QUALITY ASSESSMENT OF DRINKING WATER: YSR KADAPA DISTRICT (A.P)

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Abstract: ***Drinking water is contaminated by different activities like human ,Industrial ,Agriculture in day to day ,due to this contamination human life will go in serious threat it leads to more water born diseases like cholera,diahrea, typhoid ,malaria ,flourosis etc.So that in this paper to maintain the quality of drinking water from some places in YSR Kadapa district of andhra pradesh such as pulivendula, badvel,rajmpet,proddhutur in every place surface and ground water two types of drinking water sources samples were collected and send to laboratory to evaluate some water quality parameters are pH,EC,Turb.,F^-,NO_3^-,SO_4^{2-},Temp,Dissolved oxygen, Total suspended solids ,Total Hardness, Chloride, and Trace metal ions are Cu, Zn, Mn, Fe, Al and After getting result we compared that with Indian water standards finally we observed some samples are not to safe drinking without treatment of water .***

Keywords : Drinking water ,Indian standard procedures ,water quality parameters, YSR kadapa dist.

I.INTRODUCTION:

Environmental pollution is the global concern of the day. The growth of industrial area is rapid and very fast thus related anthropogenic activities have also been increased like waste discharge from industries, transportation and domestic activities. The domestic waste generated is directly enters into the different sites of water bodies without any treatment. Also the continuous flow from agricultural waste water contaminates the water source of surrounding area. This entire problem affects the water resources and ultimately human health. Water is one of the three major components of the environment; therefore, there exists a close linkage between the quality of water and the environment which bears an almost importance for eco-system. Natural bodies of water are not absolutely pure as various organic compounds and inorganic elements remain in dissolved form. Many kinds of macroscopic flora and fauna grow in different types of aquatic habitats. The physical and chemical quality of water vary according to the basin shape and size, depth, light penetration, precipitation, location, temperature, chemical nature of surrounding soil and dissolved minerals, pH, etc, and the biological components of the habitats depend upon them If all the physical, chemical and biological parameters are in optimum condition the balance between these is maintained. Many people depend on fresh water supplies from groundwater. It provides water for domestic use for a large part of the Indian population. It is one of the major sources of water for irrigation and small scale industries. The availability of groundwater depends on the rate at which it is recycled by hydrological cycle than on the amount which is available for use at any moment in time. In most parts of the country finite supply of fresh water is put of heavy use. Industrial water sewage and agricultural run-off can overload groundwater with chemical wastes and nutrients and make the water-supply toxic. Effective management of water resources and control of pollution are becoming increasingly important for sustainable development and human welfare, the term pollution is defined as the deterioration in the chemical, physical and biological properties of water by human and industrial activity. The industrial activity discharges water containing hazardous chemicals on the open ground which may pollute the nearly groundwater.

II.MATERIALS AND METHODS:

II.I: Study area: Geographically,YSR Kadapa lies between14°28'N 78°49'E and 14°57'N 78°82'E. It has an average elevation of 138 metres (452 ft). It has an area of 8723 m^2. It is shaped like an irregular parallelogram, divided into two nearly equal parts by the range of the Eastern Ghats, which intersects it throughout its entire length . The two tracts thus formed possess totally different features. The first, which constitutes the north, east and south-east of the district, is a low-lying plain; while the other, comprising of the southern and southwestern portion, forms a high table-land from 1500 to 2,500 ft (760 m) above sea-level . The chief river is the Penna, which enters the district from Bellary on the west, and flows eastwards into Nellore. Though a large and broad river, and containing a great volume of water during the rains, in the hot weather months it dwindles down to an inconsiderable stream. Its principal tributaries are the Kundaur, Saglair, Cheyair and Papagni rivers.

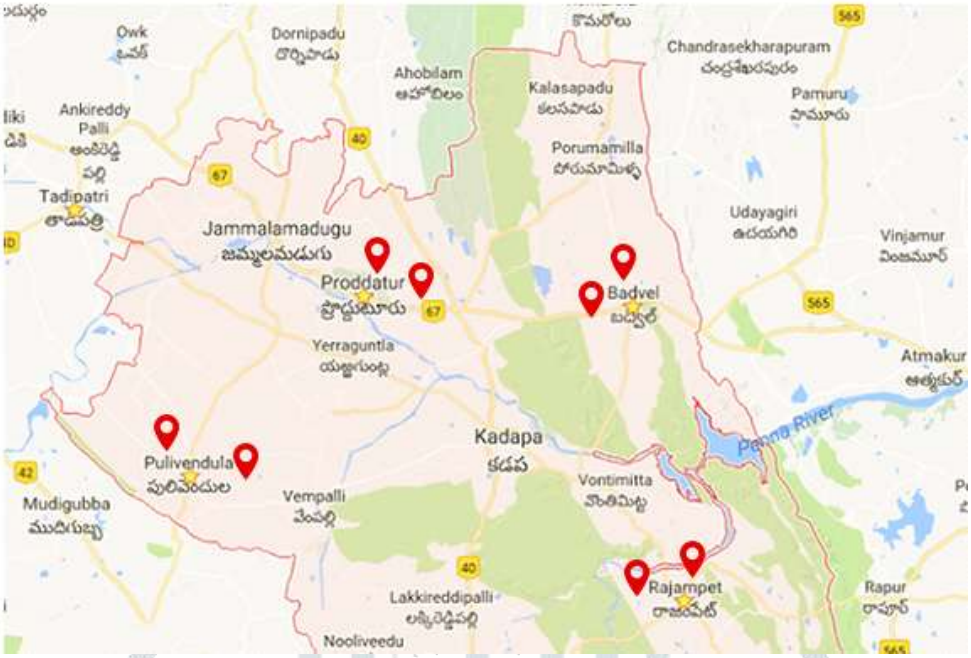

Fig.1 : Map of YSR Kadapa district

III.SAMPLING ANALYTICAL METHODS:

The drinking water samples were collected 16 different places of YSR kadapa district as surface water and ground water which is to be used for drinking purpose by living human in their places .These samples were selected and the details of sample codes are in the given Table.1.In the whole study we used the same codes for samples with labeled on polythene bottles which were previously cleaned with appropriate cleaner and also before collecting sample we were rinsed bottles with same sample of water once after only we collect water into bottle and fix the cap immediately and prevent air bubbles. Then send to laboratory with in 24 hours to evaluate parameters. The Analysis is carryout and output results are mentioned in their respective fields of tables which are shown in below one by one. The collected samples were analyzed to evaluate the parameters like are pH,EC,Turb.,F^-,NO_3^-,SO_4^{2-},Temp,Dissolved oxygen, Total suspended solids ,Total Hardness, Chloride, and Trace metal ions are Cu, Zn, Mn, Fe, Al as per Indian Standards methods and WHO guidelines. Sample codes are distributed are shown in below Table I

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Source of water	Type of water	Area and Sample code							
		Pulivendula		Badvel		Rajampet		Proddatur	
Ground Water	Drinking	Gd1	Gd2	Gd3	Gd4	Gd5	Gd6	Gd7	Gd8
Surface Water	Drinking	Sd1	Sd2	Sd3	Sd4	Sd5	Sd6	Sd7	Sd8

Table.1 : Distribution of Sample Codes

Gd : ground Drinking Water **Sd : Surface Drinking water**

IV.RESULTS AND DISCUSSIONS:

Here , After completion of all analytical methods to evaluate the quality of taken drinking water samples observed values are mentioned in the given Table 2, Table 3, Table .4 and Table.5 as Ground water sources and surface water sources of drinking water. and also prediction of Minimum and Maximum observations of parameters in separated rows. In these tables Table.2 & Table.3 are prediction about Physico –Chemical parameters of drinking water .and Table.4 &table.5 are prediction about Trace metal ions in drinking water .

Sample Code	pH	EC µs/cm	Turb NTU	F^- (mg/l)	NO_3^- (mg/l)	SO_4^{2-} (mg/l)	Temp °C	DO Mg/l	TDS (mg/l)	Total Hardness (mg/l)	Chloride (mg/l)
Gd1	6.32	184	28.21	1.58	19.08	54.17	25	8.9	237	213	215.3
Gd2	7.26	221	54.28	1.97	38.55	48.74	26	7.4	224	219	114.3
Gd3	6.92	120	34.66	1.34	31.47	49.11	27	7.1	265	193	313.9
Gd4	7.12	113	38.64	1.08	27.71	53.25	28	8.5	254	208	410.2
Gd5	6.84	255	60.14	1.84	26.66	54.83	25	6.5	231	206	312.2
Gd6	6.92	115	34.66	1.62	31.47	49.11	27	8.4	229	216	115.4
Gd7	6.84	551	60.24	0.98	26.66	54.83	26	6.7	267	244	210.0
Gd8	6.26	225	17.12	1.12	28.74	59.87	27	8.9	271	231	329.1
Minimum and Maximum observations of Parameters											
Min.	6.26	113	17.12	0.98	19.08	48.74	25	6.5	224	193	114.3
Max.	7.26	551	60.14	1.97	38.55	59.87	28	8.9	271	244	410.2
BIS	6.5-8.5	0-800	1-5	1.0-1.5	45-100	200-400	--	<8	<300	300-600	250-1000

Table.2 : Observations of Physico-Chemical parameters of water samples- Ground water source

Sample Code	pH	EC µs/cm	Turb. NTU	F^- (mg/l)	NO_3^- (mg/l)	SO_4^{2-} (mg/l)	Temp °C	DO Mg/l	TDS (mg/l)	Total Hardness (mg/l)	Chloride (mg/l)
Sd1	6.94	212	18.08	1.18	27.99	51.20	23	5.6	237	227	311.3
Sd2	6.33	194	38.51	1.64	22.09	42.65	24	8.2	256	200	213.6
Sd3	6.84	255	60.14	0.84	26.66	54.83	22	7.4	237	234	329.6
Sd4	6.26	101	27.03	0.97	28.74	59.87	25	6.2	244	255	428.9
Sd5	7.12	113	38.64	1.58	27.71	53.25	24	7.3	246	224	314.4
Sd6	7.19	201	29.99	1.96	20.65	42.33	23	8.9	264	216	513.3
Sd7	6.92	112	34.66	1.34	31.47	49.11	25	8.4	269	218	428.7
Sd8	7.12	113	38.64	1.08	27.71	53.25	23	7.4	261	207	359.9
Minimum and Maximum observations of Parameters											
Min.	6.26	101	18.08	0.84	20.65	42.33	22	5.6	237	200	213.6
Max.	7.19	255	60.14	1.96	31.47	59.87	25	8.9	269	255	513.3
BIS	6.5-8.5	0-800	1-5	1.0-1.5	45-100	200-400	--	<8	<300	300-600	250-1000

Table.3 : Observations of Physico-Chemical parameters of water samples- Surface water source

Sample code	Cu (mg/l)	Zn (mg/l)	Mn (mg/l)	Fe (mg/l)	Al (mg/l)
Gd1	1.64	8	0.0657	0.09	0.09
Gd2	1.21	10	0.0742	0.11	0.10
Gd3	1.87	15	0.0942	0.86	0.14
Gd4	2.14	11	0.141	0.91	0.15
Gd5	1.49	14	0.0851	0.97	0.11
Gd6	2.57	13	0.0846	0.51	0.14
Gd7	2.46	12	0.0868	0.41	0.24
Gd8	1.98	09	0.0857	0.84	0.09
Minimum and Maximum observations of Parameters					
Min.	1.21	08	0.0657	0.09	0.09
Max	2.57	15	0.141	0.97	0.24
BIS	0.05-1.5	5-15	0.1-0.3	0.3(desirable)	0.03-0.2

Table.4 : Observations of Trace Metal Ions of drinking water samples- Ground water source

Sample code	Cu (mg/l)	Zn (mg/l)	Mn (mg/l)	Fe (mg/l)	Al (mg/l)
Sd1	1.26	9	0.169	0.24	0.09
Sd2	2.17	8	0.114	0.64	0.14
Sd3	2.57	11	0.0846	0.51	0.14
Sd4	1.98	09	0.0857	0.84	0.09
Sd5	2.08	10	0.0925	0.96	0.11
Sd6	2.22	14	0.124	0.87	0.16
Sd7	1.36	13	0.0942	1.87	0.86

Sd8	2.27	11	0.141	2.14	0.91
Minimum and Maximum observations of Parameters					
Min.	1.26	08	0.0846	0.24	0.09
Max	2.57	14	0.169	2.14	0.86
BIS	0.05-1.5	5-15	0.1-0.3	0.3(desirable)	0.03-0.2

Table.5 :Observations of Trace Metal Ions of drinking water samples- Surface water source

pH: As per the above results and as shown in table.2 pH of Ground water source is in 6.26-7.26 and as in Table.3 pH of Surface water source is in 6.26-7.19 where as BIS value is 6.5-8.5 i.e: pH of all samples in its limit of BIS .So that according to pH this samples are safe to drinking .

Electrical Conductivity: As per the above results and as shown in table.2 EC of Ground water source is in 113-551 and as in Table.3.EC of Surface water source is in 101-255 where as BIS value is 0-800 (Good) i.e. EC of all samples in its limit of BIS. So that according to EC this samples are safe to drinking.

Turbidity: As per the above results and as shown in table.2 Turbidity of Ground water source is in 17.12-60.14 and as in Table.3. Turbidity of Surface water source is in 18.08-60.14 where as BIS value is 1-5 i.e: Turbidity of all samples in its above limit of BIS.Sothat according to Turbidity this samples are safe to drinking only after related treatment of water to reduce the turbidity .

Fluoride: As per the above results and as shown in table.2 fluoride of Ground water source is in 0.98-1.97 and as in Table.3.Fluoride of Surface water source is in0.84-1.96 where as BIS value is 1.0-1.5 i.e:Fluoride of all samples in its limit of BIS but GD1, GD2,GD5,GD6 and SD2, SD5 are above limit.Sothat according to fluoride these samples are not safe to drinking without treatment of water to reduce fluoride content.
Nitrate : As per the above results and as shown in table.2 Nitrate of Ground water source is in 19.08-38.55 and as in Table.3.Nitrate of Surface water source is in 20.65-31.47 where as BIS value is 0-800 i.e:Nitrate of all samples in its limit of BIS.Sothat according to Nitrate this samples are safe to drinking.

Sulphate : As per the above results and as shown in table.2 Sulphate of Ground water source is in 48.74-59.87 and as in Table.3.Sulphate of Surface water source is in 42.33-59.87 where as BIS value is 200-400 i.e:sulphate of all samples in its limit of BIS.Sothat according to Sulphate this samples are safe to drinking.

Dissolved Oxygen : As per the above results and as shown in table.2 DO of Ground water source is in 6.5-8.9 and as in Table.3.DO of Surface water source is in5.6-8.9 where as BIS value is <8 i.e: DO of all samples in its limit of BIS. Except GD1,GD4, GD6, GD8 and SD2, SD6,SD7 these are above limit. Sothat according to DO some samples are safe to drinking but Sd1,Sd2,Sd4,Sd5,Sd7 are need to treatment of water.

TDS : As per the above results and as shown in table.2 TDS of Ground water source is in 224-271 and as in Table.3.TDS of Surface water source is in 237-269 where as BIS value is <300 i.e:TDS of all samples in its limit of BIS.Sothat according to TDS this samples are safe to drinking.

Total Hardness: As per the above results and as shown in table.2 Total Hardness of Ground water source is in 193-244 and as in Table.3. Total Hardness of Surface water source is in 237-269 where as BIS value is 300-600 i.e: Total Hardness of all samples in its limit of BIS.Sothat according to Total Hardness this samples are safe to drinking.

Chloride: As per the above results and as shown in table.2 Chloride of Ground water source is in 114.3-410.2 and as in Table.3. Chloride of Surface water source is in 213.6-513.3 where as BIS value is 250-1000 i.e: Chloride of all samples in its limit of BIS.Sothat according to Chloride this samples are safe to drinking

Trace Metal Ions :
Copper : As per the above results and as shown in table.2 Copper of Ground water source is in 1.21-2.57 and as in Table.3. Copper of Surface water source is in 1.26-2.57 where as BIS value is 0.05-1.5 i.e: Copper of all samples above limit value of 1.5 but Gd1,Gd3,Gd4,Gd6,Gd7,Gd8 and Sd2,Sd3,Sd4,sd5,sd6,Sd8 are above limit .Sothat according to Copper these samples are not safe to drinking with out removal of excess copper.

Zinc: As per the above results and as shown in table.2 Zinc of Ground water source is in 08-15 and as in Table.3. Zinc of Surface water source is in 08-14 where as BIS value is 5-15 i.e: Zinc of all samples in its limit of BIS.Sothat according to Zinc this samples are safe to drinking.

Manganese: As per the above results and as shown in table.2 Manganese of Ground water source is in 0.0657-0.141 and as in Table.3. Manganese of Surface water source is in 0.0846-0.169 where as BIS value is 0.1-0.3 i.e: Manganese of all samples in its limit of BIS except Sd7.Sothat according to Manganese this samples are safe to drinking except Sd7.

Iron (Fe): As per the above results and as shown in table.2 Iron of Ground water source is in0.09-0.97 and as in Table.3. Iron of Surface water source is in 0.24-2.14 where as BIS value is 0.3(desirable limit) i.e: Iron of some samples in limit of BIS but Gd3,Gd4,Gd5,Gd6,Gd7,Gd8 and

Sd2,Sd3,Sd4,Sd5,Sd6,Sd7,Sd8 are above limit .Sothat according to Iron these samples are not safe to drinking without removal of excess iron in particular that samples.

Aluminium : As per the above results and as shown in table.2 Aluminium of Ground water source is in 0.09-0.24 and as in Table.3. Aluminium of Surface water source is in 0.09-0.86 where as BIS value is 0.03-0.2 i.e: Aluminium of all samples in its limit of BIS ,but Gd7&Sd7, Sd8 are above limit .Sothat according to Aluminium this samples are safe to drinking except Gd7&Sd7, Sd8.

CONCLUSION:

In the present Investigation ,an Attempt was made to evaluate the quality of water in prediction of physic chemical and trace metal ions are found in taken water samples .out of all samples some of the samples need to treat before using to drink .It is shown that presented the Turbidity of all samples are above limit.and Incase of Fluoride,DO,Copper,Iron,Aluminium parameters some samples are not safe to drinking without treatment of water.

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