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Physio Chemical Analysis of ground water from various part of Cuddalore District, Tamil Nadu (India)

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ABSTRACT

The study evaluation the groundwater quality in the different areas of the Cuddalore district of determine its suitability for drinking and other purposes. The physio chemical properties of a ground water sample from the cuddalore region are compared with standard limits specified by the BIS and the water quality parameters such as PH, TDS, Calcium, Magnesium hardness, Alkalinity and some heavy metals are assessed using Indian Standard Precedents. Based on the result, I was able to confirm that all ten ground water samples that were collected contained harmful substance that could harm humans and animals and be used for other purposes. The results also showed that all of the parameters of the samples were above the BIS standards.

INTRODUCTION

One of the materials that is widely present in nature is water. It makes up over 75% of the material that makes up the earth's crust and is a necessary component of all plant and animal life. About 70% of the human body is made of water is essential to all of all an animals and plants bodily processes. However excessively hard ground water can lead to health problem in human such as kidney, heart and nervous system issues. For this reason, analyzing the quality of ground water is crucial.

I decided to examine the groundwater quality of the cuddalore region because most nations these days evaluate (check) the ground water quality for drinking purposes. A few literature reviews are provided below:

In general calcium is the necessary for human health but when a person has an excess of calcium in their to known as hyper calcimia it can lead to a number of disease including heart problems, canes and even death is the blood calcium level reaches 160mg/100ml.

According to D. Kannan etal (2014) the groundwater samples from the Thiruvarur and Nagapattinam region are not fit for human consumption due to high levels of TDS, TA, Ca2+ and Fe+.

According to D. Kannan etal (2014) the groundwater samples from the Thiruvarur and Nagapattinam region are not fit for human consumption due to high levels of TDS, TA, Ca2+ and Fe3+.

According to the N. Mani etal several groundwater samples in the Thanjavur region were contaminated due to the presence of excess of TDS, total alkaline, magnesium hardness and calcium hardness.

There are many water purifiers available in the market which have different techniques like boiling, filtration, distillation, chlorination, sedimentation and orientation. Currently nano technology plays a manipulation atoms in a nano scale. In nanotechnology, nano membranes are used with the purpose of softening the water and removal of contaminants. There are variety of techniques in nanotechnology which uses nanoparticle for providing safe drinking water with a high level of effectiveness.

STUDY AREA

Cuddalore the center of Tamil Nadu is a grown industrial city between latitude 11.43 North and 79.49 East. It is situated 200km south of Chennai and less than 25Km of Pondicherry. It has a long history of having with the orient and accident as pat town. The 27 sq. Km district is divided into 136 panchayat villages and six taluks. In this district bore will water is used for irrigation and drinking SPICOT was founded in 1984 and now occupies 518-19 acers. It spans from semmankuppam in the south to Pachaiyankuppam in the north and is situated 8Km from the Cuddalore to Chidambaram route.

Objective

1. To study the physicochemical parameters in the Cuddalore District
2. To evaluate the ground water quality in the wells and bore wells in and around the cuddalore District.

TABLE: 1 SAMPLING POINT OF CUDDALORE REGION

S.NO	Sampling Point	Sampling Point Number
1	Sochikadu	S1
2	Mandapam	S2
3	Semmankuppam	S3
4	Sonanchavadi	S4
5	Thechan Colony	S5
6	Varaikadu	S6
7	Kudikadu	S7
8	Thaikal	S8
9	Pachayankuppam	S9
10	Thechan Colony	S10

MATERIAL AND METHOD

Water samples were taken in plastic bottle made of poly propylene that had been previous sterilized and sealed. The sampling process and completed in.

The bottles (canes) containing the samples were stored in the refrigerator. The 13 analytical method was used to determine the physicochemical parameters. The techniques of estimating the variation of physicochemical parameters are listed.

TABLE:2 METHODS USED FOR ESTIMATION OF VARIATION PHYSICO CHEMICAL PARAMETER

S.No	Parameters	Methods
1	Magnesium	EDTA Trimetric method
2	Calcium	EDTA Titrimetric method
3	Sulphate	Turbidity method
4	Chloride	Argentometric method
5	Total Alkalinity	Titrimetric method
6	Total Dissolved Solids	Gravimetric method
7	Electrical Conductivity	Conductimetric
8	Turbidity	Nephelometric method
9	PH	PH – meter
10	Appearance	Platinum – cobalt method
11	Nitrate	Chemotropic acid method
12	Iron	1, 10 phenanthroline method
13	Fluoride	Zirconium alizarin method

RESULTS AND DISCUSSION

Water samples were gathered from different area within the cuddalore region and their physical and chemical properties were examined. The BIS drinking water quality guidelines were compared with the results.

APPEARANCE - The color of water can be caused by specific mineral matter in solution by the presence of fine particles in suspension. The collected samples as a whole lacked color.

ELECTRICAL CONDUCTIVITY - The ability of water to transfer current can be attributed to the presence of ionic species and soluble salts which function as conduction media. The of the sample sites in the current study have EC values.

TOTAL DISSOLVED SOLIDS - TDS provides information about ground water salinity behavior. Water with more than 500mg/l of TDS is typically regarded as undesirable for use in drinking water supplies. Ground water TDS ranges from 800mg/l. Ground water samples from the cuddalore region have been found to surpass the BIS desirable limit.

TURBIDITY - Organic matter clay, phytoplankton and other substance cause turbidity in natural water. There is no turbidity in any of the collected groundwater sample.

PH – Water suffering quality generally affects PH. The range of the water sample was 7.85 to 7.31. Every sample that was found to be within the BIS permissible limit was nearly neutral and safe.

ALKALINITY - The hydroxides, bicarbonate and carbonates that are present in water cause it to be alkaline. In the current investigation the alkalinity varied between 200 and 352mg/l. All of the gathered ground water samples have alkalinity levels above the BIS desirable limit. The human abdomen is impacted by the excessive alkalinity of groundwater.

TOTAL HARDNESS - The association of certain inorganic fons with carbonate is the cause for the hardness of water. The total hardness of the samples of ground water varies from 181mg/l to 693mg/l.

CHLORIDE - The value indicates concentration range of 111mg/l to 2042mg/l of chloride ion. A small percentage of the groundwater samples that were collected contain high levels of chloride ions.

SULPHATE - the primary source of elevated sulphate concentration is drainage water. The BIS desirable limit is not exceeded by the sulphate concentration of any of the ground water samples that were collected region varied from 31mg/l to 97mg/l

CALCIUM - According the water sample calcium content ranged from 23mg/l to 172 mg/l. Groundwater sample number S3 in the cuddalore region has a higher concentration of calcium hardness than the BIS limit.

MAGNESIUM - Table 4 shows the range of magnesium hardness measurements which was 20mg/l to 79mg/l. There is an excess of magnesium hardness in the groundwater samples number S1, S2, S3, S4, S5 and S 10.

NITRATE - The most highly oxidized form of nitrogen in this one. The primary source of nitrate is the biological oxidation of nitrogenous substance found in sewage. Table – 4 show the samples nitrate concentration which range from 12 mg/l to 22 mg/l. the nitrate concentration of the ground water samples that were collected is within the BIS desirable limit.

FLOURIDE - The primary source of fluoride ions is industrial water. The fluoride ion content of all the ground water samples that were gathered is within the desired BIS limit.

IRON – Ferrous and Ferroric forms are the two commons forms of iron in natural water, the ferric form usually predominates. The iron levels in the groundwater samples that were collected ranges from 0.23mg/l to 0.34mg/l. The majority of the ground water samples from the cuddalore region have an excessively high iron concentration. Over abundance of iron resulting in ferric fading.

TABLE:3 PHYSICAL PARAMETERS OF GROUND WATER COLLECTED FROM CUDDALORE REGION

Parameter	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	BIS DESERABLE LIMIT
Appearance	Clear	Clear	Clear	clear	Clear	Clear	Clear	clear	clear	Clear	
Conductivity	2085	1201	5100	1665	176	1230	1201	1245	1158	1448	
TDS	1141	831	352	1151	1221	851	831	861	801	1001	500mg/l
Turbidity	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	0.2NTO

TABLE :4 CHEMICAL PARAMETERS OF GROUNDWATER COLLECTED FROM CUDDALORE REGION

Parameter	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	BIS Desirable Limits
PH	7.85	7.31	7.50	7.37	7.60	7.70	7.80	7.30	7.90	7.30	6.5 – 8.5
TH	409	293	693	401	349	229	181	185	261	297	400mg/l
TA	349	201	353	229	337	293	305	333	205	257	200mg/l
Cl	443	122	2042	273	284	120	151	156	111	219	200mg/l
$S04^{2-}$	37	35	97	31	39	33	37	36	35	38	200mg/l
Fe	0.23	0.34	0.34	0.23	0.23	0.23	0.34	0.23	0.34	0.23	0.1mg/l
Ca^{2+}	32	32	172	66	52	52	41	23	49	31	75mg/l
Mg^{2+}	80	52	62	58	25	25	20	32	35	54	30mg/l
No_3	12	15	18	12	20	17	22	15	15	19	45mg/l
F^-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	1mg/l

CONCLUSION

The current study reveled that because the groundwater in the area have excessive levels of TDS, chloride, iron and magnesium hardness, none of the ten ground water samples were physically or chemically suitable for human samples were found to be above that was gathered contained dangerous material that are determined to human health. This study increases the people of the cuddalore regions knowledge awareness.

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