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SEASONAL VARIATION IN GROUNDWATER QUALITY OF BEED DISTRICT OF MAHARASHTRA

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Abstract- Seasonal variation in groundwater quality of Beed District of Maharashtra is studied during the period of June 2008 to May 2009. To analyse water quality different parameters were studied like Temperature, pH, Electrical conductivity, Total dissolved solids, Total Alkalinity, Total hardness, Chlorides, Sulphate, Calcium, Sodium and Potassium and Dissolved Oxygen. The values observed were compared with values given by WHO for drinking water. The observed values are given in table.

Introduction

Hydrochemical studies of ground waters depend on number of factors including nature of recharge, residence time in the aquifer and pollution by anthropogenic activities. Water demand has increased over the year, which leads to water scarcity, in many parts of the world. India is now leading towards ground water crises, mainly due to improper management of water resources and environmental degradation. Major areas in Maharashtra, including Beed and its area, facing significant shortage of drinking water supply due to the lack of insufficient monsoon rainfall in the study area and water flow in the rivers. The water reservoirs like Manjara project, Dhanegaon, Majalgaon project, Majalgaon, Bendsura project, Pali are the major drinking sources of water. But most of the residents in study area are depends mainly on ground water source for drinking water.

Materials and Methods

Sixteen ground water samples were collected from the study area monthly from June 2008 to May 2009. These sites are present in the Beed district. The chemical analysis of samples was carried out by following standard procedures.

Result and Discussion

Sixteen ground water samples were selected from the study area. The result of thirteen physico-chemical parameters of ground water are presented. The seasonwise data is presented in above table. Some of the interesting observations are summarised below-

1) **Temperature (T):** In present investigation maximum value of water temperature were recorded in summer season corresponding with the atmospheric temperature. Our findings are

in good agreement with those of *Palharya*¹, *Verma*², and *Ganpati*³. During summer, water temperature was higher because of low water level, clear atmosphere and greater solar radiation. Water temperature is lower in rainy and winter season and it was due to frequent cloud, high percentage of humidity and high water level.

2) **pH:** There is seasonal fluctuation in pH values which is also reported by *Sireenivasan*⁴, *Vyas and Kumar*⁵. However maximum pH is observed during winter is in agreement with *Goels*⁶ work. The reason for higher value of pH in winter may be due to the growth of microscopic as well as filamental algae which utilise Carbon from Carbonates, Sulphur from Sulphate, Nitrogen from Nitrates and Phosphorus from Phosphate converting them into hydroxyl ion which are responsible for increase in pH. In the present work pH value varies in between 6.60 to 8.20 throughout the years for all sampling stations.

3) **Electrical conductivity:** These values are high and water samples are unsuitable for drinking purpose in all samples. In the present investigation maximum conductivity values were observed in the water samples near nallas carrying waste water. Usually high conductivity values were observed in summer season as compared to rainy and winter season which is in agreement with the observation made by *Rao*⁶ and *Bansan*⁷.

4) **Total Dissolved Solids (TDS):** TDS values in present work are higher than the permissible limit in most of the cases. The maximum concentration was recorded during summer

which decreases during rainy season obviously due to dilution of ground water. High TDS is due to evaporation of ground water.

- 5) **Total Alkalinity (TA):** The TA values are above permissible limit, 200 ppm, in all the cases indicating presence of bicarbonate, carbonate and hydroxide salts. It is found to be maximum in summer and minimum in rainy season.
- 6) **Total Hardness (TH):** Hardness values are higher in most of the cases as per WHO7 and it may be decrease in water table. The values are low in winter and rainy which is mainly due to dilution.
- 7) **Chloride (Cl):** The concentration of Chloride ion is found to be lower in the baseline stations but are suddenly found to be increased at the stations situated in the vicinity of nallas (sample no. S₃). High abnormal values of Chloride concentration indicate high degree of pollution and it is due to discharge of domestic waste, human faeces, domestic sewage etc.
- 8) **Calcium (Ca⁺⁺) and Magnesium (Mg⁺⁺):** In the present investigation the high value of Calcium and Magnesium are observed in summer season, and low value in rainy and winter season, this may be due to dilution of Calcium in rainy season. The rise in Calcium content during summer is due to rapid oxidation of organic matter in the substrate.
- 9) **Sodium (Na⁺) and Potassium (K⁺):** The lowest value of Sodium and Potassium were obtained in summer and higher concentration in winter and rainy season and that may be due to weathering and leaching of Sodium silicate mineral releasing Sodium ions in to the water. Some samples have very high concentration of Sodium and Potassium, due to contamination of ground water from domestic sources and solid waste.

- 10) **Dissolved Oxygen (DO):** The lower value of DO during summer may be due to loss of Oxygen to the atmosphere at high temperature and its utilization in fast decomposition of Organic matter. The maximum amount of DO was observed in monsoon due to aeration of water on account of rapid flow. In winter solubility of Oxygen increases with decrease in water temperature. Our results are well in agreement with Jain, Sharma and Thakur⁹

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References

- [1] Palharya J.P., Siriah V.K. and Shobha Malviya (1993) *Envir Impact of sewage and Effluent Disposal of the River System*, Ashish publication, New Delhi.
- [2] Verma S.R., Tyagi A.K. and Dalela R.C. (1978) *Indian J. of Environmental Health*, 20, 1-13.
- [3] Ganpati S.V. (1943) *An Ecological Study of Garden Pond Containing Abudant 300 Planktan proc. Indian Acad., Sci.*,17, 41-58.
- [4] Sireenivasan A. (1965) *Hydrobiologia*, 24(4), 514-539.
- [5] Vyass L.N. and Kumar H.D. (1969) *Hydrobiologia*, 31, 421-434.
- [6] Jeevan Rao K. and Santram M.V. (1995) *Ind.J.Envi. Port*, 37-197.
- [7] Bansan S. (1984) *Ind.J. Envi.Prot.*9 (12), 899-903.
- [8] *World Health Organization, Guidelines for Drinking Water Quality, Recommendations of WHO, (1984 and 1996) Geneva* 1, 1-130.
- [9] Jain S.M., Sharma M., Thakur R. (1996) *J. Eco.* , 8(3), 181-188.

Table 1- Seasonal Variation of ground water quality parameters in Beed District of Maharashtra Summer /Winter/ Rainy Season

Sampling Sites	Season	T	pH	EC	TDS	TA	TH	Cl ⁻	SO ₄ ⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	DO
S1	Summer	35.0	8.2	1120	1260	385	735	140	47	154	481	69	7.20	4.48
	Winter	26.0	7.3	769	1000	298	525	139	32	118	407	72	10.40	6.82
	Rainy	25.0	6.9	862	350	271	330	62	37	90	240	72	8.40	5.96
S2	Summer	34.8	7.1	2230	2800	510	1000	307	97	226	774	72	6.40	4.26
	Winter	25.9	6.6	2310	2078	461	810	249	05	188	612	87	6.80	6.76
	Rainy	25.1	6.9	1742	720	371	550	228	32	120	430	75	12.80	6.12
S3	Summer	34.9	7.4	2280	2500	363	845	326	87	298	547	72	7.20	4.12
	Winter	25.8	6.7	2210	1640	310	600	264	14	200	462	79	8.80	6.64
	Rainy	25.2	7.2	1627	670	225	565	201	02	138	365	66	5.50	6.26
S4	Summer	35.2	7.3	1880	1700	876	375	161	98	64	390	72	8.40	3.98
	Winter	26.1	7.4	1864	1000	625	330	145	01	64	266	95	10.40	6.88
	Rainy	25.1	7.1	1583	660	618	290	116	09	52	238	95	7.20	5.84
S5	Summer	35.0	7.4	1190	1000	437	460	124	97	118	342	82	7.60	4.14
	Winter	25.9	7.4	1133	800	436	280	106	22	88	210	92	7.20	7.02
	Rainy	25.3	7.3	1020	470	434	260	85	50	70	172	74	6.00	5.12
S6	Summer	35.1	7.1	1150	1000	515	610	204	57	195	430	72	6.00	4.20
	Winter	25.8	7.3	1101	800	398	530	157	50	108	415	75	6.80	7.12
	Rainy	25.3	7.2	996	470	352	470	95	53	100	362	72	7.60	5.26
S7	Summer	34.9	7.9	850	750	345	380	105	48	100	305	77	8.40	4.12
	Winter	25.9	7.6	740	700	332	375	29	37	70	278	87	12.40	6.66
	Rainy	25.4	7.8	558	320	296	335	42	20	102	235	90	5.50	5.56
S8	Summer	35.1	8.2	865	1000	389	505	85	60	166	339	61	3.60	4.46
	Winter	25.8	7.5	810	560	312	400	72	55	154	246	92	6.00	6.94
	Rainy	25.2	7.4	667	240	310	280	62	45	68	212	84	4.00	5.88
S9	Summer	35.1	7.8	1346	1200	354	600	203	48	190	417	87	6.40	4.52
	Winter	26.0	7.3	1030	760	315	510	120	38	140	410	89	9.20	7.40
	Rainy	25.2	6.9	949	570	287	500	70	20	93	360	69	9.20	6.12
S10	Summer	34.9	7.8	2090	2300	410	940	304	35	340	770	61	4.40	4.38
	Winter	25.8	7.2	1893	1845	376	850	195	01	170	510	84	6.80	7.12
	Rainy	24.9	7.2	419	170	228	210	64	08	72	138	72	5.50	6.08
S11	Summer	35.0	7.9	1124	1438	408	730	98	35	260	470	61	5.20	4.08
	Winter	25.9	7.3	910	230	278	300	80	02	100	200	57	4.80	7.02
	Rainy	25.0	7.4	538	204	260	78	67	05	38	40	90	13.20	6.28
S12	Summer	35.1	7.9	1018	1580	388	555	106	60	162	419	65	5.50	4.12
	Winter	25.8	7.3	931	1200	367	485	100	55	136	323	87	6.80	5.98
	Rainy	25.4	7.1	820	380	362	380	96	03	76	304	67	7.20	6.48
S13	Summer	35.1	7.5	1233	1545	410	475	119	53	200	285	49	8.80	4.64
	Winter	25.9	7.3	633	1200	351	370	96	16	100	275	97	7.60	6.96
	Rainy	25.1	7.9	609	250	243	310	83	25	85	110	73	13.20	6.66
S14	Summer	35.2	7.6	956	1200	420	822	95	20	224	596	72	4.40	5.10
	Winter	25.8	8.2	813	620	398	450	31	15	118	332	92	4.80	7.12
	Rainy	25.3	8.2	650	420	387	430	80	01	124	306	72	5.50	6.14
S15	Summer	34.8	7.2	1640	1000	390	685	98	62	180	505	81	12.00	4.48
	Winter	26.0	8.1	982	940	376	405	72	58	122	285	95	10.00	7.21
	Rainy	24.8	8.1	904	410	362	340	58	22	120	218	87	14.80	6.82
S16	Summer	34.9	7.3	2390	1380	675	1245	112	63	295	1033	83	7.20	3.96
	Winter	25.8	7.1	1920	832	482	1230	68	62	212	935	97	14.00	7.20
	Rainy	25.4	7.5	960	410	368	365	42	02	92	273	100	16.40	6.86