

Pre-Post Monsoon Assessment of Ground Water of Ghot Village in Gadchiroli District



Arif Khan, Amol V. Naitam

Abstract — there 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 priceless naturally occurring things which balance human health and development of ecology. 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. Water quality guidelines provide a threshold value for each parameter for drinking water. It is necessary that the quality of drinking water should be checked at regular time intervals, because due to the use of contaminated drinking water, the human population suffers from various water borne diseases. There are some parameters of drinking water quality parameters 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 five parameter which are essential for check for quality. Physico-chemical parameters such as PH, Turbidity, Total Hardness, Fluoride and Total Dissolved Solids 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— physical Characteristic of water, ground water quality, Drinking Water, Arsenic, Iron Concentration, Dissolved Oxygen

I. INTRODUCTION

Nagpur regional area has known as the mineral rich region of Maharashtra state. There are several mine like coal, copper, iron, brass, lime stone, steel etc. according to recent study its seen that India's Central belt is the one of the 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 very necessary in human day to day life. Due to urbanization and deforestation water is going contaminated. As per data Gadchiroli district is rich of no. of plants i.e. known as dense forest district. In Village areas where the sources of water like dam, canal, or river is not available. Rural areas In Gadchiroli district, most of the population is dependent on groundwater is the only source of drinking water supply. According to the present analysis, it has been observed that groundwater becomes highly polluted due to increase in some contaminated minerals like fluoride, arsenic, TDS etc. as water borne diseases have been observed, which is a cause of health problems. Therefore, basic concentration is needed to monitor water quality as well as to detect various sources that increase groundwater pollution. The purpose of this study is to investigate qualitative analysis of some physiochemical parameters of groundwater.

A. Study Area:

Ghot is Small village and it's 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 Ghot area is done by overhead tanks & bore wells.

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 normalized by a hot in summer, a evenly distributed rainfall during the monsoon time and normal dryness except while rainy season.

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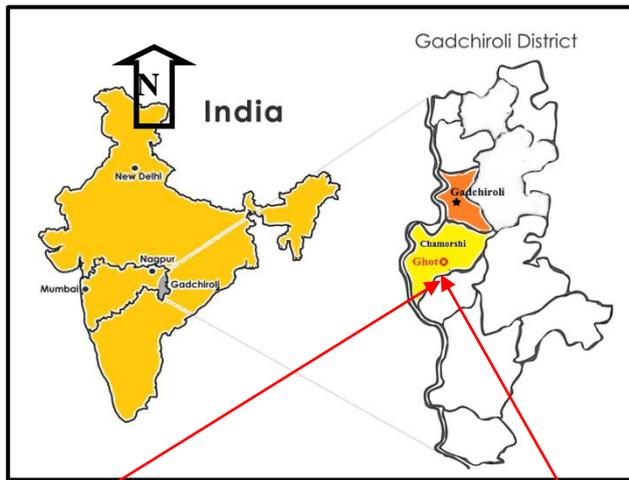


Fig 1: Gadchiroli District map

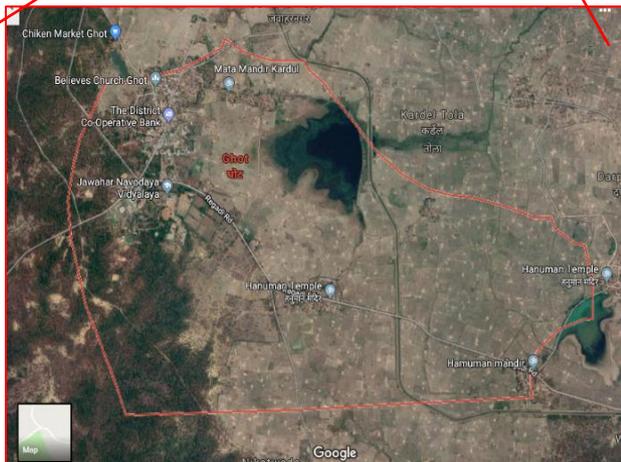


Fig 2: Ghot Village Satellite map

II. 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 are collected in fresh sterilised glass bottles of 1.0 Litter capacity for physicochemical test determination. Bottles are neatly clean and rinsed thoroughly with distilled water and then fill the with groundwater sample 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.

III. 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 is chemical content determine the hydrological chemistry of the subsurface water and classify this water according to safe drinking or domestic suitability.
- 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 dieses and find the solutions. And also helps for improving immunity power

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.

IV. 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	PH.		Turbidity		TDS		Fluoride		TH	
		Pre-M	Post-M	Pre-M	Post-M	Pre-M	Post-M	Pre-M	Post-M	Pre-M	Post-M
1	SW-1	6.0	5.8	5.5	7.0	1560	1600	2.0	2.1	1000	950
2	SW-2	6.2	6.0	3.8	6.8	1210	1280	1.6	1.5	950	900
3	SW-3	7.5	7.5	2.8	5.3	1000	1100	1.0	0.8	860	750
4	BW-1	6.2	6.4	2.0	2.9	1550	1200	1.5	1.2	550	500
5	BW-2	6.8	6.8	1.5	1.8	900	1050	1.7	1.5	600	560
6	BW-3	7.9	7.5	1.5	2.0	750	850	1.8	1.9	800	770
7	BW-4	6.5	6.8	1.0	1.4	480	520	1.3	1.4	750	740
8	OW-1	7.9	7.7	1.2	2.5	1200	1000	1.1	1.4	900	930
9	OW-2	8.0	8.1	1.5	2.3	1350	1250	1.0	1.1	750	730
10	OW-3	7.5	8.0	2.4	2.8	1200	1000	1.6	1.8	600	620
11	TW-1	7.5	7.8	1.0	1.5	450	500	0.9	1.1	340	320
Indian Std.		6.5-8.5		1-5 NTU		500		1.0-1.5		300-500	
WHO Std.		6.5-8.5		5NTU		1000		0.7-1.5		200-600	

1. pH. Calculation

PH value shows the potential of ions of hydrogen presents in the water sample. Well pH value of given water is expressed as the logarithm of reciprocal of hydrogen ion concentration presents in water. It is an indicator of the acidity or alkalinity of drinking water sample. As we all know in pure natural water, positively charged hydrogen ions and negatively charge hydroxyl ions are equal hence the pH value neutral water is 7. According to WHO limits for safe drinking water the value for pH should be in range of 6.5 to 8.5. If the pH value is low then it may cause tuberculation and corrosion in pipe and water tank. If pH value is high water is alkaline and it may produce incrustation sediment, deposit, and difficulty in chlorination beside certain psychological effects on human system if such alkaline water is consumed. With respect to the results are found that highest value for pH is 8.1 and the lowest value is 5.8. so overall pH value is in the limits except sample SW1, SW2 and BW1 are found low pH value hence water for drinking purposed from this source are may cause health problem as above mansion but this source not in red zone for drinking purpose. Alternative option will use for this sources. Result can see at fig no. 3

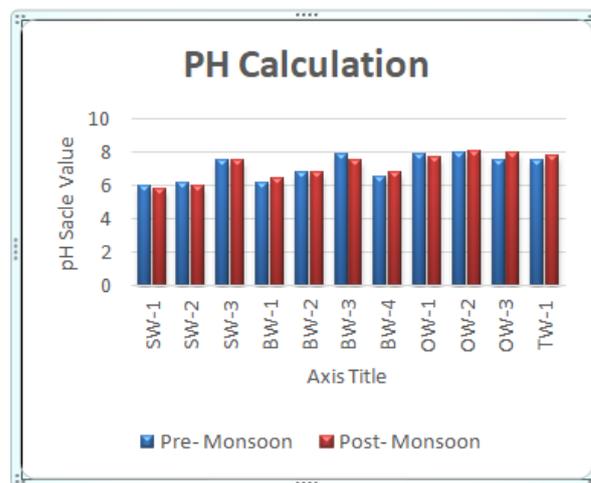


Fig 3: Experimental results of PH for Drinking water Samples

2. TURBIDITY CALCULATION

As per BIS code turbidity limit for safe drinking water is 1 to 5NTU. According to the study, turbidity is not greatly affected for human health issues, but turbidity in open water exceeding the limit may be due to increased phytoplankton. Due to bacterial growth digestive problem will happen and diarrhea may be cause.

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As with respect to given results the heights value observe that 7.0 NTU and lowest value 1.0NTU. It's found that sample no. SW-1, SW-2 and SW-3 have high turbidity value. This all sample are from open water i.e. from lake. As shown in fig 4.

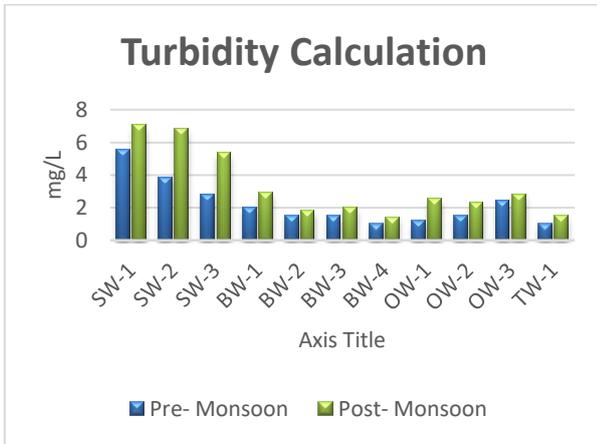


Fig 4: Experimental results of Turbidity in Drinking water Samples

3 TDS CALCULATION

Calculation of total dissolved solids (TDS) is used for the compatibility of household and water for drinking purpose. TDS is addition of, calcium, sodium, carbonate, potassium bicarbonate, chloride, organic matter, magnesium, phosphate, and other particles. The high concentration of TDS causes gastro-intestinal inflammation in the human body. The highest & lowest value for total dissolved solids is observed to be 1600.00 mg/l and 420.00 mg/l respectively. Anyhow, the TDS values are found to be more than the decibel limits i.e. 500mg/lit in (BIS, 2012) for drinking water.

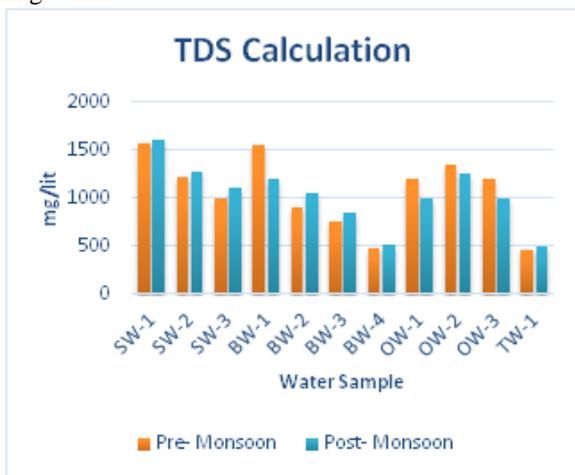


Fig 5: Experimental results of TDS in Drinking water Samples

4. FLUORIDE CONCENTRATION CALCULATION

Fluoride is one of the general ingredient in groundwater. Due to Agricultural activities high fluoride concentrations added in surface water. Fluoride is a contaminant part of geochemical. Fluoride affects the dental system in small doses. Higher concentration of fluoride causes dental and skeletal fluorosis. Some conditions excess fluoride can affected the parathyroid gland. This can result in hyperparathyroidism, which involves uncontrolled secretion of parathyroid hormones. In The experimental results

fluoride values are observed to be 0.8 mg/L to 2.16 mg/L at SW-3 and SW-1 respectively. However, the fluoride values at all locations are found to be just above the acceptable limits being prescribed in BIS.

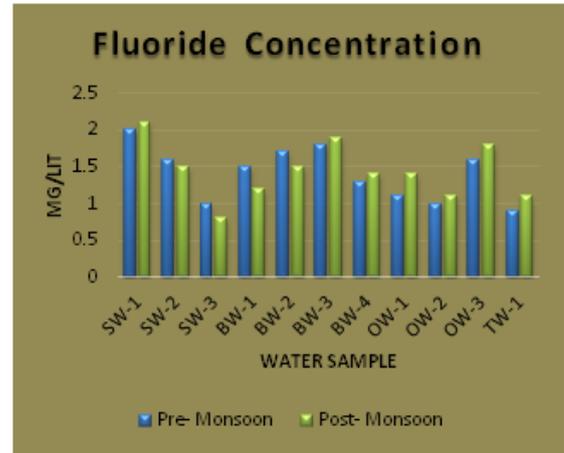


Fig 6: Experimental results of Fluoride in Drinking water Samples

5. TOTAL HARDNESS CALCULATION:

Total Hardness due to calcium bicarbonate or temporary hardness of magnesium is and the hardness due to chloride, sulphates and nitrates of calcium and magnesium is permanent hardness. It also produces calcification of arteries. It also affects the water supply system. Urinary tract infections, stomach disorders and kidney or bladder diseases are rigidly produced without definitive evidence. Calcium carbonate in water at concentrations below 60 mg/l is generally assumed as soft; 60–120 mg/l, slightly hard; 120–180 mg/l, hard; and more than 180 mg/l very hard. The total hardness value maximum and minimum is observed to be 1000.00 mg/l and 320.00 mg/l. However, the total hardness values are recorded to be more than the acceptable limits being prescribed in (WHO, 2012) for drinking water

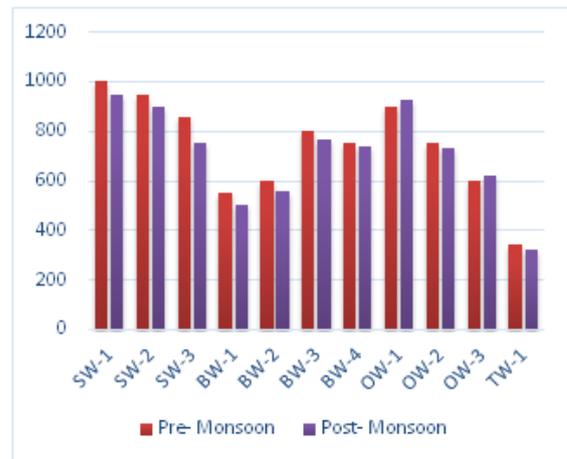


Fig 7: Experimental results of Total Hardness in Drinking water Samples

V. CONCLUSION:

Groundwater quality of Ghot Village is not compactable for drinking purpose without proper 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. Following are the observations from approximately 25 different monitoring locations.

The data revealed that Ghot area also nearby villages' districts have shown nitrate levels above desirable limits, 100% of the time. However, nitrate monitored by MPCB at 34 locations in Maharashtra do not show high level of nitrate. As observed from the descriptive statistics of these talukas, the nitrate levels exceeding the permissible limit ranged between 33-100%. Also total hardness and Mg concentrations were also very high in the range of 33-67%. 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 diseases.

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Dr. Arif Khan, working as a Principal at Civil Engineering Department of NUVA college of Engineering and Technology, Nagpur, Maharashtra India. Completed P.hD and M.Tech in Environmental Engineering from RTMNU. Teaching work since 1997 till present.

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