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## Assessment of Water Quality and its Parameter of Sohagpur Tehsil, Shahdol District, Madhaya Pradesh, India.

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### ABSTRACT

Ground water samples of bore well (BW) ,Open well (OP) , Hand pump (HP), Lakes, Falls collected from different locations of sohagpur tehsil of shahdol district, Madhaya Pradesh. The present study was undertaken to characterize the physicochemical parameter such as Temp, pH, Total Alkalinity (TA), Electrical conductance (EC), calcium hardness ( CH), Magnesium hardness (MH), Total hardness (TH), Total dissolved solid (TDS), DO, Fluoride.Each parameter was compared with its standard permissible limit as prescribed by WHO. The study reveals that the ground water of area needs some degree of treatment before consumption it also needs to be protected from the perils of contamination.

**Keywords:** physicochemical parameter, dental fluorosis

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## INTRODUCTION

Ground water is used for irrigation purpose, domestic, and industrial water supply, it is used as potential source of drinking water. Rapid urbanization and industrialization are the major cause which affects the availability and quality of ground water [1,2].

According to WHO about 80 % of all the diseases in human being are caused by contaminated water [3], so water quality has acquired as much importance as water quantity [4].

India is heading towards a freshwater crisis mainly due to improper management of water resources and environmental degradation. The fresh water crisis is already evident in many parts of India [5]. It is vital to regularly monitor the quality of ground water and to devise ways and means to protect it [6].

The water from the sources viz, falls, lakes, hand pump, open well, and bore well are contaminated with domestic, and industrial waste and likely to cause water related diseases [7].

In this study, physicochemical parameters are determined to draw a conclusion on the quality of water whether it is good or unfit for drinking purpose.

### The main objectives of the study are

- Collection of ground water samples from open wells, bore wells, hand pumps, lakes and falls Sohagpur tehsil, Shahdol district.
- Analysis of quality parameter such as pH, Total alkalinity EC, TDS, Hardness Fluoride etc.

### Salient features of the study area

Shahdol district is situated in the north-eastern part of Madhya Pradesh, India. It is geographically situated between 22° 38' N latitude to 24° 26' N latitude and 30° 28' E longitude to 82° 12' E longitude. It is surrounded by Anuppur in south-east, Satna & Sidhi in the north, Umaria in the West and Dindori in south-west.

Shahdol district consist of five tehsil, viz – Gohparu, Jaisinghnagar, Beohari, Jaitpur, and Sohagpur. The present study area *Sohagpur* is one of the five tehsil in Shahdol district.

District Shahdol is predominantly hilly district. It is located in the north-eastern part of Deccan plateau, it lies at the trijunction of Maikal ranges of Satpura mountain the foot of the Kymore ranges of the Vindhya mountain and a mass of parallel hills which extend over the Chhota Nagpur plateau in Bihar.

Shahdol district experiences a temperate climate characterized by a hot summer, well distributed rainfall during the south-west monsoon and mild winter. The winter season commences from December and lasts till the end of Feb followed by summer from

March to middle of June. The south-west monsoon continues from middle of June to September.

The month of May is the hottest month with mean daily maximum temp at  $41.4^{\circ}$  and daily minimum temp at  $26.6^{\circ}$ . The normal average rainfall of shahdol district is 1211mm [8].

## EXPERIMENTAL

### Water sampling

The Water samples were collected from bore well (BW), open well (OW), hand pump (HP), lakes, falls, during April 2013 to August 2013, from thirteen different location (villages) of *sohagpur* tehsil in shahdol district. The samples were collected in sterilized bottles and were analyzed just after sampling<sup>9</sup>. The temp of the samples were measured in the field at the time of sample collection.

### Analytical methods

Analysis was carried out for various water quality parameters pH meter (systronics digital model) was used to determine the hydrogen ion concentration. Electrical conductivity calculated by using conductivity meter.

Total alkalinity (TA) was estimated by neutralizing with standard HCl acid. Salinity and Total dissolved solids (TDS) were estimated using systronics water analyzer. Total hardness (TH) and calcium hardness (CH) as  $\text{CaCO}_3$  were determined titrimetrically, using standard EDTA. The calculation of Magnesium hardness (MH) was done by subtracting the CH from TH value. The DO and Fluoride was estimated as per standard procedures [9].

## RESULT AND DISCUSSION

For the purpose of revealing the water quality of samples covering the study area the physicochemical parameters have been listed systematically and presented in Table -1. The parameters viz, pH and total dissolved solids show the *physical characteristics* of the ground water under the study area. The *chemical characteristics* of the groundwater under the study area are known by the parameters viz, total hardness, calcium hardness, magnesium hardness, fluoride, alkalinity and dissolved oxygen.

The Temp mean value of Sohagpur Tehsil water samples was  $29.47^{\circ}\text{C}$ . It is obvious that the samples collected from bore well were found to have higher temp than hand pump, open well, lake and falls. The increase in temp decreases to potability of water due to unpleasant taste produced by  $\text{CO}_2$  and other gases. Thus the taste of samples differ from place to place [10].

The pH value of water samples was 7.62 this approves that the nature of ground water is slightly alkaline. The mean value of EC 477.95 is an index to represent the total

concentration of soluble salt in water. The mean total alkalinity (TA) of the water sample of Sohagpur was 245.1. The Salinity ranged from 152.6 to 280.3 .

Summary of basic statistics for different water quality parameters is given in Table -2

**Table -1**

Palace	Source	Temp	pH	EC	TA	Salinity	CH	MH	TH	TDS	DO	Fluoride
Fatehpur	OW	27	7.42	253	215.3	241.8	81.3	14.7	96	292	1.41	0.62
Fatehpur	HP	31	7.68	271	360.1	172.1	80.5	17.5	98	280	2.01	0.39
Nargi	BW	35	7.50	522	364.5	280.3	101.3	24.7	126	258	2.41	0.19
Nargi	OW	28	7.81	710	141.8	169.3	221.4	141.6	362	320	4.36	0.33
Singhpur	HP	30	7.93	826	215.5	185.6	151.9	40.1	192	283	1.90	0.36
Singhpur	Lake	26	7.87	385	232.2	200.1	243	81	324	320	1.82	0.18
Koni	Fall	27	7.34	436	145.9	178.6	89.5	29.5	119	410	2.02	0.25
Koni	HP	30	7.62	546	332.5	211.7	169	67	236	302	2.01	0.34
Pipariya	BW	33	7.58	723	280.3	263.3	168.2	71.8	240	259	2.30	0.40
Pipariya	OW	29	7.51	280	205.1	152.6	145.9	36.1	182	342	4.05	0.41
Chatwai	HP	31	7.60	463	278.3	261.4	169.2	40.8	210	310	1.92	0.82
Chatwai	OW	28	7.33	383	205.2	169.6	94.7	44.3	139	363	1.01	0.72
Kotma	Fall	25	7.54	310	151.4	171.5	109.4	32.6	142	424	1.27	0.69
Kotma	HP	29	7.47	620	332.1	261.3	110.2	62.8	173	317	1.0	0.56
Kudri	OW	28	7.56	381	205.6	167.6	103.6	15.4	119	428	0.95	0.38
Kudri	HP	30	7.72	489	218.7	185.9	104.6	38.4	143	310	1.67	0.25
Sahpur	HP	31	7.55	523	262.0	241.8	121.3	41.7	163	301	1.93	0.14
Kalyanpur	BW	33	7.47	681	347.3	280.1	128.8	66.2	195	290	1.30	0.55
Kanchanpur	OW	29	7.87	392	220.4	152.6	111.6	15.4	127	468	4.8	0.67
Lalpur	HP	32	7.86	523	215.6	211.7	111.6	42.2	159	371	0.84	0.81
Sinduri	OW	27	7.39	320	219.3	231.6	116.8	58.4	188	523	4.4	0.22

[ All the values are expressed in mg/L , temp °C , EC (µS/cm), ]

**Table -2**

Parameter	Min	Mean	Max
Temp	25	29.47	35
pH	7.34	7.62	7.93
EC	253	477.95	826
TA	141.8	245.1	364.5
Salinity	152.6	209.07	280.3
CH	80.5	131.03	169.0
MH	14.6	46.72	81.0
TH	96	177.76	362.0
TDS	258	341.47	523
DO	0.95	2.16	4.80
Fluoride	0.14	0.44	0.82

Units are in mg/L, except pH and EC (µS/cm ), Temp in °C

### CONCLUSION

In the present investigation , an attempt was made to evaluate the ground water quality of Sohagpur Tehsil, Shahdol district Madhya Pradesh India .The water samples were found to be moderately hard , the hardness of water caused by the presence of Calcium and Magnesium study reveals that all the villages have hardness within the desirable limit prescribed by WHO. The TDS values of water samples of certain villages is higher but overall

it is in the permissible range. Fluoride promotes dental health if it is between 0.5-1.5 mg/l but when it exceeds 1.5mg/l it causes dental fluorosis.

In the area where the fluoride content of water is lower than the desirable limit of 0.5mg/l (WHO) the fluoridation has to be done and supplied to the children and public. The water samples are slightly alkaline in nature. The values of various parameter such as EC, TA, Salinity and DO shows the ground water of area needs some degree of treatment before use.

The study helps us to understand the quality of the water as well as to develop suitable management practices to protect the ground water resources.

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