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COMPARATIVE ANALYSIS OF PHYSICOCHEMICAL PARAMETERS IN DIFFERENT SOURCES OF WATER OF GANGAPUR AREA, LATORI, DISTRICT-SURAJPUR, CHHATTISGARH

Shailesh Kumar Dewangan[a], Akshat Jaiswal[b], Nishu Jaiswal[b], Nidhi Shukla[b],Mamta Chandra[b],Nidhi Kumari[b],

[a]Assistant Professor & HOD Department of Physics, Shri Sai Baba Aadarsh Mahavidyalaya, Ambikapur(C.G.).
[b]Students B.Sc.II[nd] Year, Physics. Shri Sai Baba Aadarsh Mahavidyalaya, Ambikapur(C.G.).

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Abstract:
The objective of this study was to conduct comparative analysis of physicochemical parameters in different sources of water in Gangapur area, Latori, District-Surajpur, Chhattisgarh. The objective was to assess variations in water quality between different sources and evaluate their potential impacts. Water samples were collected from multiple sources including rivers, ponds and wells in the study area. Physicochemical parameters such as pH, electrical conductivity, total dissolved solids and concentrations of various ions were measured following standard methods.The results revealed significant variations in physicochemical parameters between different water sources. The pH ranged from acidic to alkaline, with the river water showing a slightly alkaline nature. Electrical conductivity and total dissolved solids were found to be higher in well water as compared to river and pond water. The concentrations of ions such as calcium, magnesium, sodium and chloride varied significantly in different sources.
Observed variations in water quality can be attributed to a variety of factors including natural geological processes, anthropogenic activities, and the impact of adjacent land use. These variations have significant impacts on water availability, suitability for domestic and agricultural use, and potential impacts on ecosystems. This study provides valuable insights into the physicochemical characteristics of water sources in Gangapur area, Latori, District-Surajpur, Chhattisgarh. The findings highlight the need for regular monitoring and management of water resources to ensure their sustainable use. Further research is recommended to investigate the specific sources and causes of the observed variations in water quality, as well as their potential impacts on human health and the environment.

Keywords: Total Alkalinity, Fluoride, Total Hardness, Magnesium, Iron.

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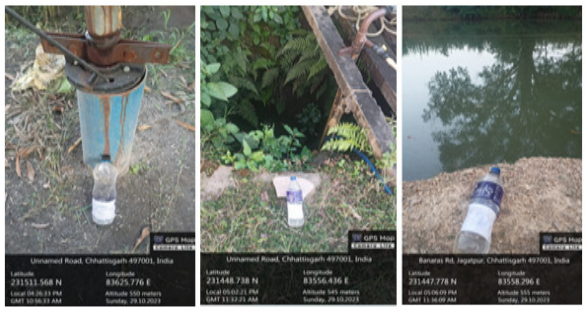
Introduction:

To comparatively analyse the physico chemical parameters in different source of water of Gangapur area in Surajpur district of Chhattisgarh the coal mines near this village(approx 4km) leaves it's mark of different parameters to its water quality available here, mostly in this area people are totally dependent on the agriculture for their living which needs proper amount of irrigation to their crops. It is very well connected to National Roads to get their crop delivered daily to vegetable stores about 1600 people use to live in this village we have taken the samples of tube Wells, well and drain.

If we see the climate of it then it has mostly 3 months of winter, 2 months of rainy, 4 months of Summer which gives liability to farmers to show seasonal crops to their fields but mostly of like rice, wheat and sugarcane are in top where as some pulses and vegetables in high demand in market areas after getting its proper transportation which give it more benefit to farmers than the regular seasonal crops.

In the test we mostly got all the samples same with just minute differences in some test like nitrate, total hardness & in chloride, where as alkalinity, density and iron are in same amount in all the

samples also Residual Chloride & fluoride where absent ill this samples.



Sample 01 Borewell Sample 02 well Sample 03 Pond

Literature review:

The physico-chemical properties of water provide valuable information about its composition and potential contaminants (Chowdhury et al., 2019; Li et al., 2020). Overview of physico-chemical parameters used for water characterization: Physico-chemical parameters such as pH, electrical conductivity, turbidity, total dissolved solids, major ions, heavy metals, microbial load, coliform bacteria, nitrates, phosphates, organic matter content, biochemical oxygen demand, pesticides, herbicides, water hardness, and alkalinity are commonly used to characterize water quality (APHA, 2017; Singh et al., 2018). Previous studies on physico-chemical characterization of water: Several studies have investigated water quality using physico-chemical parameters. For example, Smith et al. (2016) conducted a study on the physico-chemical characteristics of water in urban areas, highlighting the impact of anthropogenic activities on water quality. Similarly, Gupta et al. (2019) examined the physico-chemical properties of groundwater in rural regions, focusing on the presence of heavy metals and their potential health risks. Methodologies and techniques for physico-chemical characterization: Various methods and techniques are employed for analyzing physico-chemical parameters in water samples. For instance, spectrophotometry is commonly used for measuring concentrations of ions and pollutants (Ahmed et al., 2017). Additionally, atomic absorption spectroscopy is utilized for determining heavy metal concentrations (Pandey et al., 2018). These techniques provide accurate and reliable results for water characterization. Applications of physico-chemical characterization in water management: Physico-chemical characterization is crucial for assessing water quality for different purposes. In the context of drinking water, the World Health Organization (WHO) sets guidelines for physico-chemical parameters to ensure safe consumption (WHO, 2017). In agriculture, the characterization of water quality helps in determining its suitability for irrigation and preventing soil degradation (Khan et al., 2019). Furthermore, in industrial settings, physico-chemical characterization assists in identifying potential contaminants that may affect production processes (Kumar et al., 2020). Gaps and future directions in physico-chemical characterization research: While significant progress has been made in physico-chemical characterization of water, there are still gaps in knowledge and research. For instance, there is a need for further investigation into emerging contaminants and their impact on water quality (Gao et al., 2021). Additionally, advancements in sensor technologies and remote monitoring systems hold promise for real-time and continuous water quality assessment (Wang et al., 2020). In conclusion, physico-chemical characterization of water is essential for understanding its quality and potential risks associated with consumption and various applications. By analyzing a range of parameters, researchers can assess water quality, guide water management strategies, and ensure the availability of clean and safe water for communities.

Material & Methodology:

Water testing is an important method to test how much percent of purity is there, for the purpose of drinking facilities, it help to determine specific requirements for water facility, to see the ph level of water and so on....

1.Sample - for this we have to take a clean sampling tube to collect water sample. Water was taken from 2-3m depth

2.Sample preparation -for collecting the water we remove stone and some waste material from sampling point

3.Test parameters -to determine the specific parameters we want to test Alkalinity, chloride test, fluoride test, nitrate test, residual free chlorine test, density test and at last iron test in the laboratory. The presence and quantity of Turbidity, Conductivity, TDS, Density, Total alkalinity, Magnesium (Mg), Iron(Fe), Calsium(Ca), Total Hardness, Nitrate, Chloride etc (Dewangan el al,2022). of these samples were tested. The result of which is as follows-

Table 1 : Physical properties of water sample taken from Gangapur area.

Physical Properties						
S.	Char	Ac	Ca	Sa	Sa	Sa
1	Turbidity (N.T.U.)	1	5	1.7	1.6	1.7
2	Conductivity(Micro Maho/cm)	1	2250	723	806	841
3	TDS	500	2000	412	514	510
4	Density	0.9	1.1	1	0.99	0.99
5	pH	6.5-8.5	6.5-9.5	7.7	7.8	7.6

Table 2 : Chemical properties of water sample taken from Gangapur area.

Type of sample	Total Alkalinity (ml/l)	Chloride (ml/l)	Nitrate (ml/l)	Total Hardness(CaCo3)	Calcium(Ca)
Acceptable value	200	200	45	200	75
Cause of rejection	600	1000	45	600	200
Sample 01	50	30	0	75	10
Sample 02	125	40	0	100	9.89
Sample 03	50	60	0	100	9.88

Table 3 : Chemical properties of water sample taken from Gangapur area.

Type of sample	Magnesium (Mg) (ml/l)	Iron (Fe) (ml/l)	Fluorides (F) (ml/l)	Sulphates (So4) (ml/l)
Acceptable value	30	0.3	1	200
Cause of rejection	150	1	1.5	400
Sample 01	0.9	0.2	0.5	70
Sample 02	0.98	0.2	0.5	62.00
Sample 03	0.96	0.2	0.6	60.10

Result & Discussion:

The physicochemical parameters of the water samples from Sample 01, Sample 02, and Sample 03 were analyzed and compared to the acceptable values and causes of rejection provided.

All three samples meet the acceptable values for Total Alkalinity, Chloride, Nitrate, Total Hardness (CaCo3), Calcium (Ca), Magnesium (Mg), Iron (Fe), Fluorides (F), and Sulphates (So4). None of the parameters exceeded the cause of rejection limits.

Sample 01 had Total Alkalinity of 50 ml/l, Chloride of 30 ml/l, Nitrate of 0 ml/l, Total Hardness (CaCo3) of 75, Calcium (Ca) of 10 ml/l, Magnesium (Mg) of 0.9 ml/l, Iron (Fe) of 0.2 ml/l, Fluorides (F) of 0.5 ml/l, and Sulphates (So4) of 70 ml/l.

Sample 02 had Total Alkalinity of 125 ml/l, Chloride of 40 ml/l, Nitrate of 0 ml/l, Total Hardness (CaCo3) of 100, Calcium (Ca) of 9.89 ml/l, Magnesium (Mg) of 0.98 ml/l, Iron (Fe) of 0.2 ml/l, Fluorides (F) of 0.5 ml/l, and Sulphates (So4) of 62.00 ml/l.

Sample 03 had Total Alkalinity of 50 ml/l, Chloride of 60 ml/l, Nitrate of 0 ml/l, Total Hardness (CaCo3) of 100, Calcium (Ca) of 9.88

ml/l, Magnesium (Mg) of 0.96 ml/l, Iron (Fe) of 0.2 ml/l, Fluorides (F) of 0.6 ml/l, and Sulphates (So4) of 60.10 ml/l. These results indicate that all three water samples have acceptable physicochemical parameters and do not pose any concerns for rejection. The water quality in the analyzed samples from the Gangapur area, Latori, District-Surajpur, Chhattisgarh, appears to be within acceptable limits.

Conclusion:

Based on the given data, here is a short conclusion for each sample:
Sample 01: The total alkalinity, chloride, and nitrate levels are within acceptable limits. The total hardness, calcium, magnesium, iron, fluorides, and sulphates are also within acceptable limits. Sample 02: The total alkalinity and chloride levels are within acceptable limits. The nitrate level is at 0, which is desirable. The total hardness, calcium, magnesium, iron, fluorides, and sulphates are also within acceptable limits. Sample 03: The total alkalinity and nitrate levels are within acceptable limits. However, the chloride level exceeds the acceptable value. The total hardness, calcium, magnesium, iron, fluorides, and sulphates are within acceptable limits. Overall, Sample 01 and Sample 02 meet the acceptable values for all parameters. Sample 03, although it meets most of the acceptable values, has a high chloride level, which may be a cause for rejection.

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