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Analytical Study of Ground Water Contamination in Umarala Taluka of Gujarat

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ABSTRACT

Ground water is considered as most valuable nature resources to human lives. In the recent era fresh ground water is a topic to think. The Area having high contamination of ground water is selected named as Umarala Taluka located in Bhavnagar district. The objective of study to accessmwater quality parameters in 8 numbers of selected wells. Most effected pollutant like TDS, Alkalinity, Chloride and pH analyzed during study. Ground water attached with the soil so Calsium and magnesium hardness become less or more. Water is one of the majority important necessary of drinking and care of crops.

Keywords : Ground water, Temp., pH, Umarala Taluka.

I. INTRODUCTION

Groundwater comprises 97 percent of the world's readily accessible freshwater and provides the rural, urban, industrial and irrigation water supply needs of 2 billion people around the world. Ground water is store in the soil and rock arrangement below the earth's surface. Ground water plugs a vital role in human life. In this research paper Umarala Taluka region water containg pH, TDS, EC, Hardness of drinking water so the studies of this Analytical study of parameter. Ground water attached with the soil so Calsium and Magnesium hardness become less or more. Water is one of the majority important inputs necessary for the manufactures of crops. Plants need it incessantly during their life and in huge quantity.

II. LITERATURE REVIEW

Groundwater Quality is an issue of great importance and concern. Many scholars and research have worked on study and analysis of ground water quality worldwide. They have used tools use of GIS and Statistical Modelsare very popular. Some Studies to India and nearby region are as follows.

S.Krishnaraj et al carried out spatial analysis of groundwater quality using GIS for Karur district of Tamilnadu, India. They analyzed number of water sample for physico-chemical parameters like TDS, TH, TA, chloride and Fluoride. They also did geographic information system based groundwater quality mapping and contour map. Finally classes such as Excellent, good and Poor ground water quality zones of the study are.

South Gujarat The water quality is good in the eastern belt of the zone. In the western, they are either saline or sodic in nature. The waters from Amod, Jambusar, Vagra and some portions of Bharuch talukas indicated predominance of Mg.

Bhal and Coastal area basically, the soils of this zone are serious textured with low permeability and poor drainage. Simultaneously, majority of the ground waters are either saline or sodic in nature.

North-West Gujarat This is one of the zones having severe ground water quality problems. Majority of the waters are highly saline and have medium to very high sodality problems.

III. STUDY AREA AND DATA COLLECTION

The study area Umarala is located in Bhavnagar district of Gujarat. It lies between 21.539705 N (latitude), 71.577560 E (longitude). Umarala Taluka is located around 20Km from Bhavnagar district. The beautiful Bhavnagar district is situated on bank of Kalubhar river, which also known as lifeline of Saurastra of Gujarat.

Umarala town and Bhavnagar also have remarkable peculiarities in ancient time. Many lime stone chimany and industries of stone are located in Bhavnagar taluka. There are 200 industries located in this area.

ANALYTICAL STUDY DATA OF GROUND WATER OF SOME STATIONS OF UMARALA TALUKAS OF BHAVNAGAR DISTRICT(GUJRAT)

Sr. No.	Station	Owner name	Depth (Foot)	Temp. °C	TDS ppm	EC mʊ	Ca^{+2} mg/L	Mg^{+2} mg/L	Cl^{-1} mg/L
1	Umarala	JS Gohil	90	30.3	721	1.257	208.0	19.2	166.0
2	Ratanpar*	KP Gohil	220	30.8	149	4.560	216.0	15.4	241.0
3	Dharuka	BN Gohil	70	30.2	155	1.661	168.0	12.0	323.0
4	Bajud	ON Pavasiya	142	30.5	136	2.050	148.0	13.9	289.8
5	Timbi	JR Patel	90	29.8	610	1.701	144.0	12.5	82.0
6	Vangadhara	PB Ahir	135	31.1	475	1.753	176.0	11.0	66.0
7	Hadamtala	ML Patel	70	30.7	164	1.282	96.0	10.1	62.0
8	Tarpala	KD Patel	80	29.9	175	2.640	168.0	20.6	190.0

Sr. No.	Station	Owner name	SO_4^{-2} mg/L	Na^{+1} mg/L	K^{+1} mg/L	Ph	CO_3^{-2} mg/L	HCO_3^{-} mg/L
1	Umarala	JS Gohil	98.8	177.80	5.4	7.96	232.0	632.0
2	Ratanpar*	KP Gohil	131.7	218.81	3.31	8.78	136.0	566.0
3	Dharuka	BN Gohil	280.0	132.95	4.38	7.80	256.0	792.0
4	Bajud	ON Pavasiya	247.0	84.5	2.50	7.98	310.0	680.0
5	Timbi	JR Patel	222.2	193.28	3.95	8.45	72.0	652.0
6	Vangadhara	PB Ahir	251.0	71.0	2.64	8.42	0	700.0
7	Hadamtala	ML Patel	263.4	345.8	12.9	8.56	0	440.0
8	Tarpala	KD Patel	230.5	297.5	8.82	7.82	0	656.0

IV. METHODS AND MATERIAL

All the reagents, chemicals and solvents used were of analytical reagent grade and were used as such without any further purification.The collection of samples of Ground water of three rural talukas of Bhavnagar district with 08stations in Umarala Taluka were done as per mentioned procedure

❖ **SAMPLING**

For Umarala station in taluka of Bhavnagar district some point was selected for collecting the taster of groundwater And were analyzed to determine TDS, pH, Total Hardness, Ca^{+2}, Mg^{+2}, Cl^{-1}, SO_4^{-2}, NO_3^{-1}, F^{-1}, Alkalinity, Turbidity, EC, DO, COD, BOD, Temperature

Water taster were unruffled from Hand pump/Tube-wells/Bore-wells which were used for drinking and/or irrigation.

Water taster from Hand pump/Tube-wells/Bore-wells were unruffled directly in pre-cleaned 2.5 L glass taster bottle after running the water for five minutes. Samples were analyzed immediately for the BOD, COD Temperature and turbidity, whereas rest of the samples were taken to laboratory and were further analyzed within fifteen days.

❖ **Sampling of ground water from borewells and its depth:**

A. Temperature Measurement
B. Total dissolved solids (TDS) : Calculations:

$$\text{T.D.S.(mg/mL)} = \frac{[(\text{Weight of beaker + residue}) - (\text{Weight of empty beaker})]}{[\text{mL of sample taken}]}$$

C. Electrical Conductivity: conductivity = (Kcell/{R[1+(α/100)(T–25)]}
D. pH measurement:
E. ALKALINITY (CARBONATE AND BICARBONATE):
F. CHLORIDES BY ARGENTO METRIC METHOD
G. Ca & Mg HARDNESS BY EDTA TITRATION:

   I. Temporary Hardness
   II. Permanent Hardness
   III. Efect of hard water

H. SULPHATE BY GRAVIMETRICS METHOD

Calculation :

$$\text{Sulphate (mg/L)} = \frac{\text{Wt of residue} \times 0.4116 \times 1000}{\text{Volume of water taken(mL)}}$$

V. SUMMARY AND CONCLUSION

✓ **Main objectives of the work:**

1. To estimate the value of underground water of selective representative areas in Umarala talukas of Bhavnagar district region.
2. To characterized the different types of parameters of ground water in terms of Colour, Odour, temperature, pH, Total Hardness, Ca^{+2}, Mg^{+2}, Cl^{-1}, SO_4^{-2}, Na^{+1}, K^{+1}, Alkalinity, Turbidity, TDS, HCO_3^{-1}, CO_3^{-2}.
3. The main aim of the work done is to highlight the condition/property/reliability of water of Umarala taluka of Bhavnagar district. 08 stations were selected for taluka and different parameters were checked/analyzed such as Colour, Odour, temperature, pH, Total Hardness, Ca^{+2}, Mg^{+2}, Cl^{-1}, SO_4^{-2}, Na^{+1}, K^{+1}, Alkalinity, Turbidity, TDS, HCO_3^{-1}, CO_3^{-2}.

Maximum and minimum values of parameters of ground water quality of some stations of Bhavnagar taluka of Bhavnagar district. (Gujarat)

❖ **(1) Depth (Feet)**
highest value at Ratanpar (220) and lowest value at Dharuka (70).

❖ **(2) Temperature (°C)**
highest value at Vangadhara (31.1) and lowest value at Timbi (28.9).

❖ **(3) TDS (ppm)**
highest value at Umarala (760) and lowest value at Bajud (136).

❖ **(4) Electrical Conductivity (mʊ)**
highest value at Ratanpar(4.560) and lowest value at Umarala (1.257).

❖ **(5) Calcium Content (mg/L)**

highest value at Ratanpar (216.0) and lowest value at Hadamatala (96.0).

- **(6) Magnesium Content (mg/L)**
  highest value at Tarpala (20.6) and lowest value at Hadamtala (10.1).
- **(7) Chloride content (mg/L)**
  highest value at Dharuka (323.0) and lowest value at Hadamtala (62.0).
- **(8) Sulphate Content (mg/L)**
  highest value at Dharuka (280.0) and lowest value at Umarala (98.8).
- **(9) Sodium Content (mg/L)**
  highest value at Hadamtala (345.8) and lowest value at Vangadhra (71.0).
- **(10) Potassium Content (mg/L)**
  highest value at Hadamtala (12.9) and lowest value at Bajud (2.50).
- **(11) pH**
  highest value at Ratanpar (8.78) and lowest value at Dharuka (7.80).
- **(12) Carbonate (mg/L)**
  highest value at Bajud (310.0) and many of the stations shows 0.0 values as listed in table.
- **(13) Bicarbonate (mg/L)**
  highest value at Dharuka (792.0) and lowest value at Hadamtala (440.0)

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