ASSESSMENT OF DRINKING WATER SUITABILITY IN RURAL AREA

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Abstract

Groundwater is being increasingly recognized as a dependable resource to meet the demands of domestic, irrigation and industrial sectors all over the world. Water Quality is the critical factor that influence on human health. In this project the water quality of Lalgudi Taluk is determined by collecting 39 groundwater samples. To determine the important parameters like PH, EC, Hardness, Alkalinity, Chloride, Phosphate, TDS, Nitrite, Nitrate, Ammonia, Fluoride, Iron, and chlorine was identified by using a TWAD board kit. Then the results were analyzed by using WQI and MVSA. from the WQI analysis it's found that most of the samples lies in Poor Status and from MVSA analysis it found that three types of pollution that influence the ground water quality in Lalgudi Taluk namely domestic wastewater pollution (24%), agriculture pollution (18%) and chlorine pollution (13%).The TDS and pH is most pollution causing parameter and Pudukkottai in highly polluted place as per cluster analysis. To control the pollution in study area we suggest proper drainage system and control the discharge of waste water into the ground. To find out the highly contaminated pollutants and give idea for some remedial measures.

Keywords*: Ground Water, Parameter, Cluster Analysis, SPSS, WQI, MVSA, Principle Component Analysis, Pollutants, Remedial Measures.*

Introduction

Water is the most essential and one of the prime necessities of life. Rising demand of water for irrigation, agriculture, domestic consumption and industry is forcing stiff competition over the allocation of scarce water resources among both areas and types of use. The term groundwater is usually reserved for the subsurface water that occurs beneath the water table in soils and geologic formation that are fully saturated. It supports drinking water supply livestock needs irrigation, industrial and many commercial activities. Groundwater is generally less susceptible to contamination and pollution when compared to surface water bodies. Also the natural impurities in rainwater, which replenishes groundwater systems, get removed while infiltrating through soil strata. But in India, where groundwater is used intensively for irrigation and industrial purposes, a variety of land water based human activities are causing pollution of this precious resource.

Hazardous waste should always be disposed of properly, that is to say, by a licensed hazardous waste handler or through municipal hazardous waste collection days. Many chemicals should not be disposed of in household septic systems, including oils (e.g., cooking, motor), lawn and garden

chemicals, paints and paint thinners, disinfectants, medicines, photographic chemicals, and swimming pool chemicals. Similarly, many substances used in industrial processes should not be disposed of in drains at the workplace because they could contaminate a drinking water source. Companies should train employees in the proper use and disposal of all chemicals used on site. The many different types and the large quantities of chemicals used at industrial locations make proper disposal of wastes especially important for ground water protection. In this study to evaluate the water quality status in pudukkottai taluk and to identify the ground water pollution by using multi various statically analysis and water quality index.

Materials and Methods

To evaluate the nature of groundwater in the study area, water samples have been collected from different sites in selected locations of Pudukkottai District. The samples were collected in 1-litre plastic containers, which were thoroughly washed twice with the water to be analyzed. Determination of various physico-chemical parameters like pH, electrical conductivity, turbidity, alkalinity hardness, Total dissolved solids, nitrates, phosphates, sulphates, fluorides, chlorides etc., has been carried out within 6 hours after bringing the samples from the laboratory using Standard procedures.

Methodology

Iron and Fluoride Removal Methodology

- Raw water Iron
- Removal Resin
- Anion fluoride removal resin
- Pure water

Figure 1 Iron-removal resin and Strong-Basic-Anion-Fluoride-Removal-Adsorbent-Resin

Study Area

#	Town	State	Population	Latitudes	
1	Pudukkottai Municipality	Tamil Nadu	117,630	10° 22' 55.1"N	78° 48' 46.5" E
2	Pudukkottai Census Town	Tamil Nadu	26,116		
3	Nathampannai Census Town	Tamil Nadu	8,915	10° 24' 37.8"N	78° 47' 18.9" E
#	**Villages**	**Administrative Division**	**Population**	**Latitudes**	
1	Adanakottai	Pudukkottai	4,265	10° 35' 34.6"N	79° 10' 26.8" E
2	Agavayal	Pudukkottai	30		
3	Ayyavayal	Pudukkottai	77	10° 26' 47.7"N	78° 49' 44.9" E
4	Ganapathipuram	Pudukkottai	1,713		
5	Ichiadi I Bit	Pudukkottai	511	10° 25' 55.6"N	78° 53' 03.9" E
6	Ichiadi II Bit	Pudukkottai	350	10° 26' 00.5"N	78° 53' 38.2" E
7	Kallukaranpatti	Pudukkottai	1,605	10° 32' 34.5"N	78° 58' 55.0" E
8	Kavinad East	Pudukkottai	2,853	10° 22' 17.2"N	78° 48' 52.1" E
9	Kavinad West	Pudukkottai	4,227	10° 22' 09.3"N	78° 47' 21.6" E
10	Kedayapatti	Pudukkottai	405	10° 28' 55.3"N	78° 49' 16.7" E
11	Kulavaipatti	Pudukkottai	3,061	10° 24' 03.8"N	79° 00' 12.6" E
12	Kunichipatti	Pudukkottai	369	10° 28' 40.0"N	78° 50' 03.6" E
13	Kuppayampatti	Pudukkottai	1,006	10° 31' 08.8"N	78° 58' 00.4" E
14	Manaviduthy	Pudukkottai	3,081	10° 26' 58.0"N	78° 56' 37.9" E
15	Mangalathupatti	Pudukkottai	1,502	10° 30' 23.7"N	78° 54' 21.9" E
16	Mukkanpatti	Pudukkottai	1,414		
17	Mullur	Pudukkottai	5,451	10° 25' 41.5"N	78° 52' 31.3" E
18	Nemmelipatti	Pudukkottai	1,106	10° 30' 14.2"N	78° 57' 21.7" E
19	Perungalur	Pudukkottai	6,474	10° 29' 01.3"N	78° 56' 19.4" E
20	Perungondanividuthy	Pudukkottai	2,111		
21	Pudukkottai R.F.	Pudukkottai	26	10° 24' 53.6"N	78° 51' 01.3" E
22	Pulavankadu	Pudukkottai	2,158	10° 34' 30.3"N	79° 16' 11.3" E
23	Purakarai Natham	Pudukkottai	559	10° 23' 17.1"N	78° 46' 55.8" E
24	Puthambur	Pudukkottai	3,032	10° 29' 20.1"N	78° 49' 32.7" E
25	Sanivayal	Pudukkottai	180	10° 28' 54.2"N	78° 49' 21.5" E
26	Sellukudi	Pudukkottai	470	10° 24' 33.0"N	78° 46' 14.7" E
27	Sembattur	Pudukkottai	2,630	10° 29' 28.9"N	78°50' 31.8" E
28	Semmatividuthy	Pudukkottai	4,036	10° 25' 49.1"N	78°58' 15.6" E
29	Siruvayal	Pudukkottai	29		
30	Sokkanathapatti	Pudukkottai	1,092	10° 26' 22.3"N	78°43' 36.5" E
31	Tattampatti	Pudukkottai	281	10° 34' 54.6"N	78°03' 26.2" E
32	Tennathirayanpatti	Pudukkottai	541	10° 26' 52.5"N	78°50' 50.0" E
33	Thirumalaraya Samudram	Pudukkottai	3,288	10° 22' 55.1"N	78° 48' 46.5" E

34	Thondaman Urani	Pudukkottai	1,729	10° 30' 21.6"N	79° 01' 18.7" E
35	Vadavalam	Pudukkottai	7,563	10° 25' 36.6"N	79° 53' 34.4" E
36	Vagavasal	Pudukkottai	3,060	10° 26' 24.4"N	78° 48' 46.7" E
37	Vannarapatti	Pudukkottai	1,598	10° 30' 23.4"N	78° 58' 56.6" E
38	Varappur	Pudukkottai	1,667	10° 27' 46.7"N	78° 58' 41.7" E
39	Varappur R.F.	Pudukkottai	71	10° 27' 45.4"N	79° 00' 17.6" E

Results and Discussion

The project works have been divided into 4 major parts. They are,

- Data collection
- To prepare study area maps pertaining to ground water studies.
- To determine the physical and chemical characteristics of ground water samples.
- To analysis the ground water contamination levels and assesses the suitability for drinking.
- To achieve these goals the ground water samples were collected from bore wells.

Sample Analysis by Indian Standard Methods

Rapid industrialization and urban population growth over the past 30 to 40 years have introduced many important implications on the quality of water and to the overall environment. Urban, domestic and industrial consumers are using large quantity of water and consequently depleting the available resources, at the same time they are degrading the natural of water. Ground water is the most preferred water source in recent days

Sample Analysis

Testing of sample were done by the methods suggested in IS (Indian Standard). The following physical and chemical tests were conducted for all 39 samples.

Physical Tests

The collected samples were analysis for the physical tests like odour, Total Dissolved Solids, Electrical Conductivity and Appearance.

Chemical Tests

The collected samples were tested for the chemical parameters like pH, Alkalinity, Total Hardness, Iron, Ammonia, Nitrate, Nitrite, Phosphate, Fluoride, Chloride, Residual chlorine

Conclusion

The quality of water plays a prominent role in promoting both the standard of agricultural production and human health. It deterioration starts in water quality it will naturally affects the soil-crop-water system and human health conditions. In the initial period of water quality deterioration, the damage may be low but if it is not controlled at the right time, this water will not be suitable for any purpose. Water quality may vary depending upon variation in geological formations. Human

activity such as industrialization, mining and urbanization may also to determine its quality and classify the quality of water used for different purposes. Keeping these points in mind, an attempt was made to study the qualitative analysis of ground water and also to detect the sustainability of water quality for drinking and irrigation, by collection 39 samples in various places.

References

1. A Localized Study on Reducing Total Dissolved Solids Present in Southern California Tap Water Bill Wang1,* 1Redlands East Valley High School, Mentone, 92359, USA
2. A Review on Removal of Turbidity and TDS from Water by Using Natural Coagulants Article · February 2020
3. Phyto-remediation of total dissolved solids (TDS) by Eichhornia Crassipes, Pistia Stratiotes and Chrysopogon Zizanioides from second stage RO-Brine solution Abinaya S.1*, Saraswathi R.1 , Rajamohan S.2 and Mohammed Siraj Ansari M.1
4. Removal of Total Dissolved Solids (TDS) from Aquaculture Wastewater by Coagulationflocculation Process using Sesamum indicum extract: Effect of Operating Parameters and Coagulation-Flocculation kinetics Chinenye Adaobi Igwegbe*, Okechukwu Dominic Onukwul 2019