

## Assessment of Water Table in Open Wells in Amravati

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### Abstract

*The importance of groundwater can be estimated by simply considering the fact that about 70% of water demand currently in the country are been meet by groundwater reserves mainly tube wells, bore wells. But considering the above stated fact and current scenario, humans have a huge impact on the ground water availability and also the quality. The day by day depletion of the groundwater levels and also the degrading quality of the water are proving to be an alarm for upcoming drastic conditions which needs to be mitigated as early as possible. Similar condition occurs in case of Amravati region, as there is significant degradation in groundwater. Present study is aimed at quantitative evaluation of water table in open wells for planning water conservation strategies for AMC. Field survey research methodology is used to analyse the situation. Various techniques are adopted for measuring the ground water level and the sample required for pH and TDS calculations, which signifies the quality as well as quantity parameters. Around 300 wells are covered in duration of 30 days and data obtained through the survey form is tabulated in Excel sheet and further analysis is done in graphical format.*

*From study it is observed that pH of around 91% wells which comes under range of 6-8, whereas remaining 9% comes under critical range of acid and alkalinity. Similarly, in TDS there are around 77% of wells, which comes under satisfactory range. Around 132 (42%) wells out of 300 consist of good quality water but around 107 (35.68%) wells are used for dumping purpose, extinguished and dried. There are only 128 (42.66%) well which are good in all the physical and chemical aspects, there are around 6 wells in zone I, 24 wells in zone II and zone III, 30 wells in zone IV, 15 wells and 29 wells in zone V and VI respectively. The priority of wells is decided to undertake rejuvenation of wells, GIS maps showing open well condition will help AMC for conservation works. Approximate estimate for recharging of wells is suggested. This technical report will surely help Amravati Municipal Corporation to plan for their water conservation strategy.*

**Keywords: Ground Water, pH, TDS, Water table, Open Wells**

### INTRODUCTION

Water is a very essential component to be taken in account in terms of its quality and quantity for the betterment of communities. Rainfall is the main source for the quantities availability of the water, which in other terms recharges the resources. On an average, in India rainfall is observed to be

insufficient and also it is not uniformly and regularly spread throughout the year. Ground water are largely tapped in India, about 70 to 80 % of the population get their supplies from underground resources. Commonly observed resource, found to be utilizing ground water from a drilled hole with certain dimensions referred as a well. Digging well in personal area in order to fulfil the basic required of water to be observed from a very ancient period.

The location of a well is mainly determined by the well's purpose. Enough ground water must be available to meet the pumping requirements of the wells. The basic requirement of an open well is Highest yield with minimum drawdown, Good quality water with proper protection from contamination, Sand-free water, Long lifetime (>50 years), Reasonable short term and long term costs. General observation through the wells in nearby region indicates the fluctuation in the water level, which remarks that most of the wells are on the level of depletion whereas some are already dried and used for dumping purpose. Proper conservation, protection and development of this vital source is, therefore an extremely important issue to be summarized as effectively as possible.

### EXPERIMENTAL WORK

The study is based on Assessment of water table, so in order to inculcate this study in proper manner, the Amravati Municipal Corporation helps us in providing the necessary data of all the public wells present in Amravati city. Data shared by AMC helped us thoroughly as it indicates the place, area and landmark. This provided data helps us to properly plan our area, based on the reliability, approach, ease for conducting the survey.

Later on based upon various aspects of survey, as per various literature review many questions arises, which are identified and that can be asked during survey form filling. The survey form is prepared which includes all the general information such as ward name, ward number, locality, geological parameters, physical parameters and comments. The survey form is approved by the AMC and then finalized. As per the information given by AMC, there are around 300 wells comprises of domestic as well as public wells were shortlisted for carrying out survey for analyzing quality of water.

### MATERIAL AND METHODS

In order to calculate the quality parameters of the ground water resources, there is need to calculate and measure the quality measures such as pH meter and TDS meter. Depending upon the schedule that is prepared earlier, wells as per their zones were visited and analysed along with that survey form is filled. Following are the steps that is followed during the survey.

- i ) Distribution of wells zone wise, helps in finding out the exact location of well, by using Goggle map it is done and also people in the localities were asked for the wells. For this entire process Amravati district is divided into 5 zones which includes varies wards in it.
- ii) A rope with a container is dipped for collecting water sample and readings for pH and TDS of the water was noted using pH meter and TDS meter.
- iii) The localities present near the area of well were asked about the well and their comments is noted down.
- iv) The whole information is the penned down on survey form which includes various basic parameters of the wells, such as ward name, ward number, locality, geological parameters, chemical parameters.

## RESULT AND DISCUSSION

The ground water development has reached a critical stage resulting in decline in groundwater level. Dug wells are generally used for both domestic requirement and for minor irrigation process in the area. In this area it is observed that dug wells varying from 5.60m to 30m in depth. Ground water is major significance in this region. Water being a very important parameter for life, it is must to carry out such assessment. Amravati city is 2<sup>nd</sup> most growing city after Nagpur in Maharashtra, same situation regarding water is found in this city. Therefore, this assessment was taken by us and all the data that is collected at the time of survey is now comes out to a final conclusion, this conclusion will help us to understand all the parameter of wells, water at a glance and also to determine its future scope and provide references for taking various actions on that particular zone or area for better results.

### pH Range in Wells.

From this graph we can observed that at most slightly alkaline range of pH of water is present in nearly all the six zones, this range includes pH with 7 to 8 value, which can be considered as a potable water. On an average around 85% of wells comes under this category. It is followed by a 4.66% of wells with slightly acidic values, generally it should not be used, but can be preferred at extreme conditions like scarcity of water. So at that time water should be treated first and then used so that it can reduced its acidic nature. Only few % of acidic water is observed of about 0.67%, which is a good result because acidic water is not good for drinking as well as any other domestic used, it is only observed in zone I which can be a point of preference for reducing its acidic nature.

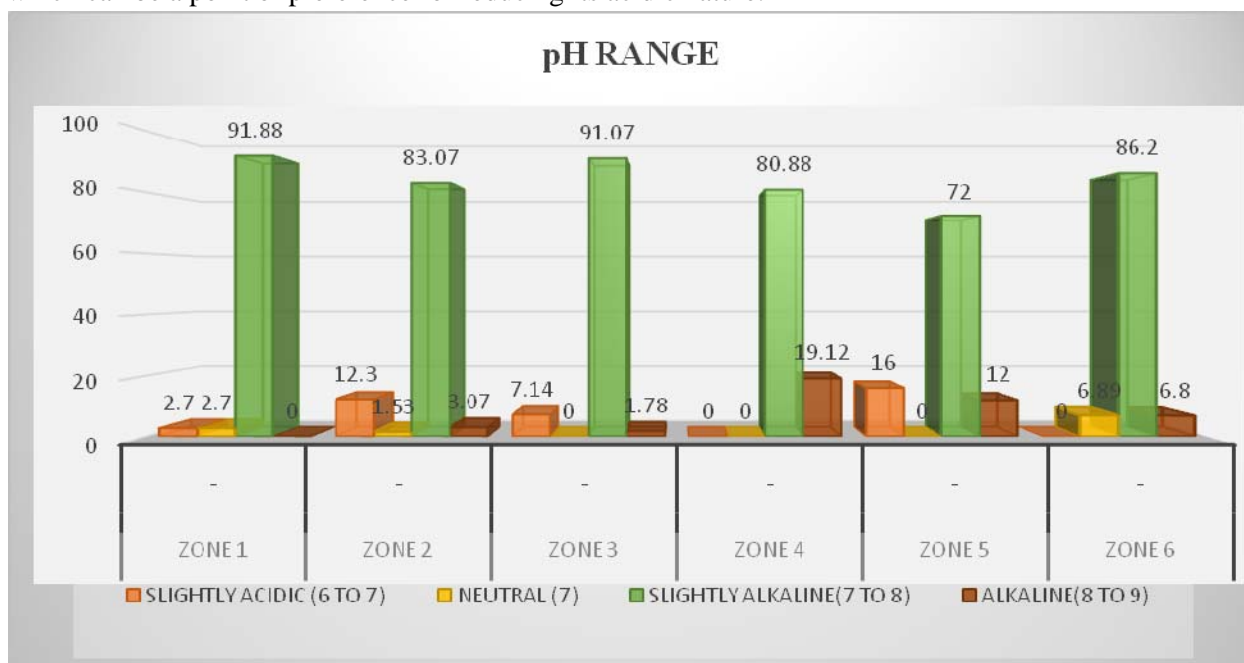


Figure 1 Zone wise comparison for pH values of water.

Neutral range of water with pH value exact 7 is excellent for all the purpose and it is analysed to be only 1.34% of wells. Around 8% of wells have alkaline water with value more than 8. Further they can also be compared zone wise. Accordingly zone I has a good range of water it is followed by zone VI which also has good range **neglecting** acidic range, then there is zone III and zone IV which has moderate

range and at last with an average range including zone II and zone V and they can be preferred for taking action accordingly. The pHgraph is shown in fig 1.

### TDS Range Wells

Depending upon the standard value of TDS i.e. 500 ppm, we can distribute all wells into three categories such as wells with minimum, average and maximum TDS and the result we get is that, there are 27 wells with minimum TDS value with range less than 300 ppm, 265 wells with average TDS values between 300 to 900 ppm and about 14 wells which have maximum TDS value of higher than 900 ppm to a maximum value of 1200 ppm. So from this analysis these 14 wells are considered as a preference spot. Graphical representation of all wells with respect to TDS is shown in Figure 2.

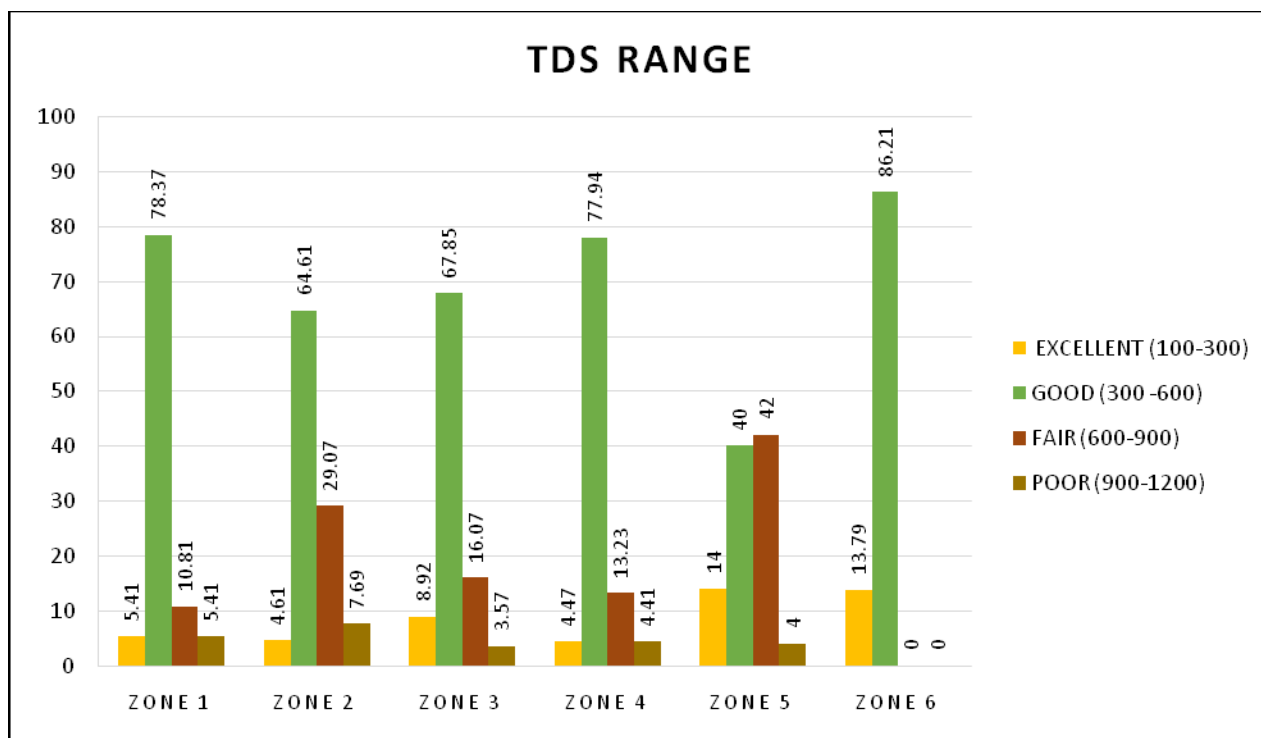


Figure 2 Zone wise comparison for TDS values of water

### Quality of Water in Wells

Water need for any purpose must be in good quality so that it should not affect the consumer. Quality of water is very important parameter so special attention should be given on this content. Around 18.67% of wells have good quality of water, average number of wells are there in each zone belonging in this category. 25.34% of wells have fair quality of water, 14% wells have satisfactory range of water. This type of wells should be given attention for purification, so that quality can be improved. The most important content that should be preferred is the % of bad quality of wells, there are 23.34% of such wells which contain bad quality of water in the wells. Bad quality of water is not preferred for any used. It may damage consumer health, cause skin disease and damage to the structure. It is observed that water quality of wells is bad due the waste matter dumped in it. These waste material reduces the nutrient contain in the water and made water useless, if this material get decomposed in it for a long time. Zone I and zone V

contains more % of bad water. So these zones are preferred with respect of quality of water. Graphical representation is shown in Figure 3.



Figure 3 Zone wise comparisons for Quality of water in wells

## CONCLUSIONS

- From observation it is found that, there are 91% of wells which have pH value in between 6 to 8 and count comes to be 273 wells. Remaining 9% wells i.e. 27 have pH less or more than the above range.
- There are 231 wells with good TDS range between 100-600 ppm which covers 77% wells and remaining 23% have moderate range of TDS greater than 600 ppm with maximum value of 1200 ppm.
- There are 132 wells with good quality of water which covers 44% wells in all and remaining 112 wells have average quality of water as per our survey data and people opinion. Along with that there are 80 (26.67%) wells used for dumping purpose, 11 (3.67%) wells are extinguished from their locations and 16 (5.34%) wells are dried which requires proper attention so that they can be reused again.

## Recommendation

- In order to maintain the acceptable pH value in 9% wells which required stabilisation, rain water harvesting from nearby houses of the well is recommended.

- b) The wells with moderate range of TDS i.e. greater than 600 can also be stabilised by the same rain water harvesting process.
- c) The quality parameter of the well is also the integrated part which includes pH and TDS in it. The ground water pH and TDS is termed as important factor through which the drinking water accessibility is determined. pH and TDS of deteriorated well can be improved directly by drawing out the dumped in it and digging it deeper so that the ground water recharge gets flourished, which thus leads to the improve the quality of water.

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