

Physio-Chemical analysis of ground water of selected areas of Mysore City, Karnataka, India

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Abstract: A laboratory study was conducted to monitor the ground water quality of selected sites of Mysore city by examining the various physico-chemical parameters like pH, TDS, DO, total hardness, COD, etc. Ground water samples were collected from various locations in study area during monsoon and post monsoon season. The results are analyzed comparatively and conclusions regarding the suitability of the use of such waters are made.

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Key words: Ground water, water quality, physico-chemical parameters, COD, DO, TDS.

1. Introduction:

Water is extremely essential for survival of all living organisms. The quality of water is of vital concern for mankind since it is directly linked with human health, protection of the environment and sustainable development. Increasing population and its necessities have led to the deterioration of surface and sub-surface water. Ground water is the major source of drinking water in both urban and rural areas. The domestic sewage and industrial waste are the leading causes of ground water pollution (Dahiya S.D,1999; Saharan,2009). Consequently number of cases of water borne diseases has seen which is a cause of health hazards (Desai, 1995; Naik, 2005; Grahaw, 2001). So basic monitoring on water quality has been necessitated to observe the demand and pollution level of ground water (WHO, 1999). A good number of water analysis experiments are regularly conducted by different groups of chemists and biologists across the country (Nath, 2001; Kalkar, 2001; Karlo, 1992; Vijender singh, 2006).

The collected samples were analyzed on various physico-chemical parameters such as dissolved oxygen, TDS, total hardness, calcium hardness, magnesium hardness, chloride, iron, COD as per standard methods of analysis of water and waste water (APHA) and the results were compared with the Indian standards for potable water.

The average values of various physico-chemical parameters during monsoon and post monsoon seasons are presented in Table 1 and 2. A comparison of ground water quality of the study areas with drinking water standards (WHO) are presented in table 3 and 4. The data of the chemical results showing consider variation which reflects their chemical composition.

The present work is an attempt to carry out qualitative analysis of some physico-chemical parameters of ground water during monsoon and post monsoon season in and around Mysore city.

2. Materials and Methods:

2.1. Study area: Mysore is one of the famous tourist centers of Asia, located between latitude 11°45' to 12°40' N and longitude 75°57' to 77°15' E. The district covers an area of about 6940 sq.km and is accessible from several parts of the world.

2.2. Sample collection: 150 ground water samples from four different zones (North, South, East and West) of Mysore city were collected during Monsoon and Post monsoon seasons of 2009-2010. The water was pumped out from bore wells a few minutes before sample collection. Temperature and pH were determined immediately at the sampling station.

3. Physico-chemical analysis of ground water:

A brief account of the range of these parameters is also discussed.

pH: The average values of water samples are alkaline ranging from 7.01 to 8.4 during monsoon and 7.31 to 8.4 during post monsoon. According to Kannan(1991) pH between 6.7 and 8.4 is suitable while pH below 5.0 and above 8.0 are detrimental.

TDS: TDS of ground water samples are due to vegetable decay, evaporation, disposed effluents and chemical weathering of rocks. TDS values varied from 0.02 to 1.043mg/l during monsoon and 0.01 to 0.08 during post monsoon.

EC: Electrical conductivity is a measure of water capacity to convey electric current. It signifies the amount of total dissolved salts (Kaur, 1999)

Total Alkalinity: Alkalinity of samples is in between 95 to 490 ppm during monsoon and 117 to 415 ppm during post monsoon season which indicates that water from all selected areas are hard. Higher values of alkalinity registered during monsoon which may be due to presence of excess of free CO₂. Alkalinity itself is not harmful to human beings.

Total hardness: Hardness is the property of water which prevents the lather formation with soap and increases the boiling points of water (Goel,1986). Hardness of water mainly depends upon the amount of calcium or magnesium salts or both. The hardness values ranges from 145 to 655mg/l during monsoon and 165 to 480mg/l during post monsoon season.

Cl⁻: The chloride concentration serves as an indicator of pollution by sewage. People accustomed to higher chloride in water are subjected

to laxative effects (Kaur, 1999). The values range from 120 to 210 mg/l during monsoon and 40 to 210 mg/l during post monsoon season.

Ca²⁺: Calcium and magnesium are directly related to hardness. Calcium concentration ranges between 45 to 188 mg/l during monsoon and 50 to 230 during post monsoon season.

Dissolved Oxygen: Dissolved oxygen is important parameter in water quality assessment and biological processes prevailing in the water. The DO values indicate the degree of pollution in the water bodies. Dissolved oxygen values varied from 1.2 to 7.6 mg/l during monsoon and 4.8 to 8.0 mg/l during post monsoon season.

COD and BOD: All samples from monsoon and post monsoon season analyzed for COD and BOD. The values observed are in between 0 to 8.

TABLE 1: Average values of Physico Chemical parameters of ground water of Mysore City, Monsoon season (2009-2010)

Sl	Area	pH	EC	TDS	TH	Ca ²⁺	TA	Cl ⁻	DO	COD	BOD
NORTH											
1	Bannimantap	7.06	0	0.116	532	188	341	126	5.4	0.02	2.8
2	Mandimohalla	7.6	0.7	0.026	460	120	375	120	1.6	0.096	0.4
3	N.R.Mohalla	7.5	0.7	0.029	640	135	340	160	6.8	0.08	5.2
SOUTH											
4	Siddappa square	7.22	0	0.177	375	100	220	120	4.0	0.016	0.4
5	J P Nagar	8.84	0.8	0.047	655	135	415	200	1.2	0.092	0.8
6	Jayanagar	7.01	0.7	0.027	445	135	390	130	0.8	0.008	2.1
EAST											
7	Saraswathipuram	7.81	0.7	0.027	350	105	240	140	6.0	0.012	4.8
8	TK Layout	7.41	0.3	0.012	145	45	95	410	7.6	0.016	6.8
9	Sharadadevinagar	7.06	0.4	1.043	210	100	150	130	5.2	0.032	4.4
WEST											
10	Nazarbad	7.52	0.9	0.045	650	75	490	160	5.6	0.032	1.2
11	Siddarathalayout	7.78	0.8	0.02	340	120	290	120	4.8	0.0016	0.9
12	Kyathamaranahalli	7.14	0.6	0.038	600	130	490	120	2.0	0.0016	0.6

Note: All parameters are expressed in mg/l except pH and conductivity (µs/cm)

TABLE - 2 Average values of Physico Chemical parameters of ground water of Mysore City, Post Monsoon season (2009-2010)

Sl No	Area	pH	EC	TDS	TH	Ca ²⁺	TA	Cl ⁻	DO	COD	BOD
NORTH											
1	Bannimantap	7.31	1.21	0.02	360	230	350	210	6.0	0.01	2.8
2	Mandimohalla	8.2	0.9	0.023	375	70	355	110	4.8	0.06	2.0
3	N.R.Mohalla	7.4	0.5	0.03	310	110	285	155	5.2	0.03	2.5
SOUTH											
4	Siddappa square	8.4	0.8	0.02	360	110	250	90	6.4	0.01	2.0
5	J P Nagar	8.1	0.6	0.03	305	98	290	125	5.8	0.02	2.2

6	Jayanagar	8.0	1.0	0.03	420	200	350	110	6.4	0.03	2.8
	EAST										
7	Saraswathipuram	8.2	1.0	0.03	480	315	415	120	7.2	0.01	3.2
8	TK Layout	7.71	0.2	0.02	165	50	165	40	8.4	0.05	2.4
9	Sharadadevinagar	7.8	0.8	0.022	232	176	205	169	7.5	0.03	2.6
	WEST										
10	Nazarbad	7.5	0.5	0.01	248	135	117	97	6.8	0.02	2.4
11	Siddarathalayout	7.8	0.1	0.04	195	108	162	107	7.2	0.02	2.5
12	Kyathamaranahalli	7.71	0.2	0.08	130	90	155	110	7.6	0.03	2.8

Note: All parameters are expressed in mg/l except pH and conductivity ($\mu\text{s}/\text{cm}$)

Table 3. Comparison of ground water quality at the study areas with drinking water areas during monsoon period (WHO 1993)

Parameters	Values from collected samples			WHO
	Min	Max	Mean	
pH	7.01	8.4	7.705	7 – 8.5
EC	0.0	0.1	0.05	1400
TDS	0.02	1.043	0.531	500
TH	145	655	400	500
TA	95	490	292	120
Ca ²⁺	45	188	116	100
Cl ⁻	120	210	165	250
DO	1.2	7.6	4.4	-
BOD	0.4	6.8	3.6	5.0
COD	0.016	0.08	0.096	4.0

Table 4. Comparison of ground water quality with drinking water standard at the study standard during post monsoon period (WHO 1993)

Parameters	Values from collected samples			WHO
	Min	Max	Mean	
pH	7.31	8.4	7.85	7 – 8.5
EC	0.1	1.21	0.65	1400
TDS	0.01	0.08	0.045	500
TH	130	480	370	500
TA	117	415	324	120
Ca ²⁺	50	215	157	100
Cl ⁻	40	210	145	250
DO	4.8	8.0	6.4	-
BOD	2.0	3.2	2.6	5.0
COD	0.01	0.06	0.04	4.0

4. Conclusions:

The various parameters studied are within the permissible limit as per WHO norms for drinking purposes in the studied period. Except few parameters like hardness and Chloride, Ca²⁺ were

reported more than the permissible limit indicating the need of some treatment for minimization of these parameters. The findings of the present work is also recommended that quality of ground water under

study is nearly fit for drinking purpose and domestic use.

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