ANALYSIS OF GROUND WATER OF CANACONA TALUKA OF GOA, INDIA

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ABSTRACT

The structure and properties of water are integral to the existence and evolution of life on any number of levels. Physico-chemical status was examined to determine quality of drinking water at Canacona taluka of Goa, India. The parameters studied includes pH, total hardness, calcium, magnesium, nitrate, dissolved oxygen, biological oxygen demand and chlorides. The results were compared with BIS standards. The study noticed that some water samples exhibited pollution tendencies which may be attributed to the higher or lower level of different parameters studied which are not satisfying the requirement for the use of various purposes. The usefulness of these parameters in predicting ground water quality characteristics were studied.

Key Words: drinking water, Physicochemical properties, Canacona, pollution, BIS standards etc.

Introduction: Water is one of the most Important Compound to the Ecosystem. Better Quality of water Described by its Physical, Chemical and Biological Characteristics. But some Correlation was Possible among these Parameters and the Significant One would be Useful to Indicate Quality of water. Rapidly growing population and poor water supply facilities have encouraged people to dig their own wells in many areas which have resulted in large scale withdrawals of groundwater in Goa. Generally, water samples are analyzed for a number of water quality parameters to assess its suitability for drinking and irrigation purposes. Water is addressed as a necessary resource and life preservative. It is required for most human activities

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like drinking, cooking bathing, washing, agriculture, industry, recreation, navigation and fisheries etc. Now-a-day, water quality issues have become a significant concern due to the growth of population, urban expansion and technological development. Water can be easily contaminated in different ways through unregulated or regulated but not well designed and monitored disposal practices. Goa is a tiny State of India located along its West Coast having an area of 3702 sq.km and a population of over 1.45 million people. It is a popular international and domestic tourist destination owing to its natural beauty and rich cultural heritage. More than 2 million tourist visits this small place every year. This floating population puts tremendous stress on its natural resources, especially its water resources. The tourism activity is restricted to the coastal zone and degradation of groundwater quality in coastal aquifers has been witnessed all along this belt [1]. The ecosystem of the country is highly dependent on the river system and any upset in the supply of water in the system is sure to bring about changes in the living systems including people, flora and fauna [2]. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. Natural water contains different types of impurities are introduced in to aquatic system by different ways such as weathering of rocks and leaching of soils, dissolution of aerosol particles from the atmosphere and from several human activities, including mining, processing and the use of metal based materials [3]. The increased use of metal-based fertilizer in agricultural revolution of the government could result in continued rise in concentration of metal pollutions in fresh water reservoir due to the water run-off. Also faucal pollution of drinking water causes water born disease which has led to the death of millions of people [4]. It is therefore necessary that the quality of drinking water should be checked at regular time of interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. It is difficult to understand the biological phenomena fully because the chemistry of water revels much about the metabolism of the ecosystem and explain the general hydro - biological relationship. Lack of access to safe water is strongly correlated with poverty, and the provision of safe drinking water is considered to be a fundamental step in a community's transition out of poverty [5].

MATERIALS AND METHODS

The Water Samples from Goa were collected from twenty five different Stations in the Morning Hours between 9 to 11am, in Polythene Bottle Regularly for Every Month. The Water samples were immediately brought in to Laboratory for the Estimation of various Physico-

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chemical Parameters like pH, conductivity and total dissolved solids were recorded at the time of Sample Collection, by using Thermometer and Pocket Digital pH Meter. while other Parameters Such as DO, TDS, Free CO2, Hardness, Chlorides, Alkalinity, Phosphate and Nitrate were Estimated in the Laboratory By using Standard Methods as Prescribed By APHA, AWWA, [6], Trivedy and Goel [6], Kodarkar [7].

RESULTS AND DISCUSSION

The physico-chemical analysis (pH, conductance, total hardness ,alkalinity, nitrite, dissolved oxygen, biological oxygen demand and chloride) is presented in Table 1.

In the present investigation some water samples are colourless and odourless. However some water samples were slightly coloured due to muddiness. The pH of the water samples ranged from 5.20 to 7.13. Acid pH of water may be due to dissolved carbon dioxide and organic acids such as fulvic and humic acids which are derived from decay and subsequent leaching of plant materials [8-9] pH is mainly influenced by volume of water, soil type. Low pH of groundwater can cause gastrointestinal disorders especially hyperacidity, ulcers and burning sensation [10]. Water having pH below 6.5, causes corrosion of metal pipes, resulting in the release of toxic metals such as zinc, lead, cadmium, copper etc. Higher values of pH hasten scale formation in water heating apparatus and decrease germicidal potential of chlorine. Specific conductivity of water is an index of availability of total concentration of soluble ions, which has a wide bearing on productivity. During study, the values of specific conductivity were found to vary between 0.03 to 0.852mS/cm. This observation gets support from the earlier findings on various reservoirs [11].Total hardness is the indicator of hydrogeology and aesthetic quality of water. During study, the hardness was ranged from 4.0 to 328.2 mg/l. These findings suggest that the water body is moderately hard. Total hardness of sample. No. 12 was found to be high as prescribed by WHO (300mg/l)[12]. Calcium is an important element influencing flora of growth. The calcium content varied from 1.6mg/l to102.6 mg/l and magnesium content varied from 4.0mg/l to 328.2 mg/l. Desirable and maximum permissible content of calcium and magnesium in drinking water are 75 mg/l and 200 mg/l and 30 mg/l and 100mg/l respectively [13]. Water containing high calcium content is not suitable for washing, bathing and in boilers. It cause concretion in the body and may cause intestinal diseases and stone formation [14]. Higher concentration of magnesium can cause hardness of water and exerts a cathartic and diuretic action [15]. Nitrate content of water samples in the present study varied from 7/5mg/l to 34.3

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mg/l. The study clearly indicates nitrate content of all the samples are well within the desirable limit [16].Dissolved Oxygen is very important parameter of water quality and an index of physical and biological process going on in water. In the present study dissolved oxygen of samples ranged from4.90 mg/l to 8.32mg/l. Do is of great importance to all living organisms. It may be present in water due to direct diffusion from air and photosynthetic activity of autotrops. Concentration of DO is one of the most important parameter to indicate water purity and to determine the distribution and abundance of various algal groups [17].BOD values of water samples varied from 0.53mg/l to 3.20 mg/l and the values are within the permissible limits of WHO (5 mg/l)[18]. Chloride content of water samples varied from 4.9mg/l to 99.1mg/l. 250 mg/l has been established as desirable limit and 100 mg/l as the maximum limit for chloride in drinking water [13].Higher concentration of chloride in water can impart undesirable taste may cause corrosion in the distribution system and may harm growing plants [19].

Conclusion

Analysis of Canacona water revealed that the some water samples were not suitable for different purposes like irrigation and potable purposes. The present study is essentially a primary work and needs to be further investigated to arrive at specified conclusion with respect to clinical implications. It is therefore, advisable that authorities should take appropriate steps to check the ground water contamination.

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Table.1

S.No	pH	Conductance in micromhos/cm	Total hardness mg/l	Calcium hardness in mg/l	Magnesium In mg/l	Nitrite In Mg/l	DO in mg/l	BOD in mg/l	Chloride in mg/l
1	7.13	0.505	124.0	33.6	124.0	34.3	7.68	1.06	54.5
2	6.66	0.232	48.0	16.0	48.0	7.60	7.52	1.10	19.8
3	6.08	0.534	216.1	65.7	216.1	11.4	7.85	2.66	34.6
4	6.54	0.158	40.0	11.2	40.0	19.0	6.9	1.06	9.90
5	6.15	0.140	40.2	9.60	40.0	19.5	5.85	1.50	39.6
6	5.43	0.154	41.0	4.80	40.0	11.5	7.6	1.20	24.7
7	6.00	0.184	28.0	14.4	44.0	47.9	8.32	1.60	34.6
8	6.18	0.105	116.0	6.40	28.0	10.2	8.11	2.13	39.6
9	5.85	0.440	20.0	28.8	116.0	11.4	8.15	3.20	34.6
10	6.12	0.019	42.0	4.80	20.0	26.7	7.65	1.60	99.1
11	5.69	0.125	104.0	8.00	40.0	7.68	7.62	0.53	4.90
12	5.31	0.345	328.2	28.8	104.0	8.00	7.20	1.06	49.5
13	6.10	0.852	20.0	102.6	328.2	8.11	7.52	1.60	54.5
14	6.42	0.081	16.0	14.4	20.0	8.16	8.16	2.20	49.5
15	5.54	0.058	24.0	19.0	16.0	7.68	8.32	1.60	24.7
16	6.08	0.083	42.0	6.40	24.0	7.50	5.50	2.13	34.6
17	5.70	0.016	48.0	8.00	40.0	7.90	4.80	1.60	39.5
18	5.66	0.255	88.2	8.20	48.0	7.52	3.20	2.66	54.5
19	5.56	0.277	28.0	20.8	88.0	8.16	7.56	2.25	64.4
20	5.50	0.109	4.0	6.40	28.0	8.32	8.00	2.66	39.6
21	5.26	0.039	60.0	9.60	4.0	8.10	7.80	1.65	19.8
22	5.80	0.254	80.1	14.4	60.0	8.60	7.90	2.14	4.9
23	5.60	0.298	4.0	28.8	80.0	9.10	5.20	2.19	54.5
24	5.96	0.039	44.0	1.60	4.0	7.85	4.90	1.65	39.8
25	5.20	0.207	22.2	6.40	44.0	8.97	4.95	2.60	49.5

Physicochemical properties of water at Conacona Goa.

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