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Assessment of Aquatic Physio-Chemical Parameters of Shivnath River from Dagauri Village Zone Bilaspur Chhattisgarh

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ABSTRACT
Water is a valuable essential and survive vital composition of universal Nature Biotic and abiotic life cycles . Surface river water has one Important for living society besides its habitats. However, there are various micro-organism ions and suspended particles, mineral dissolved components. According to the selected site of River water sample are main source of multiple purpose required for the daily human needs and all other activities. Shivnath river water is one of the major sources for domestic uses may part of dagauri village area. The present investigation deals with the study of chemical parameters , studies have in this river on different sites by a specially prepared. Aquatic assessment questionnaire chemicals & inorganic meters. Water quality Index and various physio-chemical Analysis of river drinking water of Different 8 sites of Dagauri village zone Bilaspur had studied in Over a period of three months (Oct.-Dec. 2022) reading had observed to analyse different physio-chemical parameters Turbidity, Total Hardness (Mg &Ca), COD & BOD, pH the results were found in the range of 2.51–3.8 NTU, 300-650 mg/l , 15.3-18.5 mg/l ,1.3-3.2 mg/l & 7.0-8.1 pH value. Respectively while F, Cl, No3, So4 were in the range of 0.56-2.5 mg/l. 250-400 mg/l, 6-28 mg/l, and 12-40 mg/l . Iron and zinc heavy metal were present in range of 0.48-1.12 ml/l, 1.26-1.29 mg/l. The present study has it's almost importance for hygienic point of view in the Public Interest and its consequence with respect to health hazard. Bilaspur district Dagauri village zone was selected for the purpose of Investigation many illiterate villagers and use of surface river water for their drinking purpose & domestic activity.
Keyword- Public health, Aquatic environment, Physio-chemical, Investigation

INTRODUCTION

The world's ground water reservoirs are probably the planet's most important fresh water resource. There is nearly 96% salt water in the world's and 4% fresh water. Many people depend on fresh water supplies from river water. It provides water for domestic use for a large part of the Indian population hence it is one of the major sources of drinking and domestic uses in the village and rural areas of the country. The present investigation deals with the study of Surface water used for various domestic uses[1-2]. As per the survey conducted in recent year revealed the Increasing awareness and concern about water absorption & using for every activity all over the world. And new approaches toward achieving sustainable exploitation of Surface River water has been developed Nationally & Internationally. An Indication of various concentrations of certain physio-chemical parameter and heavy metals the effluent and their subsequent effect on aquatic eco-system have critically examined. Study proved the physio-chemical Characteristic of surface river water from 8 sites of rural areas Dagauri village zone Bilaspur District (C.G.) exhaustive use of pesticides, Manure Line, fertilizer, insecticide and solid waste (Garbage, onetime use polyethene) through surrounding river in a village sites. are main sources of river water contamination and pollution[3-4].

River water is usually safe to drink(Growth & Health) purpose. But it is not 100% pure because of its hardness and contamination level. Surface water might certain bacteria, geogenic chemical, inorganic, organic substance as like heavy metal and other like Fe, Zn, Ca, Mg, F, No_3, So_4. Typically, river water is naturally clean & safe to use for living being. But many uses and flows of Agriculture Insecticide Waste water effluent, Industrial waste, water Chemical owing to increasing Industrialization on hole hand and

exploding population and irregular activities s such as no clearness atmosphere, surface, circles of River[5-6] .

STUDY AREA & SITES
Bilaspur is located in eastern part of Chhattisgarh and fall within latitude 21º47' to 23º8' and longitude 81º14' to 83º15'. State Chhattisgarh is situated in center of India, Bilaspur district Dagauri village zone is the rural & agriculture less literate area. literate most population located in south eastern central railway rout area (C.G.). Shivnath River is the longest tributary of the Mahanadi River which joint's Changori-Puridham in the Janjgir-Champa district in Chhattisgarh India[7-8]. The river Shivnath is a one of the major interstates east flowing river in Chhattisgarh.
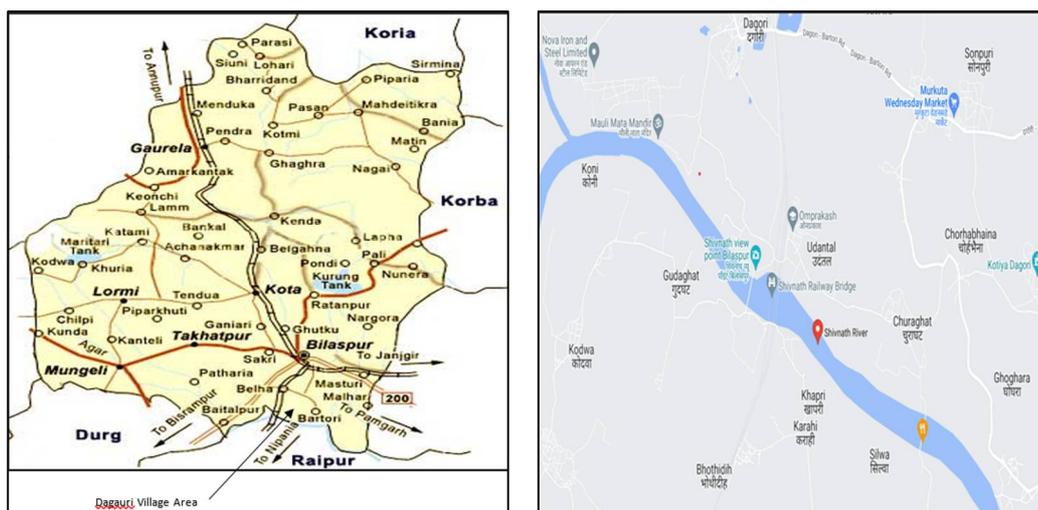

Figure no. 01 Shivnath river map

Figure No.02 Research location site Shivnath river

MATERIAL AND METHODS Sample of river water was collected from Eight site in a one-liter polythene Jerry which was previously washed with 3N Nitric Acid. Sample undergone quality test parameter named turbidity, pH, Total Hardness, Fluoride, Chloride, Nitrate, Sulphate and Iron, Zinck heavy metals. The water parameter has been determined by APHA 22th edition (2012) Prescribed standard method[9-11].
 pH of water sample was measured by pH meter (Systronics). Turbidity was measured by using Turbidity meter Estimated of Fluoride & Nitrate were carried out via spectrophotometer, Di-Sulphonic acid method and BOD, COD measure by Open reflex Winkler method, Chloride and sulphate SO_4 estimated by gravimetric method and Iron Fe heavy metal were measured by thiocyanate & Spectro-colorimetric method and Zn was measured by AA-Spectro photo meter and Total Hardness Estimated by Complexometric Titration [12-16]. All the reagent used were of A.R. grade.

Table No. 1 Sampling Sites

S.No.	Name of Sampling Sites
1.	Chudadih
2.	Near nova Iron Industry right side
3.	Near nova Iron Industry left side
4.	Guda Village-I
5.	Guda Village -II
6.	Beside river bottom of Udantal
7.	Upper side Dagauri Out let side
8.	Down side Dagauri Out let side

RESULT AND DISCUSSION

The observed range of concentration of all the parameter studies are given table no.-2. it is apparent from the data for -

pH: The water is always associated with the kind of high Alkalinity . pH is normality associated with high photosynthetic activity of water i.e. (sampling village Near nova Iron Industry left side pH value 8.1)

Turbidity: range observed were 2.51-3.8 NTU. The physical pollution of water showed the change in with regard to turbidity, change in color of water. By turbidity noted the presence of suspended matter in water i.e., divided organic waste soluble compound, microrganism and water plants. Change of taste of water effluent of metal Ion was also noted. High turbidity of water in Down side Dagauri Out let side was in observed range of 3.8 NTU.

Total Hardness : Calcium carbonate and magnesium carbonate were observed in the range of 300-650 mg/liter respectively of different sampling sites (Villages) High value of Hardness was due to Hardness of water reflected in the nature of the geological formation with which the water is in contact (According WHO 2011 above 300 mg/liter $CaCO_3$ very hard water). Mostly noted very hard water of different sites.

BOD: BOD is the measurement of the degradable organic material present in water sample and can be defined as the amount of O_2 required by the microorganisms in stabilizing the biological degradable organic matter under aerobic conditions. BOD is measured by incubating sample at 27°C for three days. BOD value noted was 1.3 mg/l - 3.8 mg/l. On different sampling sites maximum BOD value was observed on sample no. 2 and sample no.4.Other samples showed value in acceptable limit as prescribed I ISI 2012.

COD: From sample no. 1 – 8 COD was in range 15.3 mg/l - 18.5 mg/l. According to WHO 2011 standard drinking water agencies as per the higher value is greater than given permissible value. Indicate high value may be cause presence of content carbonaceous particle and suspended particles.

Chloride: Ranges observed were between 250-400 mg/liter respectively of different sampling station (Villages) Chloride occurs naturally in groundwater but was found in greater concentrations where sewages water and run-off from road salts can make their way into water sources. Chloride is one of the most common anions found in tap water. It generally combines with calcium, magnesium, or sodium to form various salts for example, sodium chloride (NaCl) was formed when chloride and sodium combine. Although chlorides are harmless at low levels, well water high in sodium chloride can damage plants if used for gardening or irrigation, and give drinking water an unpleasant taste[23]. Over time, sodium chloride's high corrosity will also damage plumbing, appliances and water heaters, causing toxic metals to leach into water. Interestingly, there is no federally enforceable standard for chlorides in drinking water, though the WHO (2011) recommends levels no higher than 250 mg/L to avoid salty tastes and undesirable odors. At levels greater than this, sodium chloride can complicate existing heart problems and contribute to high blood pressure when ingested in excess. Sample site No. 2 and No. 7. Investigated 400 mg/liter in excess value.

Nitrate : Observed range was 6-28 mg/liter respectively of different sampling station (Villages). Nitrate is one such widespread surface flow water pollutant, mainly emanating from agricultural activities and improper waste disposal, posing global health concerns like blue baby syndrome, thyroid disorders, and cancers due to prolonged exposure to high concentrations. Observed value is 28 mg/liter Nitrate value of villages sites 3. Slightly risk for living beings.

Sulphate : Observed range of 12-40 mg/liter respectively of different sampling station (Villages) Excess amount of sulphate in water has cathartic effect of human health [11-24]. In areas with high Sulphate levels, plumbing materials more resistant to corrosion, such as plastic pipe, are commonly used. How can Sulphate be removed from water. Three types of treatment systems will remove sulphate from drinking water they are reverse osmosis, distillation, or ion exchange. Water softeners, carbon filters, and sediment filters do not remove Sulphate. All study sites obtain sulphate value is permissible limit.

Fluoride : Observed range was from 0.56-2.5 mg/liter. Fluoride is a geochemical containment & Natural sources account for much of the Fluoride formed in ground water. Mazar part of Fluoride is Dissolve

Alkaline Element and clay minerals, dental & skeleton Fluorosis 2.5 > 1.5mg/liter. (1 mg/liter [25]) Fluorosis and the severity of the symptoms are governed by various factor Nutrition deficiencies High Ambient Temp., High Alkalinity and low Ca & Mg content in drinking water. Sampling site Near nova Iron Industry left side observe value 2.5 mg/liter Fluoride contain slightly large value important for measurement and monitoring every time of River water for drinking and domestic uses.

Iron: - Observed range was 0.48-1.12 mg/liter , whereas the permissible limit of Fe in the potable is only 0.3 mg/liter as per W.H.O. standard 2011. Water quality stations were collected and analyzed for Iron content from Oct. to Dec. 2022. Out of 8 water samples. 8 water quality station were found to contain Iron concentration 0.48-1.2 mg/liter, BIS has recommended 0.3 mg/liter as acceptable concentration of Iron in ground water for drinking and domestic uses. Iron is essential to almost all living things, from micro-organisms to human . Iron is the fourth most abundant elements in the earth's crust and the most abundant heavy metal. Iron, an essential element in human nutrition, is an integral component of cytochromes, porphyrins and metalloenzymes. It can be observed that 8 village water samples collected from river water shown a concentration of Iron that is much in excess of the safe permissible limit due to High Concentration water is rendered taste less and odorous and finely not fit for human consumption. The water also Import a brownish color on the laundered cloth due to this high concentration of Iron the high concentration. Also supported growth of Iron Bactria resulting in clogging of pipes Iron (Fe) concentration therefore needs to be Reduced to render the water safe for human consumption [26-28].

Zinc : It is an essential and beneficial element for human health and aquatic ecosystem [2]. In surface river water values of zinc in obtained 1.26 mg/l - 1.29 mg/l. This value located permissible limit.

Conclusions - Analysis of different physio-chemical parameter of Shivnath River water of Bilaspur Dist. Dagauri Village zone. People of this region had common problem of drinking water because of the Total Hardness salinity hazard (i.e., Soluble potential of Carbonate Bi-Carbonate) and Alkalinity hazard & Toxicity, Fluorosis Skelton Hazard by Chloride Nitrate sulphate Iron, Zinc & Fluoride. Showed that concentrated turbidity, Total Hardness Sulphate Fluorotic and Iron and zinc in view of preventing these health problems.So that the most important physio-chemical assessment at a time interval(periods) some were carried out parameter for illiterate villagers' socio economics aware for health issues leaving beings.

Total Hardness : Sample site 5 & 4 (600-650 mg/l).

BOD : Sample site 2 & 4 (3.2-3.8 mg/l).

COD : Sample site 1 & 2 (16.4-18.5 mg/l).

Iron : Sample site 1 & 2 (1.1-1.12 mg/l).

Zinc : Sample site 2 & 3 (1.28-1.29 mg/l).

It is suggested that the uses of drinking water and domestic purpose caused toxicity and Fluorotic effects[24]. Hard water before use villagers have to boil with magnesium oxides, cooled down and then filtered or treated with HCL acid and Iron, zinc thereby Isolated from suitable effluent treatment plant. A strict aquatic environment protection policy. For waste water, solid waste, domestic refused a just moment dumping, one tie used polyethnic bags, domestic effluent water and uses of pesticides agriculture industrial runoff waste water treatment in industries regulatory and need treatment plants [25]. A measured human health, economic and aquatic ecosystem settlement.

Table No.2 Standards of physical & chemical quality of   drinking water specification [26-30]

S. No.	Parameter or Characteristics	Permissible Limit		
		WHO Rec. 2012	ISI 10500: 2012	ICMR 2011
I	PH	6.5-8.5	6.0-8.5	6.0-8.5
ii.	Turbidity	5(NTU)	5-8(NTU)	5(NTU)
iii.	Hardness (as $caco_3$)	500	300-600	300
iv.	BOD mg/l	2.0	5.0	3.0
v.	COD mg/l	10	50	50
vi.	Teste mg/l	Normal	-	-
vii.	TDS mg/l	500	500-800	400
viii.	Ca mg/l	200	150	150
ix.	Mg mg/l	50	30	30
x.	Zn mg/l	5.0	5.0	0.10
xi.	Fe mg/l	0.3	0.1-1.0	1.0
xii.	Mn mg/l	0.1	0.2	0.1
xii.	Pb mg/l	0.05	0.10	0.05
xiv.	F mg/l	1.5	1.0-1.2	1.0
xv.	Cl mg/l	250	250	250
xvi.	No_3 mg/l	50	45	45
xvii.	So_4 mg/l	250	200-400	200

<p style="text-align:center">Table No. 3: Result of Evaluation Parameter</p>

No. of Sites	Turbidity NTU	Total Hardness	COD Mg/l	BOD Mg/l	pH Value	Fe mg/l	Zn Mg/l	F Mg/l	Cl mg/l	No3 Mg/l	So4 mg/l
1	3.57	300	16.4	2.7	7.0	1.1	1.27	1.7	250	Nill	12
2	3.21	425	18.5	3.2	7.8	1.12	1.28	1.8	400	25	40
3	3.29	450	17.4	2.9	8.1	0.98	1.29	2.5	375	28	38
4	3.41	650	16.1	3.8	7.5	0.89	1.26	0.86	325	11	25
5	2.51	600	15.3	1.8	7.4	0.52	1.29	0.81	300	9	17
6	3.23	500	15.8	2.3	7.6	0.48	1.26	0.79	350	11	35
7	3.1	450	14.1	1.3	7.9	0.8	1.27	0.91	400	6	30
8	3.8	400	15.9	1.3	7.0	0.65	1.28	0.56	375	9	28

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