RESEARCH PAPER

Evaluation of ground water quality in the tribal area of Marathwada region

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ABSTRACT

The quality of ground water was assessed to their suitability for drinking purpose. Ground water samples from two sampling sites in and around Kinwat taluka Nanded district were collected and analyzed for ten different physico –chemical parameters such as total dissolved solids, sulphate, pH, dissolved oxygen biochemical oxygen demand, chemical oxygen demand, total hardness, chlorides, calcium and magnesium were tested for a period of one year. Based on the results of present study it is concluded that water needs before being used for drinking purpose.

Key Words : Ground water, Tribal area, Sulphate, pH

In a broad perspective, "water pollution" means contamination of water leading to alteration of physical, chemical or biological properties of water rendering such water harmful of injurious to public health and safety. Groundwater also plays a very important role in many geological processes pumping from new wells may reface the quantities which can be pumped from others nearby, or cause local spring flows to dwindle. It is equally important to ensure that it is suitable for drinking and other purpose (Brssington, 1999). The most common sources of ground water contamination are sewage, landfills, toxic water disposal sites and agriculture. Once pollutants get into the ground water system, they will spread whenever ground water travels which can make contamination to large extent. Furthermore ground water moves very slowly, it takes a longtime to cleanse a groundwater reservoir. In many areas, septic tanks are the most common way of disposing of sewage. An oxidation and microorganism and filtered by the sediments as it percolates through the zone of aeration. It has been cleansed of any impurities and is very close to the surface or if the rocks are permeable, water entering the zone of saturation may still contaminated and unfit for use (James, 2000). The Kinwat taluka is located at one hundred twenty five kilometers away from Nanded city and fifty kilometers away from Adilabad district of Andhra Pradesh. Samples were collected from Subhash nagar and Bodhali village.

RESEARCH METHODOLOGY

Water samples were collected at monthly intervals. Samples were collected in clean bottles through out the period of study Nov- 2010 to Oct- 2011. All the parameters

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were measured by applying methods as prescribed by APHA (1989), guidance manual of NEERI, Trivedi and Goal.

RESULTS AND REMONSTRATION

The results of the present study as well as relevant discussion have been summarized under following heads:

Total dissolved solids :

Total dissolved solid denotes the various types of minerals present in water in the dissolved form. However, if some organic substances are also present as more often in polluted water, they may also contribute to the dissolved solids. The contents of total dissolved solids from ground water stations were in the range of 438 to 540 mg/L at station -I, 432 to 556 mg/L at station -II, The samples showed the total dissolved solids with a maximum of 540 mg/L in the month of September 2011 at station- I while the minimum value of 432 mg/L in the month of April 2011 at station-II. Delphine Rose *et al.* (2008) noted the level of total dissolved

solid from 435 to 1540 mg/L in all the ground water samples of selected areas of Dindugal District, Tamil Nadu.

pH :

Hydrogen ion concentration (pH) is a term used to express the intensity of the acid or alkaline condition of a solution. It is the expression of the hydrogen ion concentration or more precisely, the hydrogen ion activity. The pH recorded were in the range from 7.2 to 7.5 at station - I, 7.2 to 7.4 at station- II, The maximum pH value recorded was 7.4 at station - I in the month of September 2011. Jameel (2002) found pH value in the mild alkaline range of 7.6 to 8.6. From ground water in Tiruchirapalli indicating the presence of very weak basic salts.
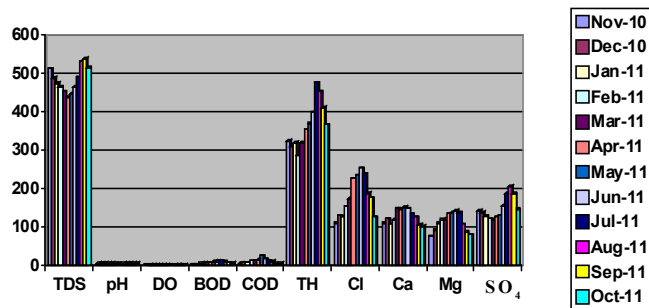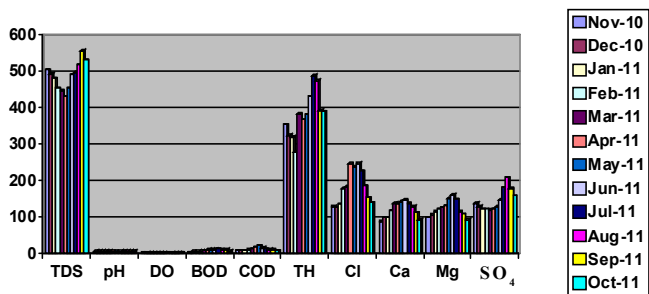
Dissolved oxygen:

In the present study the concentrations of dissolved oxygen recorded were in the range of 2.6 to 4.3 mg/L at station - I, 2.2 to 4.2 mg/L at station -II, The maximum value of dissolved oxygen was recorded as 4.2 mg/L in the month

Table 1 : Physico-chemical parameters of S_1 (Subhashnagar)

Month	TDS	pH	DO	BOD	COD	TH	Cl	Ca	Mg	SO$_4$
Nov., 2010	514	7.4	4.2	4.1	7.6	326	112	112	78	144
Dec., 2010	490	7.5	3.2	5.9	9.2	312	132	124	94	140
Jan., 2011	475	7.3	3.0	6.8	10.6	322	128	110	112	130
Feb., 2011	466	7.3	3.1	7.3	13.6	290	156	122	120	124
Mar., 2011	455	7.4	2.8	9.6	13.8	320	176	150	118	120
April. 2011	438	7.2	2.6	10.8	16.0	356	228	148	138	128
May, 2011	448	7.4	2.8	11.8	28.2	370	236	152	140	132
June, 2011	466	7.4	3.2	12.8	20.0	400	256	150	144	158
July, 2011	492	7.3	2.8	14.2	14.8	478	242	136	140	190
Aug., 2011	531	7.3	2.8	12.6	11.4	456	190	128	110	208
Sept., 2011	540	7.5	4.3	10.2	8.4	412	178	108	90	190
Oct., 2011	516	7.5	3.8	7.8	7.8	368	128	102	82	148

All parameters are in mg/L except pH

Table 2 : Physico-chemical parameters of S_2 (Bodhali village)

Month	TDS	pH	DO	BOD	COD	TH	Cl	Ca	Mg	SO$_4$
Nov., 2010	504	7.3	3.2	5.5	9.1	356	130	90	100	140
Dec., 2010	494	7.4	3.1	6.2	8.8	326	128	100	108	130
Jan., 2011	482	7.4	3.0	7.2	9.8	322	136	100	116	124
Feb., 2011	454	7.4	3.1	7.7	11.8	280	180	118	124	124
Mar., 2011	448	7.3	2.2	9.4	14.2	384	184	140	128	120
April, 2011	432	7.2	3.0	11.4	20.0	368	248	138	132	124
May, 2011	456	7.4	2.6	12.6	23.4	382	240	144	154	130
June, 2011	492	7.4	2.8	11.8	17.6	432	248	148	162	148
July, 2011	498	7.3	2.4	13.6	14.8	490	228	140	150	182
Aug., 2011	518	7.4	3.0	11.4	11.6	476	188	130	116	210
Sept., 2011	556	7.4	3.0	11.0	12.2	394	156	114	110	180
Oct., 2011	532	7.3	4.2	6.5	10.2	392	142	94	94	160

All parameters are in mg/L except pH

Fig. 1 : Physico-chemical parameters of S_1

Fig. 2 : Physico-chemical parameters of S_2

of November 2010 at station - I Dissolved oxygen is one of the important parameters that measure the extent of organic as well as biological pollution load to a water body. Khajuria and Datta (2010) noted 3.44 to 10.39 mg/L of DO in ground water of Cristian Colony in J&K.

Biochemical oxygen demand:

During winter season the biochemical demand values are low. This is because after monsoon the winter temperature retards the rate of reproduction of microorganisms. The highest amount of organic matter brought in by the surface run off of heavy rains. In the present investigation the range of biochemical oxygen demand was 4.1 mg/L to 14.2 mg/L at station –I, 5.5 to 13.6 mg/L at station – II. Ingole (2009) founds a range of 3.2 to 8 mg/L of BOD.

Chemical oxygen demand:

Boyd (1975), observed the positive correlation between chemical oxygen demand and biochemical oxygen demand. In the present investigation the range of chemical oxygen demand was 7.6 mg/L to 28.2 mg/L at station- I, 8.8 mg/L to 23.4 mg/L at station -II, Ingole *et al.* (2009) founds a range of 1.9 to 8.15 mg/L of COD.

Total hardness :

The range of total hardness values recorded was 290 mg/L to 478 mg/L at station-I, 280 mg/L to 490 mg/L at station – II. The hardness in water is mainly due to its calcium and magnesium contents. Gonsalves and D'Souza (1998) studied the impact of water from soft drink factory on ground

water at Madkai, Goa. Gangotri and Mudkhede (2009) founds 450 to 750 mg/L of Total Hardness in ground water of Ahmednagar district.

Chlorides :

In the present investigation, chloride levels ranged from 112 mg/L to 256 mg/L at station - I, 128 mg/L to 248 mg/L at station- II. Generally the concentrations of chloride impart a salty taste to water. Jadhvar *et al.* (2010) founds a range of 64 to 168.5 mg/L chlorides in ground water of Nagothane region of Maharashtra. Gangotri Mudkhede (2009) founds 242 to 1050 mg/L of Chloride concentration in ground water of Ahmednagar district.

Calcium :

Calcium is one of the most abundant constituents of earth's crust and is highly mobile in hydrosphere. Calcium is one of the principal cation in ground water. The source of calcium is mainly from ignores rock. Minerals like silicates, pyroxene, amphiboles, feldspars and silicate minerals produced in metamorphism. Calcium is present abundant anywhere in ground water (Karanth, 1987). In the present investigation, the concentration of calcium recorded were in the range of 102 to 152 mg/L at station- I, 90 to 148 mg/L at station-II. Khajuria and Datta (2010) noted 28.91 to 61.32 mg/L of calcium in ground water of Cristian Colony in J & K.

Magnesium :

In the present investigation, the levels of magnesium concentration were recorded from 78 to 144 mg/L at station - I, 94 to 162 mg/L at station- II. Khajuria and Dutta (2010) recorded range of 86 to 241.17mg/L magnesium in tube well water of Cristian colony in J& K. Ingole *et al.* (2009) found a range of 4.86 to 19.14 mg/L of COD.

Sulphate :

In the present study concentration of sulphate was in the range of 120 to 208 mg/L at station-I, 120 to 210 mg/L at station -II, Dhembare *et al.* (1997) recorded the concentration of sulphate from the ground water of Sonai area of Maharashtra with a maximum value of 267 mg/L and a minimum value of 1.mg/L.

Conclusion:

The data of present study reveal that there must have to give some primary treatment to maintain the water quality.

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