

AN ANALYSIS OF ASSESSMENT OF GROUNDWATER QUALITY IN DIFFERENT
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ABSTRACT

This paper mainly focusing on the assessment the quality of groundwater is crucial for understanding its suitability for various purposes ,such as drinking , agriculture, bathing, washing cloths and industrial use. A water quality index (WQI) is a used to evaluate and summarize the overall quality of groundwater based on various water quality parameter. The physicochemical parameter like pH, EC ,TDS, alkalinity, hardness, calcium, magnesium, chloride , fluoride, DO, BOD,COD, sulphate, ,nitrate commonly monitored in Chhattisgarh by using ICMR and BIS standard. The result show that the water is not very suitable for drinking purpose but it is useful for house hold work, bathing and agriculture etc .However seasonal variation saw that the in physicochemical parameters are variable in different seasons .

Keywords: Physicochemical parameter ,Groundwater quality, Water quality index.

INTRODUCTION

Water is one of the most indispensable resources and is the elixir of life. Life is not possible on this planet without water [1] Groundwater is a vital resource for drinking, irrigation, and industrial purposes in Chhattisgarh, India. The quality of ground water is of must importance as it directly impacts human health, agriculture, and the overall environment. According to World Health Organization (WHO) states that drinking contaminated water is the root cause of 80% of diseases suffered by human population in the developing countries. Contamination of groundwater due to both natural and anthropogenic sources are associated with disease burden like thyroid, dengue , malaria, fluorosis, diarrhoea, dysentery, hepatitis , cancer, gastrointestinal liver and intestinal infection etc. The water quality index is an important tool of for assessing and monitoring the quality of water in various context, such as drinking water, recreational

water bodies and aquatic ecosystem. The water quality index provides a comprehensive assessment of water quality, serving as a vital tool for protecting human health, maintaining ecosystem integrity and promoting sustainable water resource management. The quality of groundwater influenced by several factors, including the geological and hydrological properties of the area, land use practices, proximity to potential pollution sources and the natural process of filtration and purification as water move through surface. In general the method of measuring water quality index enter data from several water quality variable into mathematical equation and assigns a number to each water quality variable. Calculation of water quality included physical chemical and biological characteristics of water.

METHODS

The physicochemical parameter are determined by standard method, the method of various physicochemical parameter are shown on table 1. The outcomes were compared to drinking water standards set by the BIS (Bureau of Indian standards), WHO (World Health Organization) and ICMR (Indian council for medical research).

Table1:Chemical variable and the method used to measure them

Parameters	Methods
pH	Systronics pH meter
BOD	BOD Merck BOD meter
Alkalinity	Alkalinity Titration with acid HCl
TH	EDTA Method
TDS	HM digital meter TDS-3
EC	Systronic Conductivity Meter-304
Sodium	Flame photometer
Calcium	Flame photometer
Magnesium	Flame photometer
Chloride	Argentometric titration
Fluoride	Ion Selective Electrode
potassium	Flame photometer
Nitrate	UV Spectroscopy
Sulphate	Turbidimetric Method

COD	Spectroquanta Merck COD meter
DO	Chemiline DO meter CL-930

WATER QUALITY INDEX (WQI)

The water quality index is a measure used to assess and summarize the overall quality of water resource based on several parameter. In order to determine if groundwater is suitable for human consumption the water quality index was calculated.

Table 2 : WOI-based classification water quality

Class	WQI	Water quality status
1	Less than 25	Excellent water quality
2	26-50	Good water quality
3	51-75	Poor water quality
4	76-100	Very poor quality
5	More than 100	Unsuitable for drinking

CALCULATION OF WQI

The WQI is a numerical expression that provide an overall assessment of water quality based on various parameter. WQI was calculated using the weighted arithmetic mean approach.

Calculation of quality rating(qn):

$$qn = 100[(V_n - V_i)/(S_n - V_i)]$$

where q_n = quality rating for the nth parameter.

V_n = Observed value of nth parameter.

S_n = standard permissible value of nth parameter

V_i = ideal value of nth parameter of pure water

Calculation of unit weight(W_n):

$$W_n = k/S_n$$

where W_n = unit weight for nth parameter, S_n = standard value for nth parameter.

Calculation of WQI

$$\sum_{n=1}^n qnwn / \sum_{n=1}^n n$$

Table 3 :Standard value of drinking water

Parameters	S _n	W _n
pH	8.5	0.083
BOD	5	0.100
Alkalinity	120	0.006
TH	300	0.002
TDS	500	0.001
EC	300	0.002
Sodium	200	0.022
Calcium	75	0.009
Magnesium	30	0.024
Chloride	250	0.003
Fluoride	1.5	0.471
potassium	12	0.049
Nitrate	45	0.016
Sulphate	150	0.005
COD	20	0.025
DO	5	0.141

RESULT AND DISCUSSION

Analytical results were obtained from the study area and on testing parameters from different location of Chhattisgarh summarized below in table 4 and 5

pH - The sample of pH was found to fluctuate from 6.5 to 8.5, higher the pH affected the bitter test. Higher the pH indicate that the most of the groundwater of Chhattisgarh is alkaline in nature.

EC - The presence of soluble and highly conductible salt presence in water sample The higher the value of EC due to presence of higher amount of ions is soluble in water.

TDS - The high value can be result of runoff from water, sludge or industrial waste.

TH - TH was found in the sample is below in the permissible limit, except Bemetara water sample

Alkalinity - The alkalinity of most of the water sample above the permissible value.

Fluoride - F concentration is below the permissible limit except sample from Dhamtari District.

Sulphate - The concentration of sulphate high in Bemetara groundwater sample.

Nitrate - The concentration of nitrate is higher in Bemtara and the lower of Korea District.

Ca, Mg - The concentration of Ca ,Mg is above the permissible limit , most of the water sample

Na - The concentration of Na above the permissible limit in ground water of Bemetara district.

Cl - the concentration of Cl higher in Bemetara district of Chhattisgarh

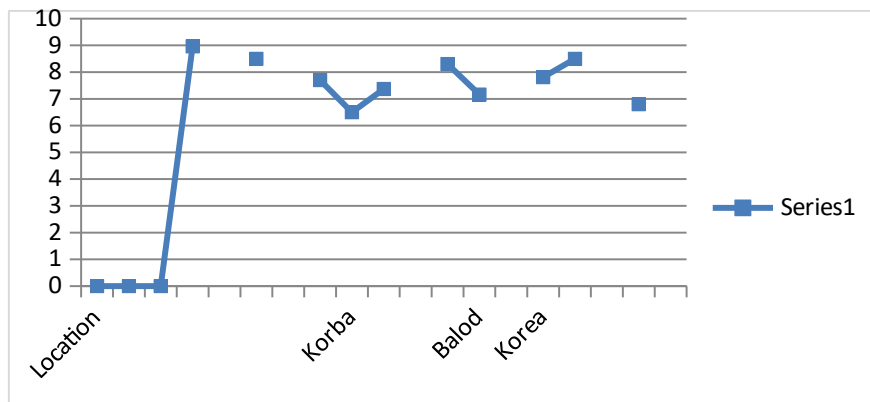


Figure 1: Variation of pH in different districts

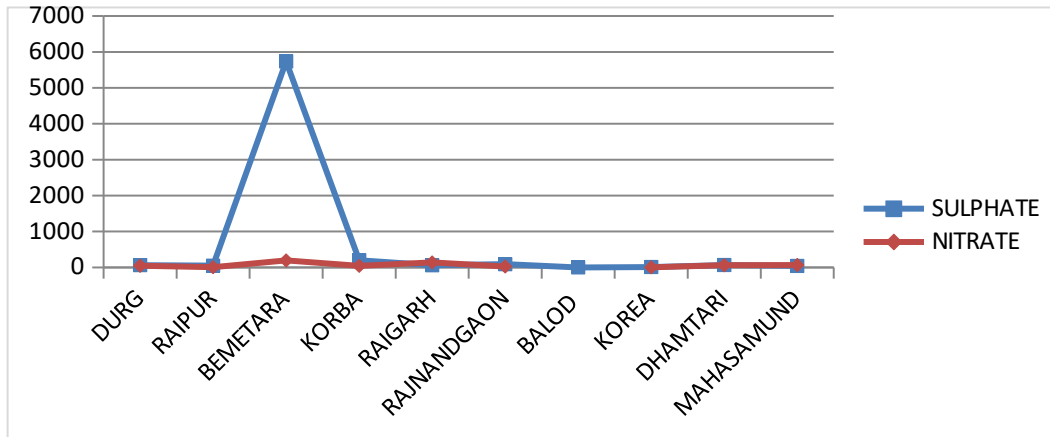


Figure 2: Variation sulphate and nitrate in different districts

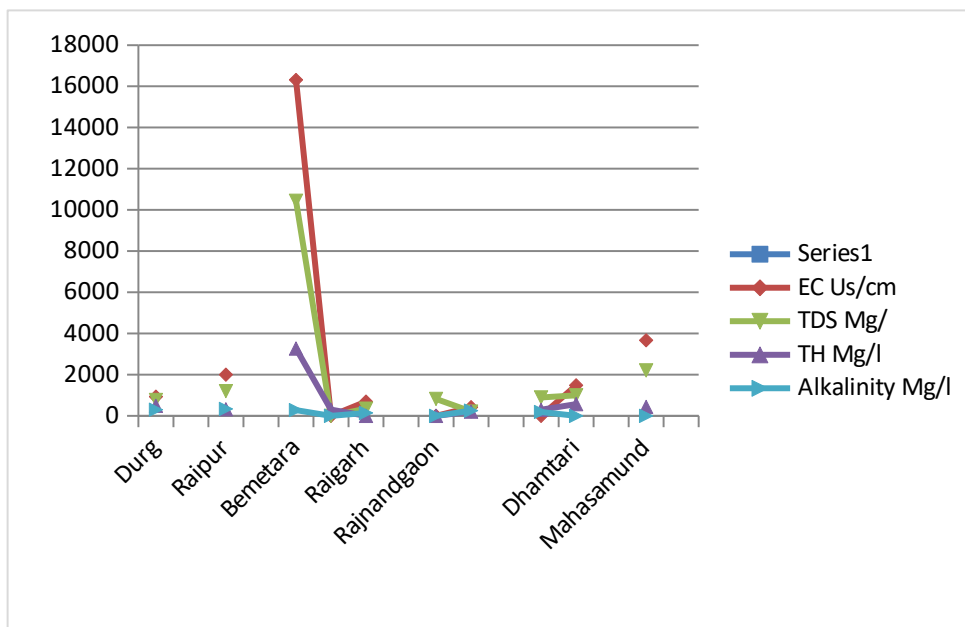


Figure 3: Variation of EC,TDS ,TH and Alkalinity in different districts

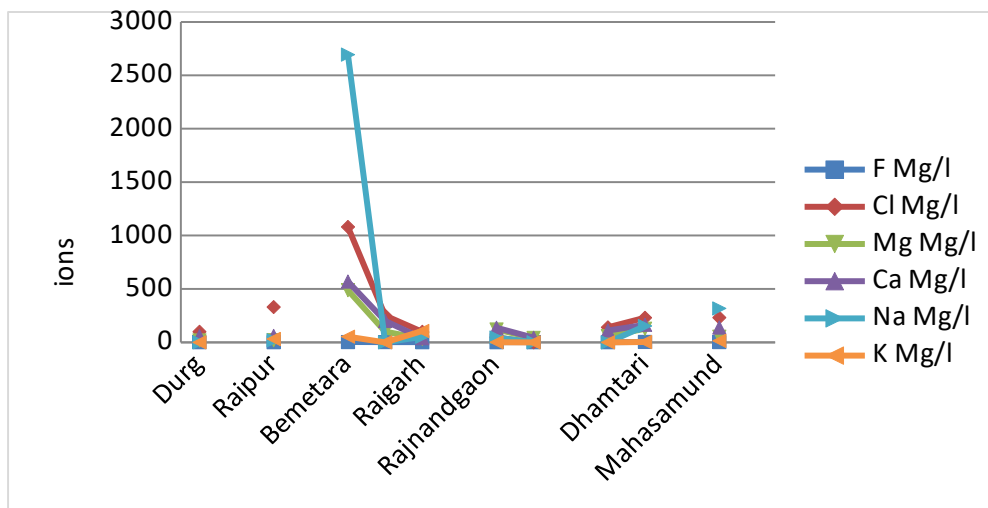


Figure 4: Variation of ions in different districts

CONCLUSION

The purpose of the current review is to assess the pollution burden on groundwater in the state of Chhattisgarh. The water quality is only slightly not upto permissible level than the recommended standards for drinking purpose, greater values the recommended indicate extremely poor water quality resulting from both geogenic and anthropogenic source. Physicochemical variation of ground water due to seasonal changes. The government should make clear policies and procedure for managing ground water and toxic elements. Treatment of

ground water is needed because everyone deserve pure drinking water and free from health hazard.

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