

Assessment of groundwater quality in Manapparai taluk, Tiruchirapalli District

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Abstract — Contamination of drinking water by human and industrial activities is a serious apprehension now-a-days. Thus the analysis of the water quality is very important to preserve and safeguard the natural eco system. Our Assessment of ground water quality is in Manapparai Taluk. In present investigation, the quality of ground water along Manapparai Taluk was studied. Forty water samples have been collected from bore well and open well water samples were collected in clean polythene bottles for analysis. Collected samples were immediately taken for its physiochemical analysis. Important parameters like P^H , Turbidity, Color, taste and Odor, Temperature, Total hardness, Total alkalinity, Total dissolved solids, dissolved solids, Dissolved oxygen and chlorides were analyzed as per Indian standards methods. From the results, the values were compared with permissible limits of various parameters as per Indian standard and World Health Organization and acceptable limits set for drinking water except fluoride. The evaluation of water quality parameters as well as water quality management practices should be carried out periodically to protect the water resources and to maintain the ecosystem of the environment.

Keywords—*quality, parameters, water resources.*

I. INTRODUCTION

Groundwater is an important source of irrigation which supply to more than 45% of the total irrigation in the country. People's lives and livings depend on water. Two-thirds of the earth surface is covered by water. Water is very important to life, without water our life cannot move. Availability of quality freshwater is one of the most serious environmental issues of the twenty first century. Due to excess use of ground water and less restoration is the major reason for depletion for groundwater. Groundwater is an important water

resource for domestic and agriculture in both country and urban parts of India.

The chemical composition of groundwater is very important criteria that determine the quality of water. Water quality is very important and often contaminated due to agricultural, industrial and human activities. Even though the natural environmental purification processes provide by means of eliminating pollutants from water, there are definite limits. It is up to the people to provide safety to protect and maintain quality of water. Drinking water with good quality is very important to improve the life of people and to protect the people from diseases. Pollution of groundwater comes from many sources. Discharge of waste disposal from agriculture, industries and municipalities are major source of groundwater pollution.

Sometimes surface run-off also brings mud, leaves, and human and animal wastes into surface water bodies. These pollutants may enter directly into the groundwater and contaminate it. Demand for clean water increases continuously with world population growth. Many areas of the world lack the fresh, drinkable water which is essential to survival of mankind. It has now become evident in many countries of the world that under groundwater is one of the most valuable natural resources, which supports living organism health, economic development and ecological diversity.

Groundwater is a vital natural resource. Depending on its usage and intake it can be a renewable or a non-renewable resource. It is estimated that approximately one third of the world's population use groundwater for drinking. Groundwater is the main source of water supply for domestic purposes in urban as well as rural parts of India. Among the various reasons, the most important factor are non-availability of potable surface water and a general belief that groundwater is purer and safer than surface water due to the protective qualities of the soil cover.

Therefore, analysis and determination of groundwater quality is most important factor to observe the suitability of water for a precise use. The problems of ground water quality are more acute in areas that are densely populated and thickly industrialized and have shallow groundwater tube wells. Geochemical studies of groundwater provide a better

understanding of possible changes in quality as development progress.

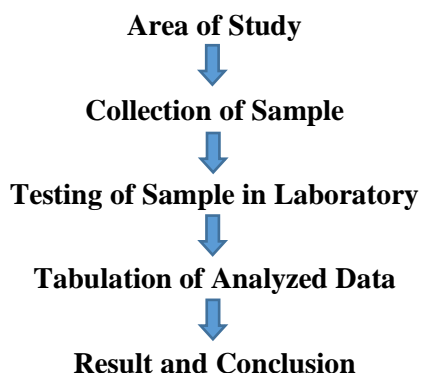
I. AREA OF STUDY

The Study area falls in Parts of Manapparai, Tiruchirappalli district .It lies between Latitude-10°36'North10°35'South Longidute-78°45'East78°25'west and covers an area of about 990.2sq.km.comprising of forty villages. Mostly rain fed area and main source of irrigation are tanks and wells. Groundnuts, Chilies, jowar, Bajra are major crops cultivated.

II. METHODLOOGY

In the present study, water samples were collected during the month of March in the study area. The samples were collected in 1 litre capacity of plastic bottles from 40 sites of study area. Measurement of electrical conductivity, P^H and temperature were measured using conductivity meter and a portable pH meter. Samples were collected in a clean polyethylene bottle and taken to laboratory for test.

In the laboratory, samples were analysis was carried within 48 hours of collection of sample. For the present analysis, the concentration of major cations, anions, pH and EC were estimated. The location of each collection area was based on discussion and study. The test results were compared with Drinking water specification with WHO (1984), Indian standards (1983). Then reason for the variation in test results were discussed.



III. CHEMICAL FACTORS OF WATER QUALITY

Major cations and anions present in Groundwater of Manapparai Taluk (2017)

Table 1: Analysis of Turbidity, TDS, P^H,EC

| SL. NO | LOCATION | Turbidity | TDS | P ^H | EC |
|--------|---------------|-----------|-------|----------------|-----|
| 1 | Periyapatti.K | 5 | 606.2 | 7.35 | 866 |

| | | | | | |
|----|---------------------|---|--------|------|------|
| 2 | Toppampatti | 2 | 1086 | 7.57 | 1551 |
| 3 | Samudram | 1 | 372.6 | 7.40 | 532 |
| 4 | Chithanatham | 2 | 2185 | 7.37 | 2185 |
| 5 | Mondipatti | 3 | 1762 | 7.35 | 1841 |
| 6 | Valanadu | 3 | 1000 | 7.40 | 1429 |
| 7 | Piranampatti | 4 | 596.6 | 7.37 | 852 |
| 8 | M.Idayapatti | 3 | 1568 | 7.43 | 2240 |
| 9 | Kalingapatti | 1 | 475 | 7.46 | 653 |
| 10 | Palakkurichi | 3 | 1525 | 6.88 | 2179 |
| 11 | Nallampillai | 1 | 1406.8 | 7.06 | 1040 |
| 12 | Vallala patti | 2 | 1208.2 | 7.26 | 1060 |
| 13 | V.Periyapatti | 1 | 900 | 7.17 | 1286 |
| 14 | Aniyappur | 2 | 720.6 | 7.14 | 1560 |
| 16 | Kalingapatti | 2 | 460 | 7.60 | 657 |
| 17 | Kannudaiyanpatti | 1 | 1143 | 6.96 | 1633 |
| 18 | Manapparai | 4 | 397.6 | 7.09 | 568 |
| 19 | Usilampatti | 2 | 2109 | 7.18 | 2109 |
| 20 | Vadagapatti | 1 | 958.2 | 7.02 | 1216 |
| 21 | Pudukkottai | 1 | 532.2 | 7.67 | 747 |
| 22 | Nadupatti | 2 | 1413 | 6.90 | 2019 |
| 23 | Ponnambalampatti | 1 | 679.1 | 7.27 | 970 |
| 24 | Puduvadi | 2 | 870.1 | 7.28 | 1243 |
| 25 | Kumaravadi | 1 | 683.7 | 7.26 | 977 |
| 26 | Pannapatti | 1 | 940.6 | 7.41 | 1344 |
| 27 | Reddiyapatti | 5 | 1018 | 7.60 | 1018 |
| 28 | Ilamanam | 6 | 1677 | 6.96 | 1677 |
| 29 | Karuppur | 3 | 1127 | 7.42 | 1421 |
| 30 | Kannivadugapatti | 4 | 1432 | 7.21 | 1568 |
| 31 | Kanjanayakkanpatti | 1 | 826 | 7.43 | 1180 |
| 32 | Karadipatti | 1 | 1039 | 7.29 | 1484 |
| 33 | Ikkaraikosakkuruchi | 3 | 694 | 7.70 | 991 |
| 34 | Sevalpatti | 2 | 704 | 7.72 | 1014 |
| 35 | Akkayampatti | 2 | 823 | 7.63 | 1152 |
| 36 | Amayapuram | 1 | 860.8 | 7.22 | 1330 |
| 37 | Muhavanur | 3 | 928.4 | 7.50 | 1326 |
| 38 | Palayakottai | 4 | 861.6 | 7.02 | 1231 |
| 39 | Sekkanam | 3 | 660.7 | 7.39 | 944 |
| 40 | Malaiyadipatti | 3 | 761.9 | 7.37 | 1088 |

Table 2 : Analysis of Total Hardness, Ca, Mg, Cl

| SL. NO | LOCATION | TH | Ca | Mg | Cl |
|--------|---------------|-----|-------|----|-----|
| 1 | Periyapatti.K | 246 | 137.6 | 18 | 099 |
| 2 | Toppampatti | 392 | 100.8 | 34 | 416 |
| 3 | Samudram | 146 | 83.2 | 10 | 070 |
| 4 | Chithanatham | 580 | 160 | 53 | 475 |
| 5 | Mondipatti | 460 | 126 | 43 | 316 |
| 6 | Valanadu | 372 | 96 | 32 | 226 |
| 7 | Piranampatti | 232 | 60 | 20 | 086 |
| 8 | M.Idayapatti | 580 | 132 | 60 | 515 |
| 9 | Kalingapatti | 196 | 50 | 17 | 69 |
| 10 | Palakkurichi | 560 | 144 | 48 | 380 |

| | | | | | |
|----|---------------------|-----|-------|-----|-----|
| 11 | Nallampillai | 650 | 163 | 86 | 160 |
| 12 | Vallala patti | 620 | 130 | 113 | 165 |
| 13 | V.Periyapatti | 336 | 100.8 | 20 | 184 |
| 14 | Aniyappur | 675 | 148 | 89 | 138 |
| 15 | Pudur | 576 | 120 | 74 | 156 |
| 16 | Kalingapatti | 178 | 94.4 | 14 | 028 |
| 17 | Kannudaiyanpatti | 468 | 121.6 | 39 | 304 |
| 18 | Manapparai | 160 | 96 | 10 | 034 |
| 19 | Usilampatti | 620 | 148 | 60 | 400 |
| 20 | Vadagapatti | 268 | 117 | 51 | 124 |
| 21 | Pudukkottai | 196 | 100.8 | 17 | 046 |
| 22 | Nadupatti | 580 | 160 | 43 | 545 |
| 23 | Ponnambalampatti | 252 | 65.6 | 21 | 114 |
| 24 | Puduvadi | 348 | 102.4 | 22 | 126 |
| 25 | Kumaravadi | 280 | 78.4 | 20 | 106 |
| 26 | Pannapatti | 340 | 88 | 29 | 244 |
| 27 | Reddiyapatti | 288 | 81.6 | 20 | 128 |
| 28 | Ilamanam | 440 | 116.8 | 37 | 236 |
| 29 | Karuppur | 372 | 92 | 33 | 194 |
| 30 | Kannivadugapatti | 317 | 104.7 | 27 | 172 |
| 31 | Kanjanayakkanpatti | 328 | 88 | 26 | 246 |
| 32 | Karadipatti | 396 | 101 | 35 | 216 |
| 33 | Ikkaraikosakkuruchi | 292 | 75 | 25 | 138 |
| 34 | Sevalpatti | 302 | 90 | 30 | 231 |
| 35 | Akkayampatti | 352 | 95 | 33 | 178 |
| 36 | Amayapuram | 690 | 145 | 68 | 130 |
| 37 | Muhavanur | 356 | 104 | 23 | 198 |
| 38 | Palayakottai | 328 | 99.2 | 19 | 160 |
| 39 | Sekkanam | 252 | 65.6 | 21 | 092 |
| 40 | Malaiyadipatti | 304 | 84.8 | 22 | 180 |

Table 3: Analysis of SO_4 , $CaCO_3$

| SL. NO | LOCATION | SO_4 | $CaCO_3$ |
|--------|------------------|--------|----------|
| 1 | Periyapatti.K | 46 | 260 |
| 2 | Toppampatti | 17 | 164 |
| 3 | Samudram | 17 | 156 |
| 4 | Chithanatham | 97 | 280 |
| 5 | Mondipatti | 58 | 198 |
| 6 | Valanadu | 33 | 316 |
| 7 | Piranampatti | 17 | 256 |
| 8 | M.Idayapatti | 70 | 396 |
| 9 | Kalingapatti | 13 | 192 |
| 10 | Palakkurichi | 194 | 344 |
| 11 | Nallampillai | 69 | 152 |
| 12 | Vallala patti | 67 | 134 |
| 13 | V.Periyapatti | 30 | 356 |
| 14 | Aniyappur | 65 | 132 |
| 15 | Pudur | 57 | 254 |
| 16 | Kalingapatti | 40 | 248 |
| 17 | Kannudaiyanpatti | 46 | 328 |
| 18 | Manapparai | 13 | 232 |

| | | | |
|----|---------------------|----|-----|
| 19 | Usilampatti | 94 | 420 |
| 20 | Vadagapatti | 63 | 282 |
| 21 | Pudukkottai | 19 | 288 |
| 22 | Nadupatti | 61 | 168 |
| 23 | Ponnambalampatti | 54 | 276 |
| 24 | Puduvadi | 30 | 420 |
| 25 | Kumaravadi | 37 | 296 |
| 26 | Pannapatti | 32 | 296 |
| 27 | Reddiyapatti | 32 | 288 |
| 28 | Ilamanam | 33 | 440 |
| 29 | Karuppur | 31 | 341 |
| 30 | Kannivadugapatti | 34 | 384 |
| 31 | Kanjanayakkanpatti | 40 | 244 |
| 32 | Karadipatti | 71 | 388 |
| 33 | Ikkaraikosakkuruchi | 15 | 268 |
| 34 | Sevalpatti | 54 | 274 |
| 35 | Akkayampatti | 33 | 321 |
| 36 | Amayapuram | 63 | 126 |
| 37 | Muhavanur | 29 | 340 |
| 38 | Palayakottai | 40 | 320 |
| 39 | Sekkanam | 34 | 312 |
| 40 | Malaiyadipatti | 29 | 236 |

IV. RESULT AND CONCLUSION

- ❖ Physico-chemical characterization of groundwater samples are taken from Manapparai Taluk.
- ❖ 40 groundwater samples were collected from different parts of Manapparai Taluk and analyzed for Turbidity, TDS, P^H , EC, Total hardness, Ca, Mg, Cl, SO_4 , $CaCO_3$ using standard procedures.
- ❖ The values of all the groundwater samples are compared with the Indian standard permissible value (ISI 1983) and World Health Organization (1984).
- ❖ Electrical conductivity, total hardness are exceeding the permissible limit in most of the groundwater samples and most of the result are greater than the acceptable limit.
- ❖ From the obtained results, it is suggested to monitor the ground water quality and assess periodically in this study area to prevent the further contamination.
- ❖ The groundwater is of good quality for drinking purpose. Presence of carbonate bearing minerals in the host rocks and their interaction with water is considered to be the main cause for P^H enrichment in groundwater.

References

- [1] S.Packialakshmi, Meheli Deb, and Hrituparna Chakraborty, "Assessment of groundwater quality index in and around shoalinganallur area,

- Tamilnadu,” vol. 8(36), Indian journal of science and technology, December 2015.
- [2] Dennis nelson,” National Variation in the composition of Groundwater”, presented at Groundwater foundation annual meeting, November, 2002.
- [3] Leslie A.DeSimone, Pixie A.Hamilton and Robert J.Gilliom, “Quality of groundwater from domestic wells,” in water well journal with permission of the National Groundwater Association.
- [4] J.M.Ishaku, “Assessment of groundwater quality index for jimeta-yola area, Northeastern Nigeria” vol.3 (9), pp. 219-231,Journal of Geology and Mining research september 2011.
- [5] H.Chandrashekar, G.Ranganna, and C.Natraju, “Assessment of groundwater potential through remote sensing and GIS technique A case study for anekal taluk, Bangalore urban district, India,” vol. XXXIII, part B7, International archives of photogrammetry and remote sensing, Amsterdam 2000.
- [6] Kerry T.B.MacQuarrie, “Review of groundwater assessment methodology,” The department of environment, Labour and Justice, Province of prince edward island, December 29,2014 .
- [7] Mohamed Hanipha M and Zahir Hussain A, “Study of groundwater quality at Dindigul Town, Tamilnadu, India”, vol. 2(1), 68-73,International journal of environmental sciences, January 2013.