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ANALYSIS OF GROUND WATER QUALITY PARAMETERS IN RISOD TAHSIL

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Abstract

Due to human and industrial events the ground water is polluted. This is the thoughtful problem now a day. Thus, the analysis of the water quality is very important to preserve and prefect the natural eco system. The valuation of the ground water quality was carried out in the different villages in Risod Tehsil. The present work is aimed at measuring the water quality index (WQI) for the ground water of different villages in Risod Tehsil. The ground water samples of all the selected stations from the villages were collected for a physiochemical analysis. For calculating present water quality status by statistical evaluation and water quality index, following 6 parameters have been considered Viz. pH, colour, total dissolved solids. electrical conductivity, total alkalinity, total hardness. The obtained results are compared with Indian Standard Drinking Water specification IS: 10500-2012. The study of physico-chemical and biological characteristics of this ground water sample suggests that the assessment of water quality parameters as well as water quality management practices should be carried out periodically to protect the water resources.

Keywords

Ground water, Water quality standards, Physico-chemical, Water Quality Index.

I. Introduction

Water is the most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life.[1] Groundwater is used for domestic and industrial water supply and also for irrigation purposes in all over the world. In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. According to WHO organization, about 80% of all the diseases in human beings are caused by water.[2] Once the groundwater is contaminated, its quality cannot be restored back easily and to device ways and means to protect it. Water quality index is one of the most effective tools to communicate information on the quality of water to the concerned citizens and policy makers. It, thus,

becomes an important parameter for the assessment and management of groundwater. The greater part of the soluble constituents in ground water comes from soluble minerals in soils and sedimentary rocks. The more common soluble constituents include calcium, sodium, bicarbonate and sulphate ions. Another common constituent is chloride ion derived from intruded sea water, connate water, and evapotranspiration concentrating salts, and sewage wastes for example. Nitrate can be a natural constituent but high concentrations often suggest a source of pollution. As per WHO, any change in the physical, chemical and biological properties of water that has a harmful effect on living things is termed as water pollution.[3] Rapid growth of population, urbanization and industrialization exerts pressure on water resources and unregulated or illegal discharge of effluents results in water pollution. Central Pollution Control Board (CPCB) reports that, the major sources of water pollution in India are release of untreated sewage from urban centres, the release of industrial effluents and organic runoffs from agricultural fields.[4] Along with human activities, various micro-biological agents like bacteria, viruses and protozoa also cause water pollution which may cause various water-borne diseases like amoebiasis dysentery, typhoid, jaundice, cholera.

Water contaminated with heavy metals like arsenic, lead, cadmium can cause skin cancer, anaemia, headache, suppression on immune system, softening of the bones and kidney failure.[5,6,7] Physical deformities such as hooked beaks in birds and thinning of egg shell can occur in avifauna due to contaminated water.[8] Growing demand for water in agriculture, industrial and domestic sectors has led to overexploitation of the groundwater resource resulting in decline in groundwater levels. Dumping of solid wastes is also an important factor resulting in deterioration of the groundwater quality. About 90% of Municipal Solid waste is dumped on land. During rainfall, the surface water percolates from waste gets dissolve or leach out with harmful chemicals through the soil and reaches the groundwater thus contaminating it. Dumping of sewage into water bodies directly results in accumulation of toxic substances which not only affects the water quality by depleting of oxygen in the water affecting the aquatic life resulting in algal bloom but affects the food chain of birds and animals.[9] In order to provide prevention and control of water pollution, MoEF (Ministry of Environment and Forests), Government of India, under a policy decision enacted. The Water (Prevention and Control of Pollution) Act in 1974. Under the Act, MoEF has established and delegated the powers and functions to CPCB which in collaboration with State Pollution Control Board (SPCB) has established a network of monitoring stations on rivers across the country. Presently, water quality-monitoring network is operated under a three-tier programme i.e. Global Environmental Monitoring System (GEMS), Monitoring of Indian National Aquatic Resources System (MINARS) and Yamuna Action Plan (YAP). The water samples are analysed for 9 core parameters and 19 general parameters, 10 trace metals.

Water Quality Monitoring in Maharashtra

Water quality in Maharashtra is monitored by various agencies namely Hydrology Project (SW), Groundwater Surveys & Development Agency (GSDA), CPCB, Maharashtra Pollution Control Board (MPCB), Central Water Commission (CWC) and Central Ground Water Board (CGWB). The water quality testing under the GEMS and MINARS program under NWMP in Maharashtra is monitored by MPCB

(state nodal agency). Maharashtra has highest number of monitoring stations (250 WQMS) under NWMP across all the states in India. MPCB has infrastructure to monitor 44 parameters covering field observations, general parameters, core parameters and trace metals and the samples are monitored with a monthly and six-monthly frequency for surface and groundwater stations respectively. In order to have continuous vigilance check on water quality across the state, MPCB has installed WQMS (Water Quality Monitoring Stations) across the state.

II. Assessment of water quality General

Due to increasing urbanization, surface water is getting over contaminated and more stringent treatments would be required to make surface water potable. Therefore, it is required to additional sources for fulfill the requirement of water. Because the ground water sources are safe and potable for drinking and other useful purposes of human being. Hence studies of physic-chemical characteristics of underground water to find out whether it is fit for drinking or some other beneficial uses.

Parameters to be analyzed

For the assessment of ground water quality of the bore well and well of the different villages in Risod Tehsil. Taking in view the following drinking water parameters are analyzed (1) pH (2) Turbidity (3) Total Dissolved Solids (4) Elec. Conductivity (5) Total hardness (6) Total alkalinity (7) C.O.D.

Parameters included in water quality assessment

Monitoring of bore wells and well of the different villages in Risod Tehsil. requires many different parameters to be sampled. The parameters analyzed in this assessment include.

pH[10]

pH of solution is taken as –ve logarithm of H2 ions for many practical practices. Value range of pH from 7 t0 14 is alkaline, from 0 to 7 is acidic and 7 is neutral. Mainly drinking water pH lies from 4.4 to 8.5. The pH scale commonly ranges from 0 to 14.

Turbidity[10]

Suspension of particles in water interfering with passage of light is called turbidity. Turbidity is caused by wide variety of Suspended particles. Turbidity can be measured either by its effect on the transmission of light which is termed as Turbidimetry or by its effect on the scattering of light which is termed as Nephelometry. As per IS: 10500-2012 the acceptable and permissible limits are 1 and 5 NTU respectively.

T.D.S.[10]

Difference of total solids and suspended solids is used to determine the filterable solids by the help of filtrate and following the procedure as above. In water sample it can also be estimated from conductivity measurement. The acceptable and permissible limits As per IS: 10500-2012 is 500 and 2000 mg/l respectively.

Elec. Conductivity [11]

Conductivity is the capacity of water to carry an electrical current and varies both with number and types of ions the solution contains. In contrast, the conductivity of distilled water is less than 1umhos/cm. This conductivity depends on the presence of ions their total concentration, mobility, valence and relative concentration and on the temperature of the liquid. Solutions of most inorganic acids, bases, and salts are relatively good conductors.

Total hardness[11]

As per IS: 10500-2012 Desirable limit and Permissible limit for hardness is lies between 200 to 600 mg/l respectively. The effect of hardness is Scale in utensils and hot water system in boilers etc. soap scum's Sources are Dissolved calcium and magnesium from soil and aquifer minerals containing limestone or dolomite. The Treatment of hard Water is Softener Ion Exchanger and Reverse Osmosis process. The degree of hardness of drinking water has been classified in terms of the equivalent CaCO3 concentration as follows: Soft - 0-60mg/l, Medium - 60-120 mg/l, Hard - 120-180 mg/l, very hard - >180 mg/l.

III. Result and Discussion

Water samples were collected from different villages from Risod Tahsil mention in table, the sample were analysed on automatic water analysis kit available in laboratory for some parameter and other parameter were analysed by manually. The main purpose of this research activity was to make aware the people about drinking water.

Sample No.	Location	pH	Cond.	TDS	Salinity	DO	Turbidity	Total Hardness
Physical and chemical properties of tube well water as per IS 10500-2012[12]		**6.5-8.5**	**-**	**500**	**-**	**-**	**1**	**200**
1	Mahagaon Tq Risod	7.9	2.1	218	1.2	10.6	0.2	150
2	Shelgaon Rajgure Tq Risod	7.6	1.0	103	0.6	8.4	0.3	250
3	Shelu Khadse Tq Risod	7.9	1.2	128	0.7	3.4	0.3	260
4	Ekta Nagar, Risod	7.9	0.5	57	0.3	7.2	0.1	100
5	Ghota Tq Risod	7.4	0.7	68	0.4	6.7	0.6	160
6	Wadji, Tq. Risod	8.1	0.2	27	0.1	6.4	0.2	100

7	Mop Tq Risod	7.7	0.6	62	0.3	6.2	0.2	100
8	Shivaji Nagar, Risod	7.3	1.7	175	1.0	5.9	0.3	150
9	Civil Line, Risod	7.7	0.8	85	0.5	6.4	0.5	200
10	Nijampur Tq Risod	7.5	0.8	83	0.5	7.9	0.3	250
11	Bhar Jahagir, Tq. Risod	7.5	1.7	167	1.0	6.7	0.4	300
12	Gowardhan Tq Risod	8.0	0.4	39	0.2	6.3	0.8	250
13	Rithad Tq Risod	7.6	0.8	79	0.4	5.9	0.3	180
14	Sawad Tq Risod	7.4	2.6	262	1.1	7.9	0.6	210
15	Mangul Zanak Tq Risod	7.7	1.3	133	0.7	6.9	0.8	250
16	Mothegaon Tq Risod	7.7	0.9	89	0.5	6.7	0.3	200
17	Eklaspur Tq Risod	7.7	0.8	88	0.5	6.8	0.1	300
18	Nawali Tq Risod	7.6	1.2	120	0.7	7.3	0.1	250
19	Jawala Tq Risod	7.7	0.7	71	0.4	6.9	0.1	180
20	Karda Tq Risod	7.8	0.6	62	0.3	7.5	0.7	210
21	Wanoja Tq Risod	7.4	1.0	100	0.6	7.7	0.5	250
22	At.Post. Sawad Tq Risod	7.6	2.1	218	1.3	10.5	0.3	200
23	Samarth Nagar Risod Tq Risod	6.9	1.5	150	0.5	8.4	0.4	100
24	Gulabwadi Galii Risod Tq Risod	7.3	0.9	400	0.4	15.5	0.7	100
25	Gajanan Vasahat,	6.5	0.7	100	0.09	6.5	0.9	160

	Risod Tq. Risod							
26	At.Post. Haral Tq Risod	7.5	0.8	70	0.3	6.9	1.00	90
27	At.Post. Mop Tq. Risod	8.0	0.2	37	0.09	6.7	1.2	200
28	At.Mop Tq Risod	7.8	0.7	70	0.2	6.3	1.3	250
29	At.Post, Goverdhan, Risod	7.2	1.6	178	1.1	6.0	0.9	200
30	At.Post. Pardi Thikhe Tq. Risod	7.9	0.9	95	0.5	6.5	0.9	100
31	Nijampur Tq Risod	7.5	0.8	83	0.5	7.9	0.10	150
32	At.Post Segaon Khodke , Tq. Sengaon	7.5	1.7	167	1.0	6.7	0.8	150
33	At.Post. Asola Tq Risod	8.0	0.4	39	0.2	6.3	0.6	100
34	Ekta Nagar Tq Risod	7.6	0.8	79	0.4	5.9	0.7	200
35	At.Post. Wakad Tq Risod	7.4	2.6	262	1.1	7.9	0.9	200
36	At. Asan Galii Tq Risod	7.7	1.3	133	0.7	6.9	0.8	100
37	At.Post. Haral Tq Risod	7.7	0.9	89	0.5	6.7	0.6	100
38	At.Post. Palaskheda Tq Risod	7.7	0.8	88	0.5	6.8	0.3	150
39	At.Post. Vyad Tq Risod	7.6	1.2	120	0.7	7.3	0.4	200

40	At.Post. Pankanergaon Tq Sengaon	7.7	0.7	73	0.5	6.8	0.6	300
41	At.Post. Mahagaon Tq Risod	7.8	0.6	65	0.2	7.6	0.8	150
42	Shivaji Nagar Risod Tq Risod	7.4	1.1	110	0.7	7.8	0.6	300
43	At. Gohgaon Hade Tq Risod	7.5	1.5	210	1.5	9.00	0.7	100
44	At.Post. Ekalaspur	7.9	0.8	95	0.3	5.5	0.8	250
45	At,Post, Wadaji Tq. Risod	7.3	0.8	90	0.6	7.2	0.2	200
46	At.Post. Mothegaon Tq. Risod	7.3	1.5	210	0.9	7.8	1.00	150

analysis table 1

All the location from Risod Washim Maharashtra India

IV. Conclusion

Water quality is dependent on the type of the pollutant added and the nature of mineral found at particular zone of bore well. Monitoring of the water quality of ground water is done by collecting representative water samples and analysis of physicochemical characteristics of water samples at different locations of different villages in Risod Tahsil. Estimation of water quality index through formulation of appropriate using method and evaluate the quality of tube well water by statistical analysis for post and pre monsoon seasons i.e. from Nov. to Feb.

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