



Experimental Investigation of Physico-Chemical Properties of Water taken from Bantidand River, Balrampur District, Surguja Division of Chhattisgarh, India.

Shailesh Kumar Dewangan¹, Nidhi Shukla², Utkarsh Pandey², Sonu Kushwaha², Aryan Mistry², Aman Kumar², Aman Sawaiyan²

¹Asst. Professor & HOD Department of Physics, Shri Sai Baba Aadarsh Mahavidyalaya Ambikapur (C.G.)

² B.Sc.-I Year Students (Faculty of Physical Science), Shri Sai Baba Aadarsh Mahavidyalaya Ambikapur (C.G.)

Abstract:-

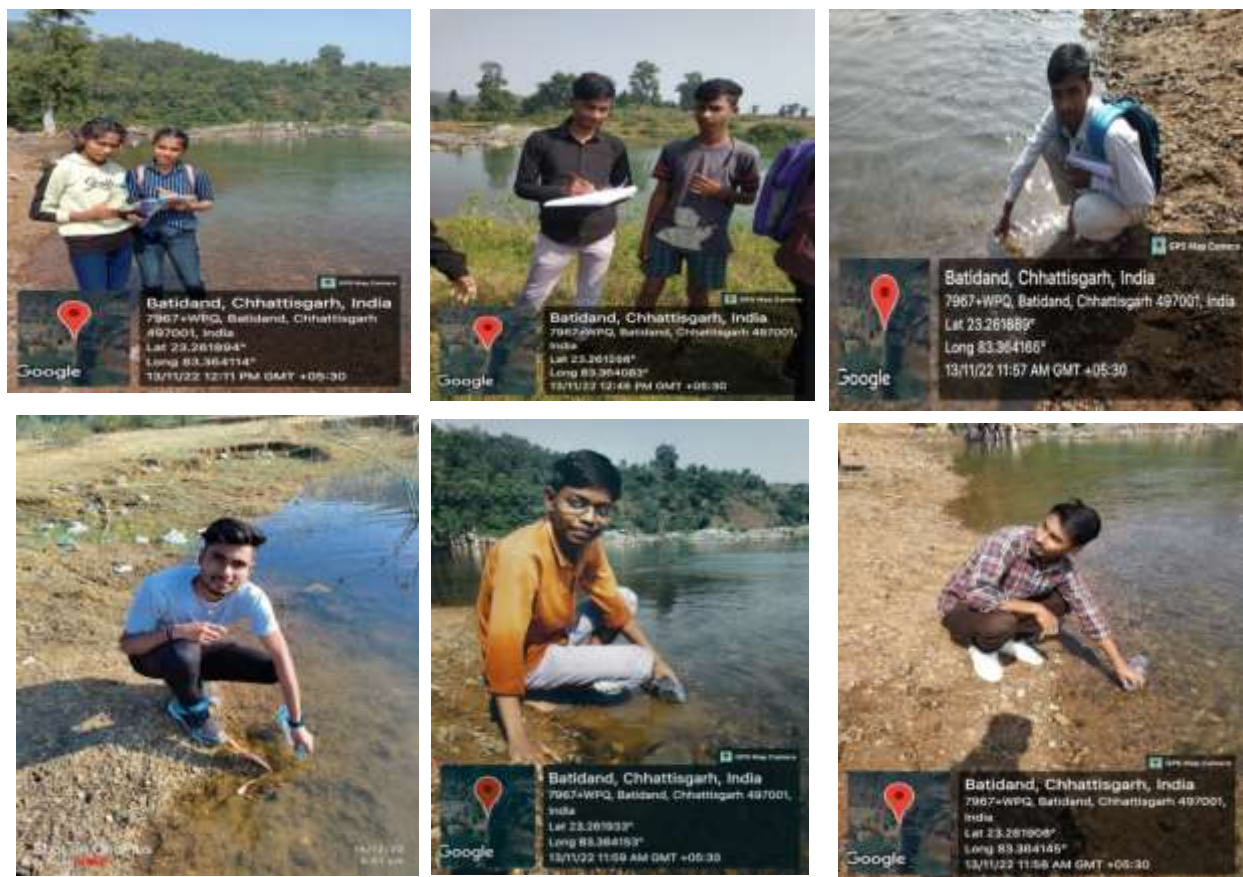
In our research, we have to test the water quality of the river flowing in Buntidand area, what are the physical properties of the water of this river, what elements are found in this water. Because many chemical elements are found in the water of the flowing river, if the amount of these chemical elements is normal, then it is beneficial for us, agriculture and animals, but due to lack or excess of these chemicals, it is harmful for humans, agriculture and animals. We have to study the physico-chemical properties of water here because water contains many chemical elements like chloride, nitrate, calcium-carbonate, Calcium, Magnesium, Iron, Fluoride, Sulphate, Oxygen, Hydrogen etc. The reason for this may be excess or deficiency of these chemicals, so in our research we will try to reach a conclusion by studying the physical-chemical properties of these water.

Keywords: Bantidandl, Conductivity, River Water, pH-value, Physical properties, Chemical properties etc.

Introduction: -

Research Area Batidand is located in Balrampur district of Chhattisgarh, here a river flows which originates from Kailash cave Dhawarpur. The river of water flows in the north to south direction. The water of this river is used for irrigation, agriculture like growing paddy, wheat, corn and many types of vegetables. The population of Batidand is about 700-800 people and religion is more Hindu and people of other religions are very less. Not much drinking source is available in Batidand, only 2 handpumps and 1 tube well. In other season they use river water for drinking but in rainy season they don't use this river water because at that time water is not pure, due to this problem they face drinking water problem. have to do. There is a Shiva temple in Batidand which is very famous. Shivratri fair is organized in Shivratri festival which is wonderful. We also have a primary government school here which is very important for today's children or young children and education is very important for everyone in today's generation. Many types of soil are found here. Batidand is surrounded by forests. It is also for picnic spot. There is not much pollution as compared to other places. Research area Bantidand village is 32 Km away from Ambikapur, the headquarter of Surguja division and the distance of this place is 372 Km from Raipur, the capital of Chhattisgarh. and geographical location position of the this research area is at 23.2615° latitude and 83.3639° longitude and no research has been done here[1].





Study of Literature :

Conductivity :- Conductivity is a measure of water's capability to pass electrical flow. This ability is directly related to the concentration of ions in the water[2]. These conductive ions come from dissolved salts and inorganic materials such as alkalis, chlorides, sulfides and carbonate compounds [3]. Compounds that dissolve into ions are also known as electrolytes [4]. The more ions that are present, the higher the conductivity of water.

pH-value :- pH is a determined value based on a defined scale, similar to temperature. This means that pH of water is not a physical parameter that can be measured as a concentration or in a quantity.[5],[6]. pH is a measure of how acidic/basic water is. The range goes from 0 to 14, with 7 being neutral. pHs of less than 7 indicate acidity, whereas a pH of greater than 7 indicates a base. pH is really a measure of the relative amount of free hydrogen and hydroxyl ions in the water. Water that has more free hydrogen ions is acidic, whereas water that has more free hydroxyl ions is basic. Since pH can be affected by chemicals in the water, pH is an important indicator of water that is changing chemically. The pH of water determines the solubility (amount that can be dissolved in the water) and biological availability (amount that can be utilized by aquatic life) of chemical constituents such as nutrients (phosphorus, nitrogen, and carbon) and heavy metals (lead, copper, cadmium, etc.). For example, in addition to affecting how much and what form of [phosphorus](#) is most abundant in the water, pH also determines whether aquatic life can use it. In the case of heavy metals, the degree to which they are soluble determines their toxicity. Metals tend to be more toxic at lower pH because they are more soluble[7].

Material & Methods:-

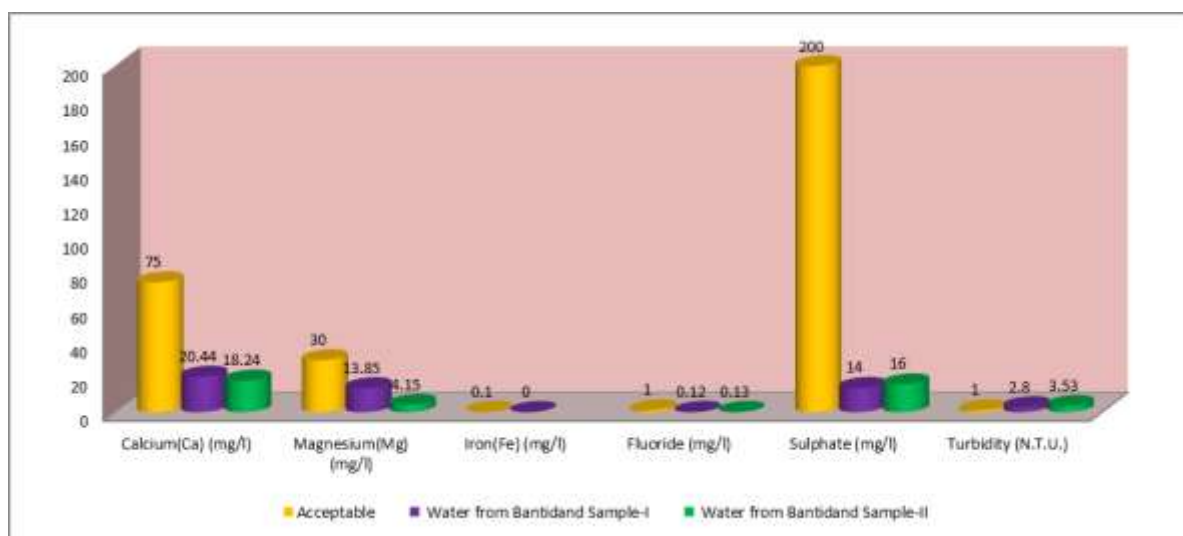
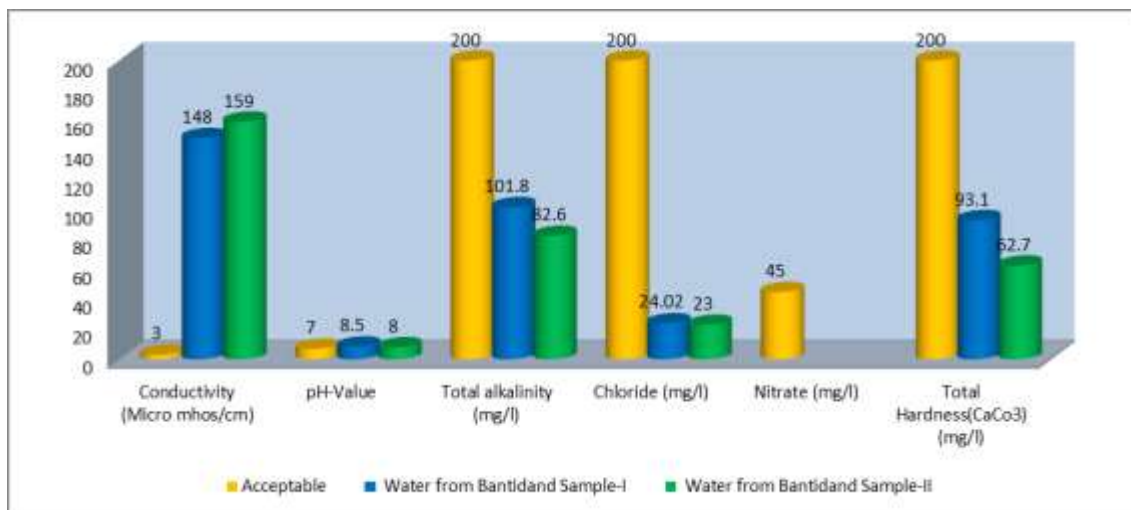
We are using experimental method as a methodology in this research, our research area is Bantidand Village, where there is a river, we took a sample of water flowing in this river. We took two different samples during sample collection, first sample was taken from water surface in 5 cm depth and second sample was taken from 25 cm depth. The physico-chemical properties of the samples taken were studied. In which we studied the presence and quantity of Turbidity, Conductivity, pH value, Chloride, Nitrate, Calcium, carbonate, Magnesium, Iron, Fluoride, Sulphate etc. which are as follows-

Physico-chemical properties	Unit	Acceptable	Water from Bantidand	
			Sample-I	Sample-II
Conductivity	Micro mhos/cm	3	148	159
pH-Value	pH Scale	7	8.5	8.0
Total alkalinity	mg/l	200	101.8	82.60

Chloride	mg/l	200	24.02	23.00
Nitrate	mg/l	45		
Total Hardness(CaCo₃)	mg/l	200	93.10	62.70
Calcium(Ca)	mg/l	75	20.44	18.24
Magnesium(Mg)	mg/l	30	13.85	4.15
Iron(Fe)	mg/l	0.1	N.D.	
Fluoride	mg/l	1	0.12	0.13
Sulphate	mg/l	200	14.00	16.00
Turbidity	N.T.U.	1	2.8	3.53
Colour	Pt. Cobalt Scale	5.0	5.0	5.0

Result & Discussion :-

The turbidity of the water located in Bantidand village is slightly more than normal. So the water coming out here is clean, the conductivity of the water found here is much higher than that of distilled water, the pH-value is higher than normal, so the water here will be alkaline. The amount of chloride, nitrate, Calcium carbonate and calcium is also much less than normal. Iron is absent. Similarly, the amount of Fluoride and Sulphate is also less than normal.



Conclusion:-

The conductivity of the river water source found in Bantidand Village is more than the conductivity of distilled water, which means that its water may be ionic. The pH-value of the water found here is greater than 7, so the water would be alkaline nature. Nitrate was not found in the source of water available in river of Bantidand Village. That means there are no Nitrates in the water here. The amount of Iron did not found in this water.

Reference:

- [1] Shailesh Kumar Dewangan*1, Kanchan Sahu*2, Garima Tirkey*3, Akshat Jaiswal*4, Akanksha Keshri*5, Nidhi Kumari*6, Nagendra Kumar*7, Siddarth Gautam*8 “Experimental investigation of physico-chemical properties of soil taken from Bantidad area Balrampur District, Surguja division of Chhattisgarh, India.” *International Research Journal of Modernization in Engineering Technology and Science*, Vol-04, Issue:12, December-2022, PP 751-755
- [2]. EPA. (2012). 5.9 Conductivity. In Water: Monitoring and Assessment. Retrieved from <http://water.epa.gov/type/rsl/monitoring/vms59.cfm>
- [3]. Perlman, H. (2014). Electrical Conductivity and Water. In The USGS Water Science School. Retrieved from <http://ga.water.usgs.gov/edu/electrical-conductivity.html>
- [4]. Milliequivalents, Millimoles, and Milliosmoles (Powerpoint). (n.d.). In University of Michigan. Retrieved from http://sitemaker.umich.edu/tutorial/files/handout_milliequiv.pdf
- [5]. Merriam-Webster. (2013). pH. In Merriam-Webster Dictionary . Retrieved from <http://www.merriam-webster.com/dictionary/ph>
- [6]. Ophardt, C. E. (2003). pH. In Virtual Chembook. Retrieved from <http://www.elmhurst.edu/~chm/vchembook/184ph.htm>
- [7]. Nave, C. R. (2001). pH as a Measure of Acid and Base Properties. In HyperPhysics. Retrieved from <http://hyperphysics.phy-astr.gsu.edu/hbase/chemical/ph.html>
- [8] https://www.usgs.gov/special-topics/water-science-school/science/ph-and-water#:~:text=pH%20is%20a%20measure%20of,important%20measure_ment%20concerning%20water%20quality.
- [9]. https://www.usgs.gov/special-topic/water-science-school/science/surface-tension-and-water?qt-science_center_objects=0#qt-science_center_objects
- [10]. <https://en.wikipedia.org/wiki/Viscosity>
- [11] <https://longsecowater.com/blog/effects-of-iron-in-water#:~:text=Staining%3A%20High%20concentrations%20of%20iron,smell%20to%20a%20home's%20water>.
- [12]. Hanan Alwediyani, Aisha Almasoudi, Anwar Abdulrahman “The Change in Physical Properties of Magnetic Water”
- [13] Joshi, K., Kamat, P. ,INDIAN, J. Effect of magnetic field on the physical properties of water. J .Ind. Chem. Soc.43:620-622. 1966
- [14] Hanan Alwediyani, Aisha Almasoudi, Anwar Abdulrahman “The Change in Physical Properties of Magnetic Water”
- [15] <https://www.fondriest.com/environmental-measurements/parameters/water-quality/conductivity-salinity-tds/>
- [16] Surraya Shahab,a Ghulam Mustafa,a,* Imran Khan,a Muhammad Zahid,b” EFFECTS OF FLUORIDE ION TOXICITY ON ANIMALS, PLANTS, AND SOIL HEALTH: A REVIEW” Research review Fluoride 50(4)393–408 October-December 2017
- [17] Shailesh Kumar Dewangan1, Vineeta Tigga2, Meena Lakra3, Preeti4 “Analysis of Physio-Chemical Properties of Water Taken from Various Sources and Their Comparative Study, Ambikapur, Surguja Division of Chhattisgarh, India” *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, Volume 10 Issue XI Nov 2022, PP-703-705