RESEARCH PAPER:

Physical and chemical characteristics of groundwater in Kollegal taluk, Chamarajanagar district, Karnataka

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SUMMARY

The quality of groundwater in the kollegal taluk covering an area of 2522 sq km^2 in Karnataka has been studied based on the composition of 60 bore well water samples. An attempt has been made to classify the groundwater by various methods. According to BIS, 97% of the water samples in the study area are within the desirable to permissible limit. 93% of the samples fall in C2S1 class of USSL diagrams according Wilcox diagram, 91% of samples fall within the excellent to permissible classes. The chemical composition of the groundwater which moves from the recharge area to the discharge area reflects changes by various geochemical process. The relationship between groundwater flow, hydro geologic properties and hydrogeochemistry has been studied by many researchers (Back 1960, Scholler 1962, Domenico 1972, Freeze and Cherry 1979, Ophori and Toth 1989, Domenico and Schwartz 1990, Afsin 1997).

Key words : Groundwater quality, Hydrochemical facies, Permissible limit, USSL diagram

Fresh water is most precious for all living organisms. Availability of safe potable water is still a problems of majority of population. Due to the steady increase in the population, urbanization, deforestration etc., the water resources have been adversely affected both qualitatively and quantitatively. Water pollution is one of the major problems in developing countries like India.

Groundwater is a prime source for drinking and irrigation purposes. However this vital resource is easily liable for pollution due to human inclination to consume more of the groundwater. Underground storage tanks, land fills, abandoned disposal of hazardous waste on land, industrial waste storage tanks, ponds, lagoons have no liners to prevent toxic liquid wastes from seepages (percolations) into the soil. These are the major sources of groundwater contamination, the major soluble effluents percolate and pass through the soil profile into the groundwater aquifers. Further no soil is effective in sieving out the organic/ inorganic synthetic wastes disposed by the industries as these affect the soil profile and show deterioration in plant growth. Once groundwater is contaminated, it does not cleanse itself as surface water because groundwater flow is slow and not turbulent. Contaminants are not effectively diluted and dispersed.

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MATERIALS AND METHODS

The study area of the Kollegal taluk geographically represented by the 77^0 05' to 77^0 45' E longitude 11^0 45' to 12^0 15' N latitude in parts of Chamarajanagar district, Karnataka, India. Groundwater samples were collected from bore wells of from 60 sites. Seven locations were chosen based on the sensitivity of residential, non-residential areas and major anthropogenic affecting areas. The samples were collected randomly in three sampling sites of each location at moderate climatic conditions in 1L pre - acid washed poly propyiene cans in the field of selected station, sealed with label together with relevant details and analysed for physico-chemical characteristics like pH, electrical conductivity, total dissolved solids, chlorides, total hardness and nitrates to determine the contamination levels of groundwater in each of the samples. Care was taken to avoid contamination during the analysis of the samples and reagents preparation used since they contribute high blank levels. The concentration of samples including blank were analysed by adopting the standard procedures for water and waste water analysis (APHA 1992).

RESULTS AND DISCUSSION

The characteristics of groundwater samples are presented in Table 1. Percolations

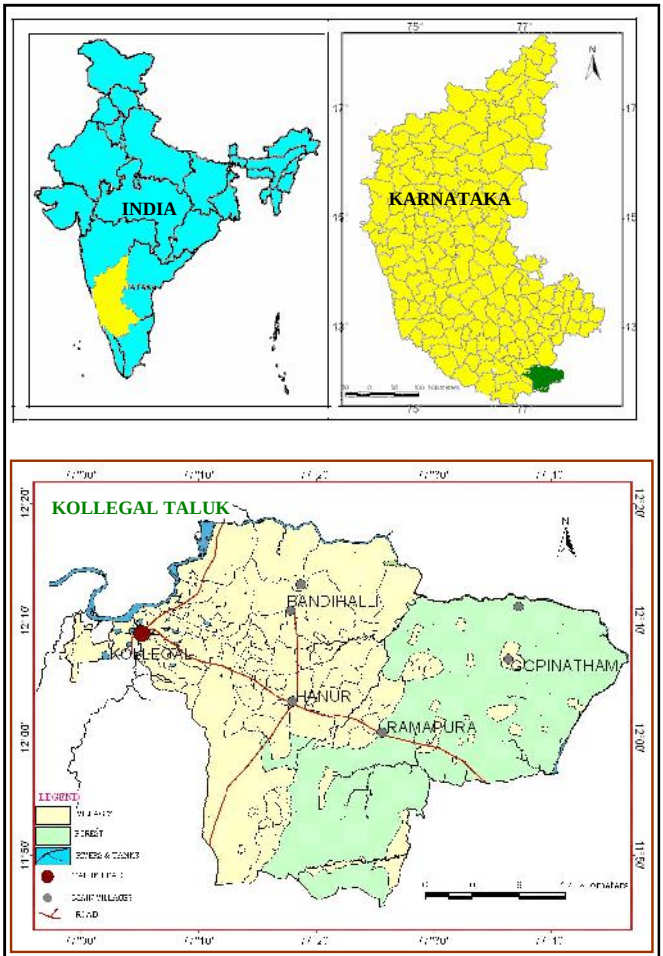

Fig. 1 : Location of Kollegal taluk

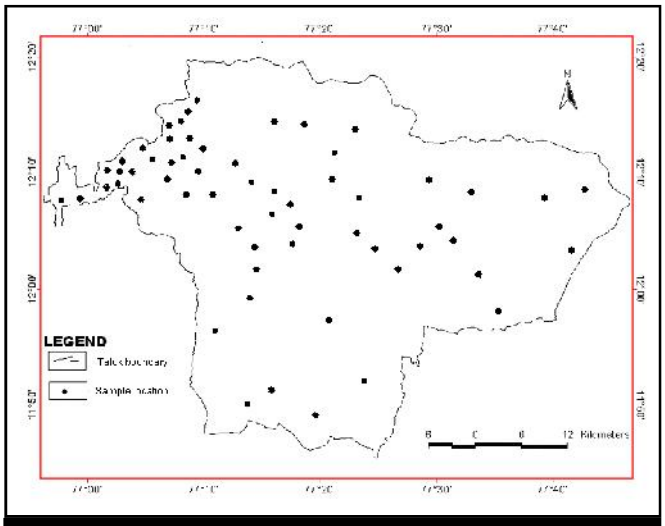

Fig. 2 : Kollegal Taluk sample locations

of wastewater by the indiscriminate disposal and storage of hazardous waste by the human activities, has affected groundwater. Anthropogenic activities made by surface

Table 1 : Analysis of groundwater samples at different locations of the sampling sites of Kollegal Taluk

Sr. No.	pH	EC	TDS	CI	NO_3
1.	7.79	500	720	52.0	24.0
2.	7.50	880	545	36.4	3.4
3.	7.93	480	370	17.0	13.0
4.	7.64	628	500	14.0	24.0
5.	7.97	650	615	31.0	18.0
6.	7.42	1080	780	162.0	89.0
7.	7.95	920	540	39.0	32.0
8.	9.21	2323	830	328.0	10.0
9.	8.91	1200	860	146.0	26.0
10.	8.32	1950	1125	294.0	36.0
11.	7.65	1500	840	137.0	26.0
12.	8.20	850	600	76.0	12.0
13.	7.64	1000	1140	84.0	3.0
14.	8.72	570	447	28.0	0.0
15.	8.59	840	610	64.0	45.0
16.	9.20	1540	1078	124.0	8.0
17.	8.99	280	250	17.0	0.0
18.	7.70	770	620	45.0	0.0
19.	8.50	640	495	42.0	2.6
20.	8.40	770	600	28.0	33.0
21.	8.50	1300	850	76.8	2.6
22.	7.53	730	525	37.0	26.0
23.	8.50	700	540	25.0	28.0
24.	8.37	600	430	28.0	26.0
25.	7.97	1000	820	129.0	30.0
26.	7.62	950	350	28.0	48.0
27.	7.61	870	670	48.0	7.0
28.	7.95	920	540	39.0	32.0
29.	7.61	900	610	95.0	45.0
30.	8.43	630	380	25.0	60.0
31.	7.67	1300	695	146.0	97.0
32.	7.84	990	640	95.0	44.0
33.	8.00	1000	615	56.0	7.9
34.	8.50	1000	590	36.0	36.0
35.	7.56	1075	560	78.0	35.0
36.	7.50	990	525	47.6	0.0
37.	7.91	1025	805	109.0	35.0
38.	7.58	530	322	20.0	13.0
39.	8.00	700	450	30.8	7.9
40.	8.00	1250	935	106.0	10.0
41.	8.70	850	560	40.0	24.0
42.	7.97	1300	775	216.0	44.0
43.	8.95	1150	825	118.0	15.0
44.	8.24	500	396	34.0	32.0
45.	8.72	1300	760	81.0	0.0
46.	8.89	890	660	62.0	7.0
47.	7.50	664	455	25.2	6.2
48.	8.20	560	350	30.0	58.0

Contd…. Table 1

Table 1 contd.……..

49.	8.71	1125	910	53.0	28.0
50.	8.14	700	520	14.0	28.0
51.	7.28	2900	1500	437.0	123.0
52.	7.79	2125	1925	202.0	53.0
53.	8.50	700	540	25.0	28.0
54.	7.90	800	575	28.0	62.0
55.	8.43	740	520	59.0	33.0
56.	7.60	870	670	48.0	7.0
57.	7.32	1800	1125	270.0	62.0
58.	7.71	920	525	50.0	44.0
59.	8.25	880	670	45.0	22.0
60.	8.17	1220	760	48.0	7.0

runoffs during the rainy season have a potential impact on groundwater quality, anthropogenic activities made by surface runoff during rainy season, have a potential impact on groundwater quality.

Table 1 shows that the pH is in a permissible range in all the sampling stations of all 60 selected locations which ranged from 7.30 to 9.21.

Table 1 shows that the Electrical Conductivity was in the high range of 480 to 2900 micro mhos. The total dissolved solids were in range of 250 to 1140 matter dissolved in water.

The presence of high total dissolved solids in water produces unpleasant taste due to the presence of inorganic salts and small amounts of organic matter dissolved in water. Overall total dissolved solids were comparatively higher than standard value.

Chlorides were in the range of 14 - 437 mg/L in the locations of sampling sites. This shows that the water is not fit for drinking and irrigation purposes, The presence of high total dissolved solids in water produces unpleasant taste due to the presence of inorganic salts and small amounts of organic also cannot be utilized for drinking and irrigation purposes and overall chlorides variations at different locations of all sampling sites are shown. Total hardness at sampling sites of respective locations is shown in and it was observed that in the locations of sampling sites were in permissible levels, The highest concentration of contaminants recorded in the water samples during the study could be attributed to the indiscriminate discharge of industrial effluents from leather, steel, iron, rubber, electro- plating manufacturing industries.

Conclusion:

The area under study is a hard rock terrains and the groundwater occurs in unconfined conditions and there is not much of variation in the groundwater quality and the groundwater samples are suitable for both domestic and irrigational uses without any hazardous effects and could be used freely.

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