

PHYSICO-CHEMICAL CHARACTERIZATION OF DIFFERENT WATER BODIES OF
PATHALGAON JASHPUR DISTRICT CHHATTISGARH

Rashmi kar Sharma

bittu.devta0007@gmail.com

Research Scholar, Department of Botany, Bharti
University Durg, Chhattisgarh

Chandni Afsana

Assistant Professor,

Department of Botany, Bharti University Durg,
Chhattisgarh

ABSTRACT

Pathalgaon city have more water reservoirs. The Pathalgaon is located at the boundary of Raigarh and Jashpur district of Chhattisgarh. The ponds are essential for the survival of the human beings as well as other organisms. The physico-chemical parameters of very important for water quality. Many parameters have been analyzed. The different physico-chemical parameters as like Temperature, pH, BOD, COD, DO, Total Hardness, TDS, Total Alkalinity, Electrical Conductivity, Turbidity of water analyzed in this research. The electrical conductivity of Suta Talab is high in summer season and turbidity is maximum for puran talab for rainy season.

Keywords: Pathalgaon, Physico-chemical Parameters, pond, water reservoirs

INTRODUCTION

Water is essential for life of every living organism. Without water we cannot survive in the earth. Ponds, dams, and other water reservoirs are very useful and important for ecology and recycling of water. Pond is a shallow water body and cannot store for a long time and it become polluted because discharging Study of Physico-Chemical Properties of Pond Water of Bilaspur, CG. India PJAEE, 18 (15) (2021) 802 waste water from domestic purpose and anthropogenic activity. (Bojakowska et al., 2010 h' Uska et al., 2013) pond has been used as traditional source of circulation in India. Physicochemical and microbiological analysis of underground water in and around Gwalior city MP has been evaluated by Parihar S.S et al., (2012).

The maximum quantity of water on earth belongs to salty in nature and only a few are fresh water. Freshwater is now confined to supply due to over exploitation and pollution by anthropogenic activity (Gupta and Shukla, 2006; Singh and Mathur, 2005). The physicochemical attributes of water reservoir is affected by adding of pollutant releases from industrial, sewage,

municipal discharge and agriculture practices (Dwivedi and Pandey, 2002). Discharge of domestic water has resulted in eutrophication in different reservoirs (Pandey and Pandey, 2003).

Pathalgaon developing towns of Jashpur district of Chhattisgarh; in Pathalgaon city it forestry site it is some coldest area its water body show many characters. Its water quality is normal Pathalgaon city is surrounded by many dams and ponds and surrounded by forest. Jashpur district is divided in two parts as per the geographical point of views of the hilly belt, the northern part, running from Loroghat, Bagicha upto the Sarguja District. This Belt having forest area it has a reserve forest also. It covered the Sanna, Bagicha and Narayanpur. This part is called upper ghat is clamed through Logoghat, Loroght is about four Km. in length and there are three ternings of verry dengerous and remining southern opart is called nich ghat. In Jashpur Rigarrh road there are two more ghats, jhanda ghat before kansabel and balghat after kansabel are the climimng.

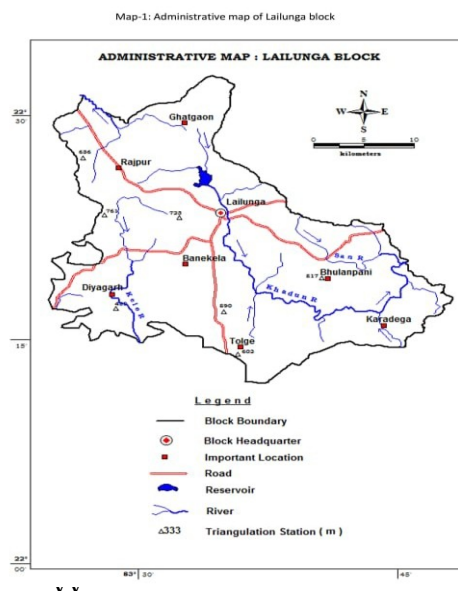
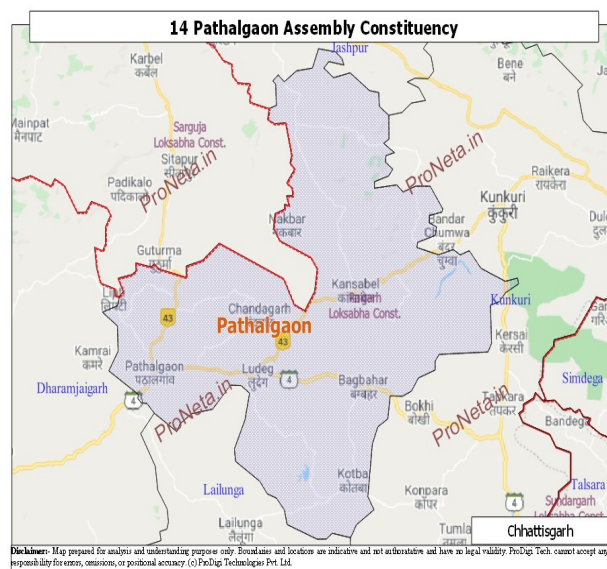
- The north-South of Chhattisgarh is near about 150 km. and its east-west breadth is rounded 85 km. Its total area is 620 km. It line in the north northern corne of adjoining the border of Bihar Jharkhand and Odisha in the stern corner side. The upper ghatai is an extension plants covering 1384 km² which is about 1200 meters above the sea level and is covered with the dense forest.
- Geogrephy of nich ghat is plane in general dotted with many big mountains. Kunkuri is the hottest region in nich ghat during the summer season and pandrapath is the coldest reason in upper ghat in winter seasion. Jashpur district been Pathalgaon is often some ponds and dam. A large population of the town is around these ponds and dams.

MATERIALS AND MATHOD

Agriculture is counted as the Chief economic occupation of the state according to government as time net sown area state is 4.828 million hectares and the grass sown area is 5.788 million hectares

The climate of Chhattisgarh is tropical. It is hot and humid because of proximity to the tropic of cancer and its dependence of the monsoon sea son is from late June to October and is the welcome respite from the heat. Chhattisgarh receives and average of 1292 mm (50.9) in of rain September from November to January band it is a good time to visit Chhattisgarh. Winters are

pleasant with low temperature and less humidity. The temperature varies between 30°C to 45°C, (86°F to 113°F) in summer and between 0°C to 25°C (32°F to 77°F) during winter.



SURVEY SITE The Pathalgaon is the city of Jashpur in Chhattisgarh state India. Ppathalgaon is a town and panchayat in Jashpur district of Chhattisgarh. Pathalgaon is located at 22.570 83.470 E. It has an average elevation of 546 meters (1791feet). As of 2001 India census, Pathalgaon had a population of 14.054.

- In this chapter the sites of study of physic-chemical analysis of water bodies. The survey sites in Pathalgaon some ponds Puran pond, Suta pond, Baiga pond, kursibudi pond, Joda pond, Basti pond.
1. Puran pond – The pond depend on rain water .It is present in front side of the Gurukul collage Jashpur road Pathalgaon . This is the oldest pond of Pathalgaon and their catchment area is 13200 m².
 2. Suta pond – It is depends on rain water this pond is present on Ambikapuar road It is surrounded 4500 m².
 3. Baiga pond – This pond which receive rain water. It is present behind the Gurukul collage. Jashpur road Pathalgaon. It is size in small 2000 m².
 4. Khursi budi - Pond depends on rain water. In the summer season pond is thirsty then its fillup by the tube well. This pond catchment area is 5600 m².
 5. Basti pond – Thos pond is receives rain water. It is present of purani basti. The pond is

present on dusting area. It's captured area 3900 m². Their present marine water.

6. Joda pond – This pond is depends on rain water. It is joint four different ponds. So it is called joda pond.



Fig. No. 1 Puran Pond



Fig. No. 2 Suta Talab



Fig. No. 3 Baiga Talab



Fig. No. 4 Khursi budi Talab



Fig. No. 5 Basti Talab



Fig. No. 6 Joda Talab

Physicochemical Characterization - Physicochemical analysis of pond water different parameter of test should be conducted like PH were different in different pond and pond water PH were identify by PH meter .Ponds June was different . It was acidic nature of water sample .PH was measured at the sampling site by a PH paper. It was again accurately at the laboratory with systronics double electrode pH meter by electrometric method.

Temperature is different of different water body. Palthalgaon is hot area and their present pond temperature various type. Temperature was observed by Thermometer in pond water .

- **Biological oxygen demand** –After the measurement of DO of sample from all the spots from all the selected sites, the sample were filled in air tight BOD Bottles separately and kept in BOD in incubator at 37⁰C for three days . After three days it was again measured by Winkler’s method. The difference between the first DO and second DO (after three days) values gives the biological oxygen demand of the water sample (APHA,1976)and can be calculated by the following formula $BOD\ mg/l = (Initial\ DO - DO_3) \times Dilution\ Factor - Bottle\ volume\ (300ml) / Sample\ volume$.

Analysis of samples – physico-chemical analysis was carried out applying the standard methods 2-3,13. Standard guidelines in this concern were followed during collection, preservation and estimation & examination of various parameters.

Conductivity and Turbidity – Conductivity of pond water was measured in mmho.cm-1 by conductivity meter in the laboratory11-12. The conductivity meter used was digital direct reading conductivity meter 304 (systronics). The turbidity of pond water was determined in Nephelometric turbidity units (NTU) in the laboratory. The turbidity meter used was Digital Nephelo Turbidity meter model-132 (Systronics).

Total dissolved solids (TDS) – For the estimation of total dissolved solids firstly take an oven dried weighed (W in mg) porcelain dish place in the desiccators. 100 ml pond water sample pour in the porcelain dish and evaporate it to dryness by using oven maintaining a temperature of 106±4°C for 2 hours and cool it in the desiccators and then record the weight of porcelain dish plus residue (W1 in mg). Calculate the value of total dissolved solids in the following manner:-
Total dissolved solids (TDS) in mg/liter = $[(W1 - W) \times 1000] / Vol.\ of\ Sample\ (in\ ml)$ Where,
W1 = Weight of porcelain dish plus residue; W = Weight of porcelain © 2018 JETIR August 2018, Volume 5, Issue 8 www.jetir.org (ISSN-2349-5162) JETIRD006018 Journal of Emerging Technologies and Innovative Research (JETIR) www.jetir.org 114

Desolve Oxygen (DO) – DO was determined by Azide modification of Winkler method⁴. 300 ml sample was collected in BOD bottle. 2ml. Each of manganese sulphate and alkali-iodide-azide reagents was added. Bottle was shaken for about 15 minutes, allowing the precipitate to settle down. Then 2ml. conc. H₂SO₄ was added to dissolve the precipitate. 100 ml of this solution was titrated against 0.025 N sodium thiosulphate solutions in presence of starch indicator. $DO\text{ mg.l}^{-1} = [A \times N \times 1000 \times 8] / V_1 - V$ Where, A = ml titrant used; B = Normality of titrant V₁ = ml of sample, V = ml of MnSO₄ + alkali-iodide azide

Biochemical Oxygen Demand (BOD) – Azide modification of Winkler method was used to measure the initial DO and DO after 5 days incubation of the sample at 20 degree C in BOD incubator. The BOD value was calculated with the help of following formula – $BOD\text{ mg.l}^{-1} DO\text{ (initial)} - DO\text{ (5 days} \times \text{dilution factor)}$; Where, DO (initial) = dissolved Oxygen of the sample for the first BOD Bottle, which is not incubated. DO (5 days) = Dissolved Oxygen of the sample after 5 days, incubation in dark.

Chemical Oxygen Demand (COD) - 2 ml of sample was diluted to 50 ml with distilled water and simultaneously running distilled water blank. 0.2 gm HgSO₄ was added to this then 5 ml 0.25 N Potassium dichromate. Solutions and 15 ml conc H₂SO₄ the solution was refluxed for 2 hour s. Excess of Potassium dichromate was titrated against 0.1 N ferrous ammonium sulphate using ferroin indicator. $COD\text{ mg/L} = [(a-b) \times N \times 1000 \times 8] / \text{ml of sample}$ Where, a = ml titrant, used for blank, b = ml titrant, used for sample; N = Normality of titrant

Table No. 1 OBSERVATION –

STUDY SITE	Season	Physico-chemical Parameter									
		Temperature 0C	pH	Conductivity	Turbidity NTU	TDS mg/l	DO mg/l	BO mg/l	COD mg/l	Hardness mg/l	Alkalinity mg/l
Puran Pond	Summer	27.36	7.4	617	12.7	438	5.7	54.5	71.4	172	215
	Rainy	23.8	7.1	538	6.5	498	6.2	57.8	78.7	188	155
	Winter	19.3	7.3	475	9.6	377	6.8	51.3	68.7	158	187

Suta Pond	Summer	28.2	8.2	1142	35.8	878	2.9	72.2	88.9	496	345
	Rainy	23.4	7.5	1018	19.5	985	3.5	78.6	94.2	521	274
	Winter	19.8	7.7	925	28.7	655	4.4	69.3	73.5	432	312
Baiga Pond	Summer	27.4	7.4	765	11.6	421	4.9	48.9	68.7	218	264
	Rainy	22.6	6.9	612	5.9	487	5.3	57.5	76.3	227	131
	Winter	18.8	7.2	584	9.3	354	5.9	51.4	63.5	191	178
Khursi Budi Pond	Summer	25.4	7.5	594	10.9	421	5.7	49.7	67.4	173	207
	Rainy	24.2	7.1	473	5.5	465	6.3	55.5	79.8	182	147
	Winter	19.6	7.3	388	9.4	345	6.6	47.3	66.3	149	167
Basti pond	Summer	28.7	8.1	1215	31.1	843	3.1	76.1	87.1	484	332
	Rainy	23.4	7.4	1018	23.4	934	4.2	82.3	92.8	508	251
	Winter	18.6	7.7	945	26.1	682	4.9	71.7	71.2	413	322
Joda pond	Summer	29.1	7.5	605	8.4	401	3.8	44.6	71.9	225	244
	Rainy	23.6	7.1	513	3.9	467	4.5	53.3	79.6	237	124
	Winter	18.4	7.2	755	9.2	415	5.5	43.4	71.3	345	277

RESULTS

Suta pond PH value is highest of all the ponds. Puran pond, Khursi Budi pond and joda pond PH value is lowest 7.1, DO is lowest 2.9 of Suta Pond in winter season and highest 6.8 of Puran pond in rainy season.

In the value of different Physico-chemical parameters in seasonal variation of 06 Ponds water samples, as observed during present investigation has been computed in Table – 1; value of three samples of all three sites collected in triplicate, from different points during summer, rainy and winter season. The range value of each parameters considering the sites wise have been compare with standard value as recommended by BSI. The pH values were found slightly alkaline at all sites of pond water that ranges from 7.4 to 8.2. Total alkalinity was observed minimum at site- P-

5, while maximum at sites P-2 & P-3. Variation in the value of DO was found from 3.57 mg/l to 6.57 mg/l that is more than standard value. The B. O. D. of the samples was found ranges from 45.43 mg/l to 76.70 mg/l, whereas the maximum value was observed at sites- P-5, P-2 BOD is a good index of pollution and therefore helps in deciding the suitability of water for consumption. The BOD level in P-5, P-2 were found maximum in all seasons it may be due to human/animal activities in the pond e.g. washing, defecation etc. and indicating polluted pond water.

The maximum value of COD was observed at sites P-5& P-2 while minimum at sites – P-6, varied from 64.07 mg/l to 86.70 mg/l. Total hardness of pond water was found maximum at site P-2 and variation from 168.0 mg/l to 483.0 mg/l was observed. The variation in the value of Nitrate, Phosphate and Sulfate was also observed, which are under permissible value, as recommended by BSI, however nitrate can be considered as more than should be for society. Nitrate represents the final stage of mineralization of nitrogenous organic matter such as dead green plants and animals. As such higher value of nitrate in the water may be indicative of sewage pollution. Similarly value of Chloride and Iron were also found with variable range whereas Chloride is lesser than standard value while Iron was found negligible. Iron is biologically on important element which is essential to all organisms. In present study Iron concentrate in all these samples found to be negligible.

REFERENCES:

1. Ahmed J. M., Reazual Haque M. and Mizanur Rahman M., Physico-chemical Assessment of Surface and Groundwater Resources of Noakhali Region of Bangladesh, *International Journal of Chemical Science and Technology*, **1(1)**, 1-10 (2011).
2. APHA, Standard Methods for the Examination for water and waste water. 14th Edition, published by American Public Health Association, Washington, (1980).
3. APHA, Standard Methods for the Examination for water and waste water. 20th Edition, published by American Public Health Association, New York (1998).
4. APHA, AWWA, WPCF, Standard method for the examination water and waste water. 17th edition, USA, Edt. Washington, D.C. (1992).
5. Arya S., Kumar V., Raikwar M., Dhaka A. and Minakshi, Physico-chemical Analysis of Selected Surface Water Samples of Laxmi Tal (Pond) in Jhansi City, Bundelkhand

- Region, Cental India, *Journal of Experimental Sciences*, **2(8)**, 01-06 (2011).
6. Bhagat P. R., Study of Physico-chemical Characteristics of the accumulated water of Pond of Lohara, at Yavatmal (Maharashtra), *Rasayan Journal of Chemistry*, **1(1)**, 195-197 (2008).
 7. Bhuiyan J. R. and Gupta S., A Comparative Hydrobiological study of a few Ponds of Barak Valley, Assam and their role as sustainable water Resources, *Journal of Environmental Biology*, **28 (4)**, 799-802 (2007).
 8. Ghose B. B. and Basu A. K., Observation on estuarine pollution of the Hooghly by the effluents from a chemical factory complex at Rashasa, west Bengal, *Env. Health*, **10**, 29-218 (1968).
 9. Gupta S. and Shukla D. N., Physico-Chemical analysis of sewage water and its effect on seed germination and seedling growth of sesamum indicum, *J Nat-Ras. Development*, **1**, 5-19 (2006).
 10. Hasan G. O., Mathisen P. P. and Pellegrino D., Distribution of heavy metals in vegetation surrounding the Blackstone River, USA: Considerations regarding sediments contamination and long term metals transport in freshwater riverine ecosystems, *J. Environ. Biol.*, **28**, 493-502 (2007).
 11. Jena V. K. and Sinha D., Ground water quality assessment by multivariate factor analysis, *Research Journal of Chemistry and Environment*, **21(8)**, 21-25 (2017).
 12. Jena V. K. and Sinha D., Physico-chemical analysis of ground water of selected area of Raipur city, *Indian Journal of Scientific Research*, **13(1)**, 61-65 (2017).
 13. Kumar S. M. and Ravindranath S., Water Studies – Methods for monitoring water quality. Published by Center for Environment Education (CEE), Banglore, Karnatka,India, 191 (1998).
 14. Mahobe H., Study of Physico-Chemical Characteristics of Water Ponds of Rajnandgaon Town, Chhattisgarh, *International Journal of Scientific & amp; Engineering Research*, **4(8)**, 738-748 (2013).
 15. Mishra R. R., Rath B. and Thatoi H., Water Quality Assessment of Aquaculture Pond Located in Bhitarkanika Mangrove Ecosystem, Orissa, India, *Turkish Journal of Fisheries and Aquatic Sciences*, **8**, 71-77 (2008).
 16. Obi C. N. and Okocha C. O., Microbiological and physicochemical analysis of selected

- borehole waters, *Journals of enginery applied science*, **257**, 920-929 (2007).
17. Onifade A. K., Ilori R. M., Microbiological analysis of sachet water vended in Ondo state, Nigeria, *Environ Res J*, **2**, 107- 110 (2008).
 18. Osci Y., New School Chemistry for Senior Secondary Schools. African First Publisher Ltd, Onitsha. 3rd edn., 292 (2005).
 19. Pathak H., Pathak D. and Limaye S. N., Studies on the physico-chemical Status of Two water bodies at Sagar city under anthropogenic influences. Pelagia Research Library, *Advances in Applied Science Research*, **3(1)**, 31-34 (2012).
 20. Sahni K. and Yadav S., Seasonal variations in physico-chemical parameters of Bharawas Pond, Rewari, Haryana, *Asian J. Exp. Sci.*, **26(1)**, 61-64 (2012).
 21. Shrivastava N., Agrawal M. and Tyagi A., Study of physico-chemical characteristics of water bodies around Jaipur, *J. Environ. Biol.*, **24**, 177-180 (2003).