

GROUND WATER RESOURCES: A STUDY

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ABSTRACT

To lessen the dependency upon surface water resources, the State Government has augmented the ground water resources during the last two decades. Every village is being supplied potable water supply through pipe lines or has been provided with hand pumps. But the entire region has pre-cambrian rocks in which the aquifers can be found only in weathered zones, joints, joints, fractures, foliation planes and cleavages. The aquifers are shallow in which the water retaining capacity is very low.

Keywords: *Ground Water Resources, Potable Water Supply, Pre-cambrian Rocks, Foliation Planes.*

Introduction

The distribution of aquifers and their salient features in various districts varies and their chief characteristics can be summarised as below.

In the Chittorgarh district the entire area is almost occupied by hard rock formation except for the alluvial patches near to the river courses. Here the pre-cambrian rocks such as gneisses, schists, phyllite, slate, quartzite, basic intrusives, dolomite, limestone, sandstone, trap-rocks form the main aquifers. The alluvium occurs overlying the weathered basement and has discontinuous beds of varying thickness. It comprises river deposits like sand, silt, gravel, pebbles etc. restricted to Gambhir, Berach and Banas river beds. Weathered biotite, hornblende and gneisses form the bedrock in central and eastern part of the Dungarpur and Banswara districts. In gneisses, ground water occurs in the weathered rock mantle and in the joints and fractures. The gneisses intermixed with schists are comparatively softer and show foliation. Schists and phyllites occupy some parts of the district and these are quite often intercalated with limestones, quartzites and basic intrusives. Alluvium deposits comprising unconsolidated pebbles of slates, phyllites and quartzites, silty clay, sand, gravel and kankar are also suitable aquifers which occur usually along the major river courses.

In Bhilwara district decomposed biotite and hornblende gneiss form the bed rock rock in the central plain east of Kankroli; gneiss intermixed with schists which are comparatively soft occupy quartzites elsewhere. There is also to be found saturated alluvium. The analysis of aquifers reveals that the yield of water is dependent upon the nature of the underground rocks. Water is easily available by striking wells and tubewells.

Protected Water Supply

To meet the daily needs of water for drinking and domestic purposes people depend on ponds and wells. Thus an assessment of the water table and its seasonal fluctuation is of great significance.

The dependency for drinking water on ponds is still very high. In the whole of the Sirohi district and the western part of Udaipur on the leeward side of the Aravallis and on the western boundary of Bhilwara and Chittorgarh districts more people depend on pond water, nearly 4000 and above per-pond. Naturally here the contamination and disease incidence are the highest. In the north of the region where semi-desertic conditions prevail, and where rainfall is scarce less people depend on pond water, less than 1000 per pond.

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Similarly the per well population. Depending on the water levels which are comparatively less in the south and the west of the region more percentage of population depends of well water. As we move northwards and north-east dependency on wells as water sources reduces considerably. The ground water aquifers in the south of the region are high yielding.

It is noteworthy that a large percentage of the water supply is fully protected. But in the east there are big pockets of unprotected water. In the whole of Chittorgarh district and parts of Udaipur the water is unprotected in in varying degrees. In Begun (Chittorgarh) the highest percentage (30-40%) of unprotected water is found and in Nimbahera, Chhoti Sadri, Bari Sadri and Partapgarh 20-30 per cent water is unprotected. In Kotra, Kherwara, Salum ber and Vallabhnagar in Udaipur district about 5-10 per cent of the water is unprotected. Therefore the percentage of unprotected water supply of villages in the region.

Depth of Water-Table

Here it is also important to consider the depth of water level in all the six districts of the region. As per the systematic hydrogeological survey, the water levels in the district were determined. In Chittorgarh district the water table lies within 26 m; although 85 per cent wells have cent wells have water levels ranging only upto 20 m. However, shallower water levels are formed near the rivers and streams. The long term water levels are stable although seasonal annual variations variations due to rainfall are reflected. Both minimum and maximum fall in water level is noted in compact basalt aquifers.

The water level in Dungarpur and Banswara districts is only 16.5 m on an average. average. In the western part of the district it is only 5-10 m in most wells but decreases between 1-5 m in the central and southern part. The water table is controlled by the topography of the area. Fluctuations in water levels during the pre-monsoon and the post-monsoon seasons are conspicuous in hard rock areas.

In Bhilwara the water table is approximately 24 m, the deepest in the region whereas in Sirohi district water can be found just below ground surface, ranging from 2-15 m. In Udaipur district the depth of water level is highly erratic due to its uneven topography. Local lateral variations variations in bed rocks are sometimes reflected in sudden changes of depth of water level. The range is 5-10 m along the Banas river course but towards the north of Banas, the depth of water level increases from west to east and south to north. Commonly deeper water levels are associated with with gneisses of pre-Aravalli formation whereas shallow levels are confined to phyllites and schists.

Chemical Properties of Water

In general, the analytical study of the chemical properties of the water in the region reveals that the shallow groundwater is alkaline in nature and ground water is generally very hard.

In Chittorgarh the pH value ranges from 7.0 to 8.9 which is very high and shows a great deal of alkalinity. As per the available data, the specific conductance of the shallow ground water varies between 250 and 2550 micromhos/cm at 25°C. By and large, the variation in specific conductance of ground water conforms with the variation in the chlorides. The concentration of carbonates is nil in general except in few samples where it ranges from 6 to 96 ppm which is within the the permissible limits of potable water. The presence of carbonate and bicarbonate ions affect the alkalinity of ground water. Bicarbonate ranges between 37 and 805 ppm whereas it is generally below 400 ppm in the ground water of aroa. Total hardness ranges between 65 to 630 ppm thereby reflecting that ground water is generally hard in the area. Calcium ranges between 8 to 2 ppm. The concentration of calcium in normal potable ground water generally ranges 10 and 100 ppm.

The district of Dungarpur shows that the ground water in neutral to alkaline in nature in the whole district. The pH value ranges from from 7 to 8.90. The chloride values in the ground water varies from 18 to 1099 ppm. In most of the samples chloride values were found to be less than 250 ppm. High values of chloride concentration in few samples may be due to local pollution.

The ground water in the area is hard in nature and total hardness as CaCO_3 ranges between 150 and 820 ppm. The specific conductivity in the greater part of the area is within 1500 micromhos/cm at 25°C. The variation in specific conductance conforms broadly with that of chlorides. The specific conductance conforms broadly with that of chlorides. The specific conductance of the water samples of national network increases from 80 to 710 micromhos/cm during post-monsoon period as compared with premonsoon period. The ground water on the whole is suitable for domestic, drinking and irrigation purposes. However, the ground water is generally hard in keeping with the quality in this part of Rajasthan.

Analytical results reveal that in general the shallow ground water in Bhilwara district is alkaline in nature and the ground water is again very hard. The pH value in major part of the area ranges between 7.0 to 9.35, pH values of more than 9.50 are recorded at places such as Pander, Ratangarh, Khamla etc.

The distribution of chlorides in the ground water in Bhilwara district. In the greater part of the district the chloride concentration is within 250 ppm. Chloride concentration of 750-1500 ppm is recorded around Sulwara, Jaitpura, Kamor, Gujarkhera, Dhikola, Shahapura, Deopuri, Paroli and Jagolai villages. Chloride concentration of more than 1500 ppm is recorded at Bardairo, east of Khamor, north of Naharsagar around Umedpura, west of Umedsagar around Kai and in Jagolai villages.

Fluoride content in well water exceeding permissible limit of 1.5 mg, ppm has been reported in Sahara taluk around Gangapur town. Fluoride concentration of 1.5 ppm and above has been reported from wells around Gangapur, Ganeshpura, Galhila, Baghpura, Dhor, Lakhora, Kheranathji, Katikhera, Matunio, Kosithal and Potla villages. Fluoride concentration is as high as 9.3 ppm in wells of Kheranathji village. The specific conductivity in the greater part of the area within 200 micromhos/cm at 25°, the variation in specific conductance conforms broadly with that of chlorides.

Throughout the Udaipur district the chemical quality of ground water is fairly good except in a few patches where it is poor. In general the water is bicarbonate type. Content in the ground water in major part of the area is less than 100 ppm, while in small patches it reaches upto 250 ppm. The result of chemical analysis of water samples collected at regular intervals on the basis of national network observation of wells.

The ground water in Sirohi district is suitable both for drinking and irrigation purposes. The quality of water in the eastern part of the district is very good with specific conductivity less than 1500 micromhos/cm at 25°C. The specific conductivity increases towards west and north of the district upto 300 micromhos/cm at 25°C. It is even higher in the northern parts of Sheoganj. In certain parts of Sheoganj, Sirohi, of Sheoganj, Sirohi, Pindwara and Abu Road tehsils (fluorodite) content in the ground water is exceeding the permissible limit of 1.5 mg. The high concentrations of fluoride are generally from the water tapping in the granite aquifer and the alluvium which is derived from the weathering of granite. The minerals fluoride and spatite which are found in Erinpura granites of Sheoganj area may be responsible for the high concentration of fluoride in the well waters of Sagalia, Andor, Sardarpura and other villages in Sheoganj tehsil. The high concentration of fluoride in drinking water causes irreparable damage to health. Hence necessary precautions for future can be taken by providing water supply from some other source where the quality of water is good.

References

1. R. Furon; *The Problems of Water A World Study*; (Tr. Barneo Paul); London: Faber & Faber, 1967, pp. 24-36.
1. D.B. Botkin; and E.A. Keller; *Environmental Studies*; London: Charles E. Merrill Pub., 1982, pp. 358-381.
2. H.S. Mathur; "Spatial Distribution and Biocoenosis of Guinea-worm Disease in Rajasthan"; *Proceedings of All Rajasthan Geographers - Fifth Academic Conference*"; Udaipur: Department of Geography, 1971, pp. 106-110.
3. A.K. Tiwari; "Guinea-worm Disease in Rajasthan"; *Selected Papers Vol. I 21st International Geographical Congress*; Calcutta: National Committee for Geography, 1970, pp. 467-475.
4. *Ground Water Resources and Development Potential of Rajasthan*, Central Ground Water Board; Government of India, Ministry of Irrigation, Western Region, Jaipur, 1984.

