PHYSICO-CHEMICAL ANALYSIS OF DRINKING WATER IN SADAVALI INDUSTRIAL ZONE OF SANGMESHWAR TAHSIL, DIST. RATNAGIRI (MAHARASHTRA)

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ABSTRACT

Water is an essential resource for life on earth. Even though planet of the earth contains 71% water out of that 97% is concentrated in oceans. Increasing urbanization and rapid industrialization in Konkan region affects the drinking water resources directly and indirectly. Ground water resources like bore well and well are significant in Konkan region in general and Sangmeshwar Tahsil in particular. Sadawali is a growing industrial zone of Sangmeshwar Tahsil, Ratnagiri district. Water from well is mainly used for drinking and domestic purpose in this area. A Physico-chemical study of both sources was carried out by analyzing sample from three bore wells and from three wells of different locations. Different parameter like colour PH, Chloride, TDS, DO, COD, BOD, etc. were determined by standard analytical methods. The main purpose of analysis is to check potability of water. According to WHO standards for drinking water the range of checked parameters were found within permissible range. Hence water from both sources was found to be potable and safe for drinking purpose.

Key Words: *Physico-Chemical, Ground Water, Drinking Water.*

1.0 INTRODUCTION

Ground water is one of the earth's important resources. The subsurface water generally includes chemical and physical properties, geological environment, natural movements, recovery and utilization. The term ground water is usually reserve for subsurface water that occurs beneath water table in soil and geological formation that are fully saturated. Ground water becomes usable source when rocks in the zone of saturation are perennial. Ground water hydrology is regardless as specialized science that involves geology, hydrology and fluid mechanics. Study of ground water requires knowledge of basic principles of geology, physics, chemistry and mathematics. Geology provides with qualitative knowledge of framework of flow but chemistry provides tool for qualitative analysis of the groundwater. Groundwater is an economic source and more than 85 per cent of public water supplies are obtained from well. Ground water supplies for rural area have certain advantages over surface water. Depth of water table below ground level is governing factor in determining pollution since, as water level approaches nearer ground surfaces, greater is the risk of contamination. Major sources of ground water pollution are urban pollution, industrial pollution, agriculture pollution and pollution from well etc. Rapid industrialization and urbanization resulted in successful pollution of water resources available on earth, which causes significant effects on ecosystem (Trivedi and Goel, 1986) plants and animal life. In order to avoid future problem it is necessary to

protect ground water sources from further pollution. Periodical and continuous monitoring of ground water quality is necessary so that an appropriate step may be taken for water resources management.

2.0 STUDY REGION:

According to Ministry of Water Resources, Government of India, 23604.76 ham/year ground water is available in Ratnagiri district out of that 4088.65 ham/year ground water is available in Sangmeshwar tehsil (Mandal, D. N., 2009, p. 15). It means ground water is the main source of water in the Ratnagiri district as well as in Sangmeshwar tehsil. Hence, for the present research paper Sadavali MIDC area is selected as a study region for the micro level analysis of the status of ground water. It is situated 2 Km away from Devrukh (Head Quarter of Sangmeshwar Tehsil) on Sakharpa-Devrukh road. It located on 17^{O} 05' 27.05" north latitude and 73^{O} 35' 22.55" east longitude. The average height of the study region from MSL is 530 feet (www.earthgoogle.com).

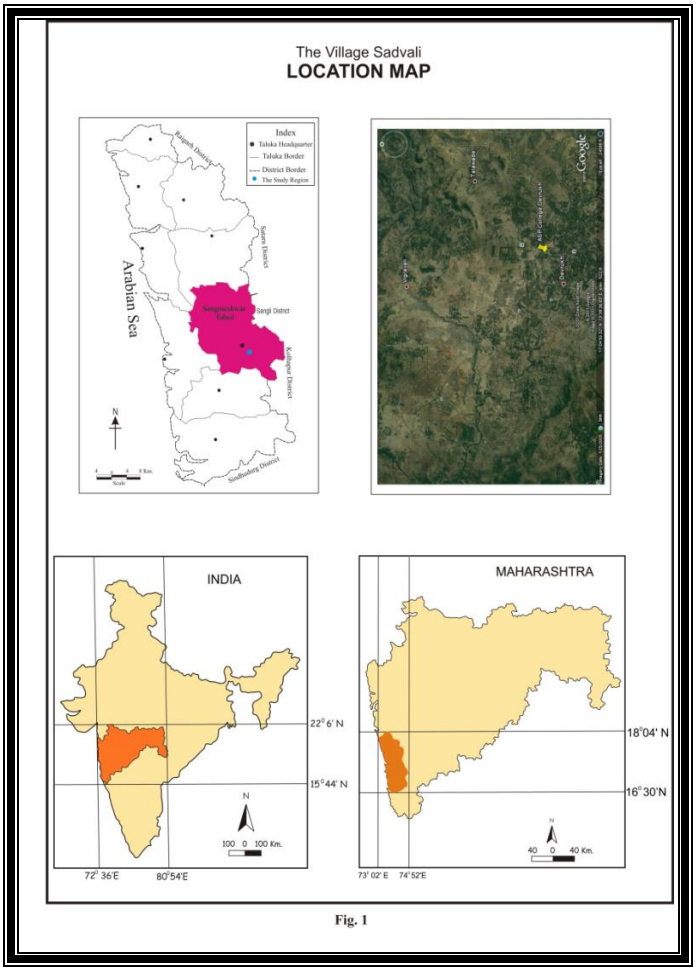

Fig. 1

According to 2001 census, population of the study region is 3490 persons and 769 households are living there (PCA, Ratnagiri district). The average temperature of the study region ranges between 25 and 30 ^{O} Celsius and annual rainfall is 2200-2600 mm. There are about 110 wells out of which 101 are private and 3 are public wells and 9 public bore wells. The well water and bore water is the main source of drinking water of the peoples of the village and is available throughout the year.

3.0 OBJECTIVE:

- The main objective of the present research paper is to check the potability of drinking water in the study region.

4.0 MATERIAL AND METHODS:

The primary data is the main source to mitigate the objective of the research paper. Hence, primary is collected through intensive fieldwork. For the collection of water samples, random sampling method is applied. The thirteen water samples from thirteen different locations are collected in sterilized bottles from the study region. Out of that, ten water samples from wells and three water samples from tube wells are collected. The collected water samples are analyzed in the laboratory using standard methods APHA (1995) for checking the potability with respect to WHO standards for drinking water.

5.0 RESULTS AND DISCUSSION:

The odor and color of water from both sources are unobjectionable. Total Solid (T. S.) of well water is 230.5 mg/lit while that of bore water is 280 mg/ lit. Therefore, both the values are within permissible range but T. S. of bore water is more than the well water. Total Dissolved Solids (TDS) of bore water (193 mg/lit) is higher than the well water (152.8 mg/lit). Total hardness of bore and well water is 102.66 mg/lit and 57.3 mg/lit, respectively. Calcium and magnesium hardness is also high in bore water than well water. Therefore, bore water is harder as compared to well water. Chlorides are also more in bore water i.e. 194 mg/lit than well water i.e. 170.95 mg/lit. Alkalinity, CO_2 and dissolve oxygen is nearly same in both the samples and is in the satisfactory range (Table-III).

All the analyzed parameters are within permissible range, as per the WHO norms.

Table-I

WELL WATER SAMPLES

Sample No. / Parameters	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
Colour	clear	Clear	clear	clear	Clear	clear	clear	Clear	clear	Clear
pH	5.0	6.2	6.0	6.1	6.0	5.8	6.5	6.3	5.5	5.4
TS (mg/lit)	280	200	240	190	220	270	255	260	190	200
TDS(mg/lit)	240	120	120	172	138	120	130	143	178	167
Chlorides(mg/lit)	172.0	167.5	168	177	168	169	160	177	173	178
Alkalinity (mg/lit)	180.7	180	210.4	178.2	189.3	190.9	220	216.4	190.2	198.4
T. Hardness (mg/lit)	16	84	72	24	67	85	74	65	35	39
Ca++ (mg/lit)	4.008	25.65	20.84	18.35	27.42	18.34	15.70	19.44	26.76	22.90
Mg++(mg/lit)	2.92	14.25	12.48	12.77	10.53	12.43	9.56	13.55	3.56	7.45
DO (mg/lit)	6.08	6.68	6.89	6.66	6.56	6.34	6.78	6.94	6.20	6.05
CO2(mg/lit)	8.8	4.4	4.4	5.0	5.5	8.8	4.5	4.5	4.0	4.2
Residual Chlorine (mg/lit)	0.2	0.3	0.3	0.3	0.3	0.2	0.4	0.3	0.2	0.2
TSS (mg/lit)	40	80	120	60	40	100	60	60	70	90

Table-II

TUBE WELL SAMPLES

Sample No. / Parameters	TW1	TW2	TW3
Colour	clear	clear	clear
pH	6.8	6.9	6.4
TS (mg/lit)	160	240	440
TDS(mg/lit)	120	180	280
Chlorides(mg/lit)	187	194	198
Alkalinity (mg/lit)	220	180	200
T. Hardness (mg/lit)	124	64	120
Ca++ (mg/lit)	44.88	22.44	40.08
Mg++(mg/lit)	19.30	10.14	19.50
DO (mg/lit)	6.68	6.48	6.48
CO2(mg/lit)	-	-	4.4
Residual Chlorine (mg/lit)	0.4	0.3	0.28
TSS (mg/lit)	40	80	160

Table-III

AVERAGE COMPARISON

Sample No. / Parameters	Well water	Tube well water
pH	5.88	6.7
TS(mg/lit)	230.5	280
TDS(mg/lit)	152.8	193
Alkalinity(mg/lit)	195.45	200
Total Hardness (mg/lit)	56.1	102.66
Chlorides (mg/lit)	170.95	194
DO (mg/lit)	6.52	6.54
CO2 (mg/lit)	5.41	4.4
Residual Chlorine (mg/lit)	0.27	0.32
Ca++ Hardness (mg/lit)	40.08	35.8
Mg++ Hardness (mg/lit)	19.50	16.3

6.0 CONCLUSION:

According to World Health Organization (WHO) standards for drinking water, the range of checked parameters is within permissible range. Hence, water from both sources is potable and safe for drinking purpose but preference should be given to the well water.

REFERENCES:

1. APHA, AWWA, WPCF, 1995. Standard methods for the examination of a Water and Waste water, 19th ed., American Public Health association, Washington, DC.
2. Gautam Mahajan, APH Publishing Carporation, evaluation and development of ground water, New Delhi.
3. H.M. Raghuraman, Ground water, 3rd ed., New age international publisher, New Delhi
4. R.K. Trivedi and P.K. Goel 986, chemical and Biological Methods, for Water Pollution studies, Enviromedia, Karad.
5. S. K. Maiti, Handsbook of methods in Environmental Studies volume I, ABD publisher, Jaipur.

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