International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 05 | May 2020 www.irjet.net p-ISSN: 2395-0072

DEVELOPMENT OF DRINKING WATER QUALITY INDEX ON DIFFERENT PARTS OF VIDARBHA

Pranot Zode[1], Mangesh Bhorkar[2], V. P. Thergaonkar[3]

[1]Dept. of Civil Engineering, G.H Raisoni College of Engineering Nagpur(440016), Maharashtra, India
[2]Assistant Professor, Dept. of Civil Engineering, G.H Raisoni College of Engineering Nagpur(440016), Maharashtra, India
[3]Retd. Scientist (NEERI), G.H Raisoni College of Engineering Nagpur(440016), Maharashtra, India

---

Abstract- *Water is very precious element existed on this planet. Life of all living creatures is nothing without water. A methodic and specifically study was carried out to evaluate the quality of ground water in different parts of Vidarbha region. The examination of groundwater was done by considering 10 parameters that are contributing significantly to find out the quality of ground water. This analysis of ground water covers the quality of ground water such as bore wells and open well. Water quality index gives proper justification of compilations of complicated information into a single data. Hence this study aims to find out water quality index on different parts of Vidarbha region and also to determine whether the water is suitable for drinking purpose and other human activities.*

Keywords- Water Quality Index, physiochemical parameters, pollution, ground water.

1. INTRODUCTION

Water is very significant element in this earth. without water there is no existence of any living beings present in this world therefore water is used in every day to day activities a huge source of clear water is present in the form of groundwater, as per the current scenario we are facing in the recent times it is observed that the quality of groundwater got contaminated and also level of contamination increasing day by day hence it is prime objective to determine the quality of groundwater. An interesting fact about water is that 97% of water is available in oceans 2% is available in glaciers and the remaining 1% it is available for human purposes out of which only 0.2% is in form of freshwater which is called as pure water.

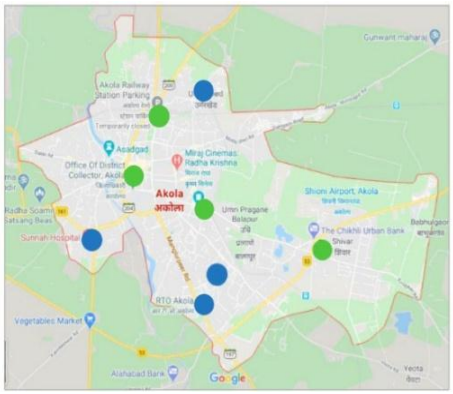
Ever since the rise of industrial era the groundwater gets polluted and other human activities contributes the pollution of groundwater. It is necessary to carried out the investigations of water quality and management and to figure out this issue the concept of water quality index is to be accepted.

A large amount of irrigation activities usually dependent on groundwater more than 60% of the total area under irrigation depends upon ground water sources.

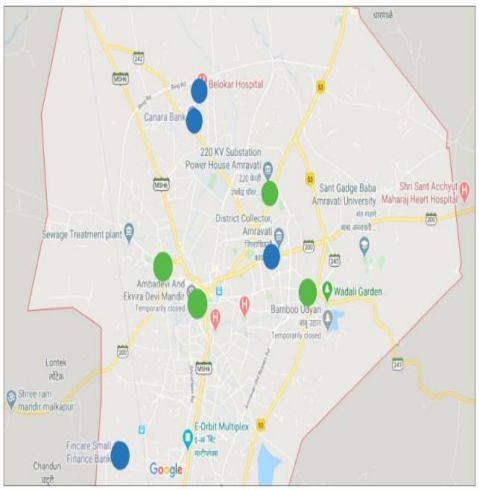
Groundwater has an important contribution in States economy so it is important to investigate examine and interpret the quality of water both in terms of quality and quantity for management and development of a region.

1.1 Study Area

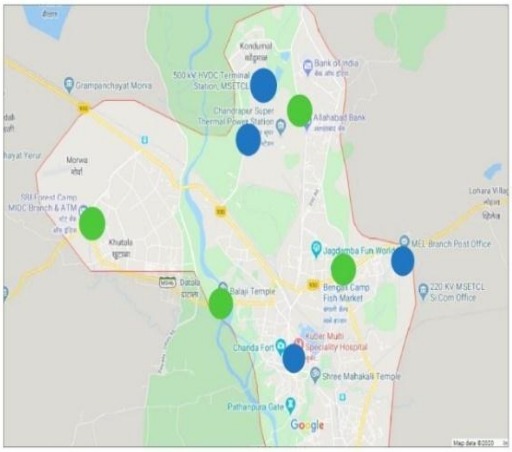
As per current scenario increasing urbanization, town planning, settling in city leads to a vast number of population obsessed with ground water sources. This leads to scarcity of ground water as well as decrement in the level of sub surface water. Vidarbha region lies between 21.1286° N latitude, 79.0964° E londgitude of Maharashtra State. In this study the sub surface water is divided into two parts such as bore well and well water, usually vast population of Vidarbha considers bore well water and well water as their primary source of water. Hence to find out parameters of quality of water, samples of Bore well and well water have been collected from different districts of Vidarbha which are given below in fig.



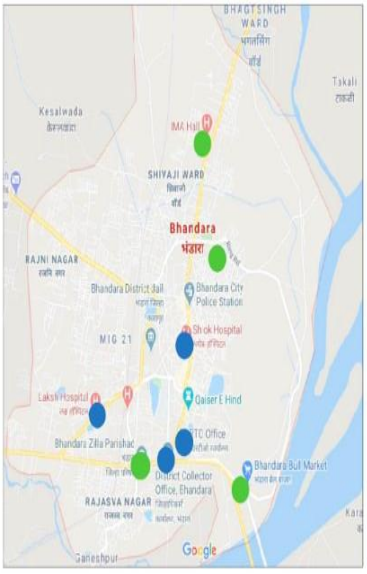
District of Akola



District of Amravati

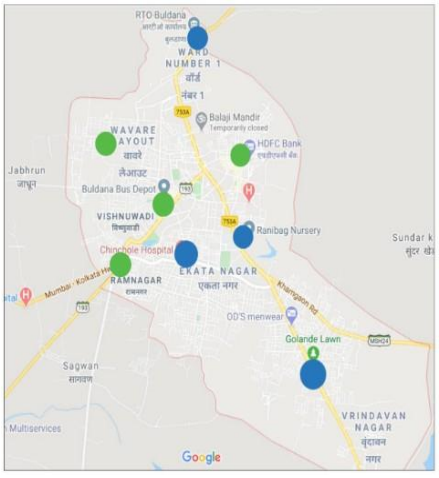


District of Chandrapur

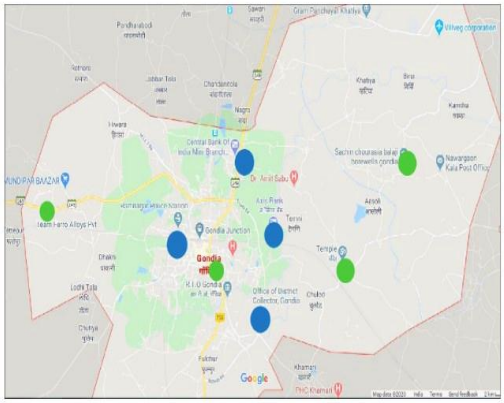


District of Bhandara

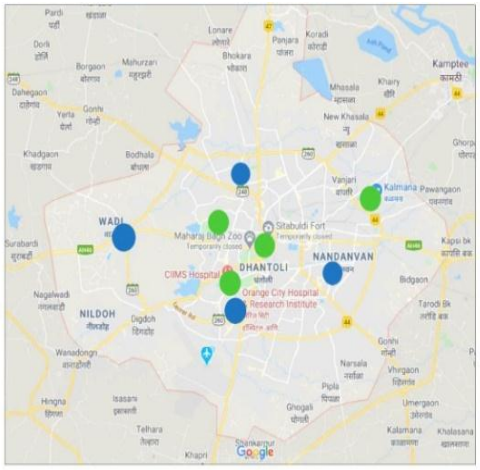
District of Gadhchiroli



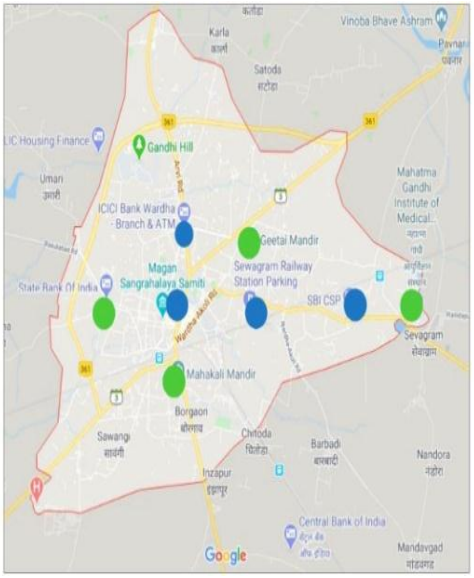
District of Buldhana



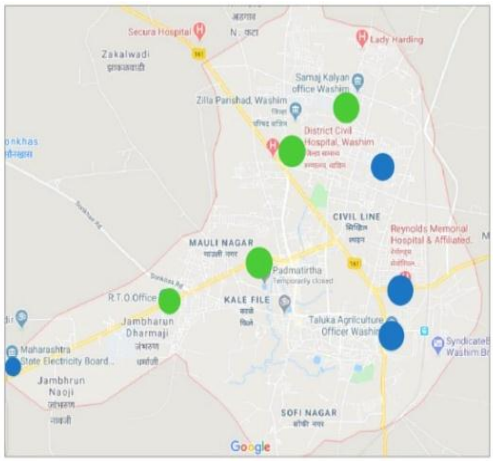
District of Gondia



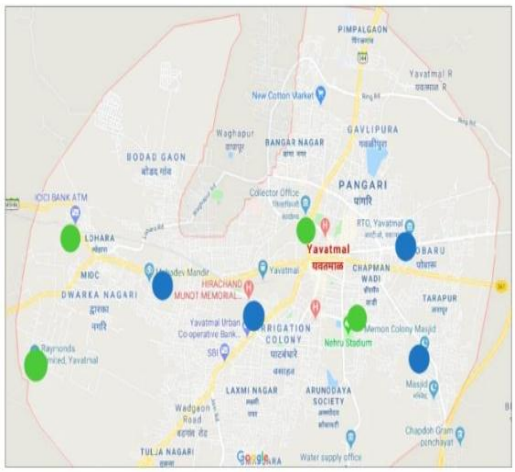
District of Nagpur



District Wardha



District of Washim



District of Yavatmal

2. LITERATURE REVIEW

Literature review was carried out to know the quality of surface and sub surface water. Different studies were carried out for examination of quality of water. An analysis was carried out for ground water quality of Indore in which 27 parameters were used (D. Dohare et. Al 2014). A case study was carried out in Tekanpur area M.P India to find whether water is used for drinking purpose or not (N. Saxena and A. Sharma et.al 2017 et. Al). An analysis was carried out at Kanksa-Panagarh Area Bardhaman District of West Bengal for use of ground water as drinking purpose, they have given a an equation to find out WQI which is very easy and fast method (A. K. Batabyal and S. Chakraborty et. Al 2015).

3. ANALYSIS OF WQI

This analysis includes samples of ground water such as bore well and well water. Around 88 samples were analysed from different parts of Vidarbha region during July 2019 to March 2020. The sample bottles were cleaned with deionised water before physiochemical analysis. This analysis includes ten parameters(pH, TDS, T.H, T.A, Ca, Mg, Fluorides, Sulfates, Iron and Chlorides). Iron and sulphates were evaluated with the help of spectrophotometer, pH was calculated with the help of potentiometer. Calcium, total alkalinity, magnesium and chlorides were calculated with the help of titration and total hardness with the help of EDTA titration. Fluoride was found with the help of ion analyser. The following table shows the information about permissible values of various parameters by BIS and WHO.

Table 1: Standard Values by BIS and WHO parameters

Parameters	Bureau of Indian Standards	World Health Organization
pH	6.5-8.5	7-8
Total Dissolved Solids	500	300-1200
Total Alkalinity	200	-
Total Hardness	200	500
Calcium	75	200
Magnesium	30	150
Chlorides	250	250
Sulphates	200	250
Iron	0.3	0.3
Fluoride	1	1.5

4. RESULTS AND DISCUSSIONS

WQI was evaluated with the help of method weighted arithmetic index. The WQI was calculated on an annual basis. The WQI of eleven districts from bore well and well water samples and status of water quality index is shown in following tables.

Table 2: Overall WQI of bore well and well water

Districts	Bore well Water		Well Water	
	WQI	Water Quality	WQI	Water Quality
Akola	40	Good	44	Good
Amravati	40	Good	38	Good
Bhandara	45	Good	42	Good
Buldhana	39	Good	43	Good
Chandrapur	49	Good	50	Good
Gadhchiroli	50	Good	40	Good
Gondia	43	Good	46	Good
Nagpur	38	Good	37	Good
Wardha	43	Good	33	Good
Washim	50	Good	47	Good
Yavatmal	49	Good	44	Good

Table 3 Water quality Index rating and its status

WQI Rating	Status	Category
Below 25	Excellent	A
25-50	Good	B
50-75	Poor	C
75-100	Very poor	D
Above 100	Unsuitable for drinking	E

By seeing the above table the water quality index of well water is less as compared to bore well water.

5. CONCLUSION

After considering the study of water quality index on different parts of Vidarbha taking bore well and well water samples for drinking purpose it is resulted from above table that the water quality index comes under good condition. The water quality index was calculated on an annual basis to find out whether source got polluted or not and by taking samples as given in maps it is resulted that some of sources of districts of Vidarbha such as Chandrapur, Gadhchiroli and Yavatmal needs a pretreatment before drinking purpose, therefore some effective measures needs to be consider for these pretreatment affected districts to boost and to put an observation for drinking water quality by proposing a proper water quality management plan for these pretreatment affected areas.

6. REFERENCES

[1]S. L. Dwivedi and V. Pathak, "A Preliminary Assignment of Water Quality Index to Mandakini River, Chitrakoot,"Indian Journal of Environmental Protection, Vol. 27, Nov 11, 2007, pp. 1036-1038.

[2]K. Yogendra & E.T Puttaih "Determination of Water Quality Index and Suitability of Urban Water body in Shimoga Town, Karnataka", Proceddings of Taal 2007: The 12th World Lake Conference, p.p 1-5.

[3]Devendra Dohare, Analysis of Ground Water Quality Parameters: A Review, Research Journal of Engineering Sciences, 3(5), 26-31(2014), ISSN: 2278-9472.

[4]Namita Saxena and Alka Sharma, "Evaluation of Water Quality Index for Drinking Purpose in and Around Tekanpur area M.P. India", International Journal of Applied Environmental Sciences, pp. 359-370, Volume 12, (2017).

[5]Rajankar P, Assessment of Ground Water Quality using water quality index(WQI) in Wardha Maharashtra, Journal of Environmental Science and Sustainability, NEERI, 1(2), 49-54 (2013).

[6] Gopal Krishan, Surjeet Singh, Kumar CP, Suman Gurjar and Ghosh NC "Assessment of Water Quality Index (WQI) of Groundwater in Rajkot District, Gujarat, India" Journal of J Earth Science & Climatic Change ournal of EarthScience & Climate change, Volume 7, Issue 3, March 22, 2016, doi:10.4172/2157-7617.1000341.

[7] Kushtagi S. and Srinivas P, "Studies on water quality index of ground water of Aland Taluka, Gulbarga District, Karnataka", International journal of applied biology and pharmaceutical technology, Volume: 2, Issue-4, Oct - Dec -2011.

[8] P. J. Puri, M. K. N. Yenkie, S. P. Sangal, N. V. Gandhare, G. B. Sarote and D. B. Dhanorkar - "Surface water (Lakes) quality assessment in Nagpur city (India) based on Water quality index (WQI)", Vol.4, No.1, 43-48 (2011), ISSN: 0974-1496 CODEN: RJCABP.

[9] P. Shroff & R.T Vashi , "Assessment of Water Quality Index for Groundwater of Valsad District of South Gujarat (India), Journal of Fundamental & Applied Sciences, p.p 203-209, Vol 5, 31th December 2013.

[10]A .K Batabyal and Chakraborty Hydrogeochemistry and Water Quality Index in the Assessment of Ground Water Quality for Drinking Uses. Water Environment Research, 87(7) 607-617(2015).