GROUNDWATER QUALITY ANALYSIS IN PART OF BAGALKOT AND BILAGI AREA

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***Abstract*— Groundwater is one of the major source of water supply in the Bagalkot district which is reflected by regular extraction of groundwater through ever increasing number of bore wells. Monitoring groundwater quality is useful to understand impact of uncontrolled drilling of bore wells, point and non point sources of pollutants. A total of 62 bore wells were selected for the study. These samples were analyzed in the laboratory. Out of 62 bore well samples 29 samples are not potable. Out of 29 bore well samples, 1 samples is not potable due to alkalinity, 3 samples are not potable due to chloride, total hardness, sulphate and TDS contents, 1 sample is not potable due to sulphates, total hardness and TDS content and 2 samples are not potable due to total hardness, chloride and TDS content, 7 bore well samples are not potable due to total hardness, 16 samples of bore well are not potable due sulphate content..**

***Index Terms*— Alkalinity, Chloride, Total hardness, Sulphate, Water quality.**

I. INTRODUCTION

Groundwater is the only largest fresh water source on the earth which helps in the development of the nation. It is the essential source for domestic, agricultural and industrial purpose. From past few year groundwater quantity is reducing due to rapid increase in the growth of population, industrialization and demand for fresh water. Hence degradation of groundwater quality also takes place due large amount of human activity and industrial waste disposal posing very serious threat to the groundwater source. GIS is a powerful tool for developing solutions for water resources problems for assessing water quality, determining water availability, preventing flooding, understanding the natural environment, and managing water resources on a local or regional scale.[1]

The purpose of the study is monitoring of groundwater level and quality in part of Bagalkot and Bilagi area. Groundwater is the only major source for domestic, agricultural and industrial purpose.

Ganapuram et al [2] used remote sensing data and GIS to explore the groundwater availability in the Musi basin is the main objective of the study. Thematic maps are prepared (i.e., base, hydrogeomorphological, geological, structural, drainage, slope, land use/land cover and groundwater prospect zones). The groundwater availability of the basin is classified into five different classes (i.e., very good, good, moderate, poor and nil) based on its hydrogeomorphological conditions. Raikar et al [3] used Geographic information system (GIS) to represent the spatial distribution of the Parameters and raster maps were created. The water quality index indicated that most of the sampling locations come under good category indicating the suitability of water for human use. Subramani et al [4] GIS technology is used for preparation of water quality mapping and Spatial Interpolation method is also used. Author said GIS technologies can provide appropriate platform for convergent analysis of large volume of multi-disciplinary data and decision making for ground water studies can be effectively done.

Jagadish Kumar et al [5] used Spatial Analyst and Geostatistical Analyst extensions of ARC-GIS 9.3. GIS is used to monitor effectively and periodically assess the quality and vital parameters of ground water and also to draw the attention of civic authorities for suitable action.

Pandey et al [6] used Sum of least squares method is adopted to analyse the relationship of groundwater level variability with the rainfall trends for the drought affected Palamu District of Jharkhand State. Spatio-temporal rainfall trend analysis is performed using interpolation in GIS.

Sarala et al [7] Collected the bore wells data from the study area in two seasons i.e., post monsoon and pre monsoon in December 2007 and June 2008. Contour analysis is done in the Arc GIS software. Procedure for Paper Submission

II. STUDY AREA

In the present study, the area is in the part of Bilagi taluk and Bagalkot taluk in Bagalkot district, Karnataka state, India. It is situated 20 km apart from the west of Bagalkot. The area falls in Survey of India toposheets 47 P/11, 47 P/11. It is bound between

16°0′ to 16°30′ North latitude and 75°15′ to 76°30′ East longitude

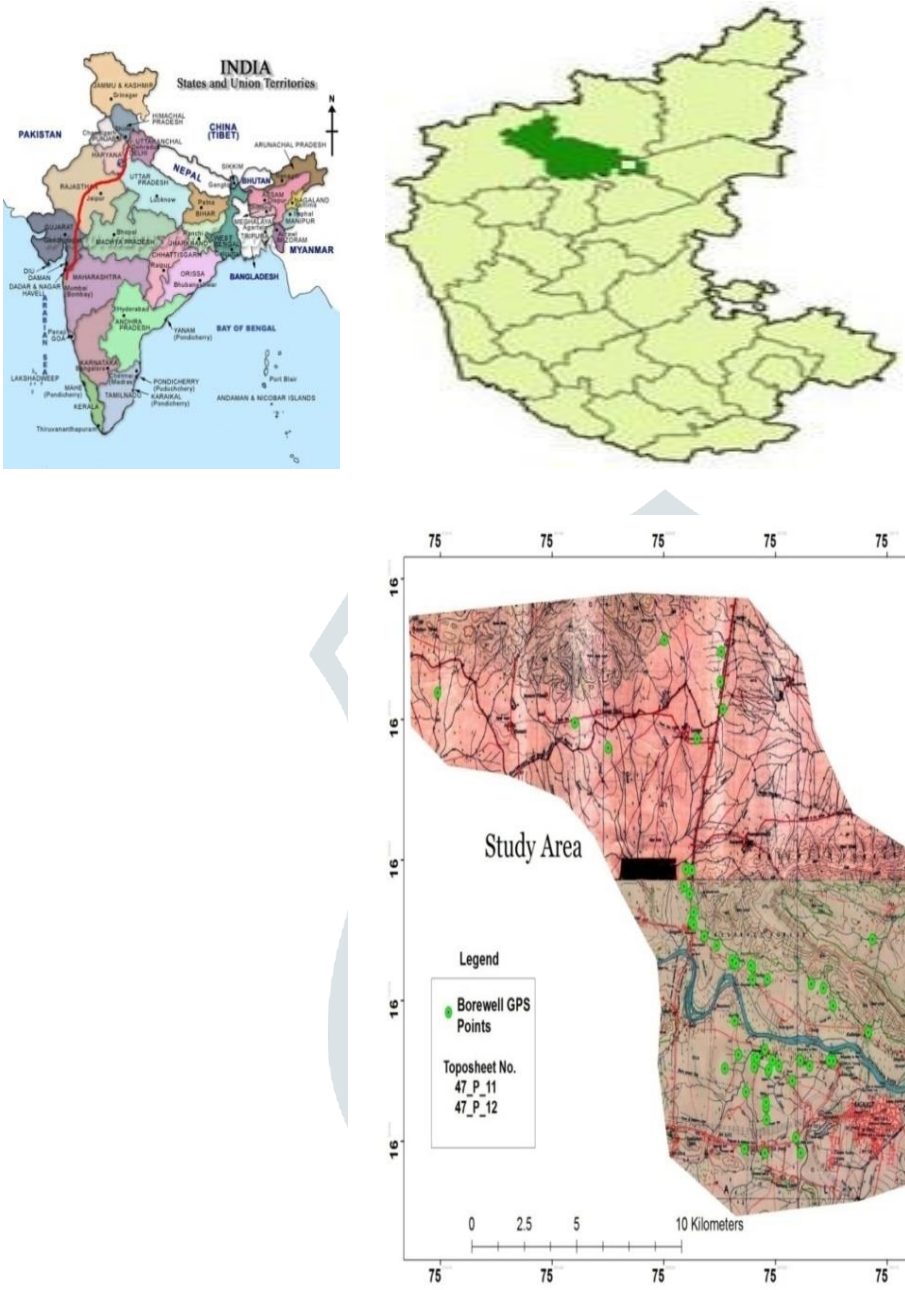

Fig. 1 Study area with Bore well point

III. MATERIAL AND METHODOLOGY

A. Field study

Field observation is done in part of Bagalkot and Bilagi area and 62 bore wells points were selected for groundwater depth measurement. GPS is used to map the location of each sampling bore well points and spatial coordinates of the sampling bore wells were measured on site using a hand held global positioning system (GPS) instrument. Water samples were from bore wells points collected in polyethylene bottles. Water level indicator instrument is used measure the depth of bore well in meters by passing graduated cable with indicator at lower end into bore well holes. When indicator touches water it beeps & LED glows & depth of water level is observed from graduated cable. RL of ground water level is calculated by deducting depth (D) observed from water level indicator to RL of GL. shows GWL of respective bore/open wells with respect Mean Sea level.

RL of GWL=RL of GL – D ---------- (Equation No. 1)

Where

- RL of GWL means Reducing level of Groundwater level
- RL of GL means Reducing level of Ground level
- D mean Depth of water level

Fig. 2 showing GPS instrument, and Water level indicator instrument

B. Lab analysis

Water sample from the field is transported to laboratory for the analysis of water quality parameters i.e. Total hardness, Alkalinity, Chloride, Fluoride, Sulphate and Total dissolved solids were analyzed for different parameters as per the standard methods .

IV. RESULT

Groundwater Quality Analysis: 3.

In study the area around Bagalkot & Bilagi taluk 62 bore wells points are selected and water samples are collected from all the bore wells points which are used for drinking and irrigation purpose. The details of water quality parameters are as shown in Table 1

Sl. No	Borewell ID	Alkalinity (mg/L)	Chloride (mg/L)	Total Hardness (mg/L)	Fluoride (mg/L)	Sulphate (mg/L)	TDS (mg/L)	Remarks
1	IRP-1	444	458	444	0.5	380	1220	P
2	IRP-2	532	776	640*	0.8	800*	1378	NP
3	IRP-5	238	165	566	1	630*	2504*	NP
4	IRP-6	340	1386*	1268*	1	690*	2553*	NP
5	IRP-7	404	1737*	1346*	1	685*	2123*	NP
6	IRP-8	348	1711*	1172*	1	750*	2259*	NP
7	IRP-10	388	321	464	0.8	430*	702	NP
8	IRP-11	532	377	600	0.7	590*	863	NP
9	IRP-12	372	380	566	0.8	555*	832	NP
10	IRP-13	352	294	524	0.8	825*	710	NP
11	IRP-14	460	320	496	1	320	798	P
12	IRP-15	458	228	536	1.2	400	974	P
13	IRP-81	420	300	454	1.3	770*	831	NP
14	IRPS-10	402	1901*	1328*	1	450*	2548	NP
15	IRPS-11	364	306	444	1.03	665*	747	NP
16	IRPS-12	316	1433*	990*	0.4	575*	2213*	NP
17	IRPS-26	385	163	555	0.5	390	522	P
18	IRPS-27	372	150	348	0.5	210	482	P
19	IRPS-29	350	694	900*	0.8	350	940	NP
20	IRU-31	324	175	380	0.8	360	1183	P
21	DOP-1	404	184	244	0.1	710*	580	NP

22	DOP-2	398	203	660*	1	245	1043	NP
23	DOP-3	410	274	892*	1.08	230	1187	NP
24	OWP-2	456	199	880*	0.7	260	614	NP
25	OWP-3	320	155	324	0.2	748*	472	NP
26	PWS-1	366	273	484	0.5	858*	743	NP
27	PWS-2	324	288	424	0.7	460*	648	NP
28	PWS-35	370	337	475	0.2	145	705	P
29	PWS-40	460	155	428	0.8	375	482	P
30	IRP-503	384	300	652*	0.8	470*	727	NP
31	IRP-504	260	150	276	0.2	75	457	P
32	IRP-505	208	131	300	0.3	170	401	P
33	IRP-506	256	170	284	0.1	270	421	P
34	IRP-508	260	174	404	0.3	360	485	P
35	IRP-509	200	103	1060*	0.1	350	385	P
36	IRP-510	208	131	368	0.15	540*	389	NP
37	IRP-511	308	238	906*	0.3	230	689	NP
38	IRP-512	256	200	476	0.6	590*	565	NP
39	IRP-516	252	134	492	0.1	270	469	P
40	IRP-517	248	258	260	0.4	215	555	P
41	IRP-518	232	250	296	0.2	250	564	P
42	IRP-520	244	142	360	0.1	80	352	P
43	IRP-521	232	150	280	0.1	220	420	P
44	IRP-522	256	115	364	0.4	770*	566	NP
45	IRP-540	300	178	448	0.7	100	491	P
46	IRP-544	264	138	324	0.8	310	411	P
47	IRP-545	276	120	464	0.5	250	426	P
48	IRP-561	210	187	272	0.4	100	305	P
49	IRP-562	620*	202	504	0.6	310	601	NP
50	IRP-563	320	178	468	0.7	150	538	P
51	IRP-569	360	170	412	0.85	355	669	P
52	IRP-574	325	246	536	0.9	140	613	P
53	IRP-577	412	142	430	0.8	740*	559	NP
54	IRP-579	420	150	304	0.8	225	563	P
55	OWP-503	310	154	360	0.8	160	514	P
56	IOWP-505	300	140	492	0.3	820	571	NP
57	IRP-605	428	232	480	0.6	180	780	P
58	IRP-611	452	225	556	0.2	160	389	P
59	IRP-613	355	111	380	0.5	215	780	P
60	IRP-614	484	265	550	0.4	182	729	P
61	IRP-615	400	132	559	0.3	165	1056	P
62	IRP-616	440	342	524	0.5	200	722	P

V. DISCUSSION

To evaluate the quality of ground water in Bagalkot and Bilagi area. Major water quality parameters like TDS, TH, Sulphate, Chloride, Fluoride, and Alkalinity were the studied in the area on these major water quality parameters of Bagalkot and Bilagi area. This integrated ground water quality help us to know the existing ground water condition of the study area.

a) Total hardness

In the present study area the total hardness of water samples ranged between 244 mg/L to 1346 mg/L. As per the experimental results, from the 62 bore well water samples out of which 11 bore well water samples has been found that having the value exceeds permissible limit and remaining 51 water samples have been found that having hardness value within permissible limit area.

b) Alkalinity

The alkalinity of water samples ranged between 200 mg/L to 620 mg/L in the study area . As per the experimental results, from the 62 bore well water samples out of that 1 bore well water samples has been found that having the value exceeded permissible limit and remaining water samples have been found that having alkalinity value within permissible limit..

c) Chloride

As per the experimental results, chloride content in the water samples ranged between 103 mg/L to 1737 mg/L in the present study area. Out of 62 bore well water samples 5 bore well water samples having chloride content beyond the maximum permissible limit.

d) Fluoride

In the study area fluoride concentration was found between 0.1 mg/L to 1.3 mg/L. As per the experimental results, the fluoride concentration of all the bore well water samples are found be less than 1.5 mg/L which is below the permissible limits prescribed by BIS.

e) Sulphate

Sulphate concentration in the study area was found between 75 mg/L to 825 mg/L. As per the experimental results, out of 62 bore well water samples 23 samples having higher concentration of sulphate.

f) Total Dissolved Solids

In the present study area shows that the TDS values varies from 305 mg/L to 2458 mg/L. As per experimental results, out of 62 bore well water sample 6 water sample having TDS value higher than maximum permissible limit and remaining water samples have been found that having total dissolved solids value within permissible limit

VI. CONCLUSION

In the study area 62 bore wells were monitored for the groundwater quality. Monitoring of groundwater quality to control sustainable use of groundwater. The water samples from the bore wells in Bagalkot area and Bilagi area were tested and analyzed for their portability. The minerals considered are fluoride, total hardness, chloride, alkalinity, sulphate, and total dissolved solids. Out of 62 water samples, 29 samples were not-potable making the bore wells unfit for drinking and irrigation purpose. Out of 29 bore well samples, 7 bore well samples were not potable due Total Hardness, 16 samples of bore well were not potable due sulphate content were the major. Concern parameter in the study area.

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