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Section A: Environmental Science

Research Article

## Study of Water Quality: Part-III. Analysis of Drinking Water from Different Villages of Muktainagar Region

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**Abstract:** The drinking water samples were collected in a bottle from 8 villages of the Muktainagar region, Maharashtra (India), in the month of Oct/Nov. 2016. These water samples were analyzed for their physiochemical parameter. The laboratory tests performed for the analysis of samples of water for Temperature, Odour, pH, CaCO<sub>3</sub> content, Total Hardness (TDS), Conductance etc. On analyzing the results conclusions were drawn about potability of water for human being due to variation of concentration of one or the other parameter. The usefulness of these parameters in predicting drinking water quality characteristics were discussed. The physiochemical parameter tests were performed for the analysis of the collected water samples. Thus an attempt has been made to find the quality of drinking water in villages of Muktainagar region, suitable for drinking purposes or not. This report will be useful to community for the correction if required to make to their water quality.

**Key Words:** Water samples, Physiochemical tests, Drinking water supply, Water quality, Purna and Tapi River and Muktainagar region.

### INTRODUCTION

Drinking water is one of the most important natural resource in human life. Water, air and cloths all have increasing importance of day to day life of mankind. Looking to this we have taken the

priority work on water topic. Drinking water is one of the most vital natural resource. In India, more than 85 % of rural and nearly 25 % of urban population depend on drinking water for meeting their drinking and domestic necessities. Due to wide distribution and availability with in the vicinity, drinking water in the recent past has become a significant source of water for satisfying the ever growing demand.

In Muktainagar region or earlier known a Edalabad is a town situated ( $\sim 21^{\circ}03'08''\text{N}$  and  $76^{\circ}03'18''\text{E}$ ) near on National Highway No.6. Muktainagar is famous for its association with Muktai, younger sister of saint Dnyaneshwar, who attained Samadhi on the banks of Tapti River at a place called Mehun (15 km from Muktainagar). Which is located in the Purna-river basin, residents mostly depend on the substance subsurface reservoir of water i.e bore well, open well, hand pumps apart from the river water. Use of drinking water in this urban area is done primarily for drinking and domestic purposes. But the users of this source are unaware of the action leading to contamination of drinking water. Causes such as improper drainage arrangements and management of domestic waste have led to change the properties of the water. Therefore, it is very critical to assess the drinking water quality to ensure the safe use of water. Recently one of us have reported the electrochemical (SWV, DPP and DP-ASV) method for simultaneous determination of trace elements in terrestrial rain<sup>1</sup> water of and soil<sup>2</sup> of Bhavnagar region and also simultaneous determination of trace elements in terrestrial rain<sup>3</sup> water of and soil<sup>4</sup> of Bhusawal region. Similarly, the water quality from the different wards of Muktainagar City was also studied earlier<sup>5,6</sup>. Here, an attempt has made to evaluate the quality of drinking water in different Villages of Muktainagar region with respect to certain parameters. Such as Temperature, Odour, pH,  $\text{CaCO}_3$  content, Total Hardness and Conductance etc. in order to provided information regarding the potability of the water in the region. The results of drinking water analysis concerning certain other parameters are discussed.

## EXPERIMENTAL

**Sample collection:** The water samples from the selected sites i.e villages were collected during Oct/Nov. 2016 and drawn in pre-cleaned polyethylene bottles. The samples V-1, V-2, V-3, V-4, V-5, V-6, V-7 and V-8 were from tap water supply. The map of the locations, from where sample drawn is shown in Fig. 1. The samples after collection were immediately placed in dark boxes and processed within 1 day of collection.

**Physio-chemical analysis:** The collected samples, V-1 to V-8, were analyzed for major physical and chemical water quality parameters like Temperature, Odour, pH,  $\text{CaCO}_3$  content, Total Hardness, Conductance as per the method Assessment of Drinking Water the parameters were analyzed by prescribed standard method<sup>7-10</sup>.

The temperature of the sample was noted at the sampling spot during collection<sup>11</sup>. Quality described in "Standard methods for the analysis of water and wastewater American Public Health Association (APHA)"<sup>7</sup>. The water sample parameters can be calculated by using various methods reported<sup>12, 13</sup> in literature. The pH of all the water samples was determined using a pH meter (Model no EQ-614A, Equiptronics). Electrical conductivity was measured using a conductivity meter (Model EQ-664 Equiptronics). All the reagents and chemicals used for qualitative and quantitative analysis were of either G.R or Analar grade. Also, all the solutions prepared for the present work were prepared using double distilled water. The total hardness was estimated by the standard methods of water and waste water<sup>14, 15</sup>.

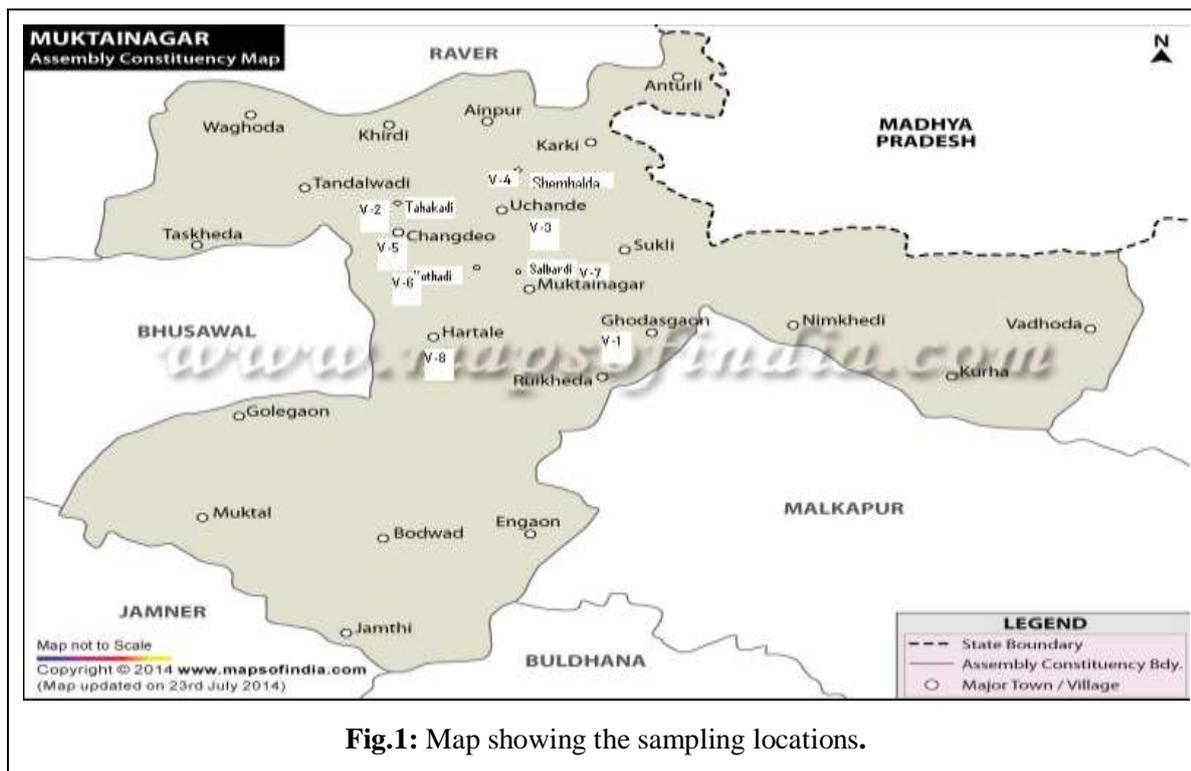


Fig.1: Map showing the sampling locations.

**RESULTS & DISCUSSION**

The results of analysis of samples, V-1 to V-8, were tabulated in Table-1 included physical and chemical water quality parameters like Temperature, Odour, pH, CaCO<sub>3</sub> content, Total Hardness, Conductance. The temperature of the collected samples V-1 to V-8, recorded was found in the range of 25 to 27°C. Thus average temperature is 26.5°C, it is found in the literature that various chemical and biological reactions in water depend on temperature to a greater extent. The Fig. 2 shows variation of Temperature vs various villages in Muktainagar region. The observed values of temperature indicate that the water quality would not be affected by this parameter. These samples were found to be odourless.

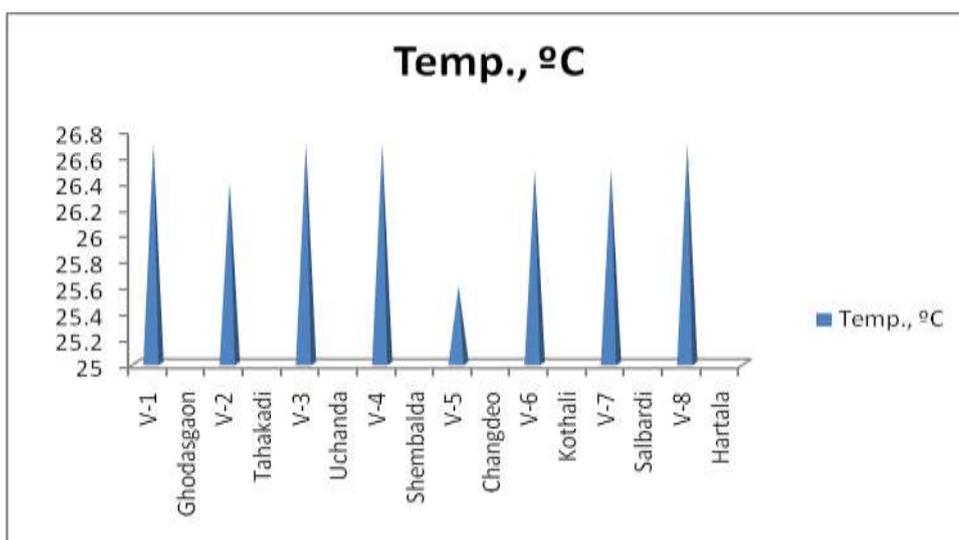
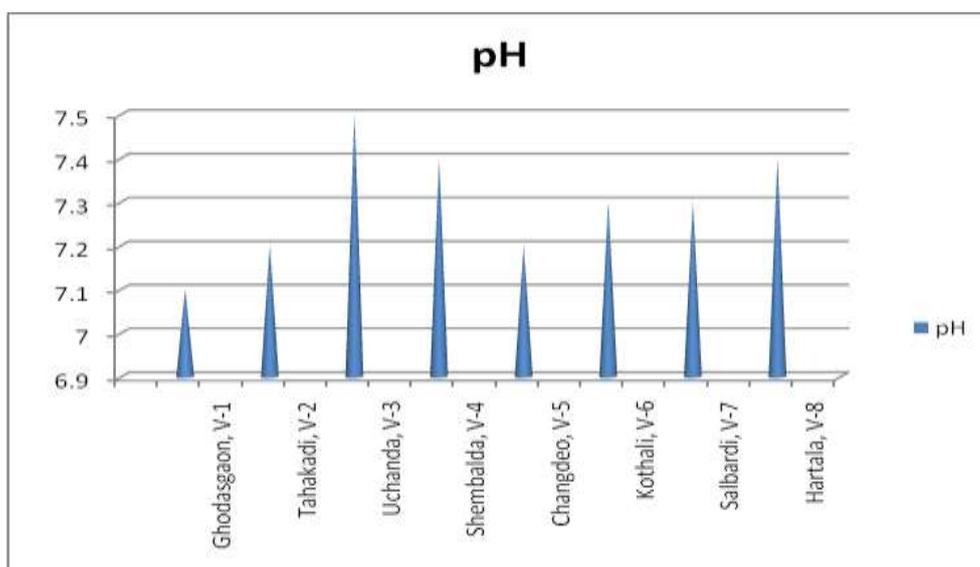


Fig. 2: The graph showing variation of Temperature vs Various villages in Muktainagar region.

**Table-1:** Results of analysis of samples, V-1 to V-8 from Muktainagar region.

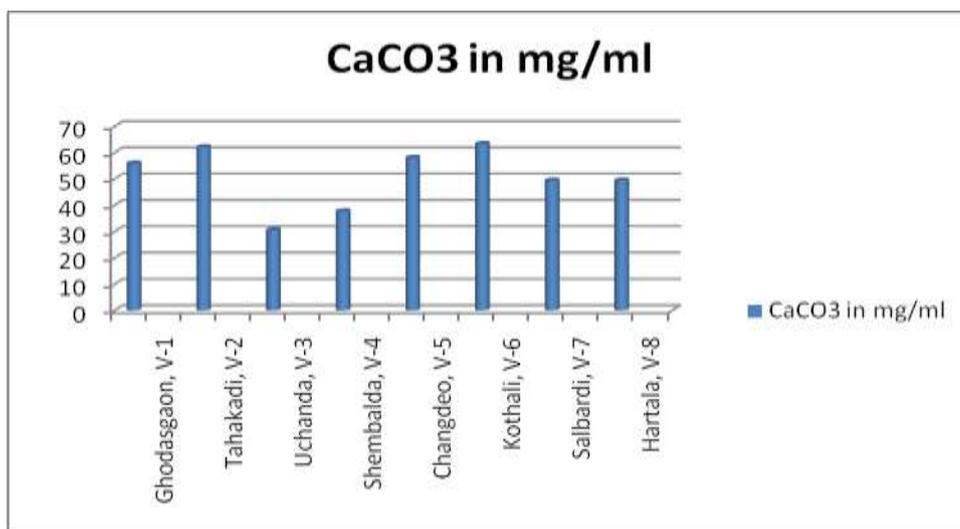
Sr. No.	Name of Village	Temp., °C	Odour	pH	CaCO <sub>3</sub> in mg/ml	Total Hardness in ppm (TDS)	Conductance, in $\mu$ S/cm
1	V-1 Ghodasgaon	26.7	Nil	7.1	56.00	750	580
2	V-2 Tahakadi	26.4	Nil	7.2	62.20	260	210
3	V-3 Uchanda	26.7	Nil	7.5	30.60	385	290
4	V-4 Shembalda	26.7	Nil	7.4	37.80	765	590
5	V-5 Changdeo	25.6	Nil	7.2	58.10	485	290
6	V-6 Kothali	26.5	Nil	7.3	63.40	390	310
7	V-7 Salbardi	26.5	Nil	7.3	49.50	400	320
8	V-8 Hartala	26.7	Nil	7.4	49.50	435	320

Results showed pH values varied in the range of 7.1 to 7.5. pH of all samples was in desirable limits as prescribed for drinking water standards<sup>16</sup>. The average pH of all water samples from sampling stations were within the maximum permicible limits. The higher value of water pH for wells in is because of a medium drainage nearby the sampling point. The Fig. 3 shows variation of pH vs various villages in Muktainagar region.

**Fig.-3:** The graph showing variation of pH vs various villages in Muktainagar region.

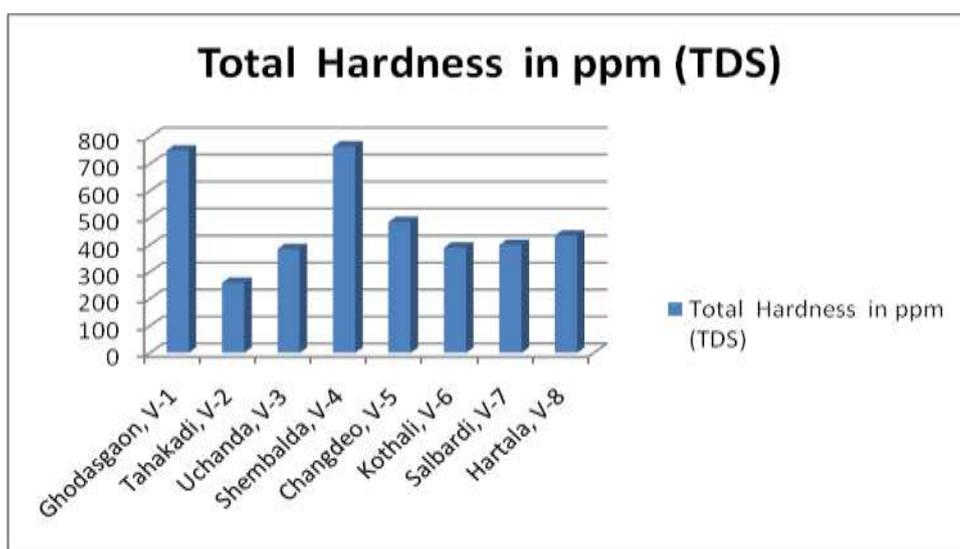
It may be due to staggered water in the rainy season. Also may be attributed to the release of carbon dioxide, ammonia and methane during decomposition of the waste materials near by which percolate through the aquifer to the drinking water via leachates<sup>17</sup>. To record the seasonal variations of physio-chemical characteristics in the drinking water resources is planned for future work.

The investigation shows that the concentration of  $\text{Ca}^{2+}$  ion as  $\text{CaCO}_3$  (in mg/L) in studied samples was found in the range 30.60 to 63.40. It indicate that the studied samples were calcium rich. The Fig. 4 shows variation of  $\text{CaCO}_3$  (in mg/L) vs various villages in Muktainagar region.



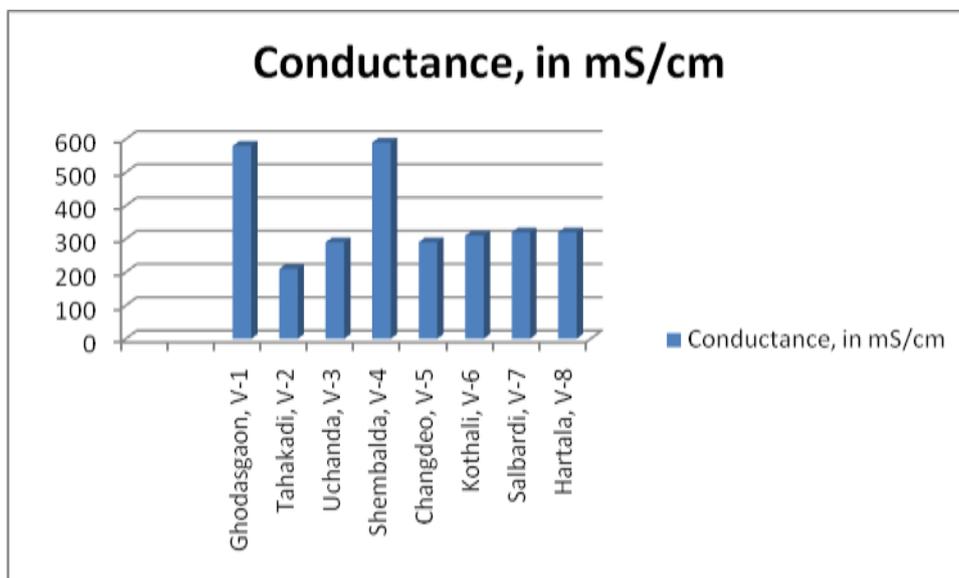
**Fig.4:** The graph showing variation of  $\text{CaCO}_3$  content vs various villages in Muktainagar region.

The TDS samples were analyzed for the total hardness (in ppm), it is found in the range of 260 ppm to 765 ppm. The Fig. 5 shows variation of TDS (in ppm) vs various villages in Muktainagar region.



**Fig. 5:** The graph showing variation of Total hardness (in ppm) vs Various villages in Muktainagar region.

The conductivity of the studied water samples, V-1 to V-8, found to be in the range of 210 to 590  $\mu\text{S}/\text{cm}$  which is on higher side. The conductivity indicates presence of dissolved solids (ionics) and electrolytes but does not give information about specific chemical. Most drinking waters have conductivity measurement below 2000  $\mu\text{S}/\text{cm}$  but the recommended<sup>16,18</sup> value is  $\approx 250 \mu\text{S}/\text{cm}$ . The conductivity levels of the water samples from wells in the vicinities of the defecation sites and residential areas were greater than 200  $\mu\text{S}/\text{cm}$ . The Fig. 6 shows variation of Conductance ( $\mu\text{S}/\text{cm}$ ) vs various villages in Muktainagar region.



**Fig.6:** The graph showing variation of Conductance vs various villages in Muktainagar region.

## CONCLUSION

The water samples taken were analyzed for varied water quality parameters such as Temperature, Odour, pH,  $\text{CaCO}_3$  content, Total Hardness, Conductance etc. and were found within the permissible limits of WHO with few exceptions such as slight lower calcium content were reported lower to lower permissible limits, and conductivity values observed were on higher side, but these value does not have any impact on the water for the purpose of drinking. As per this report the water from the studied sources is suitable for drinking purpose and needs to be investigated for more parameters, during a years plan including biological parameters with more close watch in near future.

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