

Qualitative Analysis of Ground Water Samples of 4 Sites in Hosakerehalli Locality of Bangalore South, Karnataka, India

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ABSTRACT

Water is an important source for many purposes especially for drinking and we get water especially from ground water which is considered to be the purest form and most reliable form but due to various human activities such as industrialization, irrigation and polluting the water by the means of releasing harmful wastes. Hence these are considered to be the major factors of pollution of ground water. To use water for various day to day purposes, it must meet the standards prescribed by World Health Organization (WHO) and Central Ground Water Board. Therefore the ground water is tested for various factors such as Total Hardness (TH), Alkalinity, pH, Conductivity, Chemical Oxygen Demand (COD). This paper presentation is to check the samples of ground water for the above mentioned parameters and report the comparative study the same with the standards prescribed as per WHO and other organizations and boards.

I. INTRODUCTION

Every living creature on the planet Earth needs water for its survival. Water is a very Essential component of human survival. Human body is made up of 80%-90% of water. Cell, blood and bones contain 90%, 75% and 22% of water respectively. We can hardly leave for a very few days without water. The general survey reveals that the total surface area of earth is 51 crore km² out of which 36.1 crore km² is covered by sea which needs some sophisticated processes to make it fit for drinking and other daily chores. We get fresh water from rivers, underground, lakes, tanks which are fit for drinking and other daily chores. Among this urban areas are more dependent on the underground sources of water for consumption which is considered as the purest form of water containing no dissolved impurities. But due to the industrialization and modernization of the agricultural practices, the chances of polluting the ground water has increased. Harmful chemical fertilizers used in agricultural

fields and also untreated industrial chemical waste left into water bodies enters the ground water sources by seepage through surface soil. So in order to detect and calculate pH, hardness, conductivity and other parameters we can use cost effective remote sensors which connects the mobile phone through Bluetooth or Wi-Fi by generating an application for this. By doing this we can get instantaneous reading of various parameters and if at all the readings are exceeding the normal range as prescribed by WHO then the concerned authorities will get notified about this, through this the concerned authorities can take necessary action.



HOSAKEREHALLI LAKE AFTER CLEANING

Ward no. 161- HOSAKREHALLI MAP



II. MATERIAL AND METHODS

2.1 Study area:

Ward number 121 Hosakerehalli, BSK3rd stage, Bangalore, Karnataka, India.

Geographical Coordinates: 12.9290° N, 77.5370° E

This area is densely populated and has a good commercial activity in one part of it. These areas have fairly good wide roads with a few exceptions. The area contains a lake which was cleaned and brought back to its form in 2017. Till that it was polluted with the domestic sewage. This area being a connective one between Raja Rajeshwari Nagar (Mysore Road) and outer ring road, has high amount of traffic flow which brings in great amount of air pollution in the peak hours. Though it is a very old one, it has been witnessing all the types of development in recent times. The area has a good sanitary system except some few parts. The area has a very large amount BOREWELLS dug up for supply of Drinking Water. Some are dug by the government and others of the residents. It has splendid road connectivity.

Due to its elevation, Bangalore enjoys a pleasant and equable climate throughout the year. The highest temperature recorded was 38.9°C (102.0°F) on 22 May 1935 and the lowest was 7.8°C in 1884. Bangalore receives about 970 mm of rain annually, the wettest months being August September, October and in that order. The summer heat is moderated by fairly frequent thunderstorms and

occasional squalls causing power outages and local flooding. The heaviest rainfall recorded in a 24-hour period was 159.7 mm recorded on 1 October 1997. October 2005 was recorded as one of the wettest months in Bangalore with heavy rains causing severe flooding in some areas, and closure of a number of organizations for over a couple of days.

2.2 Sample collection:

A total of 4 water samples were collected in the month of March of the year 2018 in pre-summer season in Hosakerehalli Ward no. 161, Bangalore, Karnataka, India.

2.3. Parameters under monitoring:

The groundwater samples were analysed by using chemical and physical parameters such as pH, TH (Total Hardness), Electrical Conductivity, Alkalinity and COD (Chemical Oxygen Demand) using standard protocols and the quality of the data was ensured through careful standardization.

III. RESULTS AND DISCUSSIONS

3.1 Electrical Conductance of water samples:

The conductivity of the ground water is being measured by the conductivity electrode dipped in water and connected to conductivity meter which shows the conductivity values. As per the WHO and the Indian Ground water Board, the permissible limit of Electrical Conductivity in the potable water is stated as 5mS/m to 50mS/m. From the Qualitative analysis of the ground water samples we can conclude that all the water samples tested have the electrical conductivity as per the standards and hence it is fit for drinking.

3.2 Total Hardness:

Hardness is majorly caused due to the presence of carbonates and bicarbonates of calcium and magnesium salts including sulphates, chlorates and nitrates. The hardness of water is found out

experimentally by the method of titration. By using the titre values we can calculate the accurate values of the total hardness of water. As per the WHO and Indian Ground Water Board, the normal permissible limit for drinking water is 200ppm, but in extreme cases where there is severe water shortage, the permissible limit can be raised up to 600ppm. As per the Qualitative analysis of water samples, we get to know that hardness values of all the samples lie in the range of 200ppm-600ppm. This range is not the normal permissible range, but the water can be used for drinking in severe drought conditions mainly in summer season as there will be less/no drinking water supply from the Water Board. As per the result we can conclude that, the above mentioned water samples is not advisable to use them for drinking when there is abundant other resources of water. They can only be used in extreme cases i.e. when there is no other source of drinking water.

3.3 Chemical Oxygen Demand (COD):

Chemical Oxygen Demand (COD) can be referred to as an indicative measure of the amount of oxygen that can be consumed by reactions in a measured amount of water or solution. Greater the value of COD, it means that there is greater amount of contaminants (Chemicals) in water. As per the WHO and Indian Ground Water Board, there is no mention of any limitations but the COD for drinking water must be zero or negligible. As per the Qualitative analysis of water, the water samples are not contaminated with chemicals which shows the ideal conditions for drinking water and hence it can be concluded that the tested water samples are very much fit for drinking with respect to Chemical Oxygen Demand (COD) of water.

3.4 pH:

pH is a numeric scale used to specify the acidity or basicity of an aqueous solution. Typically it is the measure of hydrogen ion concentration in the liquid (water). It ranges from 1

to 14. pH of a pure water is 7 which is considered as NEUTRAL pH. If the pH of a solution is <7 it is considered acidic and if it is >7 , it is considered basic. According to the WHO and Indian Ground Water Board, the permissible range of pH for drinking water is 6.5 --- 8.5. The samples that we have tested, the sample 1, sample 3 and sample 4 has pH in the permissible limit and hence fit for drinking. But the sample 2 shows slight variation from the permissible limit and as mentioned by WHO that there must be no compromise in pH of drinking water, it can be strictly stated that the water sample 2 is not fit for drinking purpose.

POISONED WATER OF HOSAKEREHALLI DRAINAGE



3.5 Alkalinity:

Alkalinity is a measure of the capacity of water to neutralize acids. The Alkalinity is mainly caused due to the presence of carbonates, bicarbonates and hydroxides. Alkalinity has the same limitations as that of Total Hardness i.e. 200ppm – 600ppm. From the Qualitative analysis of the water samples, we found out that all the samples had alkalinity less than 200 ppm which is perfectly placed in the permissible limits of drinking water and hence can be concluded that all the water samples are safe for drinking with respect to the Alkalinity factor.

For all samples:

Odour – Odourless

Taste – Tasteless

Colour – Colourless

IV. CONCLUSIONS

This study has let us know the water quality in the area of Hosakerehalli, ward no. 161. This is significant in making people know about the water quality in the area and also helps in building required technical devices that help in purifying the contaminated water and make it fit for drinking.

The Qualitative study of the hardness of water indicates that:

- All the samples shows the hardness level more than normal permissible limit but it is below the extreme permissible limit.
- Therefore all the water samples can be used for drinking in extreme drought conditions.

The Qualitative study of Chemical Oxygen Demand (COD) indicates that all the water samples are fit for drinking as they all showed 0 COD.

The Qualitative study of pH of the samples indicates that sample 1,3 and 4 are very much fit for drinking as they are in permissible limits and sample 2 shows a slight variation from the permissible limit which indicates that it is not fit for drinking.

The Qualitative study of Alkalinity of the water samples indicates that there is no presence of hydroxyl ions and shows presence of carbonate and bicarbonates. The presence of carbonates and bicarbonate are within the prescribed limits of WHO and hence can be concluded that the water samples are fit for drinking.

The Qualitative study of Electrical conductivity of Water samples indicates that all samples have electrical conductivity within the range of prescribes limits from WHO and hence can be concluded that the water is fit for drinking.

Hence from the overall study of all the characteristics, it can be concluded that the ground water of Hosakerehalli, Ward no. 161 is fit for drinking in Extreme cases as it shows slight variation in pH in some regions. The area regularly has a good drinking water supply, hence the citizens must be advised to use the water supplied from the BWSSB (Bangalore Water Supply and Sewage Bard) rather than using ground water.

Table 1.Shows the measurement of bore well water quality parameters by using chemical and physical methods

Sample no.	X(Latitude) (Degrees)	Y(Longitude) (Degrees)	1 st Source (Feet)	2 nd Source (Feet)	3 rd Source (Feet)	Casing Depth (Feet)	Total Depth (Feet)	Yield (Inches)	Total Hardness	Chemical Oxygen Demand (COD)	Total Alkalinity	pH	Conductivity
01	12.55336	77.32259	10	45	--	80	100	4.5	379.6ppm	nil	116.0ppm	7.92	32.6 mS
02	12.929927	77.535577	85	145	--	80	400	6	423.23ppm	nil	132.0ppm	8.6	36.4 mS
03	12.931426	77.534832	50	160	400	150	450	6	528.86ppm	nil	196.0ppm	7.91	35.6 mS
04	12.928657	77.533521	20	50	--	50	80	4	507.49ppm	nil	174.0ppm	8.23	28.2 mS