

Status of Ground water Quality, Hoskote Taluk, Bangalore Rural District, Karnataka, India

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Abstract

The quality of groundwater in nature is determined by quantum and nature of recharge, chemical composition of the soil cover and its thickness, mineralogical make up of the aquifer, residence time of the water which is governed by the transmissivity of the formation. The two important characteristics of the crystalline terrain, which covers practically the entire Taluk, are the heterogeneity and preferred flow paths. They have a dominant role to play in determining the quality of the ground water with the result; large variations are noticed in short distances. Thus it is not uncommon to get varied quality of water even in a small village. This fact is to be borne in mind while locating sources of water supply for various uses.

Quality data in respect of 14 parameters of all the drinking water sources in the villages is available with PRED. Summaries of bore well sources, Gramapanchayat wise which is presented in Table 1.1. The same has been collected and analysed. The range of value in respect of 14 parameters are given in table 1.2 Table 1.3 summarizes the number of wells with a quality problem in the Taluk. As seen the most commonly observed problems relate to the total dissolved solids, Total hardness, Turbidity, Calcium, Iron and Fluoride. The strategy to be adopted in providing solutions to these villages is discussed.

As for the irrigation requirement, the two important quality parameters are Sodium adsorption ratio and total dissolved solids are indicated by the Specific conductance of the water These determine the Salinity and Sodium hazard from the irrigation water. These determined from the results available in the records of DMG. Considering the fact that large areas of the Taluk are covered by red soils and mixed soil, it is very important to study the soil water inter relationship before undertaking irrigation practice. It

can be safely concluded that in red soil areas, the quality of ground water is safe for irrigation and has low to medium salinity-low sodium hazard

Keywords: Recharge, Aquifer, quality problem, Soil cover

1. INTRODUCTION

Location: Hoskote is a taluk in Bangalore Rural District and forms the northern part of the district. It features in the survey of India Top sheet Nos. 57 G/12, 57 G/16, 57 H/9 and 57 H/1 3 and lies between 12°51' to 13°15' N.Latitude and 77° 41' to 77° 58' E Longitude, covering an area of 582 sq.km (Fig1.1). Physiographically, the area is characterized by undulating topography. The highest elevation is seen near Nandagudi, which rises above 940 in above MSL. The low lying valleys and depressions are intensely cultivated.

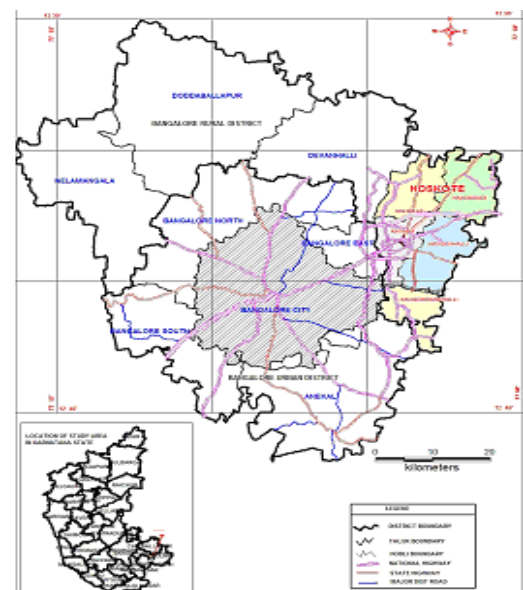


Fig.1.1 depicts the location of Hoskote Taluk in Karnataka State.

Climate: Physiographically Hoskote Taluk presents an undulating topography with gentle slope towards Southwest. The general elevation of the ground is around 870 in above MSL. The highest elevation is seen near Nandagudi which rises above 940 m N1SL. Hoskote Taluk enjoys a salubrious climate with mild summers and pleasant winters. The summer temperature touches 37°C during May and the winter temperature around 19°C during December/January. The relative humidity is around 77% during monsoon and 50% during dry month. The study area receives an average rainfall of 838mm.

Geology of the Study area:

Geologically the area is chiefly made up of peninsular Gneisses, small bodies of granite plutons and younger doleritic dykes are also observed.

The gneisses are exposed as mounds and hillocks which rise from 20 to 80m above the surrounding ground level.as in the accompanying fig.1.2

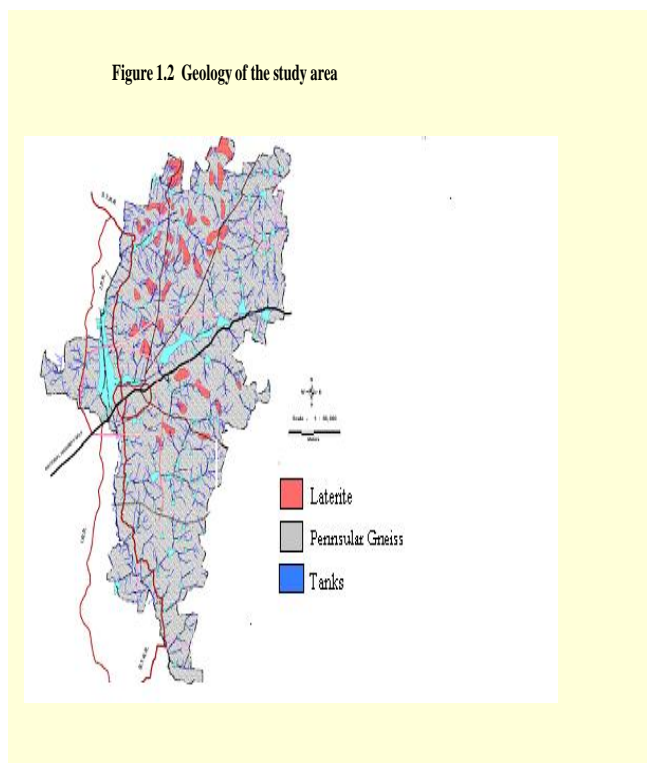


Fig 1.2 Geology of Study area

Table 1.1 Summary of Bore well sources Grampanchayatwise

| Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|-------|-------------------|-------------------|-------------------|-------------|
| Sl.no | Grampanchayat | Number Of sources | Samples Collected | Not sampled |
| 1 | Anugondanahally | 23 | 17 | 6 |
| 2 | Balnarsapura | 27 | 22 | 5 |
| 3 | DoddaGattiganabbi | 37 | 29 | 8 |
| 4 | Devanagundi | 44 | 29 | 15 |
| 5 | Dodda araligere | 47 | 36 | 11 |
| 6 | Doddanallala | 47 | 29 | 18 |
| 7 | Doddahullur | 28 | 21 | 7 |
| 8 | Ganagaloor | 35 | 29 | 6 |
| 9 | Giddappanahalli | 33 | 22 | 11 |
| 10 | Hittasandra | 35 | 31 | 4 |
| 11 | Jadigenahalli | 25 | 20 | 5 |
| 12 | Kamblipura | 30 | 24 | 6 |
| 13 | Kalkunte Agrahara | 22 | 17 | 5 |
| 14 | Khaji Hosalli | 31 | 26 | 5 |
| 15 | Kumblehalli | 29 | 22 | 7 |
| 16 | Lakkondahalli | 31 | 22 | 9 |
| 17 | Mutsandra | 36 | 33 | 3 |
| 18 | Mugabhala | 35 | 26 | 9 |
| 19 | Nandgudi | 34 | 30 | 4 |
| 20 | Nelawagilu | 34 | 25 | 9 |

| | | | | |
|----|----------------|-----|-----|-----|
| 21 | Harohalli | 34 | 23 | 11 |
| 22 | Samethanahalli | 32 | 17 | 15 |
| 23 | Shivanapura | 41 | 27 | 4 |
| 24 | Sulibelehalli | 21 | 17 | 4 |
| 25 | Thavarekere | 39 | 30 | 9 |
| 26 | Wagatta | 40 | 26 | 14 |
| | Total | 870 | 650 | 220 |

| | | | |
|----|---|--------|------------|
| 6 | Chlorides (mg/l.) | 250 | 1000 |
| 7 | Calcium (mg/l.) | 75 | 200 |
| 8 | Nitrates(mg/l.) | 45 | 100 |
| 9 | Sulphates (mg/l.) | 200 | 400 |
| 10 | Fluorides (mg/l.) | 1 | 1.5 |
| 11 | Alkalinity (mg/l.) | 200 | 600 |
| 12 | Total dissolved solids (mg/l) | 500 | 2000 |
| 13 | Bacteriological test for E - coli (MPN) | 0/10ml | <10/100 ml |
| 14 | Conductivity (Us/cm) | | |
| 15 | Temperature | | |

Detailed information regarding the reason for not sampled sources are enclosedampanchayatwise. Among others the most common reasons for not sampling were due to:

- a) The bore well was out of order / not working
- b) Source being dry during sampling
- c) Bore well being ready during sampling

Bore pump having been removed

Source: RDED Bangalore

Table 1.2 Physico-chemical characteristics of Groundwater of Hoskote Taluk

| Col.1 | Col.2 | Col.3 | Col.4 |
|-------|------------------------|----------------------|-------------------------|
| SL.NO | Characteristics | Desirable limitsmg/l | Permissible limits mg/l |
| 1 | Colour (Hazen unit) | 5 | 25 |
| 2 | Turbidity (NTU) | 5 | 10 |
| 3 | P ^H value | 6.5 to 8.5 | No relaxation |
| 4 | Total Hardness (mg/l.) | 300 | 600 |
| 5 | Iron (mg/l.) | 0.3 | 1 |

| Col.1 | Col.2 | Col.5 | |
|-------|------------------------|---------------|---------|
| SL.NO | Characteristics | Hoskote Taluk | |
| | | Minimum | Maximum |
| 1 | Colour (Hazen unit) | 1 | 1 |
| 2 | Turbidity (NTU) | 0.05 NTU | 50 NTU |
| 3 | P ^H value | 6.3 | 7.8 |
| 4 | Total Hardness (mg/l.) | 40 | 2550 |
| 5 | Iron (mg/l.) | 0 | 32 |
| 6 | Chlorides (mg/l.) | 12 | 1635 |
| 7 | Calcium (mg/l.) | 16 | 1308 |

| | | | |
|----|---|-------------------------------|--------------------------|
| 8 | Nitrates (mg/l.) | 0 | 25 |
| 9 | Sulphates (mg/l.) | 1.6 | 232 |
| 10 | Fluorides (mg/l.), | 0 | 3.6 |
| 11 | Alkalinity (mg/l.) | 32 | 770 |
| 12 | Total dissolved solids (mg/l) | 70 | 4130 |
| 13 | Bacteriological test for E - coli (MPN) | 0 | 1333 |
| 14 | Conductivity (Us/cm) | 87 | 5670 |
| 15 | Temperature | 20°C in the month of November | 31°C in the month of May |

| | | | |
|-----------|---|-----------|---|
| 3000-3500 | 2 | 1500-2000 | 6 |
| 4000-4200 | 2 | 2000-2500 | - |
| | | 2500-3000 | 1 |

| Col.3 | | Col.4 | |
|-----------|----------------|-----------|----------------|
| Iron | | Turbidity | |
| Range | No. Of sources | Range | No. Of sources |
| 5 | 6 | 7 | 8 |
| <200 | 312 | <1000 | 647 |
| 200-500 | 276 | 1000-1500 | 2 |
| 500-1000 | 57 | 1500-2000 | 1 |
| 1000-1500 | 5 | | |

Table 1.3 Drinking water Quality Data in (mg/l)

Taluk: Hoskote District: Bangalore Rural

| Col.1 | | Col.2 | |
|-----------|----------------|----------------|----------------|
| TDS | | Total Hardness | |
| Range | No. Of sources | Range | No. Of sources |
| 1 | 2 | 3 | 4 |
| <2000 | 632 | <600 | 514 |
| 2000-2500 | 11 | 600-1000 | 112 |
| 2500-3000 | 3 | 1000-1500 | 17 |

| Col.5 | |
|----------|----------------|
| Fluoride | |
| Range | No. Of sources |
| 9 | 10 |
| <1.5 | 625 |

| | | | |
|-------|----------------|-----------|----------------|
| 1.5-2 | 15 | | |
| 2-2.5 | 3 | | |
| 2.5-3 | 1 | | |
| 3-3.5 | 5 | | |
| 3.5-4 | 1 | | |
| Col.6 | | Col.7 | |
| Iron | | Turbidity | |
| Range | No. Of sources | Range | No. Of sources |
| 11 | 12 | 13 | 14 |
| <1.0 | 607 | <10NTU | 614 |
| 1-5 | 22 | 10-11 | 35 |
| 5-10 | 12 | 11-49 | - |
| 10-20 | 6 | 49-51 | 1 |
| 20-30 | 2 | | |
| 30-40 | 1 | | |

| | | |
|---------------------------------|-----|------|
| Calcium affected | 338 | 52 |
| Bacteria affected | 33 | 5.08 |
| Fluoride affected | 25 | 3.85 |
| Chloride affected | 3 | 0.46 |
| Iron affected | 43 | 6.62 |
| Potable water | | |
| Remaining water to be conducted | 220 | |

Discussion

Quality data with respect to 650 drinking water samples is available with ZPED. The same has been collected and analysed to draw conclusion for managing the resource.

Out of 650 samples analysed 70% of the samples were classified under potable category.

In a majority of the samples 136 samples (20.92%) the total hardness is more than the permissible limit of 600 mg per litre.

Among the sample source 338 samples contain Calcium exceed the permissible limit of 200 mg per litre

Among the sample source 3 samples contain chloride exceed the permissible limit of 1000 mg per litre

Among the sample source 43 samples contain Iron accounted for 6.62 % of the total samples exceed the permissible limit of 1mg per litre

Among the sample source 33 samples contain Bacteria accounted for 5.08 % of the total samples exceed the permissible limit of <10/100ml

Among the sample source 18 samples contain Total Dissolved Solids accounted for 2.77 % of the total samples exceed the permissible limit of 2000 mg per litre

Among the sample source 36 samples contain Turbidity accounted for 5.54 % of the total samples exceed the permissible limit of 10 mg per litre

Table 1.4 Analysis of Chemical parameters affected in Hoskote Taluk From Drinking Water Sources

| Col.1 | Col.2 | Col.3 |
|-------------------------|----------------|---------|
| Parameters mg/l | No. Of samples | Percent |
| TDS affected | 18 | 2.77 |
| Total Hardness affected | 136 | 20.92 |
| Nitrate affected | 120 | 18 |

Among the sample source 25 samples contain Fluoride exceed the permissible limit of 1.5 mg per litre

After the samples show above the neutral level i.e., more than 7 PH indicating the water is basic in nature.

Conclusion

Initially the water was drawn from shallow aquifers and was found to be safe and potable. As years passed on, the usage of bore wells enormously increased and drawing water from greater depths resulted in contamination of water.

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BIOGRAPHIES



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