

Variation in Total Dissolved Solids (TDS) Of Groundwater of Arni Town, District-Yavatmal (Ms) India during Period of June 2020-May 2021

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ABSTRACT

Water is life. Groundwater is considered as purest and majorly available source of water. It is used to fulfill 50% urban and 80% rural water demand in India besides irrigation. Total Dissolved Solids, also known as TDS, are inorganic compounds that are found in water such as salts, heavy metals and some traces of organic compounds that are dissolve in water. Total dissolved solids (TDS) are a measure of the combined total of organic and inorganic substances contained in a liquid. This includes anything present in water other than the pure H₂O molecules. These solids are primarily minerals, salts, and organic matter that can be a general indicator of water quality. Arni is a town (Taluka) with (Administrative Division) & Tahsil in Yavatmal district of Maharashtra State in India. As groundwater is prominently used to fulfill domestic demands hence quality of groundwater must be checked time to time in order to supply safe drinking water. In this paper, one attempt has been made to study of variation in total dissolved solids of water of Arni Town, District-Yavatmal (MS) India over a period of 1 year from June 2020 to May 2021. TDS range of groundwater in Arni city is found to be acceptable and fair.

Keyword- water, total dissolved solids, groundwater, variation in total dissolved solids of water of Arni Town, District-Yavatmal (MS) India.

I. INTRODUCTION

Water is colourless, odourless and transparent substance. Water is the important, precious and indispensable natural resources of the earth, covering approximately three-fourth of the earth surface. Water is life. Water is an essential element of human being. Approximately 60-65% of human body is composed of water (1). A man can survive for 20 days without food but cannot survive even for 20 hours without water. The earth has a reserve of 75% water of which 97% is of saline water and only 3% is fresh water. Out of the 3%, a little over 2% is tied up in ice caps and glaciers and along atmospheric and soil moisture, is not accessible and only 0.003% is readily available to us in the form of groundwater and surface water. Surface water is mostly polluted so it becomes unfit for use. Groundwater has excellent natural quality, usually free from pathogens, color and turbidity and can be consume directly without treatment. It does not require large storage, treatment and distribution system, can be frequently developed incrementally at point near water demand. Generally,

groundwater is mostly chemically and microbiologically non-polluted so it is safe for drinking and cooking in addition to agriculture or industrial use. Groundwater is used to irrigate around two fifth of India's total agricultural land. Groundwater is considered as purest and majorly available source of water. It is used to fulfill 50% urban and 80% rural water demand in India besides irrigation (2).

1. Total Dissolved Solids, also known as TDS, are inorganic compounds that are found in water such as salts, heavy metals and some traces of organic compounds that are dissolve in water. Excluding the organic matters that are sometimes naturally present in water and the environment, some of these compounds or substances can be essential in life. But, it can be harmful when taken more than the desired amount needed by the body. The total dissolved solids present in water are one of the leading causes of turbidity and sediments in drinking water. When left unfiltered, total dissolved solids can be the cause of various diseases. Total dissolved solids (TDS) are a measure of the combined total of organic and inorganic substances contained in a liquid. This includes anything present in water other than the pure H₂O molecules. These solids are primarily minerals, salts, and organic matter that can be a general indicator of water quality.
2. Arni is a town (Taluka) with (Administrative Division) & Tahsil in Yavatmal district of Maharashtra State in India. It is situated on the banks of the Arunavati River. It Connected with National Highway-361. Nearest Railway Station is a Dhamangaon which is located 90 km approximately & Nearest Airport is a Dr. Babasaheb Ambedkar International Airport, Nagpur is around 187 km from Arni. Location of Arni in Maharashtra, India Coordinates: 20°07'40"N 77°55'39"E. In Arni town, main source of drinking water is groundwater. As groundwater is prominently used to fulfill domestic demands hence quality of groundwater must be checked time to time in order to supply safe drinking water (3).



Fig. - Yavatmal distric map

In this paper, one attempt has been made to study of variation in total dissolved solids of water of Arni Town, District-Yavatmal (MS) India over a period of 1 year.

II. METHODOLOGY

Water samples were collected from different location of Arni town during investigation period of June 2020 to May 2021. Sample is collected in polyethylene bottle. Within 1 hour, its temperature, pH, total hardness is measured. For measurement of hardness of the sample, used Tds meter whose details are as follows:

Brand	•	: HM
Model Number	•	: AP-1
Type	•	: Digital
Range	•	: 0-5000 ppm
Temperature Range	•	: -5+50 degree C degree C
Accuracy	•	: +-2%
Battery Life	•	: 1000
Power Features		
Power Requirement	•	: 3v
	•	

Dimensions

Width	•	: 3 cm
Height	•	: 15 cm
Weight	•	: 0.1 kg

Manufacturer : HM DIGITAL PVT LTD SOUTH KOREA

Importer : HM DIGITAL INDIA PVT LTD DELHI

Source-www.Flipkart.com

For the study purpose, we had selected six different groundwater sources of Arni. Water samples are collected every week (four in a month) and Tds is measured with the help of digital Tds meter. Following table shows details of the water sample source:

Sr. No.	Sample	Area of sample	Groundwater source	Depth
1.	Sample 1	Madhav Nagar	Borewell	125 ft
2.	Sample 2	Old Tahsil Area	Borewell	100 ft
3.	Sample 3	Datta Nagar	Borewell	125 ft
4.	Sample 4	Mathura Nagar	Borewell	110 ft
5.	Sample 5	Sambhaji Nagar	Borewell	150 ft
6.	Sample 6	Swami Samarth Nagar	Borewell	200 ft

Following table shows Tds of different samples under study-

Sr. No.	Month	Week	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
			TDS (in ppm)	TDS (in ppm)	TDS (in ppm)	TDS (in ppm)	TDS (in ppm)	TDS (in ppm)
1	June 2020	I	545	803	621	453	444	343
2		II	514	800	610	500	475	400
3		III	510	808	603	480	514	301
4		IV	502	805	610	495	415	410

5	July 2020	I	535	800	566	485	526	406
6		II	504	803	645	500	511	396
7		III	518	801	618	506	544	348
8		IV	520	800	601	522	511	400
9	August 2020	I	511	721	620	522	499	394
10		II	521	820	675	514	534	320
11		III	547	804	615	554	520	330
12		IV	546	810	610	511	543	324
13	September 2020	I	604	720	598	499	600	410
14		II	600	659	600	458	558	333
15		III	611	698	570	501	578	404
16		IV	602	710	601	430	586	406
17	October 2020	I	500	705	510	506	605	346
18		II	613	732	498	50	640	344
19		III	605	804	507	500	614	354
20		IV	645	841	512	500	611	356
21	November 2020	I	611	854	524	455	600	400
22		II	560	644	503	451	631	400
23		III	605	800	501	436	649	322
24		IV	531	807	500	407	648	304
25	December 2020	I	505	730	476	456	624	401
26		II	493	789	509	550	627	319
27		III	488	784	480	475	506	302
28		IV	500	805	510	506	550	359
29	January 2021	I	508	700	455	505	604	319
30		II	503	631	411	503	600	303
31		III	488	655	450	500	601	330
32		IV	535	600	440	516	581	390
33	February 2021	I	508	601	500	458	498	380
34		II	414	608	498	497	550	406
35		III	511	700	506	507	506	308
36		IV	407	645	447	531	502	347
37	March 2021	I	508	600	413	503	495	303
38		II	444	611	403	445	503	322
39		III	405	466	444	498	556	301
40		IV	400	600	504	507	552	420
41	April 2021	I	431	522	355	500	446	301
42		II	474	600	423	418	315	322
43		III	401	500	400	406	400	301
44		IV	510	515	410	414	310	401

45	May 2021	I	401	565	421	411	380	396
46		II	386	458	411	406	303	314
47		III	401	541	421	420	321	300
48		IV	403	459	401	411	320	300

According to World Health Organization (WHO) and Bureau of Indian Standard some parameter are as follows:

Sr. No.	Water quality parameter	Bureau of Indian Standard (IS-10500:1994)	WHO International Standard (1983)
1.	pH	6.5-8.5	7.0-8.5
2.	Total Dissolved solids (ppm)	500-2000	500
3.	Total hardness (ppm)	300-600	100

TDS- The mineral constituents dissolved in water constitute total dissolved solids. The concentration of dissolved solids in natural water is usually <500 ppm while water with more than 500 ppm is undesirable for drinking and industrial use. It is reported that TDS value of 500 ppm is desirable limit and 2000 ppm is the maximum permissible limit and that water containing more than 500 ppm of TDS causes gastrointestinal irritation (4). High value of TDS influences taste, hardness and corrosive property of water (5, 6). Drinking water should contain sufficient minerals to keep you healthy and should not contain excess minerals that become overloaded in the body. In this article, we will provide details about the acceptable minimum and maximum TDS (Total dissolved solids) Limits for drinking water.

Following table summarize portability of TDS amount of water:

TDS Level (ppm)	Palatability of Water
Less than 300	Excellent
300-500	Good
600-900	Fair
900-1200	Poor
Above 1200-2000	Unacceptable

III. CONCLUSION

From the variation of hardness table it is observed that the minimum TDS of groundwater Arni city is 303 ppm and maximum is 890 ppm. Out of six samples, five samples have TDS more than 500 ppm and below 1000. These samples have acceptable value according to Bureau of Indian Standard (IS-10500:1994) which has range 500-2000 ppm. One sample has value below 500 ppm which has acceptable value according to WHO International Standard (1983). TDS range of groundwater in Arni city is found to be acceptable and fair.

IV. REFERENCES

- [1] . S. TYagi, B. Sharma, P. Singh, R. Dobhal, American Journal of Water Resources, 2013 1(3):34-38.
- [2] . Sahu P, Sikdar PK (2008), Hydro chemical framework of aquifer in and around East Kolkata wetland, West Bengal, India.

- [3] . C. G. Cude, Journal of American Water Resources Association (2001), 37(1):125-137.
- [4] . C. K. Jain, C. P. Kumar, M. K. Sharma, (2003) Ground water qualities of Ghataprabha command Area, Karnataka, Indian Journal of Environment and Ecoplanning, 7(2):251-252.
- [5] . A. Hari Haran (2002) Evaluation of drinking water quality at Jalaripeta village of Vishakapatanam distric, Andra Pradesh, Nature Environment and Pollution Technology, 1(4):407-410.
- [6] . D. G. Subhadra Devi, S. B. Barbaddha D, Hazel C. Dolly, (2003) Physico-chemical characteristics of drinking water at Velsao Goa, Journal Eco-Toxicology and Environmental Monitoring, 13(3): 203-209.