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Selected Physico-Chemical Parameters of Ground Water from Limbdi Taluka of Surendranagar District-Gujarat

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ABSTRACT:

Physico chemical parameters such as pH, Total dissolve solid (TDS), Total hardness, Total alkalinity, Chloride, Sulphate, Calcium, Magnesium, Nitrate values, Chemical oxygen demand (COD), Biological oxygen demand (BOD), Fluoride and Turbidity are measured and analysed for six station of **Limbdi Taluka of Surendranagar** district. All the parameter measurements are made 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 six stations in terms of 13 parameters.

KEY WORDS: Ground water, COD, BOD, Calcium content, Turbidity.

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1. INTRODUCTION:

Normal resources are the significant wealth of our country, water is one of them. Water is a roam of the nature. " *No life without water* " is a widespread saying reliable upon the fact that water is the one of the naturally found required of all life helpful activities¹ Since it is a active system, having living as well as nonliving, inorganic, organic , soluble as well as insoluble matter. So its superiority is likely to variable day by day and from foundation to source. Any variable in the natural superiority may disturb the balance system and would become unsuitable for chosen uses. The essential of water through surface and groundwater capital has become significant day to day. Only 1% part is total available on land for agriculture, drinking, domestic power generation, industrial, transportation, consummation and waste removal².

In India, most of the population is dependent comparative on surface water (damp water) as the only source for intake water provide. The ground water is whispered to be moderately much spotless and free from contamination than surface water. But long-standing discharge of manufacturing effluents, household sewage and solid waste dump causes the groundwater to become contaminated and created health problems³. The quick growth of municipal areas has additional affected groundwater excellence due to overexploitation of capital and unseemly waste dumping practices. Hence, there is always a require for and anxiety over the defence and organization of surface water and groundwater superiority⁴.

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Heavy metals are precedence toxic pollutants that harshly limit the helpful use of water for family and engineering submission⁵. The lakes have composite and easily broken ecosystem, as they do not contain self maintenance capacity and consequently readily collect pollutants⁶. The physicochemical parameters and draw metal filling of water sample from Delhi were assess⁷. The consequence of industrialization and urbanization lead to spoil the water. For undeveloped purpose ground water is enhance in rural areas particularly in those area where other source of water like barrier and river or the inland waterway is obtainable. During last decade, this is observed that the surface water get spoiled drastically because of increased human activities⁸⁻¹⁰. Our present work have importance is to overcome the problems arises due to polluted water. From above introductory part we have planned to analysed ground water of 06 stations of **Limbdi** taluka- **Surendranagar**, Gujarat with respect to thirteen parameter such as pH, Total dissolve solid (TDS), Total hardness, Total alkalinity, Chloride, Sulphate, Calcium, Magnesium, Nitrate values, Chemical oxygen demand (COD), Biological oxygen demand (BOD), 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 pH, Total dissolve solid (TDS), Total hardness, Total alkalinity, Chloride, Sulphate, Calcium, Magnesium, Nitrate values,

Sr. No.	Parameters of water analysis	Methods
1	p ^H	Digital P ^H Meter
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	COD & BOD	Open reflux method
10	F ⁻	Spectrophotometer

Chemical oxygen demand (COD), Biological oxygen demand (BOD), Fluoride and Turbidity were carried out by following methods¹¹

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)¹¹. The water samples will be collected nearly from 6 stations of Wadhwan Taluka. During the winter, Summer and Monsoon seasons. Physicochemical parameter such as pH, Temperature, Chloride, Sodium, Nitrate, Chloride content, Fluoride content, Sulphate content, Turbidity, COD and BOD etc will be planning to study.

Table 1 Physico-chemical analysis of ground water of **Limbdi** taluka of **Surendranagar** district, Gujarat (winter).

SR. NO.	NAME OF PARAMETERS	NAME OF STATIONS					
		AANANDPAR	BALOL	BODIYA	DEVPARA	JASAPAR	DHOLI
1	TDS	486	504	448	594	744	628
2	pH	6.92	7.41	7.92	7.40	7.80	7.84
3	T. Hardness	424	316	340	280	228	260
4	Ca ⁺²	61	36	34	50	33	51
5	Mg ⁺²	39	88	35	30	28	20
6	Cl ⁻¹	80	28	96	164	160	108
7	SO ₄ ⁻²	22	22	28	11	17	42
8	NO ₃ ⁻¹	41.84	13.13	18.05	21.33	8.0	8.2
9	F ⁻¹	0.3	0.6	0.3	0.7	1.2	0.2
10	Alkalinity	312	288	308	380	456	352
11	Turbidity	3.2	1.2	1.6	2.8	2.4	4.1
12	COD	13	10	9	10	11	14
13	BOD	6	8	10	4	2	4

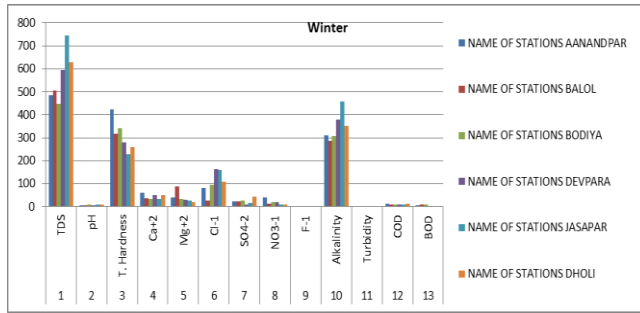


Figure 1 Physico-chemical parameter of ground water of Limbdi taluka (Winter).

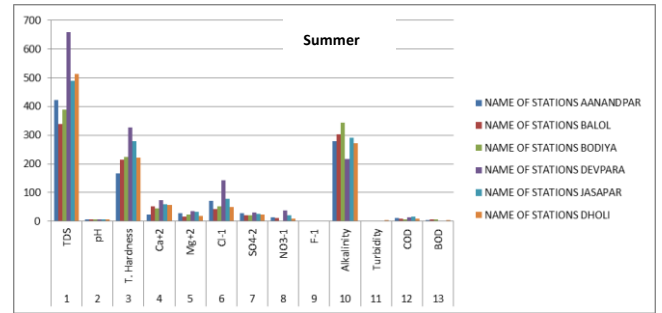


Figure 2 Physico-chemical parameter of ground water of Limbdi taluka (Summer).

Table 2 Physico-chemical analysis of ground water of Limbdi taluka of Surendranagar district, Gujarat (Summer).

SR. NO.	NAME OF PARAMETERS	NAME OF STATIONS					
		AANANDPAR	BALOL	BODIYA	DEVPARA	JASAPAR	DHOLI
1	TDS	422	340	390	658	490	514
2	pH	7.80	6.93	7.84	7.76	7.12	7.05
3	T. Hardness	168	214	225	328	280	223
4	Ca ⁺²	24	51	45	74	60	56
5	Mg ⁺²	29	16	24	36	33	18
6	Cl ⁻¹	72	42	52	144	78	50
7	SO ₄ ⁻²	28	21	20	30	26	24
8	NO ₃ ⁻¹	13.95	10.44	0.68	38.56	22.15	9.02
9	F ⁻¹	1.76	0.24	1.45	1.10	0.49	0.52
10	Alkalinity	280	302	344	216	290	271
11	Turbidity	2.6	1.4	2.8	2.2	1.6	3.5
12	COD	11	8	7	14	16	10
13	BOD	4	6	7	3	0	5

Table 3 Physico-chemical analysis of ground water of Limbdi taluka of Surendranagar district, Gujarat (Monsoon).

SR. NO.	NAME OF PARAMETERS	NAME OF STATIONS					
		AANANDPAR	BALOL	BALOL	DEVPARA	JASAPAR	DHOLI
1	TDS	566	718	584	628	776	526
2	pH	7.84	7.18	7.52	7.80	7.86	8.90
3	T. Hardness	260	396	340	452	216	244
4	Ca ⁺²	45	83	59	85	38	46
5	Mg ⁺²	39	47	36	64	72	22
6	Cl ⁻¹	104	140	116	120	28	76
7	SO ₄ ⁻²	20	36	38	40	49	28
8	NO ₃ ⁻¹	12.31	44.3	15.59	23.79	11.48	21.33
9	F ⁻¹	1.26	1.19	0.89	1.03	1.33	0.95
10	Alkalinity	340	236	348	216	368	284
11	Turbidity	3.2	3.8	3.3	4.0	1.2	1.4
12	COD	1.76	2.16	0.49	0.68	1.12	0.14
13	BOD	3	7	12	6	2	6

3. RESULT AND DISCUSSION

Maximum and minimum values of parameters of ground water quality of Limbdi taluka of Surendranagar district, Gujarat.

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/l⁶.

Winter Season shows highest value at DHOLI and lowest value at AANANDPAR.

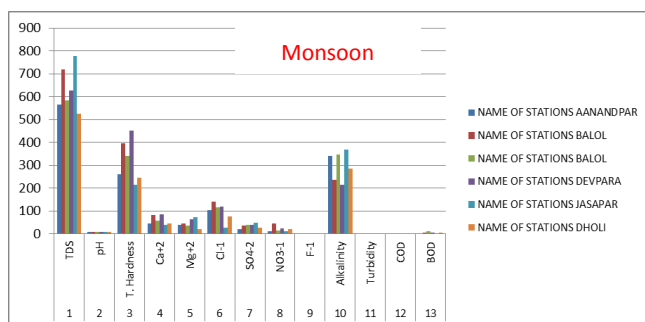


Figure 3 Physico-chemical parameter of ground water of Limbdi taluka (Monsoon).

Summer Season shows highest value at DEVPARA and lowest at BALOL.

Monsoon Season shows highest value at JASAPAR and lowest at DHOLI.

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 6.5-8.5⁶.

Winter Season shows highest value at BALOL and lowest value at AANANDPAR.

Summer Season shows highest value at BALOL and lowest at BALOL.

Monsoon Season shows highest value at DHOLI and lowest at BALOL.

3.3 Total Hardness

Its 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 dard consequences but depending in the values of Ca⁺² and Mg⁺² hardness⁶.

Winter Season shows highest value at AANANDPAR and lowest value at JASAPAR.

Summer Season shows highest value at DEVPARA and lowest at AANANDPAR.

Monsoon Season shows highest value at DEVPARA and lowest value at JASAPAR.

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/l⁶.

Winter Season shows highest value at AANANDPAR and lowest value at JASAPAR.

Summer Season shows highest value at DEVPARA and lowest at AANANDPAR.

Monsoon Season shows highest value at DEVPARA and lowest at JASAPAR.

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/l⁶.

Winter Season shows highest value at BALOL and lowest value at DHOLI.

Summer Season shows highest value at DEVPARA and lowest at BALOL.

Monsoon Season shows highest value at JASAPAR and lowest at DHOLI.

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/l⁶.

Winter Season shows highest value at DEVPARA and lowest value at BALOL.

Summer Season shows highest value at DEVPARA and lowest at BALOL.

Monsoon Season shows highest value at BALOL and lowest at JASAPAR.

3.7 SO₄⁻² 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/l⁶. The content higher than specified limit causes diarrhoea and intestinal disorders.

Winter Season shows highest value at DHOLI and lowest value at DEVPARA.

Summer Season shows highest value at DEVPARA and lowest at BALOL.

Monsoon Season shows highest value at JASAPAR and lowest at AANANDPAR.

3.8 NO₃⁻ 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/l⁶.

Winter Season shows highest value at AANANDPAR and lowest value at JASAPAR.

Summer Season shows highest value at DEVPARA and lowest at BALOL.

Monsoon Season shows highest value at BALOL and lowest at JASAPAR.

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/l⁶.

Winter Season shows highest value at Hindoliya and lowest value at Bara.

Summer Season shows highest value at AANANDPAR and lowest at BALOL.

Monsoon Season shows highest value at JASAPAR and lowest at BALOL.

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/l⁶.

Winter Season shows highest value at JASAPAR and lowest value at BALOL.

Summer Season shows highest value at BALOL and lowest at DEVPARA.

Monsoon Season shows highest value at JASAPAR and lowest at DEVPARA.

3.11 Turbidity

Desirable limit is Up to 10NTU⁶.

Winter Season shows highest value at AANANDPAR and lowest value at BALOL.

Summer Season shows highest value at DHOLI and lowest at BALOL.

Monsoon Season shows highest value at DEVPARA and lowest at JASAPAR.

3.12 COD

It is a measure of the required oxygen for the oxidation of organic matter.. It is the most essential property of the water. Generally the ground water have dissolve oxygen value 4.2 mg/l to 6.0 mg/l. WHO recommends the water having DO value greater than 3mg/l as potable water. Water saturated with oxygen

gives a pleasant taste. Water with DO less than specified limit may prove to be fetal for aquatic Kingdom⁶.

Winter Season shows highest value at DHOLI and lowest value at BALOL.

Summer Season shows highest value at JASAPAR and lowest at BALOL.

Monsoon Season shows highest value at BALOL and lowest at DHOLI.

3.13 BOD

Biochemical Oxygen Demand (BOD) reflects the value of oxygen required to oxidize organic waste in water using bacteria and/or protozoa. In case of high BOD levels the value of DO decreases. Nitrates, phosphates salts in water increases the chances for plant Kingdom to survive as a result of which the BOD value increases and DO decreases. WHO recommends the water having BOD value up to 30mg/L as potable water⁶. Winter Season shows highest value at BALOL and lowest value at JASAPAR.

Summer Season shows highest value at BALOL and lowest at JASAPAR.

Monsoon Season shows highest value at BALOL and lowest at JASAPAR.

4. CONCLUSION

Physicochemical parameter such as, P^H, Total dissolve solid (TDS), Total hardness, Total alkalinity, Chloride, Sulphate, Calcium, Magnesium, Nitrate values, Chemical oxygen demand (COD), Biological oxygen demand (BOD), Fluoride and Turbidity are varied according to season so season play an important role in the quality of water. All the parameters were measure in terms of winter, Summer and Monsoon season.

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