Ground Water Analysis Of Water Sample Collected From Selected Stations Of Bharuch District

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ABSTRACT

A various Physico-Chemical parameters like pH, Total hardness, Total dissolve solid (TDS), Total alkalinity, Chloride, Sulphate, Calcium, Magnesium, Nitrate values, Fluoride and Turbidity are measured and analysed for five stations such as ADOL, AMDADA, AMLESHWAR, BAMBUSAR and BHUVA of Bharuch district. All the parameter measurements are performed in terms of three different seasons such as Winter, Summer and Monsoon. Results obtained are compared in terms of their highest value and lowest values among five stations in terms of 11 parameters.

Keywords: Ground water, Total Dissolved Solid, Bharuch, COD, BOD, Magnesium content, Turbidity.

1. Introduction

Surface water is one of the storage in drinking water provide in India. India in rural and urban region mainly of dependent on the source of surface portable water. Portable water is body of tube well and well which is free and clean from pollution than ground water **[1].** Fresh and clean water excellence is necessary for good health in human. Safe and high-class water only one of foundation in surface water but surface water is tremendously melt solvent and heavy trace elements any way characteristics in there and very contaminated water eating is dangerous to human health & origin disease such as liver damage, cancers, paralysis, neurological, nerve damage, disorder, thyroid problems, kidney problems, cardio-vascular disorder, diarrhea, finger nail loss, hair loss, mottle teeth, lung irritation & other diseases in human body **[2].** Rain water

harvesting is a tried-and-true alternative that is crucial to the local and regional hydrological cycle, many nations use it as a workable decentralized water supply. Direct infiltration, rainwater storage in ponds or reservoirs, and bore hole recharging of groundwater aquifers are other alternatives to individual rainwater harvesting systems in densely populated cities and coastal regions. To better understand the idea behind rainwater harvesting, the following academic works are examined **[3].**

Rain water is available in monsoon only. As monsoon last for a few months most of the rain water lasts for a few months only. This rain water fills lakes and ponds and also flows into rivers some rain water also percolates into ground water became available as ground water. Rain water is stored in lakes for use our long period of time. There are many natural lakes in our country but in order to meet the increasing demand of fresh water many artificial lakes are made **[4]**.

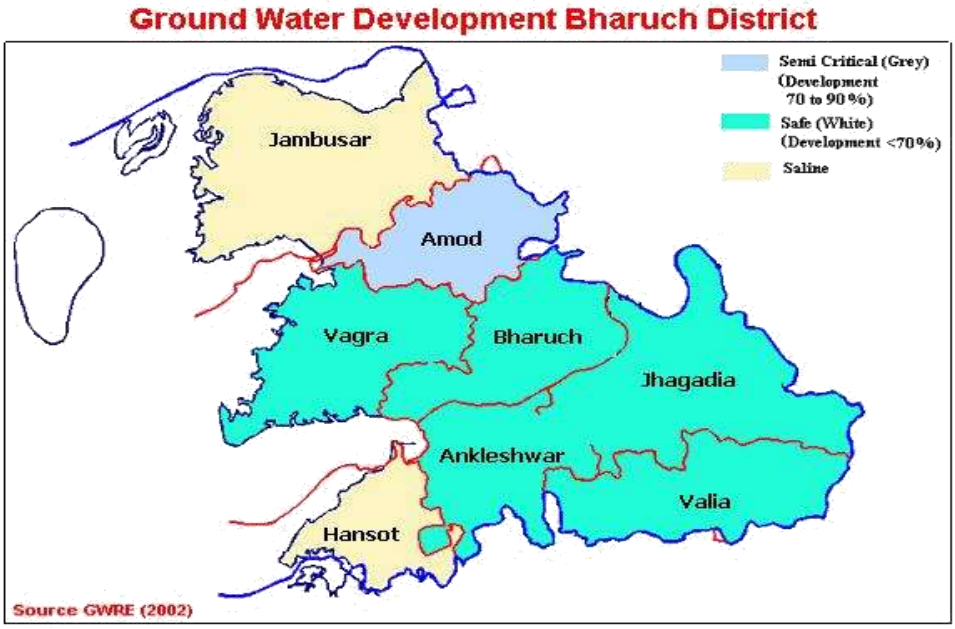
Rivers are another important source of water. In our country rivers flow across diverse regions. Some of these rivers are large and are permanently filled with water. Rivers get their water supply from the melting of snow lying on the peaks of Snow Mountains **[5]**.

The water inside the soil is called groundwater. This water which has percolated deep into the ground is clean. We are at presents utilizing nearly 25% ground water. Most of it is used in agriculture. The availability of this water is decreasing due to its overuse and deposition of salts and pollutants in it. 71% of the earth's surface is covered by water earth's surface water is held in two different kind of water bodies i.e., salt water bodies and fresh water bodies. Fresh water is defined as water that contains less than 0.5 ppt of dissolved salt. The addition of various kind of pollutants and nutrients through the agency sewage, industrial, effluents, agriculture run of etc. into the water bodies bring about a series of change in the physico-chemical and characteristics of water which have been the subject of several investigation **[6].**

Ground water is one of the source of drinking water supply in our country. Urban and rural area in India are mainly dependent on ground water. Water irrigation facilities are city area not a rural area is used for drinking water is source of the well and tube well. And clean and free from pollution than surface water **[7].**

Clean and fresh water quality is good for health of human body. Ground water is the only one source of safe and

good water. But ground water contains many solidsand heavy metals in trace amount. This water is dangerous to human health and cause disease such as various cancers, paralysis, neurological, disorder, nerve damage, thyroid problems, liver damage, kidney problems, cardio-vascular disorder finger nail loss, diarrhoea, hair loss, mottle teeth, lung irritation and so many diseases are human body **[8]**.



Bharuch district is located toward the southern part of Vadodara district and is a chronological region of Gujarat. The entire region of the Bharuch is 5136.85 sq. km, occupying eight Taluka with cenus of 13,70,656 souls (as per 2001cenus). Standard rainfall of last decades is 658 mm. District centre lise on the bank of river. Additional rivers are Dhadhar, Kim, Mahisagar and Amaravati rivers pouring to the west Arabian Sea. Basically, the Bharuch is separated in two party i.e. black & yellow clay and Alluvial layers of various size of sand.

From above literature data here we have planned to analysed ground water from five stations such as **ADOL**, **AMDADA**, **AMLESHWAR**, **BAMBUSAR** and **BHUVA** of Bharuch district, Gujarat with respect to various parameter such as pH, Total dissolve solid (TDS), Total hardness, Total alkalinity, Chloride, Sulphate, Calcium, Magnesium, Nitrate values, Fluoride and Turbidity in terms of Winter, Summer and Monsoon seasons.

2. Materials and Methods

2.1 Chemicals and Reagents

All the reagents used are of AR grade and used without further purifications. Physico-chemical characterization of river, ground, and surface water such as p^H, Total dissolve solid (TDS), Total hardness, Total alkalinity, Chloride, Sulphate, Calcium, Magnesium, Nitrate values, Fluoride and Turbidity were carried out by following methods (**Table 1**) **[8].**

Table 1 Methods for various physico-chemical parameters.

Sr. No.	Parameters of water analysis	Methods
1	P^H	Digital P^HMeter
2	Mg^{+2} , Ca^{+2} Hardness	Titration (EDTA-Titrimetric)
3	TDS & Total hardness	Digital TDS Meter
4	Total Alkalinity	Titrimetric using Indicators
5	Chloride	Argenometric
6	Phosphate	Spectrophotometric
7	Sulphate	Spectrophotometric
8	Nitrate	Spectrophotometric
9	F^-	Spectrophotometer

2.2 Experimental

2.2.1 Sampling

Samples will be collect in pre cleaned 2 litre polyethylene bottles. The sampling preservations and analysis of parameters (APHA, 1998) **[9]**. The water samples will be collected nearly from 5 stations such as **ADOL**, **AMDADA**, **AMLESHWAR**, **BAMBUSAR** and **BHUVA** of Bharuch district during the Winter, Summer and Monsoon seasons. Physicochemical parameter such as pH, Temperature, Chloride, Sodium, Nitrate, Chloride content, Fluoride content, Sulphate content and Turbidity etc where measured.

Table 2 Physico-chemical analysis of ground water of Bharuch district, Gujarat (Winter).

SR. NO.	NAME OF PARAMETERS	NAME OF STATIONS				
		ADOL	AMDADA	AMLESHWAR	BAMBUSAR	BHUVA
1	TDS	628	510	615	535	486
2	pH	6.85	6.92	7.02	7.01	6.91
3	T. Hardness	385	375	385	380	378
4	Ca^{+2}	38	35	60	39	38
5	Mg^{+2}	31	46	23	54	32
6	Cl^{-1}	80	72	98	120	88
7	SO_4^{-2}	52	35	40	38	42
8	NO_3^{-1}	16.18	19.1	20.22	18.21	15.8
9	F^{-1}	0.2	0.3	0.4	0.3	0.1
10	Alkalinity	422	430	322	318	422
11	Turbidity	3.5	3.8	2.6	2.6	3.7

Table 3 Physico-chemical analysis of ground water of Bharuch district, Gujarat (Summer).

SR. NO.	NAME OF PARAMETERS	NAME OF STATIONS				
		ADOL	AMDADA	AMLESHWAR	BAMBUSAR	BHUVA
1	TDS	512	620	540	487	481
2	pH	6.85	6.72	7.12	7.75	7.20
3	T. Hardness	360	370	258	268	310
4	Ca^{+2}	42	34	35	36	62
5	Mg^{+2}	35	36	35	48	32
6	Cl^{-1}	96	70	122	82	40
7	SO_4^{-2}	42	39	41	34	40
8	NO_3^{-1}	11.25	8.5	8.1	10.14	12.1
9	F^{-1}	0.1	1.1	0.5	0.2	1.2
10	Alkalinity	315	312	433	329	292
11	Turbidity	3.6	2.7	3.8	1.2	2.7

Table 4 Physico-chemical analysis of ground water of Bharuch district, Gujarat (Monsoon).

SR. NO.	NAME OF PARAMETERS	NAME OF STATIONS				
		ADOL	AMDADA	AMLESHWAR	BAMBUSAR	BHUVA
1	TDS	514	625	530	480	486
2	pH	6.8	6.7	7.1	7.7	7.15
3	T. Hardness	362	372	260	264	309
4	Ca^{+2}	40	31	30	38	64
5	Mg^{+2}	34	30	36	40	31
6	Cl^{-1}	94	72	120	83	42
7	SO_4^{-2}	44	30	42	35	45
8	NO_3^{-1}	11.2	8.52	8.12	10.13	12.12
9	F^{-1}	0.2	1.2	0.4	0.3	1.3
10	Alkalinity	316	314	432	328	291
11	Turbidity	3.7	2.8	3.6	1.3	2.8

3. Result and Discussion

Maximum and minimum values of parameters of ground water quality of Bharuch district, Gujarat. Standard values of parameters **[10]** are also given with each parameter.

3.1 TDS

All the minerals, salts and non-volatile inorganic impurities are termed as Total dissolved Solid. WHO in 1993 has specified upper limit of TDS as 1000mg/l. higher level of TDS may cause kidney dysfunction like stone, calcium deposition in renal system. Here in the present study the TDS ranges from 200-6000 mg/l.

WINTER Season shows highest value at **ADOL** and lowest value at **BHUVA**.

SUMMER Season shows highest value at **AMDADA** and lowest at **BAMBUSAR**.

MONSOON Season shows highest value at **AMDADA** and lowest at **BAMBUSAR**.

3.2 pH

This parameter tells about the presence of acid or alkali in water. As per the WHO the acceptable limit for potable water is 6.5-8.5.

WINTER Season shows highest value at **AMLESHWAR** and lowest value at **ADOL**.

SUMMER Season shows highest value at **BAMBUSAR** and lowest at **AMDADA**.
MONSOON Season shows highest value at **BAMBUSAR** and lowest value at **AMDADA**.

3.3 Total Hardness

It comprises the total hardness of water along with Ca^{+2} and Mg^{+2}. As per the WHO the acceptable limit for potable water is 300 mg/l. Its higher value causes dared consequences but depending in the values of Ca^{+2} and Mg^{+2} hardness.
WINTER Season shows highest value at **ADOL & AMLESHWAR** and lowest value at **AMDADA**.
SUMMER Season shows highest value at **AMDADA** and lowest value at **AMLESHWAR**.
MONSOON Season shows highest value at **AMDADA** and lowest value at **AMLESHWAR**.

3.4 Calcium content

Calcium is necessary in the body for healthier bone but under specified limit it is beneficiary or else excess of calcium can cause Kidney stone/bladder. As per the WHO the acceptable limit for potable water is 75-200 mg/l.
WINTER Season shows highest value at **AMLESHWAR** lowest value at **AMDADA**.
SUMMER Season shows highest value at **BHUVA** and lowest at **AMDADA**.
MONSOON Season shows highest value at **BHUVA** and lowest at **AMLESHWAR.**

3.5 Mg^{+2} content

Magnesium is necessary in the body for healthier digestion Magnesium above specified limit cause Gastro intestinal irritation in presence of sulphate ion. WHO the acceptable limit for potable water is 50-100 mg/l.
WINTER Season shows highest value at **BAMBUSAR** and lowest value at **AMLESHWAR**.
SUMMER Season shows highest value at **BAMBUSAR** and lowest value at **BHUVA**.
MONSOON Season shows highest value at **BAMBUSAR** and lowest at **AMDADA**.

3.6 Chloride content

Almost all water bodies contain chloride. Even common salt contain more than 50% of Chloride. Excess of Chloride cause the séance toward its taste, also the Laxative effect, Heart and Kidney diseases. According to WHO the acceptable limit for potable water is up to 250 mg/l.

WINTER Season shows highest value at **BAMBUSAR** and lowest value at **AMDADA**.

SUMMER Season shows highest value at **AMLESHWAR** and lowest value at **BHUVA**.

MONSOON Season shows highest value at **AMLESHWAR** and lowest at **BHUVA**.

3.7 SO_4^{-2} content

Sulphate has very less effect on the taste of water as compare to chloride. The desirable limit of drinking water prescribed by WHO is 200-400 mg/l. The content higher than specified limit causes diarrhoea and intestinal disorders.

WINTER Season shows highest value at **ADOL** and lowest value at **AMDADA**.

SUMMER Season shows highest value at **ADOL** and lowest at **BAMBUSAR**.

MONSOON Season shows highest value at **BHUVA** and lowest at **AMDADA**.

3.8 NO_3^{-1} content

Though the nitrate is combined form of nitrogen which is essential for healthy growth of plant Kingdom but its nitrate form may cause Diarrhea in child and adult where as when the water use to prepare baby food is having nitrate content more than specified limit it cause Blue baby syndrome. The desirable limit of drinking water prescribed by WHO is up to 45 mg/l.

WINTER Season shows highest value at **AMLESHWAR** and lowest value at **BHUVA**.

SUMMER Season shows highest value at **BHUVA** and lowest value at **AMLESHWAR**.

MONSOON Season shows highest value at **AMDADA** and lowest value at **AMLESHWAR**.

3.9 Fluoride content

Numerous of minerals are found as fluoride salts which make it soluble. It is necessary in certain limit because beyond that it cause fluorosis, porous bone etc. Desirable limit of Fluoride content in potable drinking water as prescribed by WHO is 0.6-1.2 mg/l.

WINTER Season shows highest value at **AMLESHWAR** and lowest value at **BHUVA**.
SUMMER Season shows highest value at **BHUVA** and lowest value at **ADOL**.
MONSOON Season shows highest value at **BHUVA** and lowest value at **ADOL**.

3.10 Alkalinity

It's a combined property of water that it content carbonate and hydroxide. In other terms it can be said that ability to neutralize acid. Maximum permissible limit as prescribed by WHO is 600 mg/l.
WINTER Season shows highest value at **AMDADA** and lowest value at **BAMBUSAR**.
SUMMER Season shows highest value at **AMLESHWAR** and lowest value at **AMDADA**.
MONSOON Season shows highest value at **AMLESHWAR** and lowest value at **BHUVA**.

3.11 Turbidity

Desirable limit is Up to 10NTU.
WINTER Season shows highest value at **AMDADA** and lowest value at **AMLESHWAR**

& **BAMBUSAR**.
SUMMER Season shows highest value at **AMLESHWAR** and lowest value at **BAMBUSAR**.
MONSOON Season shows highest value at **ADOL** and lowest at **BAMBUSAR**.

4. Conclusion

Physicochemical parameter such as, P^H, Total dissolve solid (TDS), Total hardness, Total alkalinity, Chloride, Sulphate, Calcium, Magnesium, Nitrate values, Fluoride and Turbidity are varied according to season to season play an important role in the quality of water. All the parameters were measure in terms of Winter, Summer and Monsoon season and it is concluded that there is no significant change in the parameters as the season gets change.

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