WATER QUALITY ANALYSIS FROM DEOLA TALUKA OF NASHIK DISTRICT, MAHARASHTRA, INDIA

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ABSTRACT:

After air, water is possibly the most valuable natural resource. Though water covers the majority of the earth's surface, only a small portion of it is usable, making this resource scarce. This valuable and limited resource must be used with caution because water is required for a variety of purposes and its suitability must be determined before use. Water body degradation is not only an indicator of environmental degradation but also a threat to the ecosystem. In industries, poor water quality can lead to hazards and significant economic loss. As a result, water quality is critical in both environmental and economic terms and so   water quality analysis is required before using it for any purpose. (Asthana, Meera Asthana etc. 2010). The current study examined the physicochemical properties of water samples collected from wells and tube wells from five villages in Deola Taluka of Nashik district.

Key Words: *pH, TDS, Sulphates, Organic carbon, Nitrite etc.*

INTRODUCTION:

Water is essential for all known forms of life and covers 71% of the Earth's surface. Only 2.5% of the Earth's water is freshwater remaining 98.8% in ice and groundwater. The composition of stream and lake water varies from place to place. The rocks that the water moves over and through along its path are the primary source of dissolved minerals in streams and lakes (D.K. Asthana et.al, 2010).

The chemical status of groundwater and streams depends on ecological status of ecosystems. The pH of water is an important measurement and an indicator of the presence of biological life, as most of them thrive in a very narrow and critical pH range. TDS (total dissolved solids) in water are made up of inorganic salts, dissolved materials such as sulphates and nitrates are mostly in ground water, (Kodarkar M.S ,1992).

MATERIALS AND METHODS :

Water quality is affected by local geology and ecosystems as well as human activities such as sewage dispersion. Temperature, pH, dissolved oxygen, conductivity, turbidity, and Sacchi disc depth are all measurements that are commonly taken on-site and in direct contact with the water source (Kodarkar M.S 1992).

Water samples were randomly collected from five different stations from Deola in Polythene bottles and were brought to the laboratory for estimation of various physicochemical parameters such as transparency and pH, which were recorded at the time of sample collection using a thermometer and a pocket digital pH metre (WHO, 1961). The Sacchi disc was used to measure transparency. Other parameters include DO, TDS, Sulphates and Conductivity. Nitrite and nitrate were measured in the lab using standard methods recommended by (R.K.Trivedy, Goel & Trival, 1986). The intended use determines the parameters for water quality (R.K.Trivedy et.al 1998).

More complex measurements are frequently performed in a laboratory, necessitating the collection, preservation, transportation and analysis of a water sample. The distance from the water boundary to the overlying atmosphere and underlying soil may affect the measurement of interest (Journal of Life Science, 2009).

OBSERVATIONS:

Table-1. Comparative chart showing pH and Total solid.

Sr. No	Name of the village	Distance from Deola Km	PH	Total Solid mg/lit.
1	Umrane	22	7.73	2387
2	Meshi	15	7.11	615
3	Bhaur	12	7.54	390
4	Khuntewadi	04	7.15	795
5	Pimpalgaon	06	7.45	409

**Graph 1: Showing pH and dissolved solid**
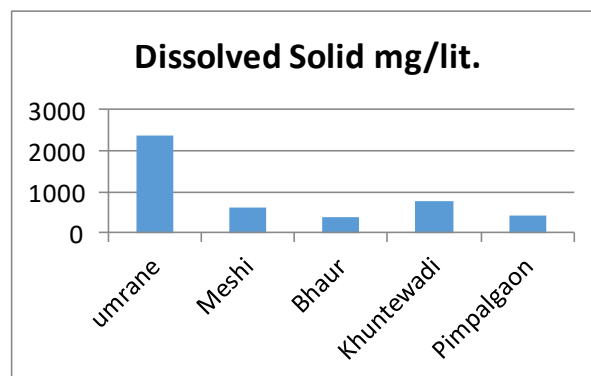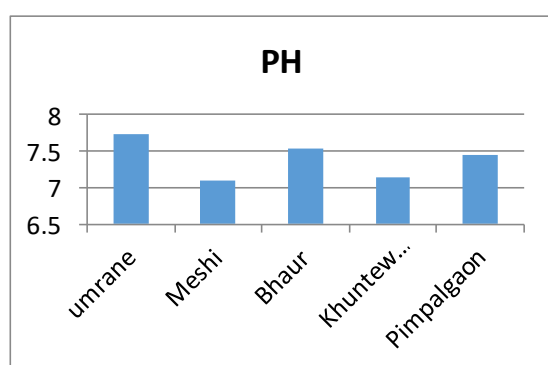
The results presented in table 1 and graph 1 show that the highest pH is found in a water sample collected from Umarana, which is more alkaline (pH is 7.73), while the pH of water samples collected from Bhaur, Pimpalgaon and Khuntewadi are lower, i.e. 7.54, 7.45, and 7.15, respectively, with the lowest pH (7.11) found in a Meshi sample.

According to the results shown in table 1 and graph 1, the highest TDS value found in a water sample collected from Umarana is 2387 mg/l, while water samples collected from Khuntewadi, Meshi and Pimpalgaon are lower in order at 795,615 and 409 mg/l respectively. The sample collected from Bhaur had the lowest TDS value of 390 mg/1.

Table 2: Comparative chart showing Sulphate (SO4) & Nitrites (NO2)

Sr. No	Name of the village	Sulphate (SO4) Mg /lit.	Nitrites (NO2)	Nitrates (NO3)
1	Umrane	1124	Traces	1.0
2	Meshi	66.3	Traces	0.14
3	Bhaur	41.5	Traces	0.13
4	Khuntewadi	223.5	Traces	0.13
5	Pimpalgaon	88.5	Traces	0.13

**Graph 2: Showing Sulphate and nitrate**
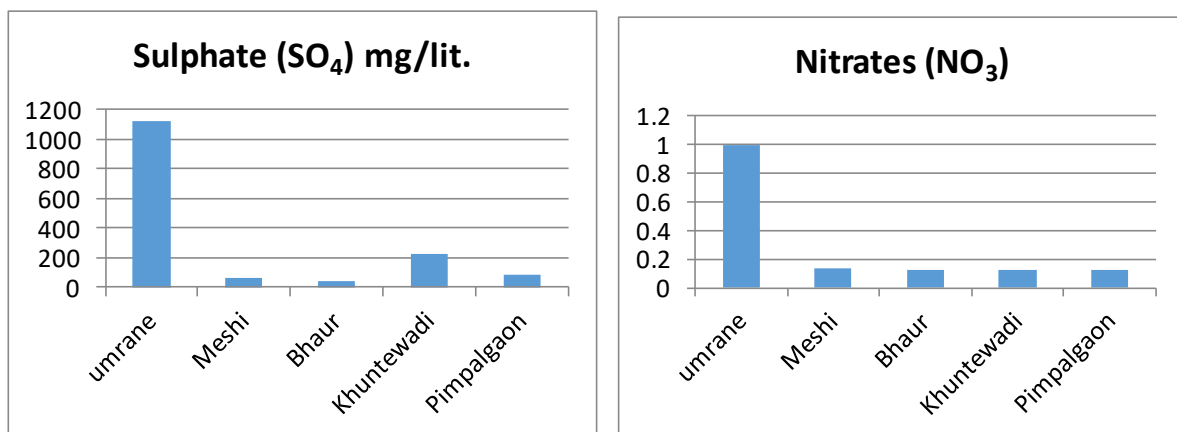
The results presented in Table 2 and Graph 2 show that the highest sulphate value is found in a water sample collected from Umarana village, which is 1124 mg/lit, while water samples collected from Khuntewadi, Pimpalgaon and Meshi showed lower Sulphates of 223.5, 88.5 and 66.3 mg/l respectively. The lowest sulphate value found in a sample from Bhaur was 41.5 mg/1. Nitrite (NO2) was found in trace amounts in water samples collected from all five villages.

The highest Nitrates (NO3) value found in a water sample collected from Umarana village is 1.0mg/l, but water samples collected from Meshi showed a lower value of 0.14 mg/1, while samples collected from Bhaur, Khuntewadi and Pimpalgaon showed a value of 0.13 mg/l.

Table- 3:   Comparative chart showing Conductivity.

Sr. No	Name of the village	conductivity	Dissolved oxygen (mg/lit)
1	Umrane	03.73	3.9
2	Meshi	0.961	6.5
3	Bhaur	0.610	10.4
4	Khuntewadi	1.243	6.1
5	Pimpalgaon	0.640	7.0

Graph 3: Showing conductivity and dissolved oxygen
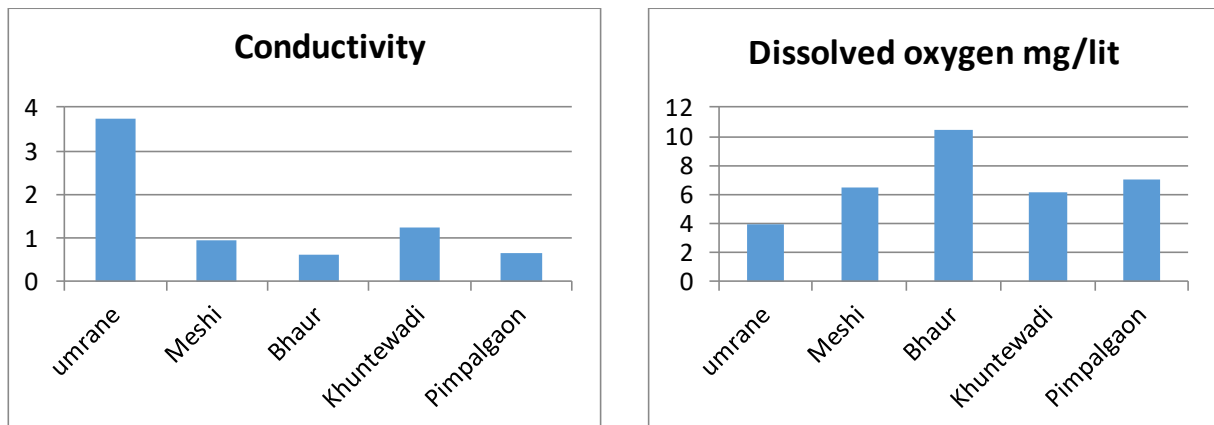
The highest conductivity value found in a water sample collected from Umarana was 03.73mg/l. as shown in Table 3 and Graph 3. The water samples collected from Khuntewadi, Meshi and Pimpalgaon are lower in order 1.243 mg/l., 0.961mg/l. and 0.640 mg/l. respectively. The lowest conductivity value found in a sample collected from Babur was 0.610mg/l. . The highest amount of dissolved O_2 is found in a water sample collected from Bhaur, which is 10.4 mg/l and water samples collected from Pimpalgaon, Meshi and Khuntewadi are lower in order, showing 7.0,6.5 mg/l. and 6.1 mg/l, respectively. The lowest amount discovered in Umbrane sample water is 3.9 mg/l.

RESULTS AND DISCUSSION:

The colour of water is determined by the ingredients that are mixed into it. While small amounts of water appear colourless and pure water has a slight blue tint. Most domestic and industrial users prefer colourless water.

Turbidity-

Turbidity can be caused by either organic or inorganic constituents. Organic particulates in water may harbour microorganisms. As a result, turbid conditions may increase the risk of water-borne diseases. If the turbidity is primarily caused by organic particles, the water body may experience dissolved oxygen depletion.

Chemical parameters: pH

The pH scale runs from 0 to 14, with 7 being neutral. A pH less than 7 is considered acidic, while a pH greater than 7 is considered alkaline (basic). The pH of drinking water should be between 6.5 and 8.5 according to IS. The pH of the water remained alkaline throughout the study. The highest pH (7.73) was found in a water sample collected from Umrane followed by Bhaur (7.54), Pimpalgaon (7.45) Khuntewadi (7.15) and Meshi (7.11).

Total Dissolved solids (TDS) & Suspended Solids:

TDS (total dissolved solids) in water are made up of inorganic salts and dissolved materials. TDS in a body of water alters the composition of an aquatic community and reduce light penetration and photosynthesis. Some pollutants are also hazardous to drinking and irrigation water supplies.

The highest dissolved solids value was found in a water sample collected from Umarana, which was 2387 mg/l, while water samples collected from Khuntewadi and Meshi were lower in order of 795, 615 and 409 mg/l. The sample collected from Bhaur had the lowest TDS value of 390 mg/l.

Sulphate (SO$_4$):

 Sulphates (SO$_4$) are plentiful in the earth's crust and in natural waters. Sulphur is also a necessary element for life because it is found in protein compounds. The highest sulphate value was found in a water sample collected from Umarana village, which was 1124 mg/l, but water samples collected from Khuntewadi, Pimpalgaon, and Meshi were lower in order, showing 223.5mg/1, 88.5mg/l, and 66.3 mg/l. The lowest SO$_4$ value found in a sample from Bhaur was 41.5 mg/1 (How to measure sulphates, New Delhi, 2000).

Nitrite (NO$_2$) & Nitrates (NO$_3$) :

Nitrogen is an essential nutrient for all plants and occurs naturally in our water which can be found in septic systems, fertilizers, animal manure and sewage discharge. Nitrate is a type of nitrogen that plants readily absorb. Nitrate levels in drinking water can cause methemoglobinemia (blue baby syndrome) in infants (La Motte Instrument, 1997).

Ruminant animals can be harmed by high nitrate levels. Because nitrates are colourless, odourless, and tasteless, they are undetectable in water or feed without testing. The water samples taken from all five villages contained traces of NO$_2$. The highest Nitrates value was found in a water sample collected from Umarana village, which was 1.0mg/1; however, water samples collected from Meshi showed a lower value of 0.14 mg/1, while samples collected from Bhaur, Khuntewadi, and Pimpalgaon showed 0.13 mg/1.

Conductivity indicates the presence of ions in the water, which is usually due to saline water, leaching, or industrial discharges. The highest conductivity value was found in a water sample collected from Umrane, which was 03.73, while water samples collected from Khuntewadi, Meshi, and Pimpalgaon revealed 1.243, 0.961, and 0.640, respectively. The sample collected from Bhaur had the lowest conductivity value of 0.610.

Dissolved O$_2$ (DO) :

Aquatic life requires dissolved O2. A low DO (less than 2mg/l) would indicate poor water quality, making it difficult to sustain many sensitive aquatic life forms. The highest amount of dissolved O2 was found in a water sample collected from Bhaur, which was 10.4 mg/l, and the water samples collected from Pimpalgaon, Meshi and Khuntewadi were lower in order, 7.0, 6.5, and 6.1 mg/l, respectively. The lowest amount found in Umrane sample water is 3.9 mg/l. Based on the above parameters, it is possible to conclude that the ground water of selected villages is within the permissible limit, with the exception of Dahiwad, where water purification is recommended. However, for Deola, Pimpalgaon, Kanakapur and Lohaner 0.1ppm chlorine water is recommended for drinking.

CONCLUSION

Appraisal of water quality is essential to check the quality of a water source for the selected use. Several water quality parameters are assessed and compared with their standard values to determine the acceptability of the source of water.

References:

➢ D. K. Asthana, MeeraAsthana S. Chand & Company Ltd. Edition (2010): A Text Book of Environmental Studies. SK.Garg: Edition - Water Supply Engineering. Geobios: An International Quarterly Journal of life science vol.-35(1) 25-28.

➢ How to measure sulphates, New Delhi, (2000):CSMRS Building, 4th Floor, Olof Palme Marg,HauzKhas, New Delhi - 1100.

➢ Kodarkar M. S. (1992): Methodology for water analysis, physico-chemical, Biological and Microbiological Indian Association of Aquatic Biologists Hyderabad; Pub.2: pp. 50.

➢ La Motte Instructions (1997): Nitrate Nitrogen Tablet Kit, G.L.O.B.E. Teachers Manual.

➢ National Journal of Life Science, (2009):Vol.06 (1), 27-34 Society of Life Sciences, Satna (M.P.) Vol.06 (3).

➢ R. K. Trivedy, P. K. Goel & C. L. Trival, Edition (1998): Practical Methods in Ecology and Environmental Science .

➢ Trivedy, R. K. and Goel P. K. (1986): Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra.

➢ World Health Organization, Geneva, (19961): Calcium and Water Hardness Vernier & Technology 13979 21. Guidelines for drinking-water quality, 2nd ed. Vel, 2. Health criteria another supporting information, Environmental Instruments Water Analysis Instruments166 Cummings Center Beverly,