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WATER QUALITY ASSESSMENT IN TERMS OF WATER QUALITY INDEX IN SATHYAVEDU AREA, CHITTOOR DISTRICT, SOUTH INDIA

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Abstract:
The aim of the present is to observe ground water suitable for drinking in Sathyavedu area, Chittoor district, Andhra Pradesh examining by the water quality index method. From that study area 40 groundwater samples have been collected and analyzed the different physico chemical parameters with standard methods. A water quality index provides a single number (like a grade) that expresses overall water quality at a certain location and time based on several water quality parameters..The present analysis denotes the study area fall in 50% good, 10% excellent, 39% poor and 0.1% unsuitable for drinking. In over all the study area contains suitable for drinking and less percentage were fall in unsuitable.

Keywords— Water Quality Index

1.0 Introduction:

Ground water plays a crucial role as a source of drinking and irrigation water for millions of rural and urban family. Water is important for the survival of any form of life. The three percent of global fresh water large satisfy to meet the requirements of man for millions of years etc., Water pollution is that characterized by the deterioration of its quality as a result of various human activities. In India only 12% of people get good drinking water. Inadequate management of water resources as directly or indirectly resulted in the degradation of hydrological environment. Therefore, a continuous periodical monitoring of water quality is necessary so that appropriate steps may be taken for water resource management practices (V. Golla et al. 2018).

The water quality index is one of the most effective tools to communicate information on the Quality of ground water to the concern and policy makers. The objective of the present work is to assess the suitability of ground water for human consumption based on the computed water quality index values, ground water characterisation and quality assessment. Twenty five samples at ten places were collecting using standard procedural methods and analyzed for pH, TH,Ca, Mg, Cl, TDS, Fe, F, No3, So4(Nagaraju et al 2018). Groundwater resources are dynamic in nature and are affected by such factors as the expansion of irrigation Activities, industrialization and urbanization; hence monitoring and conserving this important resource is essential. The quality of water is defined in terms of it Ascertaining the quality is crucial before its use of various purposes such as drinking; agricultural, recreational and industrial uses etc [Mohanbabu et.al, 2013].

The WQI was first developed by Horton in the early 1970s, is basically a mathematical means of calculating a single value from multiple test results. The index result represents the level of water quality in aim study area, such as Bore wells, ponds or stream. After Horton a number of workers all over the world(veeraswamy et al, 2018).

The water samples from the water body were collected and analyzed for 40 samples physico chemical parameters by following the established procedures. pH, electrical conductivity, total dissolved solids, bicarbonate, chloride, sulphate, calcium, magnesium, sodium, potassium, and total hardness. The results were evaluated and compared with world health organisation (WHO) ,Indian council of medical research and Bureau of Indian standard (BIS) water quality standards (Imran Basha, et al., 2018,Veeraswamy Golla, et al 2019).

2.0 MATERIALS AND METHODS

The water quality index (WQI) was calculated for evaluating influence of natural and anthropogenic activities based on several key parameters of groundwater chemistry. Calculate the WQI; the weight has been assigned for the physico-chemical parameters according to 11 parameters relative importance in the overall quality of water for drinking water purposes (Krishna Kumar et al., 2014). In this study, for the calculation of water quality index, 11 important parameter have been chosen .the WQI has been calculated by using the standards of drinking water quality recommended by the world health organization, Bureau of Indian standards and Indian council for medical research.

The Weighted Arithmetic Index Method has been used for the calculation of WQI of the water body. Further quality rating or sub index was calculated using the following expression (Yogendra et al., 2007).

Quality Rating (Qn) =100[Vn-Vio]/[Sn-Vio]

Let there be n water quality parameter and quality rating or sub index (Qn) corresponding to nth parameter is a number reflecting the relative value of this parameter in the polluted water with respective its standard permissible value. Qn is quality rating for the nth water quality parameter.

Vn=estimated value of the nth parameter at a given sampling station

Sn= standard permissible value of the nth parameter

Vio = ideal value of nth parameter in pure water(i.e.,0 for all other parameter except the parameter pH and dissolved oxygen(7.0 and 14.6 mg/l respectively)

Unit weight was calculated by a value inversely proportional to the recommended standard value Sn of the corresponding parameter

$$Wn = K/Sn$$

Wn= unit weight for the nth parameters

Sn= standard value of the nth parameter

K=constant for proportionality the overall water quality index wax calculated by aggregating the quality rating with the unit weight linearly.

$$WQI=\sum qn\ Wn/\sum Wn$$

Water quality index level	Water quality status
0-25	Excellent water quality
26-50	Good water quality
51-75	Poor water quality
76-100	Very poor water quality
>100	Unsuitable for drinking

Table1.0 Status of water quality based on water quality index (WQI) (Chatterji and Raziuddin2002).

Table. 1.2 Drinking water standards recommending agencies and unit weights (all values except pH and electrical conductivity are in mg/l)

S.N0	PARAMETER	ICMR STANDARD **(S_n)**	UNIT WEIGHT (W_n)
1	PH	8.5	0.141
2	Total hardness	600	0.002
3	Sulphate	250	0.005
4	Fluoride	1 – 1.5	1.200
5	Chloride	250	0.005
6	Total Dissolve Solids	500	0.002
7	Calcium	75	0.016
8	Magnesium	50	0.024
9	Sodium	200	0.006
10	Bi-carbonate	100	0.012
11	Potassium	25	0.012

Table 1.3 the Water Quality Index status of study area

S.NO	Sample	WQI	Status
1	1	38.063	Good
2	2	32.249	Good
3	3	44.450	Good
4	4	40.237	Good
5	5	30.492	Good
6	6	25.978	Excellent
7	7	20.917	Excellent
8	8	58.923	Poor
9	9	32.230	Good
10	10	72.648	poor
11	11	36.435	Good
12	12	18.856	Excellent
13	13	24.595	Excellent
14	14	24.226	Excellent
15	15	39.056	Good
16	16	24.853	Excellent
17	17	72.606	Poor
18	18	100.267	Unsuitable
19	19	47.541	Good
20	20	29.761	Good
21	21	48.444	Good
22	22	40.918	Good
23	23	23.602	Excellent
24	24	69.456	Poor
25	25	39.222	Good
26	26	15.336	Excellent
27	27	26.485	Good
28	28	34.969	Good
29	29	32.050	Good
30	30	58.244	Poor
31	31	61.625	Poor
32	32	64.894	Poor
33	33	62.333	Poor
34	34	24.386	Excellent
35	35	48.006	Good
36	36	49.743	Good
37	37	40.681	Good
38	38	79.883	Poor
39	39	54.658	Poor
40	40	49.047	Good

3.0 Conclusion

The water quality index (WQI) was deliberate for assess influence of natural and anthropogenic activities based on several key parameters of groundwater chemistry. The calculated WQI of the study area fall in 50% good, 10% excellent, 39% poor and 0.1% unsuitable for drinking. In over all the study area contains suitable for drinking and less percentage were fall in unsuitable. The main causes due to rabid urbanization, releasing of industrial effluents, agriculture activity like pesticides and fertilizers and saline water intrusion, being the study area situated in east cost.

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