

Analysis of Ground and Surface Water in the Arkavathi River Basin

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Abstract: With increase in the usage of water from the groundwater table in the Urban and Rural regions of Bengaluru, Karnataka, India, there has been a shortage in the quantity for domestic and drinking water purposes. Due to which this research was conducted to obtain experimentation results on the Quality of Surface and Ground Water in the Arkavathi River which is situated in the state of Karnataka India. By collection of samples and conduction of tests as per the IS 10500: 2012 Drinking Water Guidelines, tests on pH, Total Solids, Acidity, Alkalinity, Dissolved Oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand and MPN Tests have been conducted accurately. The obtained results were proven to be unfit for the usage of domestic needs and drinking purposes. Additionally, a further study and conduction of tests is advised to bring convincing conclusions.

Keywords: ground water, arakavathy, arkavathi, Arkavathi river, water analysis, surface water.

1. Introduction

India has been the largest user of ground water globally. With an estimated 230 Cu. KiloLiter of groundwater per year (Shankar et al., 2011). More than 60% of irrigated agriculture and 85% of drinking water supplies are dependent on groundwater (WHO, 2005).

Groundwater is highly valuable source of water because of its unique properties which may not be possessed by surface water. Most of the water is being utilized by humans for domestic and industrial purposes. The groundwater quality in a region largely depends on the nature and extent of the industrial, agricultural and other anthropogenic activities which are the source of the pollution in the groundwater, in the catchments.

2. Background

Arkavathi River or Arkavathi River, is a river in India, originating at Nandi Hills of Chikkaballapur district. It is a tributary of the Kaveri River, which it joins at Kanakapura called sangama in kannada after flowing through Kolar District and Bangalore Rural district.

The river is used by the Bangalore Water Supply and Sewerage Board to provide 135 million liters of drinking water per day to the city of Bangalore, or about 20% of all the city's water. The water is taken from two reservoirs built on the river, the Hesaraghatta (or Hesseraggatta) which was built in 1894 and the Tippagondanahalli Reservoir (or T G Halli), which was

built in 1933.

Arkavathi River is a river, which originates at Nandi Hills of the district of Kolar. The Arkavathi River is also considered to be an offshoot of River Cauvery. After flowing through the rural districts of Bangalore and Kolar, River Arkavathi merges at the Kanakapura confluence. The catchment area of River Arkavathy is about 4351 square kilometers. Although the origin of the Arkavathy River is traced to the southern foot of the Nandi Hills, which is 3000 meters above the sea level, the real source of the river lies in the two series of about 26 tanks that join the Nagara Kere tank in the town of Doddaballapur. It is from here that the Arkavathy River flows as one though the rural district of the Bangalore city. The Arkavathy River flows through a deep gorge here.

3. Study Area and Objective

Arkavathi River is one of the peninsular rivers; it is a tributary of the River Cauvery, originated at the foot of Nandi hills to the north of Bengaluru and located between 12°15'13.24"N, 77°12'77.41"E flows in the west part of Bengaluru city in the southern part of Karnataka state.

It covers an area of 4,253 sq. km. It flows for 190 kilometres and joins the River Cauvery at Sangam in Karnataka, India.

Objective:

- Examination of ground and surface water tests from different areas in and around the Arkavathi River Basin.
- To decipher the outcomes found from the analysis and make determinations concerning the domestic use and drinking purposes.
- Give natural importance to every part of test boundary.
- Examination of tried water tests with the rules as indicated by the Indian Standards.

4. Scope of Study

We know that the depletion of groundwater has been quite an impending issue and will continue to do so in the mere future within the Bengaluru Rural & Urban region. By bringing this issue into light, it is imperative to find certain alternative measures and conduct feasibility studies to test qualities of water for drinking & domestic purposes. With this notion, this

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Table 2

Parameters	Permissible Limits (IS 10500: 2012)	Minimum	Maximum	Average
pH	6.5-8.5	6.97	7.06	7.00
Total Solids (mg/L)	500-2000	200	1100	608.33
Alkalinity (mg/L)	600	120	368	243.89
Acidity (mg/L)	100	8	30.67	18.82
Dissolved Oxygen (mg/L)	6.0 (Minimum)	5.84	18.21	10.48
Biochemical Oxygen Demand (mg/L)	15	0.3	13.06	4.30
Chemical Oxygen Demand (mg/L)	250	20	144	79.17

study was conducted for the sole purpose to check the feasibility of domestic and drinking purposes of Surface and Ground waters collected from specific locations in & around the Arkavathi Basin located in the state of Karnataka, India.

As a part of the Academic Curriculum, this project has been conducted in an intensive manner to obtain the test results on parameters like – pH, Total Solids, Acidity, Alkalinity, Dissolved Oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand & Most Probable Number Test, and following which the results are compared with the Indian Standard Regulation guidelines to bring a convincing conclusion.

Additionally, an environmental significance is therefore brought in light to understand the various repercussions that can occur with further negligence.

However, in spite of conducting these tests, it is to be noted that an additional set of tests are recommended in order to bring a more resounding conclusion.

5. Methodology

A. Collection of Samples

Water samples will be collected directly from the Arakavathi river for testing of surface water and from bore wells, hand pumps, wells etc. around the basin for groundwater samples. As per the standards the sample will be stored and experiments will be performed immediately unless experiment requirements are otherwise.

B. Tests Performed

- Determination of pH
- Determination of Total Solids
- Volumetric Determination of Alkalinity
- Volumetric Determination of Acidity
- Determination of Dissolved Oxygen
- Determination of Biochemical Oxygen Demand
- Determination of Chemical Oxygen Demand
- Conduction of Most Probable Number (MPN) Test

Table 1
Location

Sample	Water Source	Latitude	Longitude
S1	Surface Water	12°25'20.1"N	77°26'24.1"E
S2	Surface Water	12°25'13.0"N	77°26'22.0"E
S3	Surface Water	12°25'59.7"N	77°26'33.5"E
S4	Ground Water	12°25'52.8"N	77°26'08.0"E
S5	Ground Water	12°26'18.2"N	77°24'37.2"E
S6	Ground Water	12°30'33.0"N	77°25'35.0"E
S7	Ground Water	12°32'42.6"N	77°25'25.7"E
S8	Ground Water	12°33'42.0"N	77°25'34.9"E
S9	Ground Water	12°33'42.0"N	77°25'34.9"E

S10	Surface Water	12°33'10.9"N	77°25'46.6"E
S11	Surface Water	12°32'45.3"N	77°25'36.4"E
S12	Surface Water	12°32'38.6"N	77°25'37.4"E

6. Results

MPN test results are shown in table 2.

Further tests are un-necessary since the Presumptive Test is negative.

7. Conclusion

In light of the analytical results, it is observed that the parameters tested for the portability of water according to the *Indian Standards 10500: 2012 Drinking Water Guidelines* are well within the permissible limits.

However, a further study is hence recommended to bring a convincing conclusion that the surface and ground water in and around the Arkavathi River Basin are readily portable.

The environmental significance determines the repercussions encountered if situations are neglected under specific circumstances.

The Aquatic life is soon to be disturbed if the contaminations continue to be discharged into this river from industrial outputs.

Overall, the utilization of Ground and surface water from this Arkavathi River should be limited for drinking and domestic purposes, and subjected to further tests and sufficiently treated in order to prove its potability before supplying to consumers.

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