



DRINKING WATER QUALITY OF UJJAIN DISTRICT

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ABSTRACT: To avail the Safe Maintaining of natural water resources is one of the prime importance and responsibility of any human being. This study was taken to access the quality of water of Ujjain district which different people are using for the drinking and cooking purposes. A questionnaire is prepared on the basis of necessary requirement of information so the main potential sources can be pointed out with their causes of health problem caused due to water born diseases. The main objectives are decided to assess the quality of water and detect the causes of pollution. The first site of sample collection is from Mahidpur about 60 Kms North from Ujjain City. Presently only one filter plant was able to supply the water in localities so the samples were to be collected from Mahidpur area. The different sources of water supply and their purification procedure were also been observed and found that most of them using conventional primary and secondary treatment of waste water. Finally it is observed that there is requirement of an additional advance treatment at the sampling stations. Some are using only primary treatment like addition of alum and bleaching powder even they did not know the quality of water which they are using for the drinking purpose. The water is sampled for physical, chemical and biological parameter analysis. Some sample sources are in rainy, winter and summer season analyzed them properly with the help of the given methods in APHA. Many places the main sources of water supply are from tube wells.

Key Words: BOD (Biochemical Oxygen Demand), TS (Total Solids), ISO (International organization for standardization), MPN (Most Probable Number), UNEP (United Nations Environment Programme); APHA (American Public health Association), IS (Indian Standards).

INTRODUCTION

No extra emphasis is needed to explain the importance of ground water as 50% of the total and 80% of the potable water consumption come from ground. At present all international and intrastate water disputes are confined to surface sources, but very soon such conflict will appears in the case of ground water too. Though natural causes such as hydrological and geothermal reaction results in serious pollution of ground water, its control is rather difficult. Over exploitation and manmade factors of pollution cause serious concern and assumes importance as it is controllable to a good extend. Water, the second primary need for the existence of life was never scarce on earth. Of the 1370 million Km² of water available on earth 74% is from the oceans. About 20% from the glaciers and polar ice caps and around 4% is ground water. All other fresh water sources put together accounts only for uses than 0.2% of the total water; it is more than enough for several hundred years if the hydrological cycle continues in the present pattern. In central part of India on the tropic of cancer lays the fascinating and celestial city of Ujjain girdled by Holy River Shipra and blessed by Jyotirlings of Lord Mahankaal. Simhastha is the big event recurring every 12th year for more than one month. More than five Crore pilgrims assembled in Singhastha. In the ecological point of view it is very essential to use carefully the environmental resources. Safe drinking water is defined as being free from biological contamination (guinea worm, cholera, typhoid etc.) and chemical contamination (excess fluorides, brackishness, excess iron, arsenic, nitrates etc.) Safe drinking water has special importance for keeping good health as drinking safe water people are bound to be safe from various kinds of stomach related diseases as Cholera, Diarrhea, Dysentery, Typhoid, Guinea worms and Jaundice are some of the most common forms of the dependence of general population on contaminated water, this is the reasons why provision for safe drinking water supply have been relieving attention right from the launching of the first five year plan in 1951.

In rural India the water is used mainly for domestic and irrigation purpose. However the imbalance in availability of water creates a situation of water scarcity in almost all areas. Due to over exploitation of the existing source the ground water level is fast declining in many parts of the country and has become a major cause of concern. In view of such a harsh reality the government should take urgent steps to manage water resources rationally while taking care of population dynamics consumption pattern and environmental conservation.

According to United Nations Environment Programme (UNEP); more than 200 million people worldwide will live under conditions of high water stress by 2050. Currently about one fifth of the world population lack access to safe drinking water and with present consumption pattern two out of every three persons on the earth would live in water stressed condition by 2052. This is the observation of UNEP's millennium report on environment. The report further adds that water could prove to be a limiting factor for development in next 40 years in many countries including India where Rajasthan, Kerala, Tamilnadu, Delhi, Gujarat and Andhra Pradesh could face severe water storage problems. Water is a critical need for most human activities like agriculture, domestic consumption and industries. In developing countries such as India bulk of the population lives in remote and rural areas with no access to clean and safe drinking water.

Surface Water Resources of Malwa

Geographically Malwa is a part of a much larger formation of Deccan basalt that extends over Maharashtra, Gujarat, western Madhya Pradesh and adjoining parts of Rajasthan. The natural boundary of the Malwa Plateau practically occupies most of the western Madhya Pradesh starting from north of river of Narmada and extends up to river Chambal in the north. Its eastern boundaries extend up to Sagar city while on the west it touches the capital city of Bhopal. The height of the Plateau generally ranges from about 300 to 500 MSL and the average annual rainfall is above 900 mm. the climate is generally moderate but the summer temperature may sometimes exceed 47°C. The soil is mostly black-cotton soil that has moderate to low permeability and is very fertile.

Surface water resources of the region mainly include the water bodies in the Chambal – Mahi - Catchments. River Chambal flows from south to north draining almost 90% of the Malwa Region. Most of the Malwa has to generally depend for its water needs on the ground water resources, which are dwindling very fast as evident from the information on the district wise fluctuation in the region. Thus it is clear that there is an urgent need to escalate the water storage and Conservation Programme. 72nd amendment that has paved the way to the devolution of power to the grass root levels and resulted in doing this by way of numerous micro irrigation schemes, and small stop dams that could take shape by locally available materials, labor skills and financial resources of the Panchayats.

There is also an urgent need to bring about a shift in our agricultural practices. They are changed in last few decades in such a way that we need more fertilizers and water for irrigation. Use of more artificial fertilizers causes degradation of soils and eutrophication and pollution of our surface water resources. It also causes reduction in the organic matter content of our soil making them less fertile and more prone to erosion. Coupled with deforestation, together these factors causes siltation in the dams, reservoirs and other surface water holding structures 40 to 42 inch of annual rainfall is quite significant. We should be having more than sufficient water to meet all needs for the present and even future.

MATERIAL AND METHODS

Selection of Sampling Location

Selection of sampling locations requires considerations of the monitoring objectives and some knowledge of the physical features of the water course systems as well as of water and of any discharge of waste into it. The precise location of sampling stations can be made only after field investigations. So we collect all the necessary information regarding of water supply from Municipal Corporation & also collect the water sample.

Study area: Mahidpur, Ghatia, Unhel, Khachrode, Nagda, Bardnagar, Tarana, Ujjain.



Study area:

1. Tehsil –Mahidpur

- Intake Raw water is from Filter Plant on Shipra River
- Treated water from Filter Plant. During rainy season there is no tube wells water supply is been done but in winter season three tube wells are connected together and supply with a single pipe near at Nane kardi road. In winter season two tube wells run at Nane Kardi road
- Tube well near Ravidas Mandir

2. Tehsil-Ghatia

- Tube well Near Kanya School
- Tube well near Old Police station.
- Tube well near Pond

3. Tehsil- Unhel

- Tube well at karnavad road
- Tube well at Lamba kuwa
- Tube well Near Nallah at Ujjain road.
- Tube well at Calghati road in front of Ingoria road.

4. Tehsil- Khachrode

- Tube well in front of police station Ward No-2
- Tube well at Bagpura
- Filter plant at Chambal river

5. Tehsil- Nagda

- Filter Plant at Chambal river
- Housing Board area

6. Tehsil- Bardnagar

- Intake Raw water at filter plant on Gambhir Dam.
- Treated water at filter plant of Gambhir Dam.

7. Tehsil- Tarana

- Intake Raw water at filter plant on River.
- Treated Water of filter plant.

8. Ujjain district.

- Gambhir Dam at treatment plant of
- River Shipra at Gaughat.

Planning of sampling

According to purpose of study the samples are collected thrice in a year (rainy season, winter season, summer season) the sampling frequency is per week with 3 samples a day. The sampling points are same in all season so that trends of water quality changes can be assessed.

Sample containers

The sampling bottle is made of glass and plastic usually polyethylene. It is capable of being tightly sealed either by stopper or cap. Three different types of samples are collected at the same place for the different parameter analysis.

1. MPN test (MPN plastic or bottle with sterilization)
2. DO Bottle (Neat and Clean for DO Analysis)
3. Jarikan (for the other Parameter analysis)

Sample containing bottles are placed in an ice box for transportation to the laboratory. So it protect samples from sunlight prevent the breakage of bottle and will allow a temperature of 4°C to be attained and maintained during transport.

Collection of Water Samples

Before testing, the water samples collected from the sources of water. These samples are collected from such places that represent the body of the water from which they are collected.

1. When the water is collected from a tap sufficient quantity of water allowed passing through the tap before collecting sample from it because it will eliminate the stagnant water.
2. If the water is to be collected from the surface stream or river it should be collected about 40-50 cm below the surface to avoid the Collection of surface impurities, and tree leaves etc.
3. In case the water is being collected from the ground sources i.e. through tube well sufficient quantity of water should be pumped out before collecting the samples.

For the collection of water for bacteriological test utmost care should be taken. The person who collects the water must be firstly free from any diseases. The container bottles must be cleaned with sulphuric acid, potassium dichromate or alkaline permanganate rinsed with distilled water and finally sterilization is done. In autoclave immediately after collection of the samples bottles should be closed and covered with cloth to prevent from accumulation of dirt etc.

RESULTS AND DISCUSSION

According to survey of the site it is found that most of places the main sources of drinking water sources are tube well or underground water. They simply used this water without any proper treatment but in some cases where the water is supplying from filter plant like Mahidpur, Tarana, Bardnagar, Khachrode, Nagda, only Simple conventional treatment has been done i.e. addition of alum sedimentation and bleaching powders are using for the treatment so there is urgent requirement for the development and new methods of the treatment. During the summer season most of the places the fulfillment of water demand is from supply with tankers in localities by Municipal Corporation.

The supply of water is alternate during the rainy and winter season and twice a week in summer season. In Tarana site there is more water demand due to escalating of population day by day and most of the places during summer season water table decline so there is urgent need to search some other sources of water supply. There is no testing laboratory set up for the quality check up so the first priority should be given for the set up of temporary laboratory at the filter plant so that actual quality of water for the supply of drinking water can be used.

It is important to know that the yield of a surface sources prior to selecting it for a source of water supply. At the visit sites there is no measuring device or actual recorded of water supply so according to perception for small streams with discharge less than 300 LPs the yields can be determined by stream gauging. Chemical method is also useful in determining yield of stationary body of surface water and also flowing stream of medium size. Different formulas were used for a particular region where it has been established. Secondly is obtained on weekly basis and day to day variations are not obtained by them. For large stream with high discharge the method applicable is measuring discharge by area velocity method. Most of the places the distribution of water is through pipelines. Storage in tank and sometimes use of tanker.

The water demand is not constant throughout the year it will has seasonal variations, diurnal variations and hourly variations. The population of a town as per our collected data and graph is not uniformly distributed over its entire area. The population density is normally expressed in persons per hectares or per square kilometer. This may be expressed in terms of some average figure for a big area; actually this varies in different zones. This is important in planning and design of water distribution network.

The other important point in water supply planning is design period. The plant which is being planned, designed and executed today will serve the future population as well. So it should have adequate capacity to caps up with increase in population. The normal design periods of water supply system normally adopted 10 to 15 years. Generally ground water are clear, cold, colorless and harder than the surface water of the region in which they occur in lime stone formations. Ground waters are very hard tending to form deposits on water pipes and are relatively non-corrosive. Most of the places the water quality is within the permissible level. In Mahidpur where three tube wells are connected together through pipe line and supply to the localities, there are hardness in winter season was found more complex to the standard. Some places where Mg and Ca are main causes to increase the total hardness.

Table 1 – Physico-Chemical Characteristics of Water

S.No.	Characteristic	Unit	Rainy	Winter	Summer
1.	Temperature	°C	26	12	38
2.	Turbidity	NTU	18.9	14	15.1
3.	Appearance	-	Clear	Clear	Clear
4.	pH	pH	7.8	7.6	7.9
5.	Total Solids	mg/l	268	236	280
6.	Suspended Solids		56	24	52
7.	Dissolved Solids		212	212	228
8.	Nitrate Nitrogen		1.0	1.0	1.8
9.	Phosphates (as P)		0.04	Nil	0.56
10.	Chlorides		36	38	40
11.	Total Alkalinity		140	130	146
12.	Total Hardness		160	200	190
13.	Calcium Hardness		64	68	78
14.	Magnesium Hardness		104	130	108
15.	Sulphates (as SO ₄)		8.0	18	20
16.	Dissolved Oxygen		7.0	6.3	5.1
17.	Fluoride as (F)		1.6	1.8	1.9
18.	Fecal Coliform	MPN/100 ml	--	---	---

Future Scope

Declining of groundwater levels in different parts of the country due to over exploitation of the existing source have become a major course of concern for the state Government as well as the Central Governments. The fall in water level and the consequent drying up of wells and other sources have led to mass movement of people and livestock from many areas to other places in search of fresh sources of water and greener pastures.

- Conservation and augmentation of ground water resources of the area.
- Locating rain water harvesting structure to develop sustainable water bodies.
- Controlling runoff and managing direct use of stored water by gravity or by pumping.

CONCLUSION

In most of the cases the water qualities are within the permissible of Indian standards but in few cases of Mahidpur during winter season the MPN coliform is exceeded beyond the given limit it may causes dysenteries and other water born diseases so it utmost care must be taken during this period because of bacterial survival temperature. It is advisable to the local people that during this period they can use this water for the drinking and cooking purposes after the boiling for the 30 minutes. After the treatment process total hardness during summer season was 456 mg/l of tube well supply in this place. Higher sulphates and phosphates concentration indicates the sewage contamination but in these sites all are within permissible so there is no any serious problem related with quality of water but during summer they are worry about lack of water supply. It is urgent required to make a water resource management in Malwa region mainly Ujjain district with the help of people participation for the making of roof top water harvesting techniques.

As we all know that chances of getting sufficiently large quantities of in the massive basalt formations are quite limited and the rate of replenishing the ground water too is very low. Therefore we must use our ground waters with much more wisdom and restrain. There is also an immediate need to augment our ground water recourses by way for artificial recharge techniques.

All our cities in Malwa are facing acute shortage of water for domestic and industrial use. Ground water once through to be quantitatively safe and palatable is causing serious concern today. Excessive exploitation and manmade pollution in addition to the already existed natural geological reactions cause serious threat to the quality of ground water. The manmade causes and naturally occurring factors of pollution assume greater importance as they can be controlled to a given extent.

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