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Evaluation of Groundwater Quality for the Construction Industry in Greater Noida (Jewar Region)

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Abstract – In recent years, the increasing threat to groundwater quality due to human activities has become a matter of great concern. A vast majority of groundwater quality problems present today are caused by contamination and by overexploitation, or by combination of both. The parameters to be examined are pH, Chloride (as Cl), Organic Solid, Inorganic Solid, Sulphate (as SO_3), Total Suspended Solid, Neutralization Value 0.02 H_2SO_4, Neutralization Value 0.02 NaOH, Turbidity, Conductivity for the groundwater samples of different locations which are Raunija, Rabupura, Banvaripur, Chachura, Jahangirpur, Kalupura, Jewar Banger and Jewar Khader. We are also testing the mean compressive strength of water using $CaCl_2$ and comparing the result. This Study investigates the effect of Calcium Chloride ($CaCl_2$) as an admixture on the Compressive Strength of concrete produced. It improves the compressive strength by 26%.

Keywords: Ground Water, Water Quality Index, Parameters, Calcium Chloride, Strength of Water

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INTRODUCTION

Water is most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life. Groundwater is used for domestic and industrial water supply and also for irrigation purposes in all over the world. In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. According to WHO organization, about 80% of all the diseases in human beings are caused by water. Once the groundwater is contaminated, its quality cannot be restored back easily and to device ways and means to protect it [1]. High water quality index is due to high turbidity, high concentration of Fluoride and iron. Correlation of selected parameters is analyzed and found that Electrical conductivity has significant correlation with Alkalinity, nitrate, sodium, and sulphate. Regression equations relating correlated parameters were formulated. A comparative study is also done with Indian standard and WHO standard for drinking water[2]. While a water quality model with higher complexity may provide more detailed or accurate prediction results, it is prone to provide increased uncertainty due to greater chance of error propagation[3]. Water quality data are only as good as the water samples from which the measurements are made. Even the most precise laboratory analysis of a water sample cannot compensate for improper or poorly executed sampling procedures or for physical and chemical alteration of a sample due to inappropriate sample collection, transport, or storage[4]. Most effective tool to monitor the surface as well as groundwater pollution is the water quality index which can be used efficiently in improving the water quality programmes. Water quality index gives information on a rating scale from zero to hundred. Nine parameters were performed to designed the water quality index[5]. Preserving water quality has become an urgent issue since it affects human health and hydrous ecosystems. With the continuous increase in population, there is an increasing need for water resources. Contamination of water sources resulting from some natural processes,includingairinputsorclimatic conditions, and through human pollutants such as non-treatment of sewage discharge and industrial activities, which might add further stress to water quality[6]. This production outlines various contemplations that you should remember when examining ground water. The production is explicitly proposed for use by ranchers and private well proprietors who are keen on acquiring a proper water test for screening purposes (bacterial focus, nitrate, iron, pH, mineral piece, saltiness). Open water supply frameworks are liable to guideline by the California Department of Health Services,

which indicates least rules for testing recurrence and inspecting strategies that must be trailed by any water framework operator [7]. Once the groundwater is defiled, its quality can't be re-established by preventing the contaminations from the source. It along these lines winds up imperative to consistently screen the quality of groundwater and to gadget available resources to ensure it. Water quality index is a standout amongst the best tools1-4 to impart data on the quality of water to the concerned natives and strategy creators [8]. In light of the result of the examination some basic divisions which could encounter various kinds of issue in solid structures have been recognized. The present paper features run of the mill solid solidness issues being confronted as of late in some solid structures which were built only couple of years prior or the structures up and coming in these areas. [9]

OBSERVATION AND RESULTS:

Table 1: Comparison of parameters in different sampling location

Parameter	Banvaripur	Chachura	Jahangirpur	Raunija	Maksudpur	Rabu Pura	Jewar Khader	Jewar Banger
pH	8.37	7.98	7.63	7.21	7.4	7.1	6.95	6.96
Chloride (as Cl)	9.78	15.65	29.35	256.35	25.44	9.64	101.24	43.39
Organic Solid	80	120	184	188	252	276	628	296
Inorganic Solid	512	208	508	1040	436	152	664	584
Sulphate (as SO_3)	25.32	19.7	56.94	115.69	34.43	20.48	115.85	46.46
Total Suspended Solid	4	6	18	22	4	4	< 2.0	33
Neutralization Value 0.02 H2SO4	37.2	14.8	35	36.6	34	52	43	44
Neutralization Value 0.02 NaOH	Nill	0.5	1.6	3.8	3.5	1.4	3.1	2.3
Turbidity	6.5	2.7	1.9	2.8	1.4	9.1	0.5	21
Conductivity	903.9	362	951.5	2162	886.3	579.1	1618	1193

The above table shows the Comparison of parameters in different sampling location in a single table, so we can easily analyse the water quality of each sampling location. So the water testing has been done for different parameters.

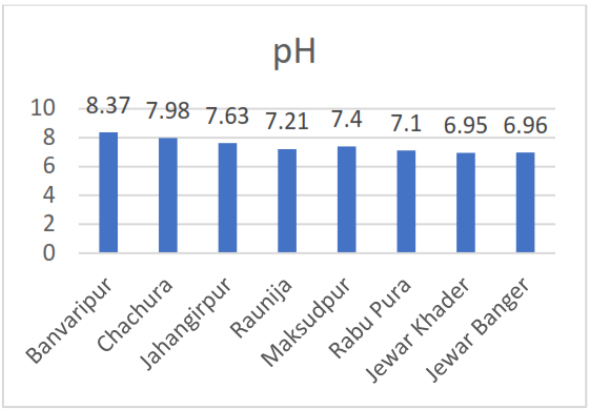

Figure 1: Graph diagram of pH value

The figure 1 shows the graph diagram of pH value of different sampling location. pH value is high in Banvaripur location and low in Jewar location and pH value is good in Rabupura.

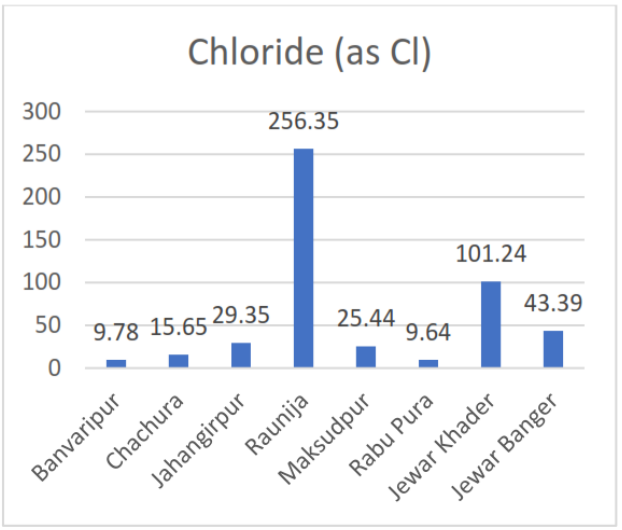

Figure 2: Graph Diagram of Chloride in sampling water

The figure 2 shows the graph diagram of Chloride value of different sampling location. Chloride value is high in Raunija location and low in Rabupura location.

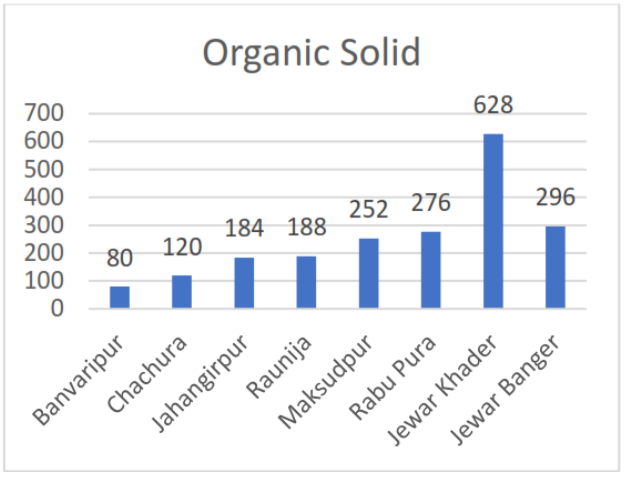

Figure 3: Graph Diagram of Organic Solids in sampling water

The figure 3 shows the graph diagram of organic solids level in different sampling location. The organic solids level is high in Jewar Khader location and low in Banvaripur.

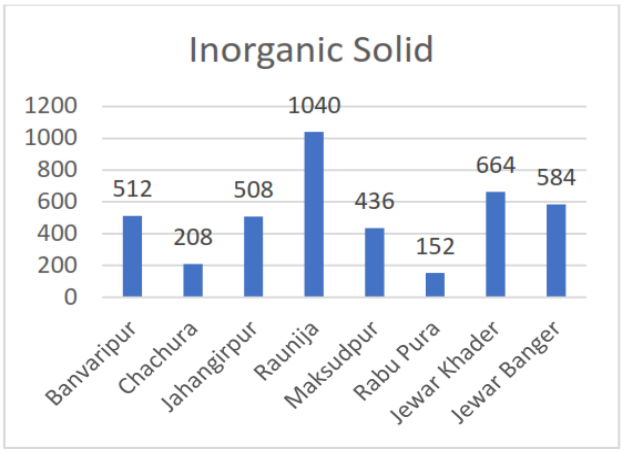

Figure 4: Graph Diagram of Inorganic Solid in sampling water

The figure 4 shows the graph diagram of Inorganic Solids level in different sampling location. The inorganic solid level is high in Raunija location and low in Rabupura.

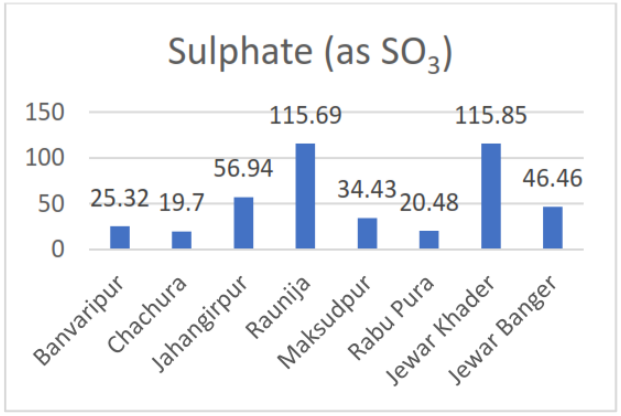

Figure 5: Graph Diagram of Sulphate in sampling water

The figure 5 shows the graph diagram of Sulphate level in different sampling location. The Sulphate level is high in Raunija location and low in Rabupura.

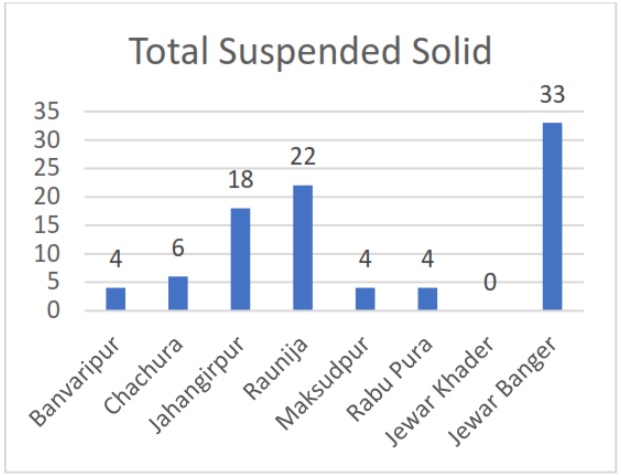

Figure 6: Graph Diagram of total Suspended Solid in sampling water

The figure 6 shows the graph diagram of total Suspended Solids level in different sampling location. The sulphate level is high in Jewar Banger location and zero in Jewar Khader.

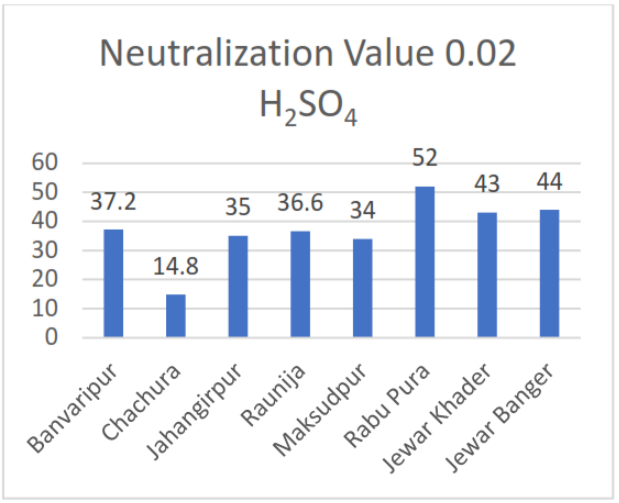

Figure 7: Graph Diagram of Neutralization Value 0.02 H_2SO_4 in sampling water

The figure 7 shows the graph diagram of Neutralization Value 0.02 H_2SO_4 level in different sampling location. The Neutralization Value 0.02 H_2SO_4 level is high in Rabupura location and low in Chachura.

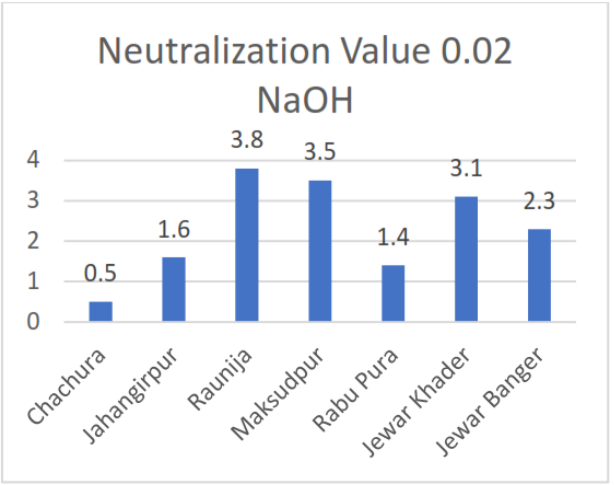

Figure 8: Graph Diagram of Neutralization Value 0.02 NaOH in sampling water

The figure 8 shows the graph diagram of Neutralization Value 0.02 NaOH level in different sampling location. The Neutralization Value 0.02 NaOH level is high in Raunija location and low in Chachura.

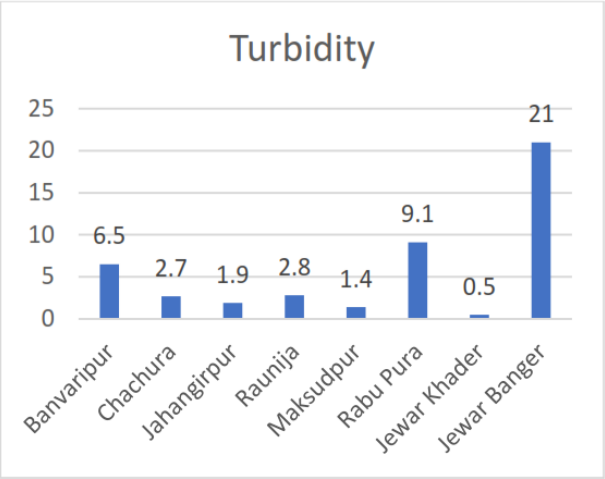

Figure 9: Graph Diagram of Turbidity in sampling water

The figure 9 shows the graph diagram of Turbidity level in different sampling location. The turbidity level is high in Jewar Banger location and low in Jewar Khader.

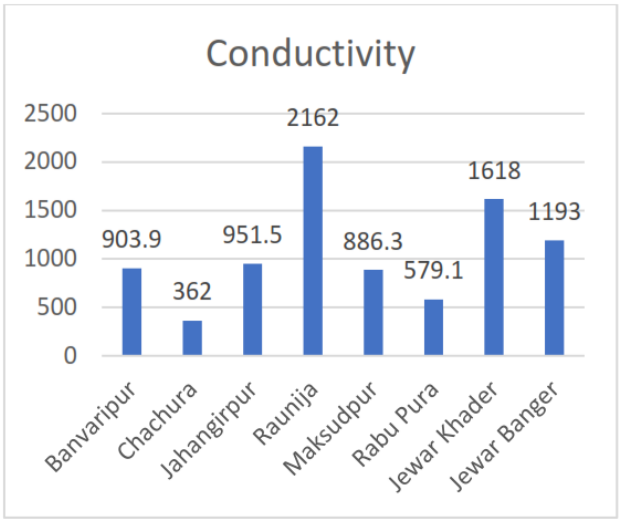

Figure 10: Graph Diagram of Conductivity in sampling water

The figure 10 shows the graph diagram of conductivity level in different sampling location. The conductivity level is high in Raunija location and low in Chachura.

CONCLUSION:

Here we are choosing the eight locations for analysing the ground water quality that is Raunija, RabuPura, Banvaripur, Chachura, Jahangirpur, Kalupura, Jewar Banger and Jewar Khader and we are checking different parameters in water such as testing of pH, Chloride(Cl), Organic Solid, Inorganic Solid, Sulphate(SO_3), Total Suspended Solid, Neutralization Value 0.02 H_2SO_4, Neutralization Value 0.02 NaOH, Turbidity and Conductivity. Water quality is good only a few locations. Large spatial variability in Water quality indicates that groundwater being affected by some anthropogenic activities. The Calcium chloride offers many advantages that make it popular as a concrete accelerator. It causes a substantial increase in early strengths and it speeds rate of setting. The analysis reveals that the groundwater of the area needs some degree of treatment before construction, and it also needs to be protected from the hazards of further contamination.

SOLUTION:

Variations in the availability of ground water resources and highly diversified hydrogeologic settings from different parts of the country call for a relatable approach in evolving suitable management strategies. Importance of management needs don't mean that resources of ground water in India are fully developed. Effective management of available ground water resources can be acquired by an integrated approach, looking after demand side and supply side measures.

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