A REVIEW PAPER ON ANALYSIS OF GROUND WATER OF GHOT VILLAGE IN GADCHIROLI DISTRICT

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Abstract — Water is an important factor for human Being. Sub-Surface water is one of the most valuable natural resources which supports human health and economic development. Groundwater resource assessment of a region involves a detailed study of the sub-surface water. 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. Guidelines of different physic-chemical parameters also have been given for comparing the value of real water sample. 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. Nearly ten physico-chemical parameters such as PH, Colour, Arsenic, Iron, Magnesium, Chloride, Total Hardness, Fluoride, Total Dissolved Solids, and Alkalinity 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— ground water quality, Drinking Water, Arsenic Concentration, minerals in ground water

INTRODUCTION:

Vidarbha Region has always been known as the mineral rich region of Maharashtra. In fact, recent studies have shown that the Central India belt is the second largest mineral belt in the country. 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 industrialization1. 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 8.3km^2. 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.

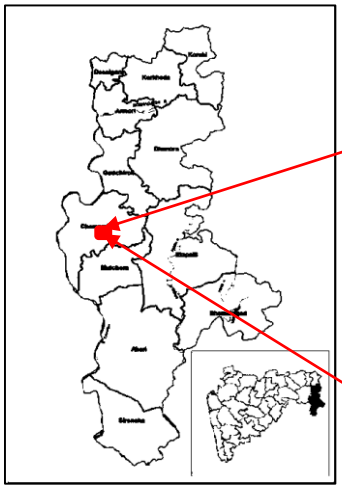

Fig1: Gadchiroli District map

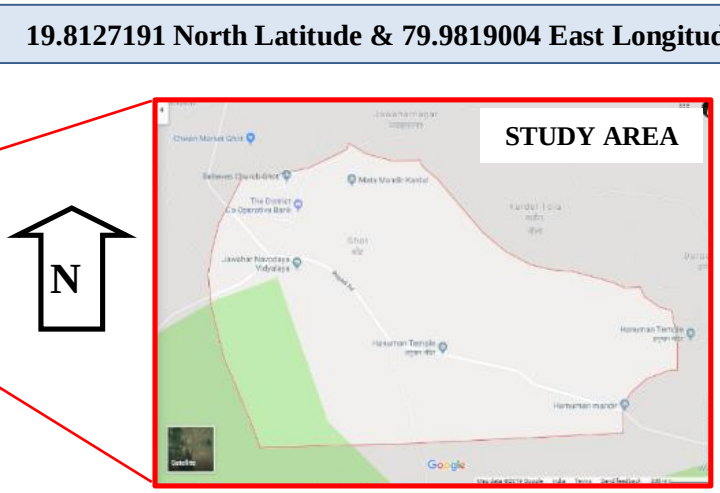

Fig 2: Ghot Village area map

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.

RESULTS AND DISCUSSION

A) PHYSICOCHEMICAL PARAMETERS:

a) ***PH Level***: pH value shows the potential of hydrogen ions presents in the sample of water. The pH value of 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. The pH value is having large scale important in water treatment. The pH value into account while deciding treatments units like coagulation, disinfection water softening etc. 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. The low pH is one of the common problems of groundwater. The primary reason for low pH is acidic rain water. Other ions found in groundwater such as nitrates and sulphates may result in less pH. There are many negative effects of acidic water. Excessive acid water can result in pipe rust, which can lead to possible release of iron, lead or copper in tap water. A low pH can eliminate water and give it a bitter taste. Within the limit prescribed by ISI.

b) ***Calcium:*** Calcium acts in our body as vascular contraction, muscular contraction, blood clotting and nerve transmission. High content of calcium and magnesium in the drinking water should be avoided in case of kidney stones or bladder stones. Lower calcium intake increases the risk of obesity and insulin resistance, nephrolithiasis, osteoporosis, hypertension, colorectal cancer and coronary artery diseases. The highest calcium value is considered 100.00 mg/L and the lowest value is 80.00 mg/L. However, calcium value is found to be higher than the prescribed limit for drinking water at all places (BIS, 2012).

c) ***Magnesium:*** Due to deficiency of magnesium various risks to humans increases such as hypertension, vasoconstrictions, atherosclerotic vascular disease, cardiac, eclampsia in pregnant women, acute myocardial in infection and osteoporosis etc. Magnesium >125 mg/l may show laxative affects. The highest magnesium value is observed to be 40.00 mg/l and lowest value is 15.00 mg/l. However, the magnesium values at all locations are found to be average the acceptable limits being prescribed in (BIS, 2012) for drinking water

d) ***Chloride concentration:*** 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. Therefore, its concentration in groundwater is high, where temperature is high and rainfall is low. But in Ghot reason the rainwater concentration is good. People accustomed to high chloride in water are subjected to laxative effect. In the current analysis, chloride concentration was found in the range of 90 mg/L to 270mg/L. All are almost within the limit range.

*e) **Total hardness**:* Hardness due to bicarbonate of calcium or magnesium is temporary hardness and the hardness due to chloride, sulphates and nitrates of calcium and magnesium is permanent hardness. Due to permanent hardness soap consumption will be more. It also produces calcification of arteries. It also affects water supply system by forming scale. Urinary concretions, stomach disorder and diseases of kidney or bladder are produced by hardness without no conclusive proof. **Water** containing calcium carbonate at concentrations below 60 mg/l is generally considered as soft; 60–120 mg/l, moderately hard; 120–180 mg/l, hard; and more than 180 mg/l, very hard (McGowan, 2000) the highest total hardness value is observed to be 280.00 mg/l and lowest value is 60.00 mg/l. However, the total hardness values are found to be more than the permissible limits being prescribed in (WHO, 2012) for drinking water

*f) **Fluoride concentration:*** Fluoride is a common constituent of groundwater. Natural sources are connected to various types of rocks and to volcanic activity. Agricultural (use of phosphatic fertilizers) contribute to high fluoride concentrations in groundwater. During weathering and circulation of water in rocks and soils, fluorine can be reached out and dissolved in groundwater and thermal gases. The fluoride content of groundwater varies greatly depending on the geological settings and type of rocks. The most common fluorine-bearing minerals are fluorite, apatite and micas. Therefore fluoride problems tend to occur in places where these minerals are most abundant in the host rocks. Fluoride is a geochemical contaminant. Fluoride in small dosage influences the dental system. Higher concentration of fluoride causes dental and skeletal fluorosis. The fluoride values are observed to be 0.06 mg/L to 0.16 mg/L at max location. However, the fluoride values at all locations are found to be just above the acceptable limits being prescribed in (BIS, 2012) for drinking water.

*g) **Total dissolved solids:*** Estimation of total dissolved solid (TDS) is useful to the suitability of water for drinking, agriculture and industrial 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 1120.00 mg/l and lowest value is 510.00 mg/l. However, the total dissolved solids values are found to be more than the permissible limits being prescribed in (BIS, **2012**) for drinking water.

h) **Iron (Fe):** 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. Iron occurrence in ground water is influenced by microorganisms which catalytically help either its oxidation to ferric ion (under aerobic conditions) or reduction to divalent iron (under anaerobic condition). The major natural sources of iron (Fe^{2+}) 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 0.5 to 1.3mg/L. i.e. more than possible limits given by BIS for drinking water.

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 TDS, Ca, Na, HCO_3 and Cl. 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 dieses.

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