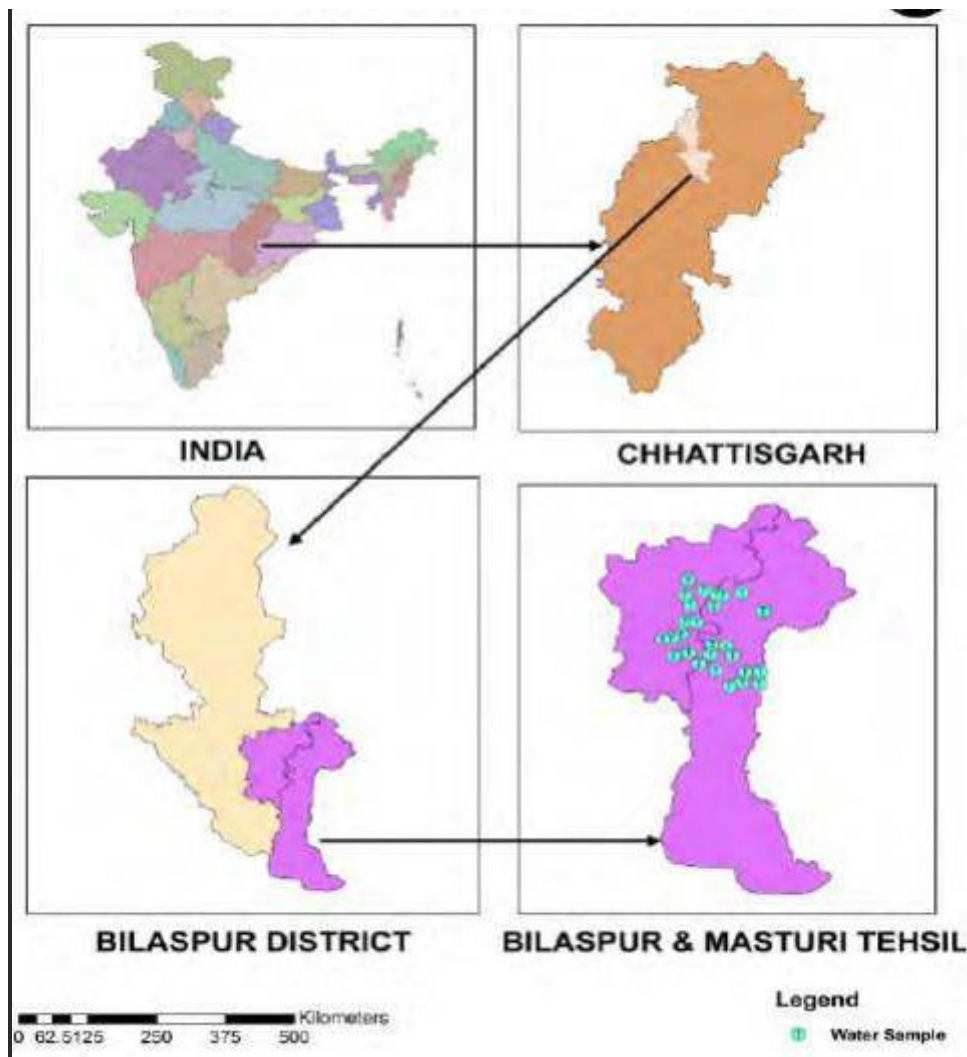


Fig. 1 :-Map of Water Sampling Locations

Table 1
Methods followed for analysis of water samples

S.No	Water quality Parameters	Method of Analysis
1.	pH	pH meter
2.	Electrical conductivity	Conductivity meter
3.	Total dissolved solid	Water and Soil analysis kit Model no 161
4.	Temperature	Thermometer
5.	Saltness	Refractometer
6.	Dissolved oxygen	Wrinkler's method

III RESULTS AND DISCUSSION

The variation in physicochemical parameters of pond water of twenty seven townlets presented in Table 2 and correlation portions among physico-chemical characteristics were shown in Table 3.

(a) **pH** - The pH (Potentia Hydrogeni) of a result refers to its hydrogen ion exertion and is expressed as the logarithm of the complementary of the hydrogen ion exertion at a given temperature. pH is measured in scales of 0 to 15. A pH value of 7 is neutral; a pH lower than 7 is acidic and lesser than 7 represents base achromatism or alkalinity. From the below trial, it was observed that among the 30 villages,

water analysis was carried out; pH ranged from 6.50 – 9.69, Maximum pH was recorded in Mohara vill, whereas minimum was observed in Kacchar vill. Shrivastava and Kanungo (2013), and Shyamala et al.(2008) reported the range of pH 6.93 to and 7.5 to 8.4 independently. Choudhary et al.(2014) reported a range of pH in between 7.0 and 8.3. According to Umavathi et al.(2007), pH ranged between 5.0 to 8.5 is stylish for planktonic growth.

- (b) **Electrical conductivity** - Electrical conductivity (EC) is the capability of an waterless result to conduct the electric current. Electrical Conductivity is a useful tool to estimate the chastity of water(Acharya et al., 2008). Water becomes a captain of electrical current when substances are dissolved in it and the conductivity is commensurable to the quantum of dissolved substance. The source of EC may be an cornucopia of dissolved mariners due to poor irrigation operation, minerals from rain water runoff, or other discharges. Electrical Conductivity ranged from 118.7 – 206.6 µmhos cm. Maximum electrical conductivity was recorded in the pond water of Pondi vill whereas minimum was in pond water of Pipra vill. Kataria et al.(2011), and Shrivastava and Kanungo (2013) also reported a range of EC in between 296 to 723µmhos/ cm and 115.11 to 212.13 µmhos/ cm independently.
- (c) **Total Dissolved Solid** - Total dissolved solids(TDS) denote substantially the colorful kinds of minerals present in water. There's no gas and colloids in TDS. TDS ranged from 165.5 – 254.8 ppm. Maximum TDS was observed in Beltukari vill, whereas minimum was recorded in Nipaniya vill. Rao et al.(2003), Kirubavathy et al.(2005), Garg et al. 2006) also reported the same result.
- (d) **Temperature** - Temperature is the dimension of voguishness of any material. It affects the physical and chemical parcels of water and also affects the submarine foliage, organisms and their natural

conditioning. During this study temperature ranged from 20.9 to 33.8 °C. Greatest temperature was seen in pond/lake water of Gataura Vill, whereas minimum was observed in pond water of Mohra vill. Thripathaiah et al.(2012) and Shyamala et al.(2008) also reported the range of temperature in between 24.75 to 28.5 °C and 26.3 to °C independently.

- (e) **Saltness** - Saltness is the saltness or dissolved swab content of a body of water. From the below trial it has been observed that saltness ranged from 5.1 – 6.9 ppt. Maximum saltness was recorded in pond water of Raliya vill, whereas minimum was recorded in pond water of Selar vill. Shrivastava and Kanungo(2013) reported the range of saltness in between 5.13-6.27 ppt.
- (f) **Dissolved Oxygen** - For all the forms of submarine life dissolved oxygen (DO) is essential element to break down man- made adulterants. The presence of dissolved oxygen is essential to maintain the advanced forms of natural life and to keep proper balance of colorful profanations therefore making the water bodies healthy. The chemical and biochemical process witnessing in water body are largely dependent upon the presence of oxygen. Estimation of dissolved oxygen is a crucial test in water pollution and waste treatment process control. In this present disquisition dissolved oxygen ranged from 4.72 – 6.13 mg/l. Greatest DO was observed in pond water of Selar Village, whereas minimum was recorded in pond water of Raliya vill. Shrivastava and Kanungo(2013) reported a rage of DO 2.43-4.45 mg/ l in their study. Thirupathaiah et al.(2012) reported a range of DO by between 5.18- 9.72 mg/l. Benerjee(1967), and Torzwall(1957) had reported that if the attention of DO is about 5mg/ l, throughout the time, the force will be productive for fish culture.

Table 2
Physico-chemical analysis of pond water

SN	Name of Village	pH	Electrical Conductivity (µmhos/cm)	TDS (ppt)	Temperature (°C)	Salinity (ppt)	D.O. (ppm)
1	Raliya	7.90	170.8	174.6	31.1	5.4	4.72
2	Parsada	7.88	179.4	178.8	31.0	5.9	4.74
3	Selar	8.14	167.9	193.1	20.9	5.1	6.1
4	Hardidih	8.28	145.8	236.5	21.2	5.3	6.07
5	Mopka	7.89	210.5	174.8	24.0	6.3	5.76
6	Mohra	9.69	157.5	196.3	21.0	5.8	6.12
7	Chilhathi	8.10	195.6	251.3	23.9	5.5	5.85
8	Ucchbhatti	7.90	145.8	214.8	27.7	6.0	5.66
9	Nipaniya	7.95	148.7	165.5	27.1	5.2	5.81
10	Nawagaon	7.94	170.4	246.9	29.3	6.7	5.5
11	Jhalmala	7.86	195.4	161.1	27.5	6.6	5.77

12	Pondi	7.34	208.2	224.3	29.0	6.6	5.4
13	Phandi	7.25	123.4	212.5	31.2	6.3	4.77
14	Pipra	7.5	118.7	219.2	32.5	5.5	4.8
15	Khaira	7.51	198.6	187.3	32.7	6.2	4.83
16	Daganiya	7.58	183.1	178.5	32.9	5.8	4.79
17	Farhada	8.62	143.7	254.5	30.3	5.5	5.02
18	Devri	8.22	172.8	198.7	30.4	5.4	4.84
19	Parsada	7.88	179.4	178.8	31.0	5.9	4.74
20	Bijaur	7.38	181.7	187.5	32.2	5.5	4.9
21	Gataura	8.13	152.9	221.3	30.4	6.5	4.78
22	Rank	7.26	142.3	183.4	32.1	5.4	4.75
Average		7.81	167.70	208.45	29.26	5.83	5.16
Range		6.50 – 9.69	118.7 – 206.6	165.5 – 254.8	20.9 – 32.9	5.1 – 6.7	4.72 – 6.12

Table 3
Correlation Coefficient (r) between different physicochemical parameters of pond water

	pH	EC	TDS	Temperature	Saltiness	DO
pH	1					
EC	0.0038	1				
TDS	-0.01049	-0.18936	1			
Temperature	-0.63099	-0.07	0.039084	1		
Saltiness	-0.143	0.097996	0.076906	0.142968	1	
DO	0.528872	0.11747	-0.07376	-0.93656	-0.0508	1

(g) **Statistical analysis** - There are so numerous statistical tools to study the interaction between different variables. Among them correlation and regression are also the important tools for the study of the interaction between two variables. In the present paper correlation was used for reducing the range of query. Correlation Measure(r) was calculated by using the equation(Patil and Patil, 2010). Correlation measure(r) was determined by taking the upsides of two boundaries all at once displayed in Table 2. From the Table 3 it has been observed that the water pH set up to show positive correlations with EC and DO it implies variety of pH with EC and DO is in forward course i.e. if one is increases other will also be increased. pH has negative correlation with TDS, temperature and saltiness i.e. if one is increases other will drop. EC has positive correlation with saltiness and DO whereas negative correlation with TDS and temperature. TDS shows positive correlation with temperature and saltiness whereas negative correlation with DO. There's the strong negative correlation in between DO and temperature. Temperature show positive correlation with saltiness. There's the negative correlation between saltiness and DO.

IV CONCLUSION

From the below trials it has been concluded that the pH value observed in different pond water samples generally ranged from 6.5 to 8.5 which is in compliance of the water quality criteria given by CPCB, New Delhi for all the orders(i.e., A to E). still, water samples of Mohra vill, Parasahi vill, Bhima Talab showed comparatively advanced values(above 9) indicating that the water from these ponds are not reasonable/suitable for drinking, washing, proliferation of natural life and fisheries, and water system purposes. Grounded on the DO values measured at different ponds, it seems that utmost of them fell in the B or C order of water quality criteria indicating that water is safe for organized bathing and indeed drinking after conventional treatment.

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