

## Physio-Chemical Analysis of Ground Water in Latur Tahsil, Latur District (MH)

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### Abstract:

Ground water is one of the predominant source of drinking and other related requirements. It has the most exploited natural system due to over increasing demand of man for food, cloths, industrialization, enormous growth of population and agriculture. The drinking water quality was analyzed in all season. The water quality parameters such as Electrical conductivity, T.D.S, Hardness, Calcium, Mg, sodium, alkalinity, Chloride and Sulphate were analyzed. The water sample collected from 12 stations. One result was compared with water quality standards of WHO, ICMR indicated that it is not suitable for drinking. So, the water needs treatment before human consumption.

**Keywords :** Drinking water quality, physiochemical parameter, water pollution, trace elements.

### Introduction:

Latur district is located on the map to the South-East of Maharashtra on the border of Maharashtra and Karnataka. The district of Latur lies between 17° 52' north latitudes to 18° 50' north latitudes and 76° 12' east longitudes to 77° 18' east longitudes. It has a total area of 7157 sq.kms and proportion as compared with Maharashtra state is about 2.32 %. It is bounded on the north by the Bid and Parbhani districts, on the north-east by Nanded district, on the south-east by the Karnataka state and on the north-west and west by the Osmanabad district. Latur district comprising 10 tahsils but only seven old tahsils i.e. Latur, Ausa, Renapur, Ahamadpur, Chakur, Udgir and Nilanga are considered for the study because of the non availability of new tahsils data i.e. Devoni, Jalkot and Shirur-Anantpal. Latur district is well inhabited and total population is 20,80,285 lived in 5 urban centers and 921 villages whereas the density of population is 290.60 person per km<sup>2</sup> as per 2011 census.

### Material and Methods:

The study has been done in pre and post monsoon. Hand pumps and bore wells samples were collected from all area in brown glass bottles, with necessary precautions, during Oct.2007 to Sep. 2008.

The physio-chemical parameters viz, P<sup>H</sup>, EC, TDS, hardness, Ca Mg, Sodium, alkalinity, chloride and sulphates of water were analyzed following method of IS 500, P<sup>H</sup> by digital P<sup>H</sup> meter, total alkalinity, total hardness and chloride of water were analyzed following the methods of APHA (1989) using Hanna fresh water analysis kit. The co-efficient of variation (CV) was determined using the formula:  $c.v. = \frac{SD}{\text{average}} \times 100$

Where, cv = co-efficient of variation, SD = standard deviation.

### Result and Discussion:

Water sample from different locations were also examined for the physio-chemical attributes (Table No.1). It was observed that was sample from hand pump, Dug wells and bore wells entire the study area.

### Physio-Chemical Analysis of Water:

The entire water sample observed to be colourless. The temperature of different water samples ranged between 24° to 28°c. And no marked variation on temperature was observed during the study period. The P<sup>H</sup>, values in sampling area ranged from 6.06 to 8.5 i.e. alkaline natures.

Permissible quality is 1500 mg/L (WHO, 1984)<sup>2</sup> and recommended level of TDS (250-2100 Mg/L) for the protection of aquatic life (USEPA, 1975)<sup>3</sup>. Irrigation (ISI, 1982)<sup>4</sup> and domestic use (ICMR, 1975)<sup>5</sup>. The amount of TDS ranged between 416 to 1610 mg/l. The electrical conductivity is a function of ions concentration. This can be used for quick checking of dissolved substance in water. Langenegger (1990)<sup>6</sup> and Edet (1993)<sup>7</sup> have described the importance of electrical conductance EC were observed.

Total hardness is an important parameter of water quality. Calcium and Magnesium are the, principle cations responsible for hardness in present study values of Total hardness varied in between 148 to 750 Mg/L. These result exceed the limit set by WHO (150 Mg/L) and ISI (300 Mg/L) Thus the water is very hard water and not suitable for drinking and domestic purposes.

| S No. | Location   | Type of source | PH    | Ec    | TDS    | Total hardness | Calcium | Mg.     | Sodium | Alakinity | Chloride | Sulphate |
|-------|------------|----------------|-------|-------|--------|----------------|---------|---------|--------|-----------|----------|----------|
| 1     | Gangapur   | Well           | 6.85  | 0.75  | 420    | 235            | 59      | 21      | 57     | 306       | 77       | 30       |
| 2     | Wasangaon  | borewell       | 6.06  | 2.91  | 1610   | 750            | 202     | 59      | 192    | 523       | 522      | 338      |
| 3     | Harangul   | borewell       | 6.8   | 1.52  | 730    | 208            | 52      | 19      | 166    | 330       | 211      | 47       |
| 4     | Kopegaon   | handpump       | 6.6   | 1.21  | 600    | 300            | 77      | 26      | 86     | 332       | 153      | 30       |
| 5     | Kawa       | borewell       | 6.65  | 1.57  | 810    | 198            | 51      | 70      | 188    | 353       | 224      | 45       |
| 6     | Bhoyra     | Well           | 7.3   | 1.49  | 612    | 346            | 188     | 39      | 170    | 310       | 249      | 79       |
| 7     | Katpur     | handpump       | 6.74  | 2.38  | 1200   | 478            | 121     | 52      | 181    | 293       | 447      | 63       |
| 8     | Murudakola | Well           | 6.97  | 1.4   | 670    | 240            | 660     | 22      | 134    | 281       | 213      | 48       |
| 9     | Borwati    | borewell       | 8.54  | 1.9   | 1330   | 521            | 180     | 45      | 149    | 302       | 491      | 69       |
| 10    | Bhatangli  | handpump       | 6.87  | 1.95  | 1064   | 323            | 81      | 29      | 230    | 286       | 417      | 63       |
| 11    | Mahapur    | Well           | 6.63  | 0.93  | 530    | 293            | 75      | 25      | 74     | 371       | 105      | 35       |
| 12    | Sarola     | handpump       | 6.56  | 1.96  | 829    | 210            | 78      | 57      | 110    | 348       | 229      | 66       |
|       | Mean       |                | 6.88  | 1.66  | 867.08 | 341.83         | 152.00  | 38.67   | 144.75 | 336.25    | 278.17   | 76.08    |
|       | Minimum    |                | 6.06  | 0.75  | 420    | 198            | 51      | 19      | 57     | 281       | 77       | 30       |
|       | Maximum    |                | 8.54  | 2.91  | 1610   | 750            | 660     | 70      | 230    | 523       | 522      | 338      |
|       | S.D        |                | 2.54  | 0.60  | 360.31 | 205.65         | 139.90  | 491.19  | 156.57 | 156.73    | 161.67   | 77.24    |
|       | C.V        |                | 36.84 | 36.24 | 41.55  | 60.16          | 92.04   | 1270.31 | 108.17 | 46.61     | 58.12    | 101.51   |

Table No. 1: Physio-chemical Analysis of Ground Water in Latur Tahsil, Source: Compiled by Researcher.

The value of alkalinity in ground water is varied between 272 to 523 ppm/l. salinity of ground water of Latur Tahsil averaged 5.1 % high saline ground water were recorded in wells located near to Mahapur Dam. The value of chlorides is observed between 47 to 522 ppm. The permissible limit of chloride in drinking water is 250 ppm (WHO, 1984). Highest concentration of chloride is found in Murum (522 ppm) station.

Similarly calcium and Magnesium are found between 38-202 Mg/L and 13-60 Mg respectively. Highest concentration of these cations recorded at Wasangaon. The concentration of sodium was found in the range from 57 to 230 Mg/L. The maximum permissible limit of sodium in drinking water is 175 Mg/L

**Conclusion:**

The quality of drinking water in the study area has been deteriorating indicted by the presence of high concentration of Ca, Mg, TDS and sodium in Wasangaon circle. Bhatangli circle has 2 samples having exceeded TDS Concentration. 06 samples were found to be proper for drinking purpose where as 04 samples badly require proper chemical treatment. Hence there is an urgent need to take steps for protection of this valuable source.

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