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Quality Assessment of Ground Water in Kashmir

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ABSTRACT- The current research examines the quality of ground water in Kashmir (J&K), India, for human consumption and other purposes. For water quality testing, a total of six sampling sites in the research region were chosen. Pampore, Ganderbal, Batamaloo, Budgam, Sopore, and Sumbal are the sampling locations. Electrical conductivity, total dissolved solids (TDS), total suspended solids, chloride concentration, pH , sulphate content, and turbidity were used to evaluate water quality in the research region. The results of the sodium adsorption ratio (SAR) calculations along with the electrical conductivity suggested that the ground water in the study area can be used for irrigation without posing any risk to crop soils. The analytical data from the research region further reveals that, with the exception of a few spots, the ground water in the study area is appropriate for residential use.

KEYWORDS: Ground water, Conductivity, chemical affinity, alkalinity, contamination

I. INTRODUCTION

Groundwater has become the major source of water for agriculture and human consumption in many countries where river and drainage systems are insufficient to meet the requirements. Therefore, poor groundwater quality is a matter of worry. Fresh water resources such as glaciers, lakes, springs, rivers, streams, and groundwater galore throughout Kashmir's valley. Irrigation, electricity generation, and recreational uses are all made possible by these water resources [1]. According to recent studies, the Himalayan region of Jammu and Kashmir has roughly 144 glaciers, the largest of which is Kolahoi, which covers 2.63 square kilometres. Natural springs have supplied the valley with clean mountain water for ages. A majority of them thrive in Anantnag, Baramulla, and Srinagar. It is impossible to overstate the importance of ground water to the survival of human society [2]. In both urban and rural parts of India and other countries, ground water is the primary source of drinking water. According to studies, approximately 70% of drinking water in modern countries like Germany and the Netherlands comes from ground water. Although groundwater development in Kashmir is still in its early stages, it is likely to accelerate. Groundwater has become the principal source of water for agricultural and human consumption in many countries where river and drainage systems are insufficient to meet demand.As a result, poor groundwater quality is a cause for concern. Human activities are to blame for the groundwater catastrophe, which is not the consequence of natural processes [3].Due to dry weather conditions, particularly during the autumn, the water level has been quickly dropping during the last two decades, creating a drought-like situation. This research aims to evaluate the physico-chemical features of Kashmiri ground water in order to gain a better understanding of its utility and suitability for drinking, irrigation, and other domestic uses [4].Water quality indices based on primary water quality parameters, such as sodium adsorption ratio (SAR), residual sodium carbonate (RSC), residual alkalinity (RA), Kelly's ratio (KR), permeability index (PI), chloroalkaline indices, potential salinity (PS), magnesium hazard (MH) (or magnesium adsorption ratio; MAR), total dissolved solids (TDS), and total hardness (TH), are frequently used to detect contamination. Six bore well groundwater samples were tested for various physicochemical parameters in this study.

II. MATERIALS AND METHODS

Six sampling locations were used to acquire representative groundwater samples for the current study. The water samples were gathered in clean 2.5 litre polythene bottles that had been cleansed with distilled water first. Bore wells were flushed for roughly 10 minutes prior to sample collection to get the requisite samples. The physico-chemical analysis was performed according to conventional procedures (APHA, 2005). Other parameters, including pH, electrical conductivity, total dissolved solids (TDS), total suspended solids, chloride content, sulphate content, turbidity, iron content, and manganese content, were assessed within 24 hours of sampling using established procedures.

III. RESULTS AND DISCUSSION

The quality of ground water is critical in evaluating whether or not it is suitable for a given application. Groundwater physico-chemical characteristics have an important role in determining water quality. Table 1 shows the results of physicochemical parameters of ground water samples. Satellite images of the sampling sites are also provided, derived from Google Maps 2021. Figure 1 Shows six sampling sites : A – Pampore, B – Ganderbal, C – Batamaloo, D – Budgam, E – Sopore, F – Sumbal . All of the sites' samples had neutral to alkaline pH levels ranging from 6.3 to 7.5 during the research period. During the investigation, the highest pH value of 7.5 was found at Batamaloo and the lowest value of 6.3 was discovered at Sumbal. Sumbal had the lowest conductivity value of 0.281S/cm, whereas Ganderbal had the highest value of 0.308S/cm. The turbidity of ground water samples was found to be in the range of 1.9 to 3.1, with the lowest value of 1.9 at Sumbal and the maximum value of 3.1 at Pampore during this study. The total suspended solids concentration in the ground water samples ranged from 0.1 to 0.3 g/L. Ganderbal location had the highest concentration of 0.3 g/L, whereas Budgam had the lowest concentration of 0.1 g/L.

Sulphate concentrations, one of the most noticeable minerals, ranged from 2.52 to 34.13g/L. Ganderbal had the highest value of 34.13g/L, while Pampore recorded the lowest concentration of 2.52g/L. Manganese concentrations ranged from 0.2 to 0.41 g/L. At the Budgam location, the greatest concentration was 0.41 g/L, while the smallest concentration was 0.21g/L at Sopore site [6].

Chloride concentrations range from 11.2 to 182.56 mg/L in the current investigation. Ganderbal site had the highest content (182.56 mg/L), while Budgam had the lowest (11.2 mg/L). The total dissolved solids (TDS) level of ground water samples ranged from 1.22 to 1.83 grammes per litre. Pampore site had the lowest value of 1.22 g/L while Ganderbal site had the highest value of 1.83 g/L.

Ground water samples had salt adsorption ratios ranging from 0.59 to 11.23meq/L. The maximum sodium adsorption ratio was 11.23 meq/L at the Sopore site, and the lowest concentration was 0.59meq/L in the Pampore location.

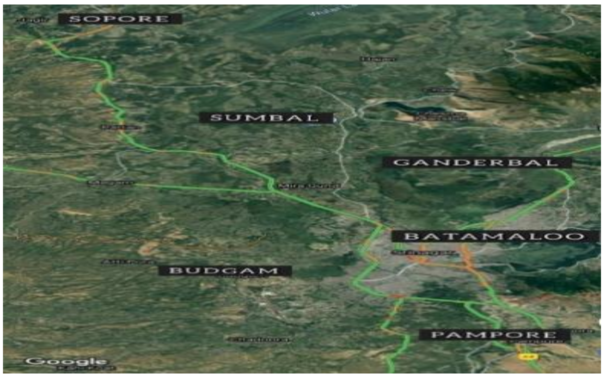

Figure 1: Six-Sampling sites

Table 1: Physicochemical parameters of ground water samples

Parameter	Concentration Values						Desirable Limit
	A	B	C	D	E	F	
pH	7.2	6.6	7.5	6.7	7.4	6.3	6.5 – 8.5
Conductivity ms/cm	0.307	0.308	0.283	0.299	0.303	0.281	0.05 – 0.5
Turbidity (NTU)	3.1	2.7	1.8	2.3	2.6	1.9	Not more than 5 NTU
TDS g/1	1.22	1.83	1.63	1.62	1.47	1.33	Not more than 2
Sulphate Content mg/1	2.52	34.13	8.23	36.09	31.29	25.34	Not more than 200
Chloride Content mg/1	93.35	182.56	156	11.2	183	157	Not more than 250
TSS g/1	0.24	0.3	0.26	0.1	0.2	0.29	Not more than 0.5
Manganese content mg/1	0.22	0.24	0.23	0.29	0.21	0.26	Not more than 0.3

IV. CONCLUSION

It can be seen from table 1 that the amount of total suspended solids has increased from June 2020 to September 2019 in all the six tube wells. The reason might be the dirt particles which are more significant in the rainy season than in the summer. As far as the TDS (total dissolved solids) is concerned, the value of TDS increases across the six samples. Lower flow volume & evaporation might be the reason.

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