



Quality Assessment of ground water in Malkapur of Buldhana, district: Characterization of chemical parameters

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Abstract

Present work presents a study on ground water quality in Malkapur of Buldhana, district, which involves analysis of chemical parameters of ground water (used for drinking) from different sources. Water quality study includes pH, Total Dissolved Solids, Dissolved Oxygen, Biochemical oxygen Demand, Chemical Oxygen Demand, Total Hardness, Chlorides, Calcium, Magnesium, Sulphate, All the parameters examined by the methods as prescribed in APHA. The study reveals that the chemical parameters of water sources are well within the permissible limit as prescribed by WHO and IS 10:500.

Key words: Malkapur of Buldhana, district, Physico-chemical parameters, total hardness

Introduction:

Interactions between groundwater and surface water are complex. Consequently, groundwater pollution, sometimes referred to as groundwater contamination, is not as easily classified as surface water pollution. By its very nature, groundwater aquifers are susceptible to contamination from sources that may not directly affect surface water bodies, and the distinction of point vs. non-point source may be irrelevant. A spill or ongoing releases of chemical or radionuclide contaminants into soil (located away from a surface water body) may not create point source or non-point source pollution, but can contaminate the aquifer below, defined as a toxin plume. The

movement of the plume, called a plume front, may be analyzed through a hydrological transport model or groundwater model. Analysis of groundwater contamination may focus on the soil characteristics and the nature of the contaminants. In the present study, the quality of ground water of Malkapur of Buldhana, district were analysed through testing of the chemical parameter. This assessment was aimed at providing a preliminary view on the current state of water quality.

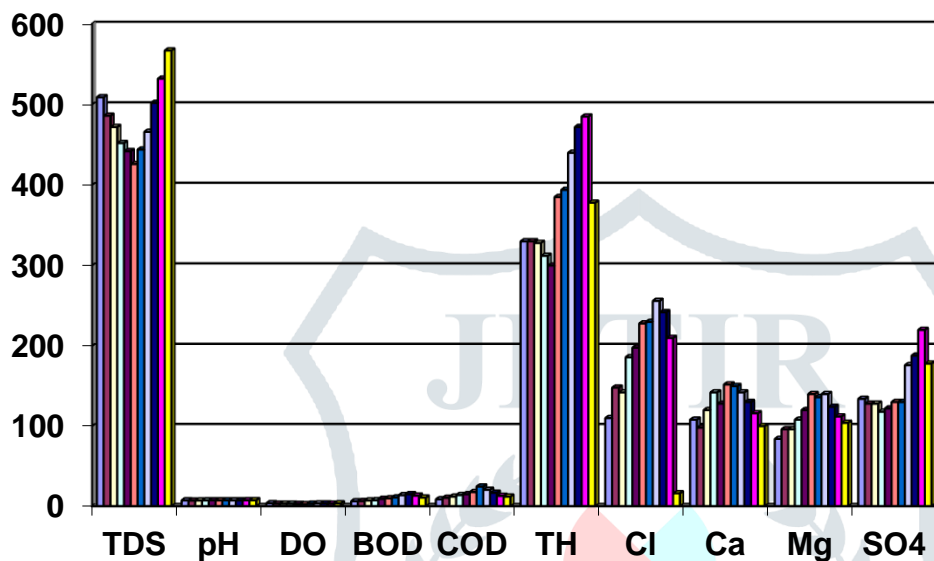
Materials and methods:

Sampling Sites:- 1] Bore well of Malkapur of Buldhana, district is in front of Waghmare's house. It is to the east of the village as it is low lying agricultural water accumulates where around the bore well waste materials lying here and there can be seen. 2] Hand pump of Malkapur of Buldhana, district which is beside the bus stop and to left side of the road. Water samples were collected on monthly basis at each sampling sites during the period of Nov- 2010 to Oct-2011. Water was collected in bottles. The assessment of water quality was done by following publications. APHA 1986, NEERI1986.

Result and discussion Water quality parameters and their range are presented in Table 1 and 2 and their monthly variations are graphically represented in figures 1 and 2.

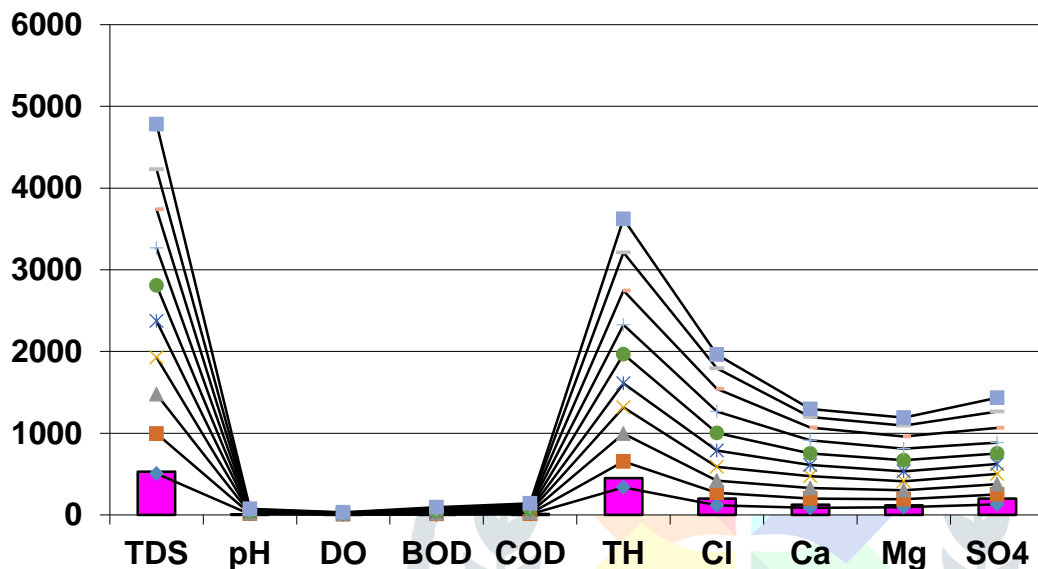
Parameters → Month↓	TDS	pH	DO	BOD	COD	TH	Cl ⁻	Ca	Mg	SO ₄
November 2022	509	7.2	3.7	6.1	8.5	330	110	108	84	134
December 2022	486	6.9	3.1	6.3	10.4	330	148	98	96	128
January 2023	472	7.1	3.0	7.1	11.8	328	142	120	96	128
February 2023	452	7.2	3.0	7.4	13.8	312	186	142	108	118
March 2023	442	7.3	2.8	9.0	14.8	300	198	128	120	122
April 2023	426	7.2	2.5	9.8	17.6	385	228	152	140	130
May 2023	444	7.3	3.0	10.8	24.4	394	230	150	136	130
June 2023	466	7.2	3.4	13.6	20.4	440	256	142	140	176
July 2023	502	7.2	3.4	14.9	16.6	472	242	130	124	188
August 2023	532	7.4	3.0	13.0	12.8	485	210	116	112	220

September 2023	567	7.4	3.5	10.6	11.8	378	16	100	104	178
October 2023	524	7.1	3.7	8.8	11.6	370	130	82	80	152



Parameters → Month ↓	TDS	pH	DO	BOD	COD	TH	Cl	Ca	Mg	SO ₄
November 2022	504	7.2	4.5	5.6	8.2	336	116	88	96	128
December 2022	491	7.2	3.2	6.8	9.6	320	156	112	96	124
January 2023	480	7.2	3.2	7.6	10.0	340	148	128	108	124
February 2023	452	7.3	3.3	8.2	14.6	318	168	146	112	126
March 2023	448	7.4	2.4	9.0	15.0	294	200	136	120	122
April 2023	432	7.4	2.2	9.6	18.6	358	216	144	136	130
May 2023	460	7.1	2.6	11.0	20.8	360	260	160	142	132
June 2023	471	7.3	3.2	12.6	16.4	418	280	156	148	180
July 2023	492	7.5	3.4	13.0	15.8	468	248	128	136	198

August 2023	528	7.4	2.6	10.6	11.2	450	200	124	116	200
September 2023	552	7.3	3.4	9.6	12.4	410	170	98	98	170
October 2023	524	7.1	3.2	7.4	10.8	380	118	88	84	144



Total Dissolved solids: - Total dissolved solid denotes the various types minerals present in water in the dissolved form. The contents of total dissolved solids in ground water stations were in the range of 426 to 540 mg/L at station -I, 426 to 567 mg/L and 432 to 552 mg/l at station -II, The samples showed the total dissolved solids with a maximum of 567 mg/L in the month of September 2023 at station- I while the minimum value of 426 mg/L in the month of April 2023 at station-II. The present study reveals the total dissolved solids values are high during monsoon period and low in summer period. Hyderabad Sayani et. al., (1998) observed total dissolved solid with a maximum value of 1531 mg/L. Sultana et al., (1990) found the concentration of total dissolved solid in the range of 991.1 to 1276.3 mg/L from ground water of Nacharam industrial complex.

pH:- pH is considered as an important ecological factor and is the result of the interaction of various substances in the water. The pH recorded were in the range from 6.9 to 7.4 at station - I, 7.2 to 7.5 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.

BOD and COD:- 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 6.1 mg/L to 14.9 mg/L at station –I, 5.6 to 13.0 mg/L at station – II. In case of COD, it founds maximum in the month of may at both the stations. Ingole S. B.(2009) founds a range of 1.9 to 8.15 mg/L of COD.

Total Hardness:- The total hardness often employed as indicator of waste water quality. The range of total hardness values recorded was 312 mg/L to 485 mg/L at station-I, 294 mg/L to 468 mg/L at station – II. The hardness in water is mainly due to the concentration of carbonate and bicarbonate salts of 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 VM (2009) founds 450 to 750 mg/L of Total Hardness in ground water of Ahmednagar district.

Chlorides:- Chlorides may be present in ground water due to discharge of sewage water of industrial waste. In the present study, chloride levels ranges from 16 mg/L to 256 mg/L at station - I, 82 mg/L to 256 mg/L at station-II. Jadhvar et al. (2010) founds a range of 64 to 168.5 mg/L chlorides in ground water of Nagothane region of Maharashtra.

Calcium:- Calcium is one of the most abundant constituents of earth's crust and it founds high mobile in hydrosphere. In the present investigation, the concentration of calcium recorded were in the range of 82 to 152 mg/L at station- I, 88 to 160 mg/L at station-II. Jayabhaye et al recorded a range of 49 to 87 mg/l of Calcium in Hingoli district of maharashtra.

Magnesium:-In the present investigation, magnesium concentration were recorded from 80 to 140 mg/L at station - I, 84 to 148 mg/L at station- II. Pondhe et al. founds range of 81 to 161 mg/l of Magnesium in ground water of sangamnagar of Ahemadnagar (M.S.)

Sulfate:- In the present study concentration of sulphate were in the range of 118 to 220 mg/L at station-I, 144 to 198 mg/L at station -II, Dhembare et al., (1997) receded 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. Delphine rose et al. also record a range of 11 to 123 mg/l in ground of dindgul district, Tamilnadu.

Conclusion: - According to the various parameters studied, it is concluded that both the water sources are useful for human consumption.

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