

ASSESSMENT OF GROUND WATER OF GHOT VILLAGE IN GADCHIROLI DISTRICT

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Abstract — The basic need of human being that is food, shelter and Cloth. So as In food water is very important after air, around 72% of earth surface is covered with water but among them only few percentage of source are available for drinking and other domestic purposed Sub-Surface water is one of the most valuable natural resources which supports human health and economic development. In this research find out safe drinking water source in Ghot village of Gadchiroli district. Also find determine chipset filtration process required other drinking water sources so that people from Ghot village are easily use this water for drinking and domestic purposed. With the help of sample analysis from different location of Ghot village are tested in laboratory and check with BIS and WHO standards. The water quality guidelines provide a Limit Value for each parameter for drinking water. It is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. There are some of parameter for drinking water quality parameter like world health organization (WHO) and Indian Standard IS 12500:2012. The objectives of this study are to analyses the underground water quality of Ghot Village of Gadchiroli region by water quality index. In this research 11 sample point location were selected on ten parameter which are essential for check for quality. Physico-chemical parameters such as Arsenic, Iron, Chloride, Nitrate Concentration, Total Dissolved Solids, and Dissolved Oxygen collected different place like boar well, pond, River etc. In this study find out the range of water quality index so that treatment on water can be perform properly on respective drinking water source

Keywords— *Total Dissolve Solid, Nitrate Concentration, Drinking Water, Arsenic, Iron Concentration, Dissolved Oxygen.*

INTRODUCTION:

Nagpur Region has always been known as the mineral rich region of Maharashtra. There are several mine like coal, copper, iron, brass, lime stone, steel etc. according to recent study its seen that Central India belt is the second largest mineral belt in the country. With the reference of this study research I have selected Ghot region. In that research study its analysis of ground water is to be carried out. Due to large number minerals presser in earth crust. Hence due to surface flow of water and spring and underground water table meets with this minerals and it mix with water body. But BIS and WHO code gives prescribed limits for drinking water standards. Due to excess of minerals adding in water table some health issue will cause. That we are study in this present research work. Ghot is a village of Chamorshi taluka situated in Gadchiroli District, Maharashtra state. The present study is to be carried out the analysis of ground water sample in Ghot region. Water is essential in human life. The main reason of water contamination is urbanization and afforestation. As per data Gadchiroli district is rich of no. of plants i.e. known as dense forest district. In rural areas where the water sources like dam, canal, or river is not available, ground the quality of water is vital concern for mankind since it is directly linked with human welfare. Rural areas In Gadchiroli district, most of the population is dependent on groundwater as the only source of drinking water supply. As per current analysis, this is observed that the ground water get polluted drastically because of increased some contaminated minerals like Fluoride, arsenic, TDS etc. because of which, water borne diseases has been seen which a cause of health problems a lot. Therefore, basic concentration is needed to monitor the quality of water as well as to find out various sources which increased ground water pollution. The objective of this study is to investigate qualitative analysis of some physicochemical parameters of ground water.

STUDY AREA:

Ghot is Small village and its one of the important area in Chamorshi tahasil Gadchiroli District, region Vidarbha of Maharashtra State (India). It is located at 19.8127191 North **Latitude** & 79.9819004 East **Longitude**; mean sea level of Ghot Village is 200 meters. The area of Ghot village total population ids 3885 and is about 966 families where lives. Village literacy rate 74.6% and the female literacy rate is 32.2% total boundary is of 12km with land cover 8.3km². The water supply in the area is done through overhead tanks, tube wells, wells and other supply lines.

This study area is sand type is red soil i.e. access contain of iron oxide and rich by minerals that why need to study about groundwater quality parameters for safe drinking purpose.

Geomorphological the area represents a dense forest area, undulating plain with linear structural hills area. The average annual precipitation is around 807 mm and its climate of this region is characterized by a hot summer, a well distributed rainfall during the southwest monsoon and general dryness except during rainy season.

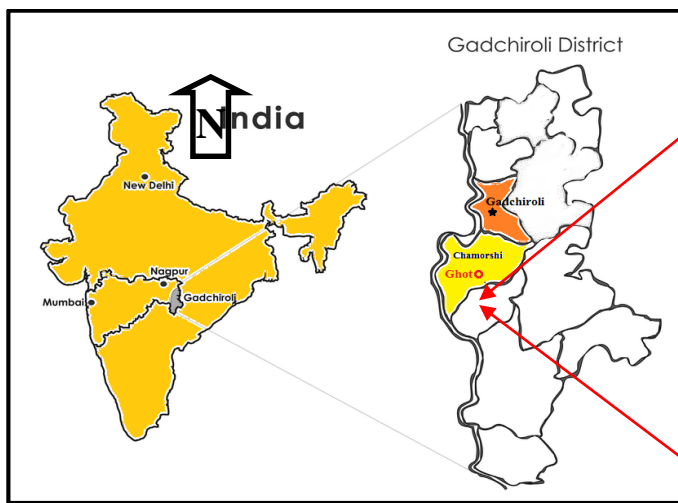


Fig1: Gadchiroli District map

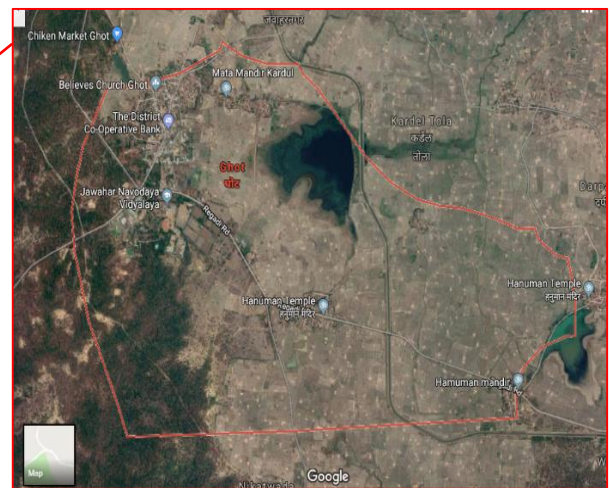


Fig 2: Ghot Village Satellite map

MATERIALS AND METHODS

Five samples were randomly collected from each collection zone i.e. well-3, lake-2 and hand pump-5 etc. in some design interval of duration. Groundwater samples were collected in plastic bottles of 1.0 Litter capacity for physicochemical analysis. Bottles were properly washed and rinsed thoroughly with distilled water and then with groundwater at each sampling site. For pH determination test directly conducted at site with the help of pH paper also test lab with the help of PH indicator and digital pH meter. The pH and total dissolved solids (TDS) of collected samples were measured with the glass electrode pH meter and titration respectively. Concentration of Iron sodium and chloride was estimated by argent metric titration method.

The method used for the analysis of calcium was EDTA titration standard method. Magnesium was estimated as the difference between hardness and calcium with the help of standard formula. Arsenic was estimated by arsenic tool kit method. All the sample were preserve at standard temperature seal pack to avoid air contact.

OBJECTIVE OF RESEARCH

- Survey of groundwater samples and collection.
- To determine good quality to provide a pure and wholesome water to the public for drinking and other domestic purposes.
- To check the efficiency, uniformity of treatment and purification Processes.
- To categorize the different types of water sources for different type of uses
- The objective of the scientific investigations is to determine the hydrochemistry of the ground water and to classify the water in order to evaluate the water suitability for drinking.
- To study about the causes of water Contamination of Ghot area.
- To find out the authentic preventions about polluted drinking water this region.
- Complete study of sewage disposal zone is not meet drinking water zone.
- To create awareness about the water pollution among the public by organizing awareness campaign programs in collaboration with health department by spread information poster, mini act, road show etc.
- Physico chemical description of water bodies in surrounding village from different locations with respect to hydrology.
- To find out health related main issue of water born diseases and find the solutions. And also helps for improving immunity power
- To check the quantity of water contaminate minerals in Ghot area.

SAMPLING LOCATION:

This is main important and primary survey in entire Ghot village find out water sources of drinking water and other domestic use water. In this field survey we finalised some source as a study location. In the field studies water treatment process, water supply system & water tank, different open wells, different hand wells, different bore (tube) wells and Lake of Ghot village will be visited. Specially those sources that are primarily use by people for drinking purpose. Detailed information on raw water quality, treated water quality, organizational structure for operational and maintenance of water treatment plant, size of water treatment plant and types of treatment unit. Complete observation that which water people are used for drinking and which supply domestic purpose. Water availability for future purposed. Season wise also water source vary with the use of purpose. After the normal survey it is

found that people usually use tap water for drinking and boar well water for domestic use. One this basis of survey I selected 10 different location i.e. boar well, open well, lake and tap water which are supply by Grampanchayat.

RESULTS AND DISCUSSION

All the sample where tested in laboratory total 11 sample are collected from different location and different sources of drinking water. The combine results are as follows after that comparison of results is to be carried out. Sample are tested in lab before the rainy season and after the rainy season. There are so many difference in both result in some parameters especially in turbidity, TDS, fluoride etc. due to monsoon, rain water goes through earth surface and many of minerals present in soil is mix with water samples. So due to water surface run off so many micro particles are easily mix water and in this duration more wastage on filtration process in mandatory. After the results it is analysis that how many sample are in describe limit for water parameters. Those sample are not in limits or greater than they permissible limit then proper action will need to takes that which type of filtration is need or is this source suitable for drinking purposed, or domestic purpose etc.

Table 1: Pre-Post monsoon water quality test results sample

Sr. No.	Sample Code	TDS		Chloride		Nitrate		Iron		Arsenic		DO	
		Pre-M	Post-M	Pre-M	Post-M	Pre-M	Post-M	Pre-M	Post-M	Pre-M	Post-M	Pre-M	Post-M
1	SW-1	1560	1600	300	280	55	53	1.0	1.1	0.06	0.05	3.2	3.8
2	SW-2	1210	1280	220	240	48	45	0.6	1.2	0.02	0.04	4.1	4.5
3	SW-3	1000	1100	190	230	50	52	0.8	1.5	0.01	0.05	4.0	4.2
4	BW-1	1550	1200	250	230	45	40	0.5	0.6	0.07	0.08	3.5	3.3
5	BW-2	900	1050	200	220	35	38	0.9	0.9	0.10	0.12	3.9	4.0
6	BW-3	750	850	100	120	50	47	0.7	0.9	0.09	0.10	4.1	4.3
7	BW-4	480	520	150	165	55	51	1.5	1.1	0.04	0.06	4.1	4.1
8	OW-1	1200	1000	120	150	40	42	0.9	0.7	0.13	0.14	4.5	4.0
9	OW-2	1350	1250	100	120	52	52	0.6	0.5	0.10	0.11	4.1	3.8
10	OW-3	1200	1000	150	120	55	53	0.3	0.8	0.08	0.09	3.8	3.9
11	TW-1	450	500	75	100	40	42	0.4	0.4	0.02	0.02	4.2	4.0
Indian Std.		500		250		45		0.3-1.0		0.01		4.0	4.0
WHO Std.		1000		200		45		0.3-1.0		0.01			

1 TDS CALCULATION

Estimation of total dissolved solid (TDS) is useful to the suitability of water for drinking and Domestic purpose. TDS is the sum of potassium, calcium, sodium, magnesium, carbonates, bicarbonates, chlorides, organic matter, phosphate and other particles. Higher concentration of TDS produces gastro-intestinal irritation in human body. The highest total dissolved solids value is observed to be 1600.00 mg/l and lowest value is 420.00 mg/l. However, the total dissolved solids values are found to be more than the permissible limits being prescribed limit i.e. 500mg/lit in (BIS, 2012) for drinking water.

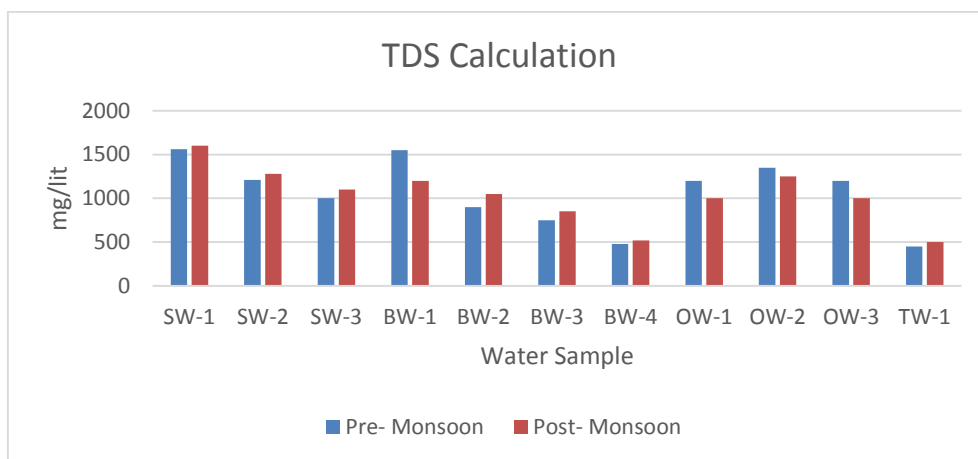


Fig 3: Experimental results of TDS in Drinking water Samples

2. CHLORIDE CONCENTRATION CALCULATION

Chloride content in fresh water is largely affected by evaporation and precipitation. Chloride ions are generally more toxic than sulphate for most plants and are the best indicator of pollution. Chloride is a widely distributed element in all types of rocks in one or the other form. Its intimacy to sodium is high. Soil aperture and permeability also have an important role in the formation of chloride concentrates. Concentration of Chloride as per BIS limits is 250mg/lit hence In the current analysis, chloride highest concentration was found 300mg/lit and the lowest concentration found to be 75mg/lit. So the range of chloride All are almost within the limit range. Highest concentration were found in SW-1 location. High concentration of chloride in drinking water causes hypertension. A normal adult human body contains approximately 81.7 g chloride.

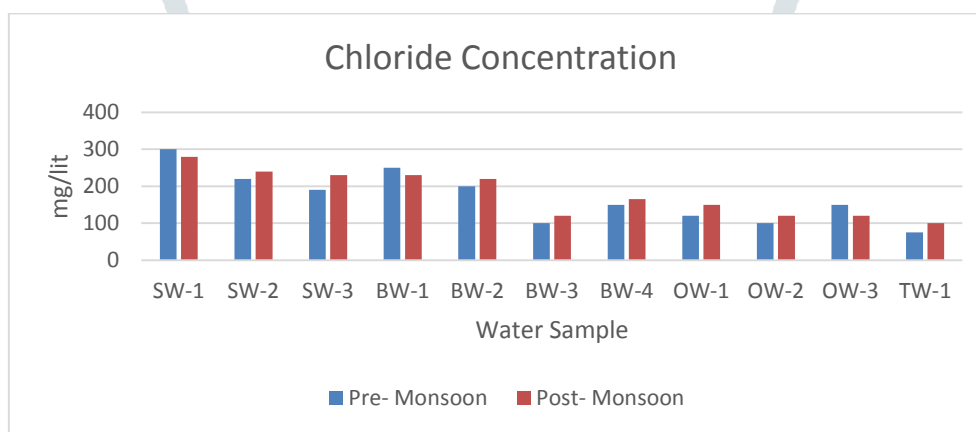


Fig 4: Experimental results of Chloride in Drinking water Samples

3. NITRATE CONCENTRATION

The federal standard for nitrate in drinking water is 10 milligrams per liter (10 mg/l) nitrate-N, or 45 mg/l nitrate-NO₃. When the oxygen is measured as well as the nitrogen. Unless otherwise specified, nitrate levels usually refer only to the amount of nitrogen present, and the usual standard, therefore, is 10 mg/l. in the experimental result for nitrate calculation highest value is 55mg/l and lowest value is 35mg/lit. As per BIS code upto 45mg/l is permissible range for safe drinking water. Many of sample are found higher than limits. Sources of nitrate that can enter your well include fertilizers, septic systems, animal feedlots, industrial waste, and food processing waste. High levels of nitrate in drinking water can be dangerous to health, especially for infants and pregnant women.

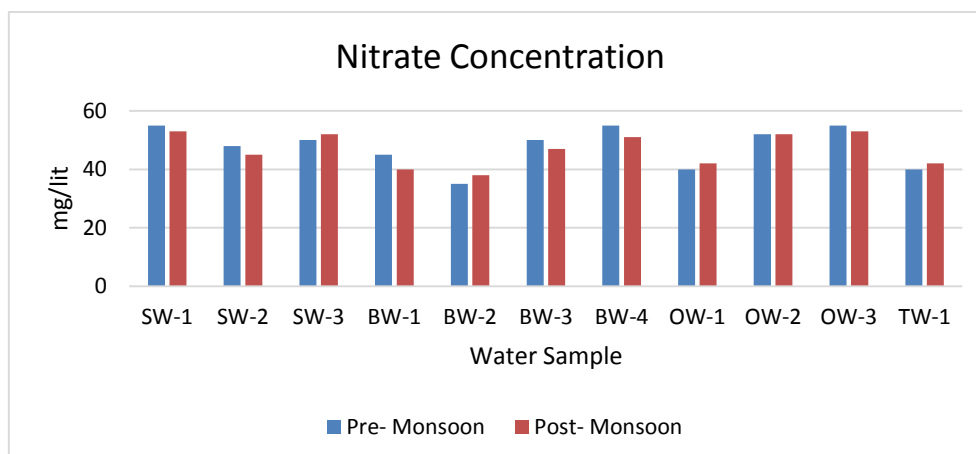


Fig 5: Experimental results of Nitrate in Drinking water Samples

4. IRON CONTENT CALCULATION:

Iron is an essential element for human health but the presence of excess iron in ground water causes attaining of plumbing mixtures, clothes after laundering, and imparts an astringent taste to drinking water. The estimation of iron in ground water is very helpful in assessing the extent of corrosion. The major natural sources of iron (Fe²⁺) in igneous rocks are amphiboles, ferromagnesium, ferrous sulphide, oxides, carbonates and sulphides of iron clay minerals. Its concentration in natural waters is less than 0.5mg/l in fully aerated water. The iron concentration values were observed that in range 0.3 to 1.5mg/L. i.e. more than possible limits given by BIS for drinking water.

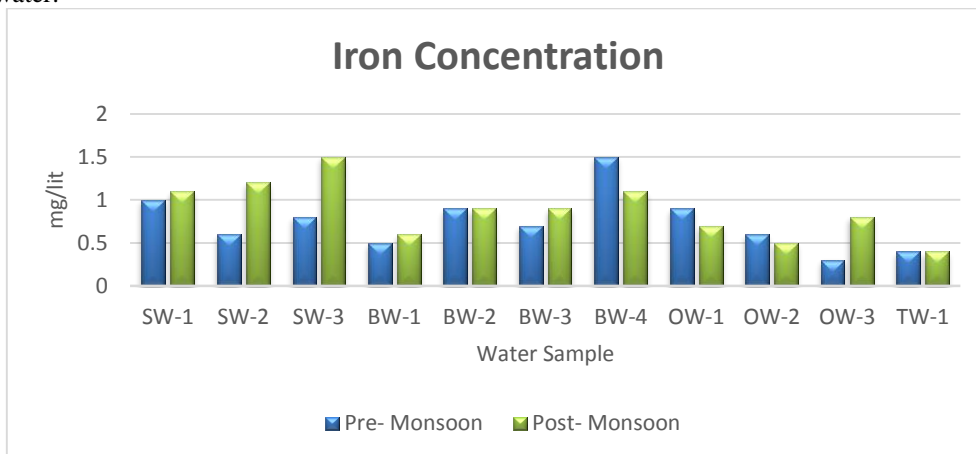


Fig 6: Experimental results of Iron Content in Drinking water Samples

5. ARSENIC CONTENT CALCULATION:

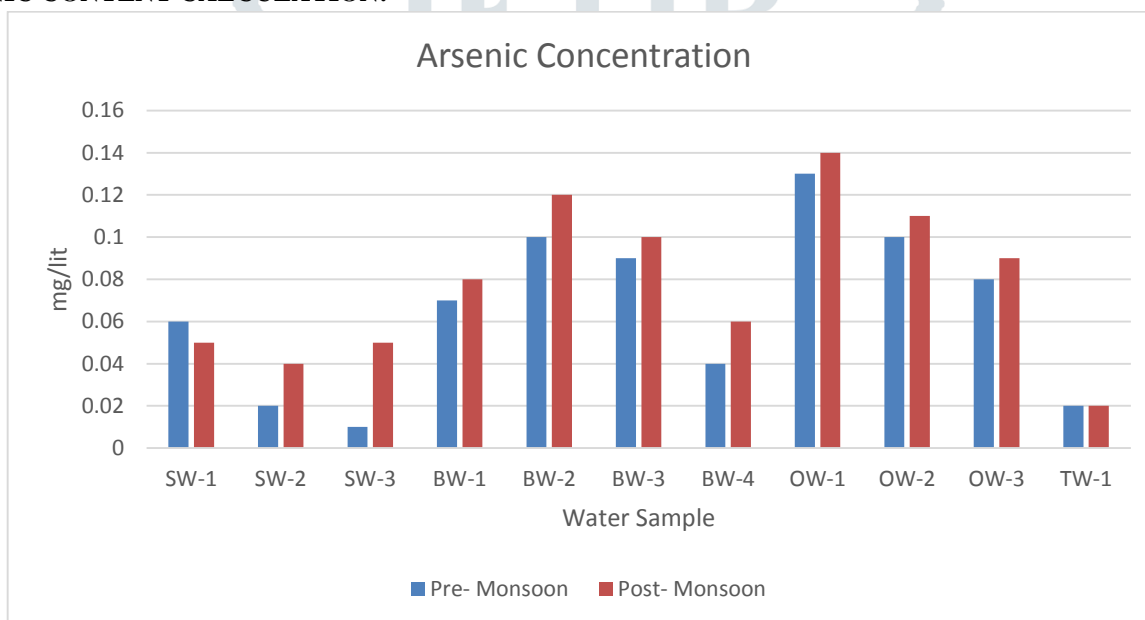


Fig 7: Experimental results of Arsenic Content in Drinking water Samples

Arsenic in Drinking Water. Arsenic is found naturally in the rocks in the earth's crust. It can be found in some drinking water supplies, and wells. Drinking water containing arsenic can have serious short-term and long-term health effects. The amount of arsenic in ground water supplies like wells is usually higher than in surface water supplies such as lakes, streams and rivers. Symptoms of exposure to high levels of arsenic include stomach pain, vomiting, diarrhoea, and impaired nerve function, which may result in 'pins and needles' sensation or numbness and burning in hands and feet. The experimental results found that arsenic content lowest value 0.01 mg/l and height value is 0.14mg/l. max location results are found arsenic concentration is more that describe limits as per BIS 2012

6. DISSOLVED OXYGEN CALCULATION:

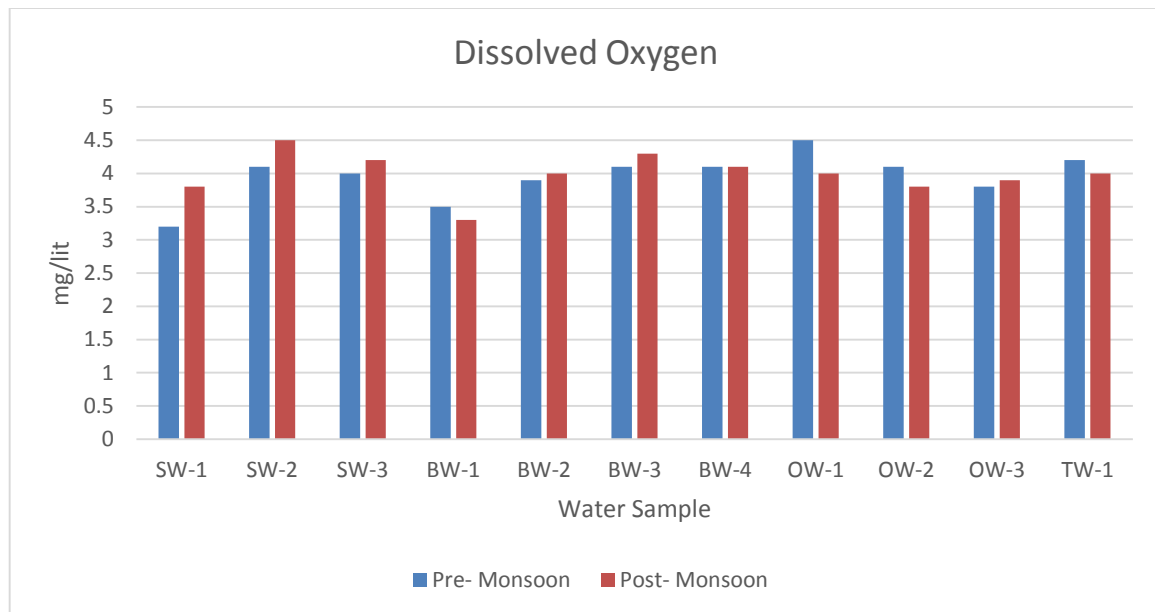


Fig 8: Experimental results of Dissolved Oxygen in Drinking water Samples

CONCLUSION:

Groundwater quality of Ghot Village is not suitable for drinking purpose directly without treatment. The main outliers in the wells of Ghot Village deteriorating the water quality are pH, Turbidity, TDS, HCO₃ and F. High content of TDS, Na and Cl indicates the mixing of sewage water which may infiltrate from the river channels and nala surrounding the study area. Calculated value of WQI revealed that the groundwater is grouped into fair category of water quality which indicates that it is unfit for drinking purpose but suitable for the irrigation and industrial use Comparing the water quality with BIS standards it has been observed that at several locations nitrate is exceeding the standard. Fluoride is also a problem. Thus, WQI evaluation of Ghot villages of Chamorshi taluka indicated that the overall ground water quality was poor in the given study area. So for cure of this further study analysis is needed. Also with the collaboration of health department health awareness camp is to be conducted so that all the society have knowledge about grand water wariness and prevent them from water born dieses.

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