VARIABILITY IN PHYSICO-CHEMICAL PARAMETERS OF DRINKING WATER – PURI (ODISHA)

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It is well known that 70% to 80% of all illnesses in India are related to water contamination. The women and children are particularly more susceptible to this contamination. The quality and availability of water is fast deteriorating. Considering these facts the author has made a study on the quality of drinking water of some areas of Puri city. It was found that the water is unsuitable for drinking without further processing as it contains high level of inorganic salts and Coliform.

INTRODUCTION

A very large section of the population uses raw water from surface and ground water sources for human consumption. Most ground and surface water contains natural dissolved salts. These salts originate from the contact of the liquid water moving in the hydrological cycle with various rocks and soil minerals. Once foreign chemical or biological material has been introduced in the environment it becomes a possible ground water pollutant. Contamination of drinking water is major health hazard as more than seventy percent of diseases are waster borne in a country like India. The contaminated water requires permanent remedy otherwise it will affect the health and hygiene of the consumer.

The present study was conducted keeping this fact in mind to determine the quality of water of some areas of Puri city. A few Physico-Chemical Parameters were studied and quality was determined. It was found that water is fit for irrigation, fish culture, cloth washing but unfit for drinking purpose without any elementary treatment.

MATERIALS AND METHODS

The three grab samples were collected from each site during the first week of every month for a period of one year, in clean screw-capped plastic bottles. Labelled samples were usually collected in the morning hours, *i.e.*, 8.00 A.M. to 10.00 A.M. from various sampling station. They were brought to the laboratory and tested for pH, Electrical conductance and dissolved Oxygen with in six hours of collection. The Physico-Chemical Parameters were estimated as APHA [1] and ICMR [7] methods.

RESULTS AND DISCUSSION

Site-I and Site-II Physico-Chemical Parameters clearly indicate that the water is slightly polluted due to high coliform value and may be used for drinking purpose only after treatment.

The results obtained are depicted in Table I and II pH value varies from 7.38 to 7.6, 7.18 to 7.64 in site-I and II through out the year. This shows that water is alkaline. This may be due to the fact that contaminant and other foreign element present in environment or used by humans find their way into surface and under ground water. Secondly, the Coliform number is mostly high in all the three samples. In site-I, the Coliform value varies from 8 MPN/100 ml to 1100 MPN/100 ML, in site-II, this value varies from 23 MPN/100 ML to 1100 MPN/100 ML. While the permitted value is 4 MPN/100 ML (WHO, 1993). This could be due to broken pipelines. Presence of high number of Coliform at all sites indicates that water will have to be pretreated before drinking otherwise the consumer will suffer from water borne diseases. On survey it was found that most people suffer from Amoebiosis, Jaundice and Hepatritis. Other parameters as observed from the table were within the recommended range through out the year.

Table 1. Physico-Chemical Characteristics of 'Site-I'

(All values are in Mg/L except pH, EC, and Coliform)

S. No.	Name of Parameter	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	pH	7.45	7.64	7.38	7.37	7.68	7.64	7.58	7.75	7.58	7.58	7.68	7.68
2.	Chloride	21	32	26	38	39	30	30	29	29	29	29	28
3.	Fluoride	0.8	0.9	0.7	0.2	0.9	0.9	0.8	0.8	0.8	0.7	0.9	1
4.	Total Hardness	145	155	155	156	186	149	149	158	148	139	134	135
5.	Ca-Hardness	86	90	89	79	98	68	78	76	76	76	74	74
6.	Mg-Hardness	68	59	72	82	93	83	74	84	76	68	68	68
7.	Nitrate	12	13	13	13	12	12	12	12	13	13	13	12
8.	Iron	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9.	Sulphate	14	12	9	11	12	13	13	11	12	11	12	12
10.	Total Solid	366	329	369	424	483	483	484	484	368	518	519	410
11.	Total Dissolved Solid	339	289	338	393	444	444	458	348	338	475	476	380
12.	Total Suspended Solid	34	28	33	34	34	35	35	35	34	38	38	38
13.	Alkalinity	309	329	319	335	315	325	329	302	302	218	214	218
14.	Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
15.	Dissolved Oxygen	7.2	7.3	7.4	7.5	7.3	7.3	7.4	7.4	7.0	7.2	7.2	7.2
16.	Biological Oxygen demand	3.0	3.1	2.8	3.3	3.3	3.3	3.3	3.3	3.5	3.5	3.2	3.2
17.	Electrical Conductance	489	420	489	568	648	620	620	620	580	673	682	500
18.	Coliform (MPN/100ML)	ND	23	28	108	98	56	ND	1100	8	18	11	8

SUGGESTIONS

(i) People should be made aware.

(ii) District Authorities should repair the broken pipeline as soon as possible.

(iii) Better water management by the Government of Community can help in conserving water.

(iv)   Through strict implementation of the Government's water treatment programme water can be rendered safe for drinking.

Table 2. Physico-Chemical Characteristics of 'Site-II'

(All values are in Mg/L except pH, EC, and Coliform)

S. No.	Name of Parameter	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	pH	7.43	7.25	7.39	7.28	7.89	7.36	7.09	7.79	7.49	7.59	7.64	7.64
2.	Chloride	86	78	92	90	91	91	76	82	83	79	90	92
3.	Fluoride	0.24	0.25	0.67	0.2	0.25	0.24	0.21	0.2	0.3	0.45	0.65	0.55
4.	Total Hardness	319	299	308	299	275	286	260	260	250	240	240	295
5.	Ca-Hardness	210	180	180	160	150	169	102	120	120	120	126	165
6.	Mg-Hardness	119	135	125	145	139	129	160	140	139	120	130	130
7.	Nitrate	16	26	28	10	35	26	28	28	28	25	20	21
8.	Iron	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9.	Sulphate	5	8	9	5	8	6	13	13	10	10	7	7
10.	Total Solid	534	478	594	648	797	793	645	676	540	815	899	608
11.	Total Dissolved Solid	505	415	566	618	628	729	619	610	505	785	849	569
12.	Total Suspended Solid	39	35	33	33	59	69	39	68	34	34	69	49
13.	Alkalinity	359	345	304	321	400	**336**	369	359	360	259	268	267
14.	Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
15.	Dissolved Oxygen	7.5	7.2	7.3	7.3	7.4	7.4	7.3	7.3	7.8	7.8	7.6	7.6
16.	Biological Oxygen demand	3.5	3.4	3.4	3.6	3.6	3.0	3.0	3.4	3.4	3.3	3.3	3.4
17.	Electrical Conductance	730	645	809	884	1046	1046	889	884	1020	1129	1200	809
18.	Coliform (MPN/100ML)	ND	23	28	ND	1100	23	550	560	49	47	101	340

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