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Research Article

AN INVESTIGATION ON GROUNDWATER QUALITY USING DIFFERENT PHYSICO-CHEMICAL PARAMETERS IN ARIYALUR DISTRICT OF TAMIL NADU, INDIA

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Abstract

Water quality analysis was conducted to monitor the ground water of selected locations of Ariyalur district by evaluating the various physico-chemical parameters. Groundwater is important natural resource that is essential for human drinking and irrigation purposes. The fast industrial growth and unsuitable agricultural practices have affected the water sources. Ground Water samples were analyzed for various water quality parameters such as temperature, pH, electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), calcium hardness (CH), magnesium hardness (MH), alkalinity, acidity, dissolved oxygen (DO), Biochemical oxygen demand (BOD), chloride and fluoride to evaluate their quality. All the parameters compared with WHO standards.

Keywords: Groundwater, Physico-Chemical parameters, fluoride, BOD, Ariyalur District

Introduction

Water is essential to the existence of man and all living things. Ground water is used for Agricultural, Industrial, Domestic, Recreational and Environmental activities in Ariyalur district. The world's total water resources estimated at 1.37 x 10⁸ million ha. m of these global water resources about 97.2% is sea water and 2.8% is available as fresh water. Out of this 2.8% about 2.2% is available as surface water and 0.6% as ground water. As a result of excessive extraction of ground water to meet agriculture, industrial and domestic purposes drinking water is not sufficiently available during the critical summer months in many parts of the country.

The quality of ground water is a great important for human beings. The quality of ground water is a functional natural processes as well as anthropogenic activities. The ground water resources are under threat from pollution due to human life style manifested. In the present study was made on the physico-chemical parameters of the groundwater samples collected from

Ariyalur district of Tamil Nadu, India. Various physico-chemical parameters were tested and the results are discussed.

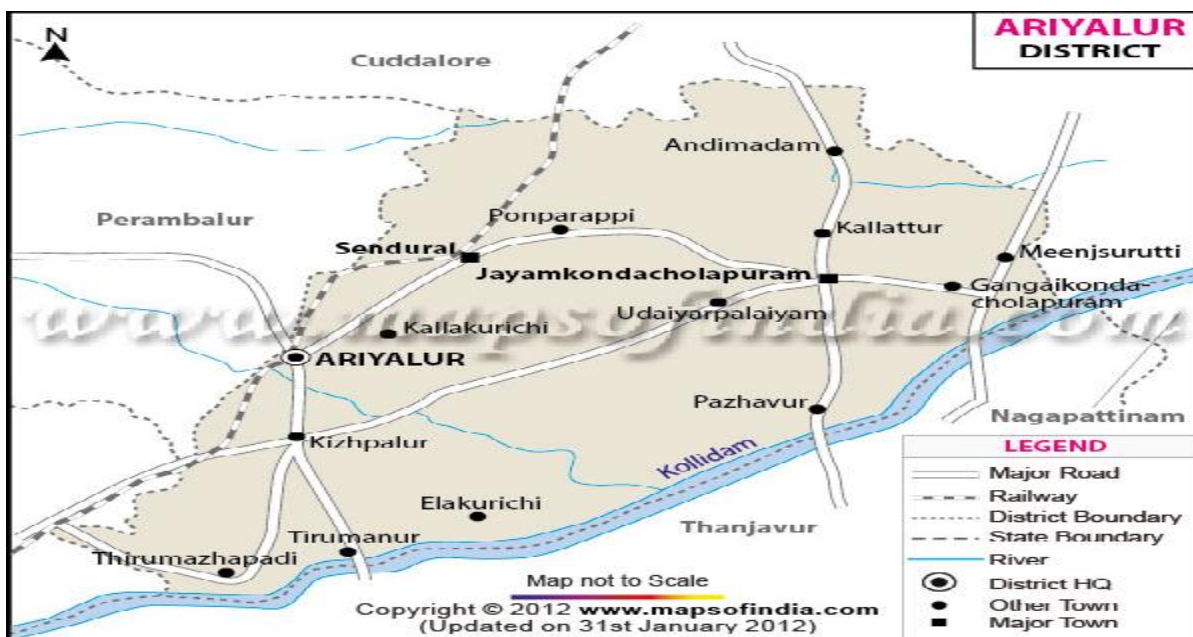
Materials and Methods

Study area

Ground water samples were collected from different hand pumps (HP) and bore wells (BW) of twenty sampling stations from the Ariyalur block. The sampling sites are rural places and the samples are major sources of drinking for the villagers, which are obtained from bore wells. The samples were collected in the polythene bottles which were previously sterile and cleaned. The analysis was carried out systematically both volumetrically and by instrumental techniques. The Procedures were followed from standard books and manuals. The pH, EC and temperature for all samples

were carried out within three hours of sampling time. In the present investigation the samples were collected during the month of August 2014 as pre-monsoon session. Ariyalur district is located at

11.1370° N, 79.0758° E latitude and 11.1370° N, 79.0758° E longitude. The nearby districts are cuddalore, perambalur and Tiruchirappalli.



Results and Discussion

The water samples were collected from Ariyalur district areas of udayarpalayam taluk, Senthurai taluk and kundapuram. The physico-chemical parameters of the collected water samples were analyzed and have been shown in table-1-3. The desirable pH ranges from 7.0 to 8.5. This value ranged from 6.8-8.5 in the study areas which indicate the pH is in the desirable limit as prescribed for drinking water standard. The electrical conductivity value is in the ranges of 4.0-4.5 which indicate the total ionic composition of water. The

total solids of all the three samples were registered within the desirable limit of WHO (500mg/l minimum and 1000mg/l maximum).

The total hardness (calcium + magnesium) of all the samples showed within the recommended limits of 75 mg/l. The maximum and minimum value of total alkalinity was measure from the study area is at 50 mg/l to 90mg/l within the desirable limit. The DO and BOD of all the samples were not exceeding in the limit given by WHO.

Table-1 Physico-chemical parameters of water sample Source: Ground water sample (HP)
Location: Kundhapuram(A)

S.No	Parameters	Values
1	Temperature °C	30
2	P ^H	8.5
3	Total Solids	1000
4	Total Hardness	76
5	Magnesium Hardness	2
6	Calcium Hardness	74
7	Alkalinity (mg ^l ⁻¹)	80
8	Acidity (mg ^l ⁻¹)	15
9	Dissolved Oxygen (mg ^l ⁻¹)	4.45
10	Chloride (Cl) (mg ^l ⁻¹)	Present
11	Fluoride (mg ^l ⁻¹)	Present

Table-2 Physico-chemical parameters of water sample Source: Ground water sample (BW)
Location: Senthurai (B)

S.No	Parameters	Values
1	Temperature °C	31
2	P ^H	6.8
3	Total Solids	1000
4	Total Hardness	80
5	Magnesium Hardness	4
6	Calcium Hardness	76
7	Alkalinity (mgL ⁻¹)	50
8	Acidity (mgL ⁻¹)	20
9	Dissolved Oxygen (mgL ⁻¹)	8.10
10	Chloride (Cl) (mgL ⁻¹)	Present
11	Fluoride (mgL ⁻¹)	Present

Table-3 Physico-chemical parameters of water sample Source: Ground water sample (BW)
Location: Udayarpalayam (C)

S.No.	PARAMETERS	A	B	C
1	Temperature, °C	30	31	30
2	pH	8.5	6.8	7.5
3	Electrical conductivity (µs)	4.3	4.5	4.0
4	Total Solids (mgL ⁻¹)	1000	1000	1000
5	Total Hardness (mgL ⁻¹)	76	80	90
6	Calcium Hardness (mgL ⁻¹)	74	76	04
7	Magnesium Hardness (mgL ⁻¹)	2	4	86
8	Alkalinity (mgL ⁻¹)	80	50	90
9	Acidity (mgL ⁻¹)	15	20	10
10	Dissolved oxygen(mgL ⁻¹)	4.45	8.10	6.48
11	BOD(mgL ⁻¹)	3.64	5.27	6.08
12	Chloride (Cl), mgL ⁻¹	Present	Present	Present
13	Fluoride (F), mgL ⁻¹	Present	Present	Present

Table-4 Comparative results of water samples

S.No	Parameters	Values
1	Temperature °C	30.00
2	P ^H	7.5
3	Total Solids	1000
4	Total Hardness	90
5	Magnesium Hardness	86
6	Calcium Hardness	4
7	Alkalinity (mgL ⁻¹)	90
8	Acidity (mgL ⁻¹)	10
9	Dissolved Oxygen (mgL ⁻¹)	6.48
10	Chloride (Cl) (mgL ⁻¹)	Present
11	Fluoride (mgL ⁻¹)	Present

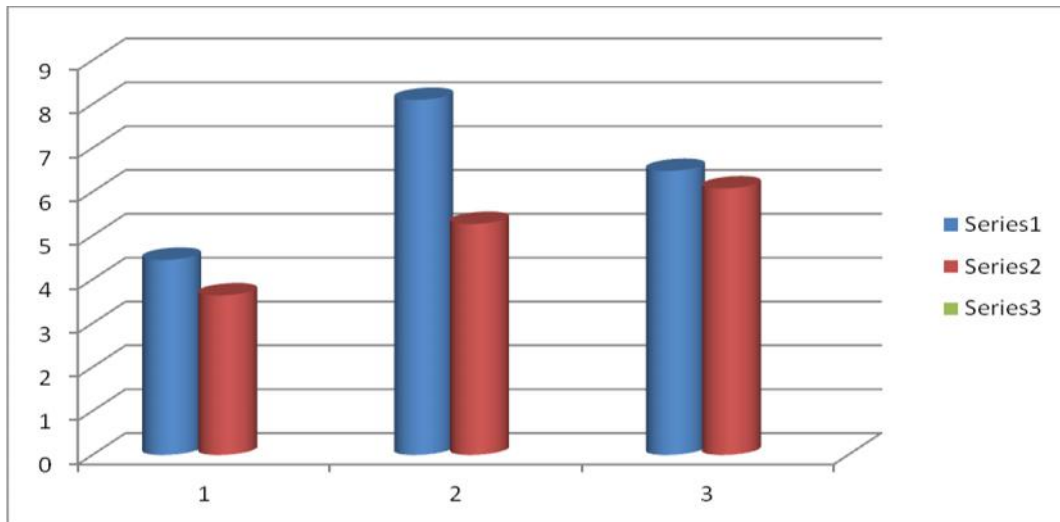


Fig. 1: Temperature, pH and EC comparison chart

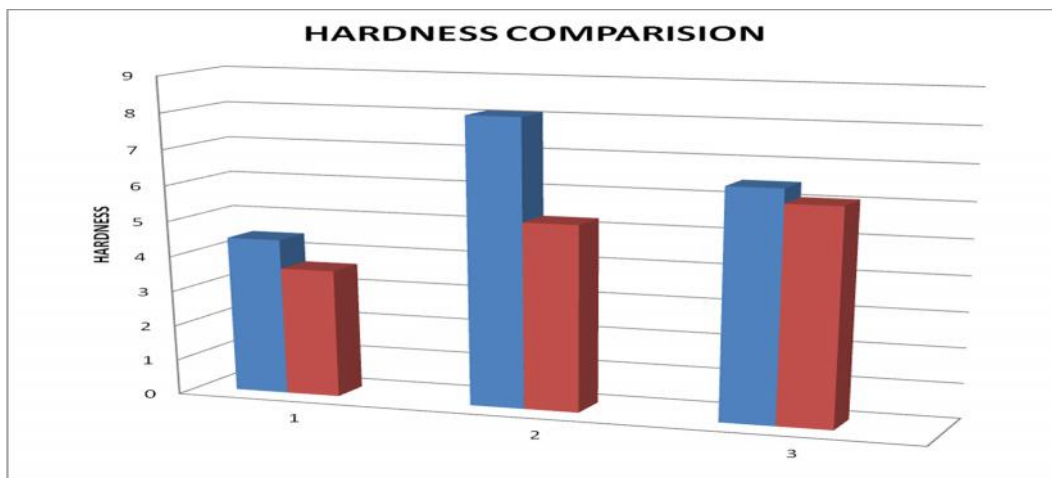


Fig. 2: TH, CH and MH comparison chart

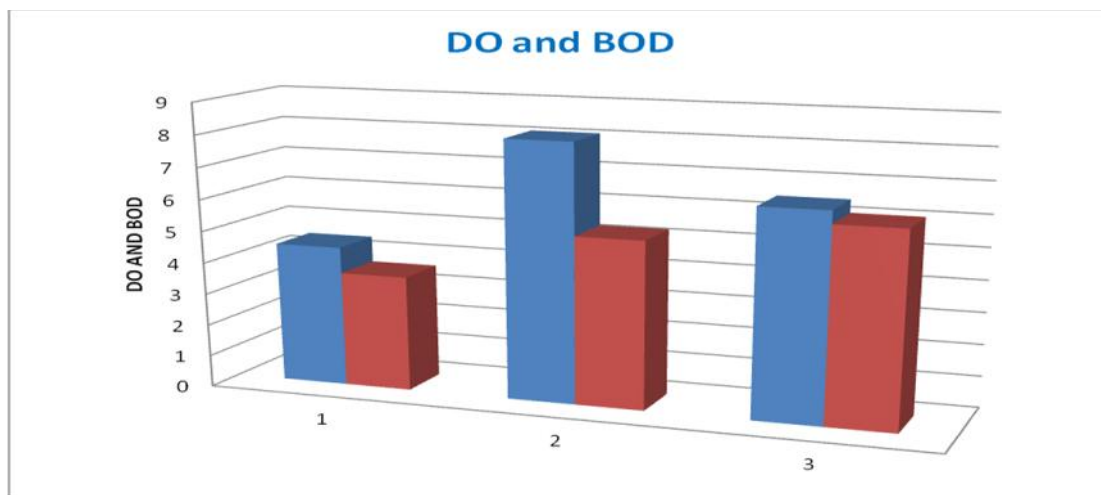


Fig.3 DO and BOD comparison chart

Conclusion

The water samples were collected from bore well and hand pump and tested various physico-chemical parameters revealed that, most of the parameters were found within the recommended limit of WHO. In some samples the above tested parameters were beyond the permissible limit as per standard. So the proper environment management plan may be adopted to control drinking water pollution. The groundwater samples of these areas need the treatment before drinking to prevent the adverse health effect on human beings.

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References

1. Yadav Janeshwar, Pathak R.K. and Khan Eliyas, *Int. Res. J. Environment Sci.*, Vol. 2(1), 9-11, January-2013.
2. Munirah Abdul Zali, Ananth Retnam, Hafizan, Juahir, Sharifuddin M. Zain,
3. Mohd Fadhil Kasim, Baharuddin Abdullah and Syaiful Bahren Saadudin *World Applied Sciences Journal*, 60-65, 2011.
4. S. A. Manjare, S. A. Vhanalakar and D. V. Muley, *International Journal of Advanced Biotechnology and Research*, 1 (2), 115-119, Dec-2010.
5. Raymond A.Wuana and Felix E. Okieimen, *International Scholarly Research Network ISRN Ecology*, Article ID 402647, 2011.
6. Ajit M. Kalwale, Padmakar A. Savale, *Advances in Applied Science Research*, 3 (1):273-279, 2012.
7. Medudhula.Thirupathaiah, Ch.Samatha, Chintha Sammaiah *International Journal of Environmental Sciences*, 3(1), 2012.
8. Manish Upadhyay¹, Vijay Laxmi Gupta, *IOSR Journal of Engineering (IOSRJEN)*, 3 (1), 42-45, 2013.
9. Pagariya S. K, *International Journal of Chemical and Physical Sciences*, 1 (2), 2012.
- 10.P. Lilly Florence¹, A. Paulraj and T. Ramachandramoorthy, *IJAPBC*, 2(2), 2013.
11. Krishnamoorthy, A. and S. Selvakumar, *International Journal of Research in Environmental Science and Technology*, 2(2): 22-26, 2012.
12. Patil VT and Patil PR, *Electronic Journal of Chemistry*, 7(1), 111-116, 2010.
- 13.Fazul Hoque AKM, Khaliquzzaman M, Hossain MD and Khan AK, *Fluoride*, 36(1), 38-44, 2003.
- 14.Singh, K.P. and H.K. Parwana, *Indian J Environ Prot*, 19(4):241-244, 1999.
- 15.Singh, M. and K. C. Gupta, *Indian J. of Env. Protection*, 24(3): 182-186, 2004.
- 16.Sinha, A.K., Kiran Srivastava and K.N. Srivastava, *Indian J Environ Prot*, 14 (12), 888-890, 1994.
- 17.Sinha, D. K., S. Saxena and R. Saxena, *Indian J. of Env. Protection*, 24(1): 49-52, 2004.
- 18.Srinivas, CH., Piska Ravi Shankar, C. Venkateshwar, M.S. Satyanarayana Rao and R. Ravinder Reddy, *Poll Res.*,19(2): 285-289, 2000.
- 19.Srivastava, R. K. and S. Srivastava, *Indian J. of Env. Protection*, 23(3), 282-285, 2003.
- 20.Tommy, W. S. Chow, Gou Fei and Siu-yeung Cho, *IEEE Trans on industrial electronics*, 44(5), 707-760, 1997.
- 21.Troussellier, M, P. Got, M. Bouvy, M. Moboup, R. Ar., F. Lebihan, P. Monfort, D. Corbin and C. Bernard, *Marine Pollution Bulletin*, 48: 852–862, 2004.