

Comprehensive Assessment of Groundwater from various areas of Aurangabad city, Maharashtra (India).

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Abstract - Groundwater is a significant water resource accounts for 30% of the globe's freshwater. 97% of extracted groundwater is useful for drinking and human consumption. The aim of present study is to analyze the scientific production which deals with the study of groundwater. The maximum value of pH was observed in the month of February and minimum value was from June month and the average value was 7.5. The maximum value of temperature was observed in the month of May was 28.3 °C and minimum value was 25.3 °C from March month and the average value was 26.9 °C. The maximum value of Electrical conductivity was observed in the month of February was 75.6 $\mu\text{S}/\text{cm}$ and minimum value was 56.9 $\mu\text{S}/\text{cm}$ from March month and the average value of Electrical conductivity was 67.83 $\mu\text{S}/\text{cm}$. The maximum value of DO was observed in the month of January i.e. 13.6 mg/litre and minimum value was from May month and the average value was 11.56 mg/litre. The maximum value of BOD was observed in the month of January i.e. 27.9 and minimum value was 16.3mg/litre from April month and the average value was 22.53mg/litre. The maximum value of COD was observed in the month of April was 13.2 and minimum value was 9.2 from January month and the average value was 11.2 mg/litre. The maximum value of TDS was observed in the month of January was 358 and minimum value was 289 mg/litre from May month and the average value was 327 mg/litre. The maximum value of Turbidity was observed in the month of June i.e. 6.1 and minimum value was from February month and the average value was 3.6 NTU. The present research study aims to identify the proper areas of water pumping for drinking as well as agricultural harvest in the study region. Industrialization and Urbanization, other manmade activities which affect the quality of groundwater.

Key Words: groundwater, physicochemical, parameters, water, quality.

1. INTRODUCTION

Groundwater is the most important natural resource for the human consumption and support of habitat and for maintaining the feature of base flow to river courses, while its quality is necessary to ensure sustainable safe exploit of the resources for all the purposes. Surface water is the main resource for drinking and domestic purposes, its scarcity

because of industrial development and population growth; it makes people by forcing to use groundwater for the portable and domestic uses in urban areas in Aurangabad. Water have many applications and every organism need it, a study of water from different the aspects which becomes essential (Potadar *et al.*, 2021; Padalkar and Kumar, 2018). The groundwater quality is the importance of every one of those procedures and responses that follow on water from the tiny it is primarily gathered until the time which is stored in a well that is regularly controlled by numerous physicochemical attributes. Groundwater plays a very important role in public water supplies around the world. Universally, more than two billion peoples are depend on the groundwater for their daily need of water supply and more than half of the world's population depends on the groundwater for drinking purpose (Anthony; 2006). At the same time the amount of groundwater consumption has been rapidly increasing may achieving sustainable development of groundwater resources is one of the significant objectives for the future of nations. Groundwater is the universal largest distributed house of fresh water which is central to sustaining the ecological systems and human alteration to the climate change. Sustainability management of the groundwater resources is particularly important, with 50% of the global drinking water and 43% of irrigation sourced from the aquifers. Due to the rigorous groundwater exploitation, saltwater interference and the land subsidence may become serious concerns in some of the areas among the other environmental threats and the geological hazards. Water is the largest universal liquid of the Earth, it is very important to all the life forms. It is best dispersion medium for all the biochemical reactions of the living process on the earth. Water is an essential nutrient and is an essential component of every cell, tissue, and the organ. Water has ability to dissolve organic as well as inorganic compounds in it; hence water is called as universal solvent (Potadar *et al.*, 2021; Jadhav and Jadhav, 2017). Due to the severe destruction of water quality, available water resources are more and more becoming not suitable or even harmful for the human consumption (Saraswat *et al.* 2016; Vorosmarty *et al.* 2000). Groundwater pollution is found in a range of aquifers of unconsolidated sedimented regions to bedrocks (Kumar *et al.* 2010; Smedley and Kinniburgh 2002). Groundwater contamination by trace elements has turned recently out as a main concern for the policy planners in the countries like India and in the sub continental zones

(Mahanta *et al.* 2015; Meliker *et al.*2008).Therefore the establishment of numbers illegal wells and the lack of means to protect the groundwater wells from different pollutants lead to reduce of groundwater storage and its pollution by pollutants and contaminations which coming from the various sources like industrial effluent and sewage water of household before use of groundwater we have to assess its quality to decide that the water suitable for drinking and domestic uses, so we have been selected randomly samples from Aurangabad city. Physicochemical parameters and comparing the obtained values with the standard value on the basis of WHO, BIS and ICMR guidelines. Ground water become polluted due to the industrial activities and human uses and pollutants discharge into ground Water and mix with it therefore the characteristics and properties of water change and water become unsuitable for Drinking water (Bishnoi, and Malik (2008). Groundwater is one of the most important sources of water for drinking, irrigation and national purposes in urban areas as well as city. Groundwater pollution is the main environmental and ecological issues in the current era of globe (Vodela *et al.* 1997; Kanak Moharir *et al.* 2017).

2. METHODS AND MATERIALS

In the present study, Total eight samples were collected randomly from the various locations in Aurangabad city in the study area, in last November 2021 (winter season) and followed by all recommendations for sampling and preservation of samples (NEERI, 2007; APHA., 2000), for the sampling, bore well samples were taken by a pump which found in citizens buildings and from the public bore well which is found near the houses to flow the water for at least five minutes. The required volumes of water were collected in the plastic container directly.

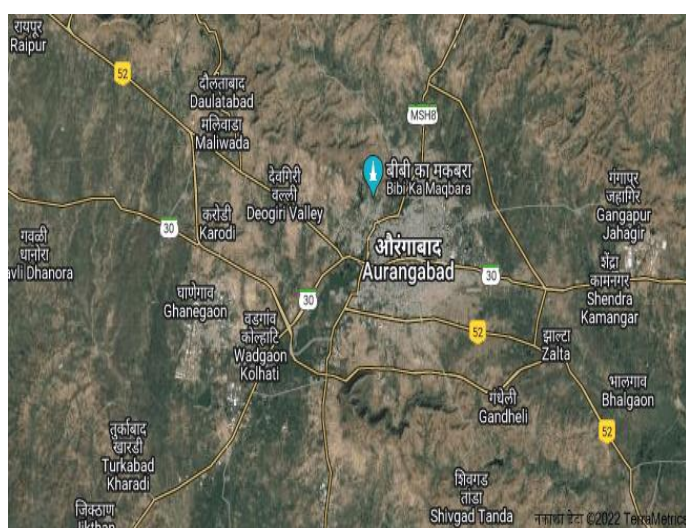


Fig.1: Showing Study area map.

Materials and methods for physico- chemical analysis of groundwater samples accredited in the study work are according to APHA (2000), WHO (1996 Manual), Temperature (T) has taken by the mercury thermometer (APHA, 2000). The value of pH was measured at the time of sample collection at locations by portable pH meter operated by battery and by use of ready buffer solution to calibrate pH meter and other parameters were analyzed in the laboratory within the 24 hours to 8 days. Electrical conductivity (EC) measurement (Saxena, 1987) gives the rapid and practical estimation of the variance in dissolved mineral contents of a water body (NEERI, 2007). It is measured with the help of a conductivity meter having a conductance cell which containing electrodes of platinum coated with carbon. Dissolved Oxygen (DO) analyzed by winklerazide modification titrimetric (APHA,2000) Chemical Oxygen Demand (COD) analyzed by the open reflux method Total dissolved solid (TDS) content determined as the residue left after the evaporation of filtered sample, TDS also calculated by the summation of total suspended solid TSS with total solid. The chemicals materials were prepared with AR grade and Equivalent grade. Glassware and the instruments that used for water quality parameter like flame photometer and spectrophotometer were calibrated at room temperature.

3. RESULTS AND DICUSSIONS

Table -1: Figure-1: Estimation of Groundwater analysis from study area.

Sr. No.	Months / Parameters	Janu ary	Febr uary	Ma rch	Ar il	M ay	Ju ne	Aver age	M ax	Mi n
1	pH	7.5	8.3	7.4	7.2	8.0	6.8	7.5	8.3	6.8
2	Temper ature	27.8	26.9	25.3	27.2	28.3	26.4	26.9	28.3	25.3
3	Electric al conduc tivity	64.5	75.6	56.9	65.3	69.5	75.2	67.8	75.6	56.9
4	DO	13.6	12.5	11.8	12.3	8.9	10.3	11.5	13.6	8.9
5	BOD	27.9	26.5	18.7	16.3	21.5	24.3	22.5	27.9	16.3
6	COD	9.2	10.3	12.5	13.2	11.6	10.4	11.2	13.2	9.2
7	TDS	358	317	357	296	289	345	327	358	289
8	Turbidi ty	2.1	1.9	2.3	5.4	4.3	6.1	3.6	6.1	1.9

The analysis of groundwater provides the information about source and area of groundwater pollution and determines the utility for a variety of purposes. Depends upon some specific standards of the groundwater quality may be

determined for its suitability for various purposes. In present study the standards of WHO (Choi et.al, 2005), is utilized to decide the potability of the groundwater for drinking purpose (Abhay et.al; 2018). Various parameter indices for rating the quality of water of study area. pH of groundwater value was found highest in the month of February i.e. 8.3 and lowest in the month of June i.e.6.8 respectively. The average pH value was 7.5. The aquifer in the study area is mostly vesicular basalt which imparts alkaline nature of water. The safe limit of pH lies between 6.5 and 8.5. The slight acidic nature of a few samples indicates impact of industrial influence on the quality of groundwater. The Temperature of groundwater value was highest in the month of May i.e. 28.3 °C and lowest in the month of March i.e. 25.3 °C respectively. The average Temperature value was found i.e. 26.9 °C. The Electrical conductivity of groundwater value was highest in the month of February i.e. 75.6 $\mu\text{S}/\text{cm}$ and lowest in the month of March i.e. 56.9 $\mu\text{S}/\text{cm}$ respectively. The average EC value was found i.e. 67.8 $\mu\text{S}/\text{cm}$ (Davis and Wiest; 1996). Dissolved Oxygen (DO) of groundwater value was found highest in the month of January i.e. 13.6 mg/l and lowest in the month of May i.e.8.9 mg/l respectively. The average DO value was 11.5. BOD of groundwater value was found highest in the month of January i.e. 27.9 mg/l and lowest in the month of April i.e.16.3 mg/l respectively. The average BOD value was 22.5 mg/l. COD of groundwater value was found highest in the month of April i.e. 13.2 mg/l and lowest in the month of January i.e.9.2 mg/l respectively. The average COD value was 11.2 mg/l. TDS of groundwater value was found highest in the month of January i.e. 358 mg/l and lowest in the month of May i.e.289 mg/l respectively. The average TDS value was 327 mg/l. Turbidity of groundwater value was found highest in the month of June i.e. 6.1NTU and lowest in the month of February i.e.1.9 NTU respectively. The average Turbidity value was 3.6 NTU.

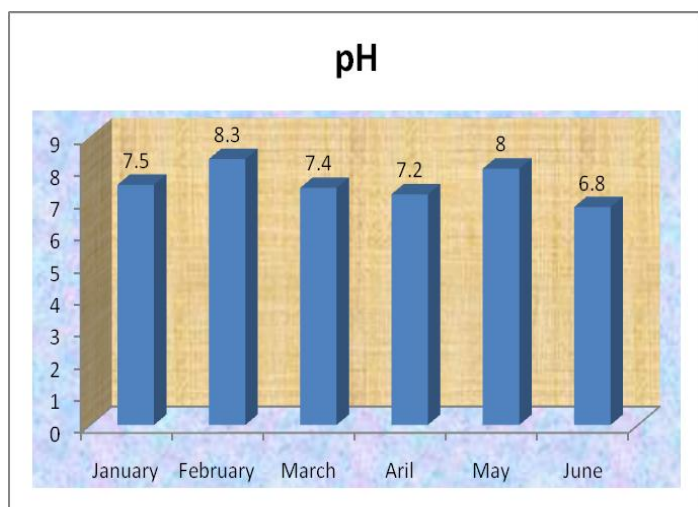


Fig.2: Values indicating monthly variation in pH

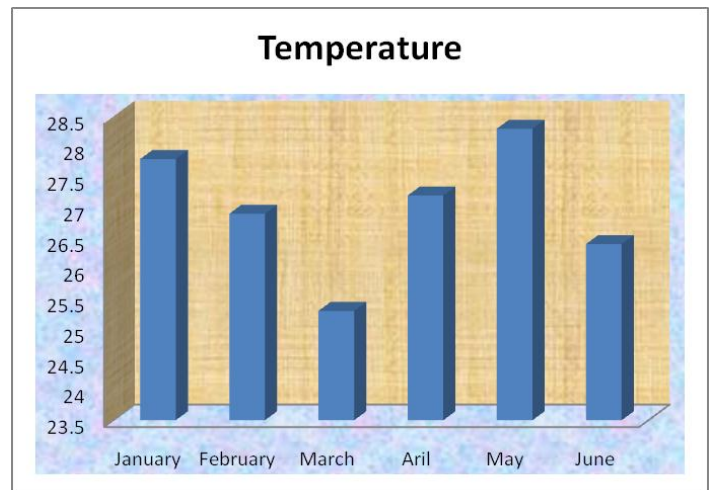


Fig.3: Values indicating monthly variation in temperature

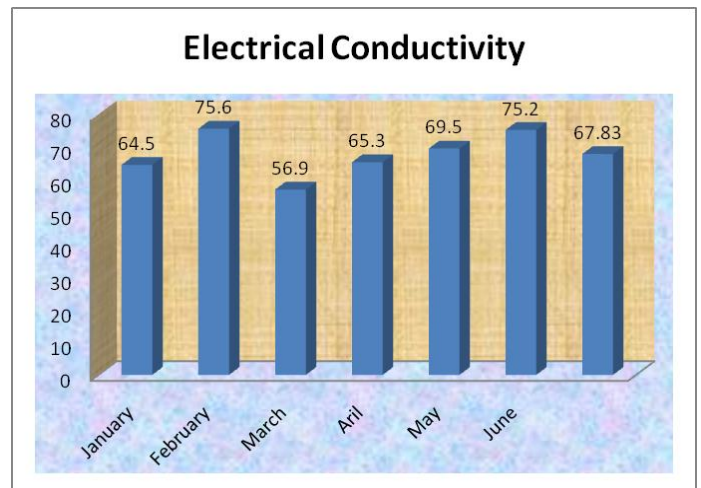


Fig.4: Values indicating monthly variation in EC

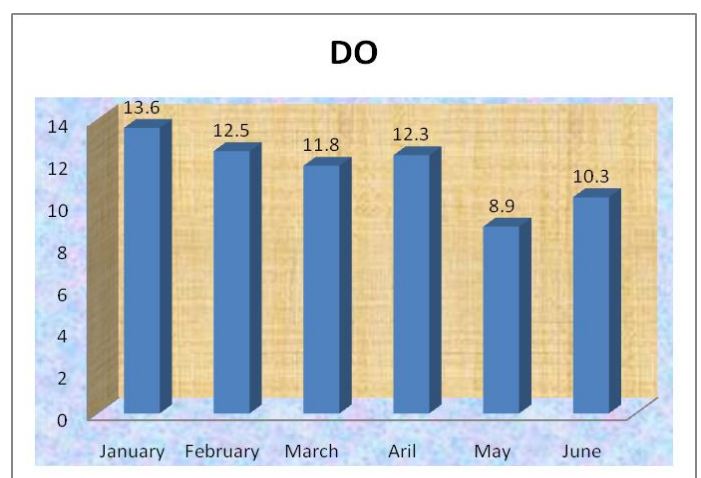


Fig.5: Values indicating monthly variation in DO

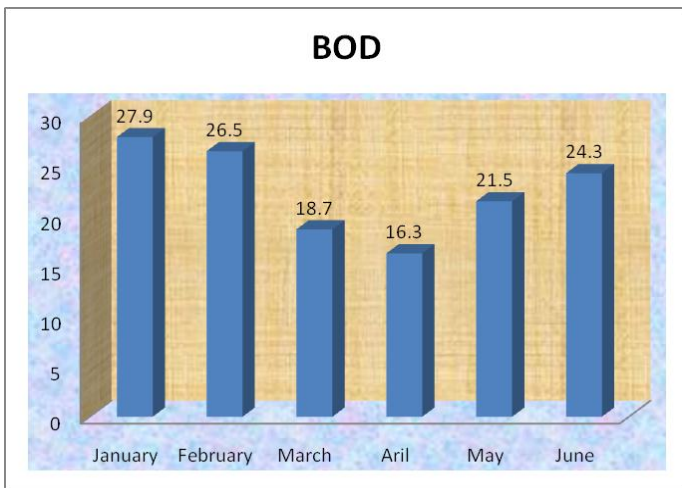


Fig.6: Values indicating monthly variation in BOD

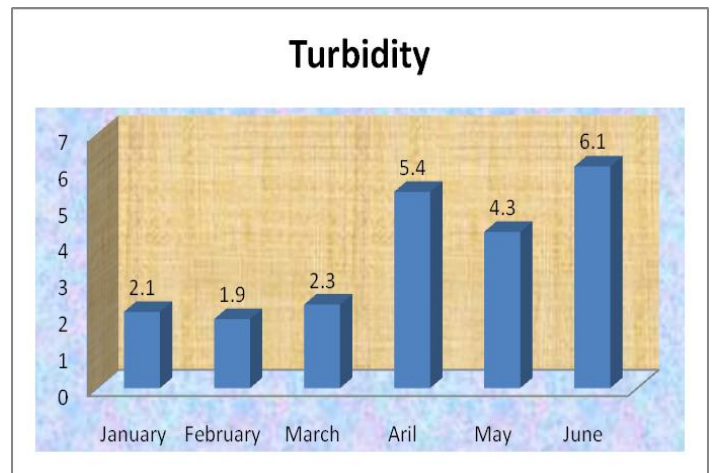


Fig.9: Values indicating monthly variation in Turbidity

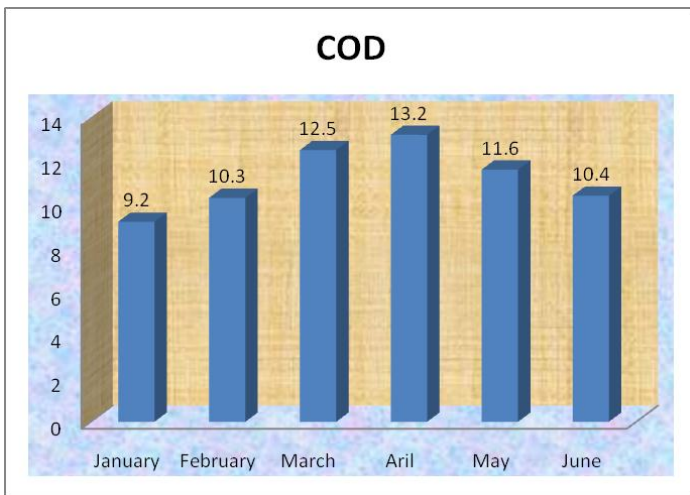


Fig.7: Values indicating monthly variation in COD

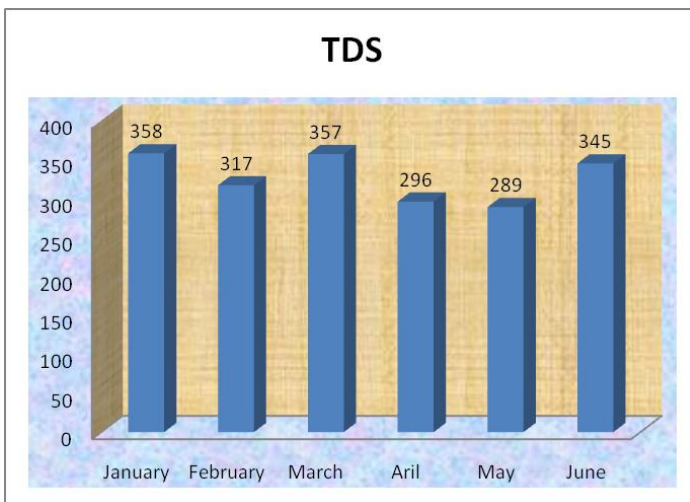


Fig.8: Values indicating monthly variation in TDS

4. CONCLUSIONS

The groundwater samples in present study are significantly detrimental to the human beings and it may use in domestic purpose and occasionally in portable purpose depend upon the ions contents in water. The maximum value of pH was observed in the month of February and minimum value was from June month and the average value was 7.5. The maximum value of temperature was observed in the month of May was 28.3 °C and minimum value was 25.3 °C from March month and the average value was 26.9 °C. The maximum value of Electrical conductivity was observed in the month of February was 75.6 μS/cm and minimum value was 56.9 μS/cm from March month and the average value of Electrical conductivity was 67.83 μS/cm. The maximum value of DO was observed in the month of January i.e. 13.6 mg/litre and minimum value was from May month and the average value was 11.56 mg/litre. The maximum value of BOD was observed in the month of January i.e. 27.9 and minimum value was 16.3mg/litre from April month and the average value was 22.53mg/litre. The maximum value of COD was observed in the month of April was 13.2 and minimum value was 9.2 from January month and the average value was 11.2 mg/litre. The maximum value of TDS was observed in the month of January was 358 and minimum value was 289 mg/litre from May month and the average value was 327 mg/litre. The maximum value of Turbidity was observed in the month of June i.e. 6.1 and minimum value was from February month and the average value was 3.6 NTU. The obtained results we can conclude that groundwater is polluted and its impacts shows on human health will be severe and lead to many diseases for human and the high values indicates that the load of pollution occurred due to the industrial, mining and human activities so the groundwater should not be used in drinking purpose as well as domestic purpose.

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