

Seasonal Variations in Physico-Chemical Characteristics of Borewell Water at Parli-Vaijnath, Dist. Beed, Maharashtra

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Abstract: *The present communication deals with the study of Physico-Chemical characteristics of borewell water at Parli-Vaijnath, Dist. Beed, Maharashtra. The Physico-Chemical characteristics were studied from June 2017 to May 2018. Seasonal variations at four different sites at Parli-Vaijnath were observed. PH, Dissolved Oxygen, Chloride, Salinity, Total Hardness were analyzed. The results revealed that the condition of borewell water in Parli-Vaijnath shows fluctuations in the Physico-Chemical parameters. It may be due to industrial effluent and thermal effect on ground water.*

Keywords: Physico-Chemical Characteristics, Borewell water, Parli-Vaijnath.

1. Introduction

Water, the most vital resource of all kinds of life is adversely affected both qualitatively and quantitatively by all kinds of human activities on land. Ground water is by far the most abundant readily available sources of freshwater followed by lakes, reservoirs, and rivers. Ground water represents over 90% of the world's readily available freshwaters resources (Boswinkel 2000). About 1.5 billion people depend upon ground water for their drinking waters supply (WRI, UNEP, World Bank 1998).

Water as a universal solvent has the ability to dissolve many substances be it organic or inorganic compound. The problems of ground water quality are much more acute in areas which are densely populated with localization of industries. Water for human consumption must be free from organisms & chemical substances in concentration large enough to affect health (Bruvold & Ongerth 1969, APWA 1995, Brain 2007). The addition of various kinds of pollutants through sewage industrial effluents, agricultural runoff into the water main streams brings about a series of changes in the Physico-Chemical characteristics of water, which have been the subject of several investigations (WHO / UNEP 1989). The World Health Organization (WHO 1985) estimated that the burning dung & drinking of contaminated water together cause eight million deaths per year. 70% of India's fresh water is polluted as per conventional standard. Hence there is an immediate need to survey & document quality of water for further implementation program. A regular monitoring of water quality not only prevents diseases & hazards but also checks the water resources from going further polluted.

Water predominant pollution is related with urbanization through rural pollution is also due to modernization in agricultural practice. The industries are also major cause for the pollution of surface and ground water. Today we need industries for economic & commercial development also, sustainable development is necessary. We should keep our strict eyes on the environment.

In order to do that, author decided to monitor the water quality parameters. Physico-Chemical parameters of ground water quality in relation to (Drinking quality) health has been studied by number of workers throughout India. But less attention has been found to this aspect compared to river, lake, ponds Physico-Chemical studies and health. (Vijay Kumar 1996, Reddy 2001 & Nagarja 2005). The present communication has been undertaken to assess the ground water quality of Parli-Vaijnath, Dist. Beed, Maharashtra.

2. Materials & Methods

The water sample for Physico-Chemical analysis were collected from Parli-Vaijnath, (Maharashtra) at four different sites.

Site-1 - Shivaji Nagar

Site-2 - Thermal Colony

Site-3 - Priya Nagar

Site-4 - Vidyanagar

Geographical Experimental Site: Parli-Vaijnath is situated at $18^{\circ} 51' 0''$ (18 degree 51 minutes zero seconds). North Latitude & $76^{\circ} 27' 0''$ (76 degree 27 minutes zero seconds) East Longitudes. The climate is hot and dry. The rainfall is an average 65 to 70 cm per year. The Thermal Power Station & some small scale industries like Vaidynath Sugar Factory, Koromandal Cement Factory, Sapna Tiles Factory are located in this city. The water samples were collected from Parli-Vaijnath at four different sites in the month of June 2017 to May 2018 in a particular time 8:30 a.m. to 10:30 a.m. Separate samples were collected from dissolved oxygen in 250ml bottles & dissolved oxygen was fixed in the sites by adding alkaline azide solution immediately after collection. The samples were analyzed immediately returned to the laboratory Physico-Chemical variations of the borewells water like PH, Temperature, Total Hardness dissolved oxygen (DO) & Chloride were determined seasonally in Summer, Monsoon & Winter according to standard methods (Trivedi & Goel 1987, APHA 1998 & Kodarkar *et al* 1998).

3. Result & Discussion

The Physico-Chemical parameters of water obtained from different borewell of selected sides are maintained in Table No.1.

Temperature: The mean air and water temperature ranged between 20^o C and 32^oC, and overall air & water temperature of the season were 30.6^oC & 21.3^oC. The maximum air temp during summer was 32^oC & minimum air temperature during Winter season was 29^oC (Table No.1). The maximum water temperature during monsoon was 23^oC & minimum water temperature mean during winter was 20^oC.

PH: The mean maximum PH (7.7) was recorded during Summer & minimum was during Winter (6.5). The overall seasonal mean was (7.2). High pH values are recorded in Winter season similar results were by Veeramani *et al*(2008)

Dissolved Oxygen: Dissolved oxygen (DO) values were maximum (2.8mg/l) in Winter & minimum in Monsoon (2.6mg/l). The overall seasonal mean was (2.7mg/l). The values of dissolved oxygen are beyond the permissible limit given by WHO & ISI. Throughout year, it was less than four high dissolved oxygen was recorded in winter. Similar results were recorded by Kumar (1993).

Chloride: The high values of chloride (531.2mg/l) were recorded in monsoon & low in winter (250.5mg/l). The overall seasonal mean was (365.5 mg/l). The high values of chlorides were recorded from April to October & this may be due to pollution of ground water. Samples from chloride rich effluent (Karnath 1989) also recorded same results. Consumption of water with high concentrations of total dissolved salts has been reported to cause disorder of alimentary, nervous system, coronary system besides causing Miscarriages and Cancer (Reddy & Subha Rao 2001).

Salinity: The higher values of Salinity were recorded in monsoon (980.2 mg/l) & lower in winter (460.2 mg/l). The overall seasonal mean was (651.9 mg/l). The high values of Salinity levels can make water unfit to use for any purpose & even low levels can create health problems for individuals who suffer from high blood pressure. High Salinity values were also recorded by Vijay Kumar (1996).

Total Hardness The total hardness values were maximum during summer (790.2 mg/l) & minimum in winter (450.5 mg/l). The overall seasonal mean was 633.7 mg/l. The high values above permissible limits by WHO & ISI were recorded from Summer & Monsoon, below limits in winter. Total hardness calcium & magnesium above limits causes encrustation in water supply structure & adverse effect on domestic use (Dhamiji 1995, Nagraj *et al* 2005).

The present study shows detailed Physico-Chemical variations of ground water in Parli-Vaijanth, Maharashtra. The summer, monsoon & winter seasons show different seasonal fluctuations in Physico-Chemical parameters. Salinity, dissolved oxygen, total hardness & chloride in this season were beyond the permissible limit according to WHO

& ISI standards for drinking purpose. It may be due to addition of industrial effluent & thermal effluent in ground water. To improve suitable quality of ground water for drinking purpose, there should be continuous monitoring of pollution level.

4. Acknowledgment

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Table 1: Seasonal variations in Physico-Chemical Parameters of ground water, Parli-Vaijnath, Dist. Beed, Maharashtra, during June 2017 - May 2018

Parameter	Summer	Monsoon	Winter	Average	WHO	ISI
Atmospheric Temp. (°C)	32	31	29	30.6	-	-
Water Temp. (°C)	21	23	20	21.3	-	-
pH	7.7	7.5	6.5	7.2	5-9.2	6.5-9.2
Dissolved Oxygen (mg/l)	2.7	2.6	2.8	2.7	6.2-7	6.2-7
Chloride (mg/l)	315	531.2	250.5	365.5	200-1000	200-600
Salinity (mg/l)	515.5	980.2	460.2	651.9	-	-
Total Hardness (mg/l)	790.2	660.4	450.5	633.7	200-600	200-500