



Short Communication

Assessment of ground water quality status of Sailan Block, MP, India

N.K. Dhakad¹ and N.D. Shinde^{2*}

¹Devi Ahilya Vishwavidyalaya, Indore, MP, India

²Govt. College, Sailana, MP, India
shindenathu027@gmail.com

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Abstract

The aim of this study was to analyze ground water quality status of the block district Ratlam M.P. India. The physico-chemical parameters, PH, TDS, Total hardness, D.O., BOD Chloride, Sulphates, Nitrates, Total alkalinity, were analyzed to ascertain the quality of water will be safe for public consumption. The results obtained in present investigations revealed that water quality is norms of Indian standard and ICMR.

Keywords: Water quality index, alkalinity, aquifers.

Introduction

Sailana is known for Khamor (Pelecon) bird sanctuary and Cactus Garden and it also has historical importance because state of Raja Jaisingh. Geographically Sailana block is located in Sailana plateau and border of Rajasthan with the latitude 23°28' N 74°55'E and the altitude is 1571 feet (494m), above the sea level. The ground water quality determination and observations reveals the significance of monitoring and management of ground water quality.

The geological changes and soil conditions brings the variations in water quality.

Management of surface water and aquifers is a big challenge for rural Communities. Water is being used in agriculture, drinking and domestic use as an essential commodity¹. Water scarcity and availability of safe water creates great challenge for rural people in the remote areas.

An extensive farming and irregular use of fertilizers and pesticides is a major cause of water pollution, percolation and seepage of contaminated water which deteriorates the ground water quality status².

According to the Indian council for medical research and Indian standard institution the drinking water standards have been considered to analyze the physico-chemical parameters of water samples during the study³.

In the present study four panchayat villages have been recognized as sampling sites. The name of sampling sites are - i. Ambakundi, ii. Karia, iii. Makodia rundi, iv. Sakrawada.

Pre-sterilized and cleaned plastic bottles were used to collect water samples were collected during morning hours in between 9.00 to 12.00 am. Analysis and observations of water samples

were carried out in laboratory during the period of March 2017 to February 2018.

In the present study computation of WQI was used to analyze trends of variations in physico-chemical parameters of ground water and observations of water quality and pollution status of aquifer⁴.

The representation of all water quality parameters in a single form is called water quality index that expresses composite influence of all parameters on that system and also helps to compare the overall quality of water with unit value^{5,6}.

Material and method

Geo-morphologically Sailana block is situated on the plateau of Sailana and surrounded by western hills and Mahi valley the total area of Sailana block is about 536 Km².

The annual maximum temperature is 18.8°C. The Pre dominant water formations are sandy alluvium vesicular and basalt fractured sand stones and according to report of CGWB (2009)⁷.

The depth of water level range varies in Pre and Post monsoon seasons, in the Pre-monsoon water level was recorded 2.70 to 23.40 meters while in post monsoon it was 1.48 to 14.28 meters.

The physico-chemical parameters were analyzed with the help of standard methods of American public health association⁸.

The Parameters, PH, TDS, Total Hardness, D.O., calcium, chloride, sulphate, nitrates and total alkalinity have been analyzed in the laboratory and the water quality index was determined by formula given below,

Computation WQI
 $WQI = \frac{\sum Q_n W_n}{\sum W_n}$

Where: Q_n = the quality rating of nth water quality parameters
 W_n = the unit weight of the nth water quality parameters,
 Quality rating Q_n is calculated using the equation $Q_n = 100 [(V_n - V_i) / (V_s - V_i)]$

Where, V_n is the actual amount of nth parameter and V_i is the ideal value of the parameter $V_i = 0$ and pH ($V_i=7$) and DO ($V_i=14.6\text{mg/l}$) Unit weight (W_n is calculated using the formula $W_n = K/V_s$).

Results and discussion

The summarized results of analysis of various parameters and their mean values and computation of WQI indicates that sampling site 1, 3 and 4 water samples were good and excellent for public consumption while site-2 samples were poor quality. The water should be used for drinking after proper treatment⁹.

Table-1: Assessment of water quality index, sampling site-1.

Parameter	Mean	STD-S1	IDS- 10	Agency	UT (Wn)	Qn	Qn .Wn
PH	7.3	6.5-8.5	7.85	IS/WHO	0.216	33.33	7.19
TDS	98	500	0	IS/WHO	0.0036	19.6	0.07
TH	124.5	300	0	IS/WHO	0.0061	40.44	0.252
DO	9.6	5	14.6	IS/WHO	0.0365	5.2	1.89
Ca	25.6	75	0	IS/WHO	0.025	34.14	0.843
Cl	22.4	250	0	IS/WHO	0.0073	8.96	0.65
SO ₄	18.8	150	0	IS/WHO	0.0122	12.54	0.152
NO ₃	0.76	45	0	IS/WHO	0.041	1.69	0.692
TA	146	120	0	IS/WHO	0.0152	121.7	1.849
			0		0.3629		13.59

WQI==37.44

Table-2: Assessment of water quality index of sampling site-2

Parameter	Mean	STD-S1	ID	Agency	UW(Wn)	Qn	Qn.Wn.
PH	7.6	6.5-8.5	7.85	IS/WHO	0.216	66.66	14.38
TDS	98	500	0	IS/WHO	0.0036	19.6	0.0705
TH	124.3	300	0	IS/WHO	0.0061	41.44	0.252
DO	9.6	5	14.6	IS/WHO	0.0365	5.2	1.898
Ca	25.6	75	0	IS/WHO	0.025	34.14	0.843
Cl	22.4	250	0	IS/WHO	0.0073	8.96	0.654
SO ₄	18.8	150	0	IS/WHO	0.0122	12.54	0.152
NO ₃	0.76	45	0	IS/WHO	0.041	1.69	0.692
TA	146	120	0	IS/WHO	0.0152	121.66	1.849
			0		0.3629		20.791

WQI=57.054.

Table-3: Assessment of water quality index of sampling site-3.

Parameter	Mean	STD-S1	ID-S10	Agency	UW(Wn)	Qn	Qn.Wn.
PH	7.21	6.5-8.5	7.85	IS/WHO	0.216	14	3.024
TDS	125	500	0	IS/WHO	0.0036	25	0.09
TH	72	300	0	IS/WHO	0.0061	24	0.146
DO	4.05	5	14.6	IS/WHO	0.0365	9.89	0.36
Ca	21	75	0	IS/WHO	0.025	28	0.7
cl	18.8	250	0	IS/WHO	0.0073	7.52	0.052
SO ₄	7.12	150	0	IS/WHO	0.0122	4.74	0.058
NO ₃	0.65	45	0	IS/WHO	0.041	1.44	0.059
TA	112	120	0	IS/WHO	0.0152	93.34	1.418
			0		0.3629		5.907

WQI=16.277.

Table-4: Assessment of water quality index of sampling site-4.

Parameter	Mean	STD- S1	ID-S10	Agency	UW(Wn)	Qn	Qn.Wn.
PH	7.4	6.5-8.5	7.85	IS/WHO	0.216	26.67	5.76
TDS	132	500	0	IS/WHO	0.0036	26.4	0.095
TH	82	300	0	IS/WHO	0.0061	27.34	0.166
DS	5.6	5	14.6	IS/WHO	0.0365	6.25	0.222
Ca	28	75	0	IS/WHO	0.025	37.34	0.933
Cl	16.9	250	0	IS/WHO	0.0073	6.76	0.0493
SO ₄	8.13	150	0	IS/WHO	0.0122	5.42	0.066
NO ₃	0.78	45	0	IS/WHO	0.041	1.37	0.07
TA	116	120	0	IS/WHO	0.0152	96.67	1.469
			0		0.3629		8.8303

WQI=24.33.

Table-5: Water quality status report of Sailana block

site	WQI	Water quality status
S1	37.44	Good
S2	57.05	Poor
S3	16.27	Excellent
S4	24.33	Excellent

Conclusion

The ground water constituents have variable ions but their relative proportion is satisfactory aquifers of Sailana region are not polluted because of absence of Industries and least Interference of human activities.

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