

## SUB-SURFACE AND SURFACE WATER QUALITY OF DAVANGERE DISTRICT, KARNATAKA: A REVIEW

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### ABSTRACT

An overview on surface and sub-surface water quality of Davangere district of Karnataka is reviewed based on published data. Ground water and surface water are a major source for domestic, industrial and agricultural purposes. In India Groundwater quality is generally good but is getting contaminated due to geogenic and anthropogenic sources. There are increasingly widespread indicators of degradation in the quality and quantity of surface water and groundwater, caused by over abstraction and inadequate water pollution control.

**KEY WORDS:** Davangere district, Ground water, Lentic water bodies, Water quality

### INTRODUCTION

Sub-surface water is the most reasonable new water asset with almost adjusted centralization of the salts for human use. Over weight of the populace pressure, impromptu urbanization, unhindered investigation strategies and dumping of the dirtied water at wrong spot improve the penetration of destructive mixes to the ground water. Ground water happens in endured divide, along the joints and cracks of the stones. Actually, modern waste and the civil strong waste have developed as one of the main source of contamination of surface and ground water. In numerous pieces of the nation accessible water is rendered non-versatile as a result of the nearness of overwhelming metal in abundance. The circumstance gets exacerbated throughout the mid year season because of water shortage and downpour water release. Sullyng of water assets accessible for family unit and drinking purposes with substantial metals, and hurtful microorganisms is one of the genuine significant medical issues (Rajappa *et al.*, 2011).

Water is one of the essential necessities of people.

Groundwater is a significant wellspring of water gracefully all through the world. The groundwater quality is ordinarily portrayed by various physico-compound attributes. These boundaries change broadly because of the different kinds of contamination, occasional variance, groundwater extraction, and so on. Consequently a consistent checking on groundwater gets obligatory so as to limit the groundwater contamination and have control on the contamination caused operators. The amount and the appropriateness of groundwater for human utilization and for water system are dictated by its physical, synthetic and bacteriological properties (Mangukiya *et al.*, 2012; Kalpana *et al.*, 2014).

Rivers are life line of living being and comprise a basic piece of both country and urban network as a wellspring of drinking and cooking purposes. Water utilized by the open must be liberated from sickness causing microbes; harmful synthetic compounds, unreasonable measure of minerals and natural issue (Yadav and Singh, 2009). New water gets contaminated because of three significant reasons, abundance supplements from sewage, businesses,

mining and agribusiness. As indicated by late examinations ground water defilement additionally expanding because of anthropogenic exercises like removal of waste, sewage, modern waste (APHA, 1985). Because of quick Industrialization, Urbanization, hence, contamination of water assets needs a genuine and prompt consideration through periodical examination of water quality.

Water is significant for each carrying on with life structures on this planet. In the current circumstance, unconstrained urbanization, quick industrialization and erratic use of fake synthetics purpose behind generous and moved sullyng in maritime conditions provoking rot of water quality and utilization of fauna. Without the learning of water science, it is difficult to fathom the natural miracle totally, considering the way that the study of water reveals much about absorption of the earth and explains the general hydro-characteristic interrelationship (Deshmukh and Ambore, 2006; Patil *et al.*, 2009; Kiran, 2010).

The primary goal of this review work is to know the water quality in surface and subsurface waters of Davangere district, Karnataka.

### STUDY AREA

Davangere region has a geological territory of 5975.97 sq.kms and involves 06 taluks (Figure 1). Agribusiness is the primary wellspring of pay of the individuals in the locale The region appreciates semi dry atmosphere, dryness in the significant piece of the year and sweltering summer. All in all, Southwest storm adds to 58 % of all out precipitation and Northeast rainstorm adds to 22 % precipitation. The staying 20 % precipitation is gotten in summer months. It gets low to direct precipitation. Davangere is a region head quarters found 260km from Bangalore Karnataka India, at 13°.5' and 14°50'N and 75°30' and 76°30'E geologically. Davangere territory gets a normal yearly precipitation of 644 mm or 25.4 inch. The locale appreciates semi bone-dry atmosphere, dryness in the significant piece of the year and sweltering summer. In Davangere town cracked granitic-gneisses are the fundamental water bearing arrangements. Sub surface water happens inside the endured and broke rocks submerged table conditions and semi-limited conditions. Underground water investigation uncovers that springs are experienced between the profundities of 8.46 and 32 mbgl.

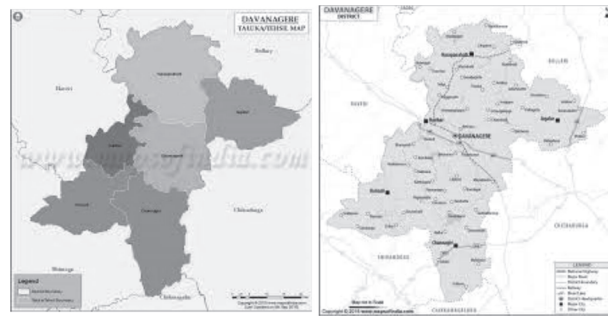


Fig. 1. Study area map (Source:www.mapsofindia.com)

### RESULTS AND DISCUSSION

Table 1 depicts the sub-surface and surface water quality parameters studied by various researchers in Davangere district of Karnataka.

#### Sub-Surface Water Quality

Rajappa *et al.* (2011) studied the ground water quality from different villages of Harihara taluk (India). Laboratory tests were performed for the analysis of samples for pH, Hardness, Chloride, Alkalinity, TDS etc. On comparing the results against drinking water quality standards laid by Indian Council of Medical Research (ICMR) and World Health Organization (WHO), it is found that some of the water samples are non-potable for human being due to high concentration of one or the other parameter. The usefulness of these parameters in predicting ground water quality characteristics were discussed by them. Thus they have made an attempt to find the quality of ground water in and around Harihara taluk, suitable for drinking purposes or not.

Kalleshappa *et al.* (2008) reported the ground water quality from 83 villages of Honnali taluk, Davangere district for their suitability for irrigation with reference to occurrence of fluoride content. Ground water was classified according to SAR-sodium adsorption ratio and electrical conductivity. In most of the water samples, SAR, pH, fluoride and sulphate were within the safe limits whereas EC, TDS, chloride, bicarbonate and nitrate were slight to moderate as per irrigation water quality guidelines. Physico-chemical parameters were correlated with fluoride content by correlation analysis. The fluoride has positive relationship with pH, potassium, sodium and total alkalinity and negative association with conductivity, total dissolved solids, chloride, calcium, magnesium, sulphate, nitrate and total hardness.

Ground water quality was studied in Davangere town by Thirumala (2014) in 5 sampling stations for analysis. Davangere area shows the moderately polluted with total dissolved solids and hardness. Sub-surface water parameters in sampling sites have varied due to human anthropogenic activities, but this value does not have any detrimental impact for the water to use for drinking purpose. Hence, the ground water in Davangere area is suitable for drinking, commercial, Industrial, and agriculture purposes.

Kalpna *et al.* (2014) aimed at assessing the water quality index for the groundwater samples of Vidyanagar, Davanagere city. The groundwater samples of about 40 samples were collected and subjected for a comprehensive physicochemical analysis. The purposes of their investigation are to provide an overview of present groundwater quality for the following 12 parameters such as pH, total hardness, calcium, magnesium, chloride, nitrate, sulphate, total dissolved solids, iron, fluoride, alkalinity and electrical conductivity are to be considered for calculating the WQI. The obtained results are compared with Indian Standard Drinking Water specification IS: 10500-2012. Water Quality Index (WQI) is a very useful and effective way for assessing the quality of water. WQI is a very useful tool for communicating the information on overall

quality of groundwater.

Mamatha and Veena Kumara Adi (2015) have studied the ground water from different areas in and around Shanthisagar Lake, Channagiri taluk, Davangere District, India were analyzed for their physico-chemical characteristics. The various physico-chemical parameters such as pH, electrical conductivity, total dissolved solids, total hardness, Chloride & Fluoride were determined using standard procedures. Their results were compared with the water quality standards of WHO, ICMR, Indian Standards, and USEPA. Their study is an attempt to ascertain the quality of groundwater for different purposes in the sampling areas. The ground water quality with respect to total hardness is found to be beyond the permissible limits in all most all the wells. Hence water is not fit for consumption. So, the proper environment management plan may be adopted to in order to provide safe water So water treatment unit must be construct wherever necessary to exercise all the necessary precaution before the water is used for human consumption. Otherwise, it may lead to much adverse health effect.

Thirumala and Kiran (2017) analysed the ground water quality in Davangere town of Karnataka. Five different sampling sites were selected for analysis and parameters estimated include pH, alkalinity,

**Table 1.** Sub-surface and surface water quality parameters studied by various authors in Davangere district of Karnataka

Sl. No	Source of water	Parameter studied	Place	References
1	Ground water	Physico-chemical characteristics	Harihara taluk	Rajappa <i>et al.</i> , 2011
2	Ground water	Water Quality	Honnali taluk	Kalleshappa <i>et al.</i> , 2008
3	Ground water	Water Quality	Davangere city	Thirumala, 2014
4	Ground water	Water Quality	Vidyanagar, Davangere city	Kalpna <i>et al.</i> , 2014
5	Ground water	Water Quality	Channagiri taluk (Shanthisagar lake)	Mamatha and Veena Kumara Adi, 2015
6	Ground water	Water Quality	Davangere town	Thirumala and Kiran, 2017
7	Ground water	Trace metals	Harihara taluk	Thirumala and Kiran, 2019
8	Tungabhadra river	Water Quality	Harihara	Basavaraj Kalashetty <i>et al.</i> , 2014
9	TV station reservoir	Water Quality	Davangere city	Begum <i>et al.</i> , 2006
10	Channel water	Water Quality	Shamanur, Davangere city	Reshma and Soumyashree, 2016
11	Bathi lake	Water Quality	Davangere city	Padmini and Aravinda, 2016
12	Avaragere lake	Water and sediment Quality	Davangere	Vidya and Suresh, 2016
13	Shanthisagar lake	Water Quality	Channagiri taluk	Rashmi <i>et al.</i> , 2017
14	Avaragere lake	Physico-chemical and Trace metal profile	Davangere	Thirumala and Kiran, 2020
15	Four lakes	Water Quality	Davangere city	Begum <i>et al.</i> , 2012
16	Kundwada lake	Diurnal variation	Davangere city	Arvinda <i>et al.</i> , 2012
17	Bathi lake	Bacterial populations and water quality	Davangere	Manohara <i>et al.</i> , 2020

total hardness, turbidity, sulphate, chloride, fluorides, total dissolved solids and electrical conductivity. Seasonal variations in the physico-chemical parameters in the water sample were observed and they were compared with BIS standards. Hence, the ground water samples are moderately polluted and impact to health hazards. In this study, the water samples of all the 5 sites of Davangere town were quite good for irrigation purpose due to high salinity.

Thirumala and Kiran (2019) estimated trace metals in the groundwater samples of the Harihara taluk of Karnataka. The outcomes are contrasted and the BIS and WHO guidelines for consumable water to distinguish the areas which are not according to norms. Nearby topographical settings may bolster the expanding grouping of water quality attributes in groundwater. The components like the moderate course, longer time of contact of aquifer and water, dissolving of minerals at the season of enduring, time, waste example and surface water interface. The porosity of the soil and rock changes the quality of the groundwater.

### Surface Water Quality

Begum *et al.* (2006) assessed the water quality of TV station reservoir at Davangere city, Karnataka. Their study revealed that there was variations in physico-chemical concentration during rainy season. Except turbidity, all the other physico-chemical characteristics were found to be within the permissible limits. They compared the results with the standards given by BIS for water quality.

Begum *et al.* (2012) studied the water quality of four lakes that is TV-station reservoir, Yelebether lake, Bathi lake and Hadadi lake in and around Davangere town. The summer, rainy and winter seasons show fluctuations in various physico-chemical parameters. Their investigations indicates that BOD levels were relatively elevated in case of Bathi lake when compared to TV-Station reservoir and Yelebettur Lake. Bathi Lake and Hadadi lake recorded relatively high turbidity. BOD values recorded maximum in Hadadi lake and Bathi lake COD recorded maximum in Bathi lake and in Hadadi lake during summer. High COD value indicates organic pollution in Hadadi and Bathi lakes.

Arvinda *et al.*, (2012) carried out the diurnal variations of water quality in Kundawada lake of Davangere district for 24 hr at 3 hr interval. Great fluctuations were noted in dissolved oxygen during

day time and oxygen was depleted during night. The pH was increased at day time and decreased at night time. Nevertheless, phytoplankton and zooplankton did not show any apparent diurnal variation .

Reshma and Soumyashree (2016) have made an attempt to know the water quality from a flowing channel near Shamanur, Davangere city. Their results obtained were found under the permissible limits. They showed that channel water can be utilized for agricultural activities.

Padmini and Aravinda (2016) revealed how the domestic wastewater is contaminated the Bathi lake in Davangere city. Physico-chemical parameter results were compared with WHO and BIS standards and some of the parameters were crossed the desired limits. Hence, their work concludes that the quality of lake is poor and is unsuitable for human use.

Vidya and Suresh (2016) were studied the for chemical and physical parameters in Avaragere Lake of Davangere at five locations, for a period of six months. Lake has been subjected to human interferences and water quality getting deteriorated profoundly. Major anthropogenic activities includes agriculture and discharging of sewage waste was generating serious threat to the biota of the lake by altering the physical, chemical and biological concentration of the lake. Their results indicated that the water of Avaragere lake has organothiophosphate and pyrethroid content with very low concentrations even at nanogram. Manganese and iron concentrations of sediment sample in Avaragere lake shows maximum level of pollution and ecological balance of lake is totally disturbed.

Rahmi *et al.* (2017) designed to study the

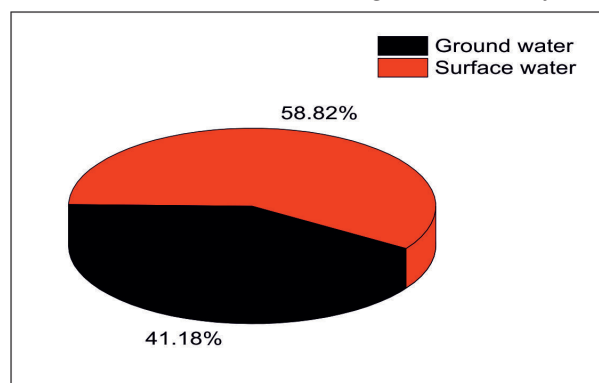


Fig. 2. Percentage occurrence of sub-surface and surface water quality parameters studied by researchers in Davangere district of Karnataka

physicochemical parameters, water quality index and also to know the clearance of Shantisagara lake, Channagiri taluk of Davanagere district using secchi disk. The analysis reveals that the lake water of the area needs some degree of treatment before consumption, and it also needs to be protected from the perils of contamination.

Thirumala and Kiran (2020) were studied the Physico-chemical and trace metal parameters at five sites of Avaragere lake in Davangere for a period of six months. This water body has been subjected to human activities periodically and water quality is deteriorated intensely. Agriculture, industrial activities and discharging of sewage creates serious threat to the biota of the lake by altering the water quality. The results obtained from their study indicated that the pH of Avaragere lake was alkaline in nature, EC, nitrogen and phosphorus contents were in moderate concentrations. Manganese and iron levels of sediment sample in Avaragere lake shows maximum level of pollution and ecological balance is totally disturbed.

Manohara *et al.* (2020) conducted an identification of bacterial populations and water quality in Bathi lake water and in some organs of cultured fishes *Oreochromis mossambicus*, *Labeo rohita*, *Cirrhinus mrigala* and *Cyprinus carpio* in a freshwater Bathi lake to evaluate the public health aspects associated with the consumption of fishes. Among the organs the maximum bacterial load was found in skin followed by gills and intestine. Thus, there appears to be a close correlation between the bacteria in water and the organs of fishes with *E. coli* was dominant followed by *P. aeruginosa* in all the 04 types of fishes. The presence of a large number of enteric pathogenic bacteria species in the lake suggests the need for following strict hygienic methods during the processing of fish to prevent humans from getting diseases.

### CONCLUSION

The discharge of domestic and agricultural runoff water into these water bodies should be avoided and the waste water is properly treated before discharge. Pollution load in the water bodies and indiscriminate use of fertilizers in catchment area should be controlled. The quality of the water bodies should be regularly controlled by giving proper guidance to the farmers through radio and mass media programmes. Appropriate sewage treatment plants have to be designed for all the sewage wastes

and laws are to be strictly implemented. Regular monitoring of water quality of these water bodies is to be established by KSPCB. This provides considerable information in the future trend of water quality changes

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