



Analysis of bore wells drinking water quality investigation in middle Gujarat of Kapadwanj Tahesil: I

P. R. Mevada¹, G. R. Jani² and N. K. Prajapati³

¹Pacific University, Udaipur, India

²Shri U. P. Arts & Smt. M. G. Panchal Science College, Pilvai, Gujarat, India

³M. N. College, Visnagar, Mehsana, North Gujarat, India

ABSTRACT

The aim of this study is to assess the quality of bore wells drinking water of Kapadwanj, taluka, district-Kheda, Gujarat. Samples were analyzed from Jan-Feb: 2013. The analysis such as temperature, PH, EC, total dissolved solids(TDS), dissolved oxygen(DO), alkalinity, Ca, Mg, Na, K, Cl, F, SO₄ and NO₃. The water is heavily of bore wells water was carried out from ten sampling station of middle Gujarat of Kapadwanj tahesil..

Keywords: Bore wells drinking water, Dissolved salt, TDS, Kapadwanj tahesil.

INTRODUCTION

Water is extremely essential for survival of all living organisms. The quality of water is vital concern for mankind since it is directly linked with human welfare. The quality of surface water within a region is governed by both natural processes such as precipitation rate, weathering processes and soil erosion and anthropogenic effects such as urban, industrial and agricultural activities and the human exploitation of water resources[1-5]. Ground water quality has become an important water resources issue due to rapid increase of population, rapid industrialization, unplanned urbanization, flow of pollution from upland to lowland, and too much use of fertilizers, pesticides in agriculture. The problems of ground water quality are more acute in low lying area like kapadwanj , as the water level is within 150ft to 400ft. More alarming news is that most of the population uses ground water as the major source of drinking water. It is well known that no straight forward reasons can be advanced for the deterioration of water quality, as it is dependent on several water quality parameters[6]. There exists strong correlations among different parameters and a combined effect of their inter-relatedness indicates the water quality. Ground water quality in the industrial areas is determined by measuring the concentration of some physico-chemical parameters and comparing them with drinking water standards[7]. So I decided the analysis of bore wells drinking water of kapadwanj tahesil.

MATERIALS AND METHODS

Ten bore wells water sample collected in brown glass bottles from difference areas located in Kapadwanj tahesil. All the chemicals used water of AR grade. Double distilled water was used for the preparation of reagents and solutions. The major water quality parameters considered for the examination in this study are temperature PH, EC, dissolved oxygen (DO), total dissolved solid(T.D.S), alkalinity, calcium and magnesium hardness, sulphate, and nitrate contents[8]. Temperature, pH, dissolved oxygen (DO) total dissolved solid (T.D.S), Nitrate values were measured by water analysis kit and manual methods. Calcium and magnesium hardness of water was estimated by complexometric titration method[9-10]. Chloride contents were determined volumetrically by silver nitrate titration method using potassium chromate as an indicator.

RESULTS AND DISCUSSION

The average results of the physicochemical parameters for water samples are presented in Table:1.

PH :

pH is a term used universally to express the intensity of alkaline condition of a solution. Most of the waters are slightly alkaline due to presence of carbonates and bicarbonates. The pH values of water samples varied between 7.02 to 8.05.

Electrical conductivity (EC) :

Electrical conductivity is a measure of water capacity to convey electric current. It signifies the amount of total dissolved salts[11]. EC values were in the range of 0.7 micromhos/L to 2.5 micromhos/L.

Total dissolved solids (TDS) :

Total dissolved solids indicate the salinity behavior of groundwater. Water containing more than 500 mg/L of TDS is not considered desirable for drinking water supplies, but in unavoidable cases 1500 mg/L is also allowed[12]. TDS values varied from 320 mg/L to 950 mg/L.

Dissolved oxygen (DO) :

Dissolved oxygen parameter is important in water quality assessment and reflects the physical and biological processes prevailing in the water. In the present study dissolved oxygen (D.O) ranged from 6.9 mg/l to 9.2mg/l. The minimum tolerance range is 4.0 mg/l for drinking water.

Alkalinity:

Alkalinity of water is its capacity to neutralize a strong acid and it is normally due to the presence of bicarbonate, carbonate and hydroxide compound of calcium, sodium and potassium. Total alkalinity values for all the investigated samples were found to be greater than the value prescribed by WHO. In the present study total alkalinity range was from 265 mg/l to 740mg/l.

Calcium Hardness:

The calcium hardness range is from 25.03 mg/l to 55.90mg/l. The tolerance range for calcium hardness is 75 to 200 mg/l. Calcium contents in all samples collected fall within the limit prescribed. Calcium is needed for the body in small quantities, though water provides only a part of total requirements.

Magnesium Hardness :

Magnesium hardness ranged from 20.35 to 96.43 mg/l. The tolerance range for magnesium is 50 to 100 mg/l.

Sodium (Na⁺) :

Sodium concentrations were found in between 116.48 mg/L to 250.41mg/L.

Potassium (K⁺) :

The major source of potassium in natural fresh water is weathering of rocks but the quantities increase in the polluted water due to disposal of waste water. Potassium content in the water samples varied from 0.86 mg/L to 2.96 mg/L.

Chlorides :

The chlorides contents in the samples between 41.20mg/l to 116.32 mg/l natural water contain low chloride ions. The tolerance range for chloride is 200 to 1000mg/l.

Fluoride :

The permissible limit of fluoride in drinking water is 1.0 mg/L, which can be extended to 1.5 mg/L in case of nonavailability of other water sources. Higher fluoride level in drinking water gives rise to dental decay and physical deformation. The dreaded disease "fluorosis" is a result of intake of high fluoride laden in drinking water. It has been observed that ground water fluoride content ranged from 0.81 to 1.97 mg/L.

Nitrate :

In the present study nitrate ranged from 125 mg/l to 430 mg/l. The tolerance range for nitrate 20mg/l to 45 mg/l. Nitrate nitrogen is one of the major constituents of organisms along with carbon and hydrogen as amino acid,

protein and organic compounds present in the bore wells water. In the present study nitrate nitrogen levels show higher values than the prescribed values. This may be due the excess use of fertilizers and pesticides in this area.

Sulphate :

Sulphate ranged from 108.25 mg/l to 267.05 mg/l. The tolerance range for sulphate is 200 to 400 mg/l.

**Table:1 Winter-Kapadwanj Tahesil
The Sample was taken in Jan-Feb: 2013**

Sr. No.	Parameter	Name of Village									
		Torana S-1	Sonipura S-2	Punadra S-3	Vav Na muvada S-4	Nava muvada S-5	Ukardina muvada S-6	Karkariya S-7	Kabhai na muvada S-8	Dholokuva S-9	Bhanavat S-10
1	Temp. °c	27.9	28.9	28.6	27.8	28.3	28.6	31.0	30.6	28.7	29.2
2	pH	7.22	7.21	7.02	7.35	7.12	7.20	7.44	8.05	7.35	7.29
3	EC	2.0	2.5	0.9	0.7	0.7	0.7	0.9	1.3	1.1	1.0
4	TDS gm/ml	700	950	320	490	520	580	680	640	410	390
5	Dissolve Oxygen	7.5	9.2	7.7	7.2	7.3	6.9	8.2	8.1	7.6	9.1
6	Alkalinity	388	555	345	620	440	295	265	360	453	740
7	Calcium	25.03	34.27	29.28	44.21	50.23	38.36	27.83	47.54	55.90	34.26
8	Magnesium	24.84	96.43	27.68	43.56	20.35	27.22	29.62	26.55	50.11	47.34
9	Sodium	218.25	116.48	154.78	165.13	225.11	250.41	178.16	236.61	182.22	127.35
10	Potassium	1.80	1.49	2.96	1.13	0.86	1.14	1.59	1.25	0.86	1.41
11	Chloride	65.10	41.20	55.80	70.03	105.0	114.24	116.32	95.53	90.00	85.23
12	Fluoride	1.97	1.38	1.27	0.96	1.02	0.81	1.13	0.99	1.07	1.20
13	Nitrate	275	125	390	260	430	300	250	275	230	185
14	Sulphate	153.82	190.36	267.05	230.63	115.29	251.11	108.25	165.76	285.25	146.62

Note : All parameters are in mg/L except pH, EC and EC in micromho /ml.

CONCLUSION

The important physico-chemical parameters of bore well water samples collected from 10 locations in Winter-Kapadwanj Tahesil. The Sample was taken in Jan-Feb: 2013. It was observed that the PH, Fluoride, T.D.S., total alkalinity, total hardness, chloride, nitrate, sulphate, calcium, magnesium are normal for the water samples. Only very few samples showed values above the desirable limits by Indian standard Index.

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