VARIATION IN PHYSICOCHEMICAL CHARACTERISTICS OF WATER QUALITY PARAMETER FROM DIFFERENT SOURCES OF SAMPLES COLLECTED FROM KALAMB TEHSIL AND ADJOINING AREAS

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Abstract:

Regular assessment of quality of water is the prime importance in view to provide safe water to agricultural and potable to both urban and rural area. The present study deals with the variation in water quality standard with respect to its sources. In this study water samples were collected from the city and some villages of kalamb tehsil from dugwell, Borewell, and lakes which were utilized by people from this region for drinking and other purposes. The study focuses on various physicochemical parameters of water like pH, EC, TDS, Ca, Mg, Na, K,CO_3, HCO_3, Cl, SO_4, SAR (Sodium absorption Ratio), RSC (Residual Sodium Carbonate) etc.. The result shows that, no more variation in water quality parameter with respect to sources were observed. The standard data of water quality as specified by WHO and BIS, when compare with the quality of water from this region was found to be medium for agricultural and drinking use.

Keywords: K, SAR, RSC, water quality, different sources, villages of kalamb, quality of water was medium.

1.Introduction:

The uncontaminated water is always safe for domestic, agricultural and drinking purposes. The water must be free from chemical substances, radioactive substances, toxic and carcinogenic elements such water can be treated as safe and acceptable water. In the present day due to increase advanced agro technology huge quantity of chemical fertilizers, pesticides, herbicides, weedicides and conditioning agents are employed to increase the crop yield[1].Regular assessment of quality of water is the prime importance in view to provide safe water to agricultural and potable water to both urban and rural area but the contamination in water still increasing[2] Kalamb tehsil of Yavatmal district of Maharashtra state is located at the lower reaches of Wardha and Penganga riverbeds. The major soil type is the deep black. This region comes under the less rain fall, highly drought prone and most of the agriculture from this region depends on monsoon rain and irrigation is very less. In summer the region is characterized by a hot and average temperature since last ten year is about 40-45[0]C. The average normal annual rainfall varies from about 800-812.69mm[3].

In the kalamb region the water used for various purposes including agricultural practices are from different sources like Ponds, lake, borewell, dugwell and river. Improper disposal of effluents from industries, domestic and urban waste into the running water bodies is the major cause of destruction of quality of water and leads to pollution[4].Monitoring of groundwater pollution problems is very much useful in an environmental economic framework where the quantity and quality of groundwater resources is major concern[5]industrial and municipal waste are major sources of surface and groundwater as in rural and urban area surface and ground water being the main sources of drinking water[6]. In the kalamb region the groundwater level in the summer season goes to very much low due to which the water become more concentrated and also due to modern agricultural practices and anthropogenic activity of human being the different types of pollutant directly enter to the sources of water hence continuous monitoring of water quality can save the rural and urban peoples from various water borne diseases. Majority of farmers use more & more chemical fertilizers and also there is deficiency of water[7]therefore the availability of non-potable water creates serious health problems. Hence the serious measures have to undertake for the assessment of water quality, it is an important mission to carry out by using various physicochemical and biological methods as a first step in water quality management. Considering all above facts we were undertaken the analysis of different water quality parameter of water sample collected from different sources.

2.Material and Methods

The study area covers the kalamb at a radius of around 10 to 15 km. the water sample collected from kalamb city and some villages of same tehsil from different sources. The soil samples collected in closed packed plastic bottle, the collected water samples were kept and preserved as per standard methods till the complete analysis of sample were carried out. All the samples were collected during the monsoon season at the end of the month August and starting of the September 2019 when there was continues and slow rain fall.

The chemicals used for all experiments were of analytical grade. All the analysis was carried out by standard and accepted methods.

Table 1:Showing the physicochemical parameter of water sample collected from well water

Location	T	pH	EC	TDS	Ca	Mg	Na	K	CO₃	HCO₃	Cl	SO₄	SAR	RSC
Sarapdhari	27	7.88	0.435	632	2.8	7.8	0.408	0.324	00	4.2	3.6	3.53	0.251	6.4
Pimpalgaon	27	7.75	0.439	612	4.6	7.0	0.452	0.352	00	5.2	6.0	1.20	0.266	6.4
Katri	26.5	7.48	0.477	721	4.0	8.6	0.625	0.421	00	5.4	4.0	4.24	0.352	7.2
Borimahal	28	7.45	0.469	596	3.7	7.2	0.438	0.364	00	5.3	4.3	2.96	0.241	5.6
Kalamb	27	7.64	0.436	563	4.6	8.3	0.524	0.421	00	5.4	5.3	3.56	0.412	7.5
Rasa	27	7.23	0.431	649	4.1	8.5	0.498	0.398	00	4.6	6.3	4.21	0.398	8.0
Tirzada	27	7.89	0.478	653	3.9	7.4	0.547	0.469	00	4.9	4.1	3.78	0.270	6.4

T-ºC, EC-mS/cm, TDS-ppm, Ca, Mg,Na, K,CO3, HCO3,Cl, SO4, SAR=Sodium Absorption Ratio,RSC=Residual sodium Carbonate-meq/l

Table 2:Showing the physicochemical parameter of water sample collected from Bore well

Location	T	pH	EC	TDS	Ca	Mg	Na	K	CO₃	HCO₃	Cl	SO₄	SAR	RSC
Sarapdhari	28	7.53	0.406	650	3.4	7.4	0.579	0.399	00	7.8	3.2	0.77	0.352	3.0
Pimpalgaon	28	7.65	0.438	780	3.8	7.8	0.598	0.351	00	7.2	3.4	0.78	0.369	4.4
Katri	28	7.36	0.463	840	3.6	7.9	0.583	0.410	00	7.8	3.2	0.70	0.381	3.7
Borimahal	28	7.48	0.398	750	3.9	7.4	0.498	0.463	00	7.5	3.1		0.408	3.8
Kalamb	27	7.79	0.469	635	3.7	7.0	0.541	0.389	00	7.1	3.0	0.81	0.383	3.6
Rasa	28	7.85	0.408	698	3.8	7.5	0.511	0.394	00	7.5	2.9	0.73	0.364	3.8
Tirzada	28	7.69	0.487	730	3.6	7.3	0.872	0.387	00	7.9	3.0	0.86	0.387	3.0

T-ºC, EC-mS/cm, TDS-ppm, Ca, Mg,Na, K,CO3, HCO3,Cl, SO4, SAR=Sodium Absorption Ratio,RSC=Residual sodium Carbonate-meq/l

Table 3:Showing the physicochemical parameter of water sample collected from lake water

Location	T	pH	EC	TDS	Ca	Mg	Na	K	CO₃	HCO₃	Cl	SO₄	SAR	RSC
Sarapdhari	26	7.96	0.298	823	3.6	7.6	0.574	0.403	00	6.2	4.0	1.97	0.343	5.0
Pimpalgaon	25	8.04	0.438	869	3.5	7.8	0.539	0.400	00	6.0	4.3	1.98	0.365	5.3
Katri	25	7.98	0.498	835	3.9	8.0	0.589	0.438	00	6.1	4.9	1.08	0.398	5.8
Borimahal	25	8.32	0.489	789	4.0	7.9	0.602	0.421	00	6.4	4.8	2.32	0.348	5.5
Kalamb	26	7.65	0.435	769	3.7	7.3	0.563	0.435	00	6.8	4.7	2.01	0.401	4.2
Rasa	25	8.24	0.365	786	4.3	7.0	0.569	0.438	00	6.9	4.5	1.89	0.398	4.4
Tirzada	25	8.57	0.498	840	4.5	8.2	0.598	0.441	00	6.3	4.4	1.86	0.368	6.4

T-ºC, EC-mS/cm, TDS-ppm, Ca, Mg,Na, K,CO3, HCO3,Cl, SO4, SAR=Sodium Absorption Ratio,RSC=Residual sodium Carbonate-meq/l

3.Results and Discussion:

In the present study the water analysis was carried out from the kalamb city and some villages of adjoining areas. The annual rain fall in every year are low therefore the irrigation system is less in this region. The samples collected from three different sources and results obtained were as follow.

3.1.Temperature: It is important factor of water body to maintain the level of biological and chemical oxygen demands. Temperature of water changes with respects to depth, season and environment. It was observed in present study the variation in the average temperature from different sources were bore-well water > well water > lake water as shown in above table.

3.2.pH: It is nothing but the power of hydrogen which determine the exact acidity of water samples. Due to excess use of chemical fertilizer and acid rain the acidity of soil increases. In the present study the result shows that the water from different sources was found to be alkaline,the highest pH 8.57 was observed from lake water collected from tirzada village and lowest pH 7.23 was observed from rasa which was slightly alkaline from dug well. From the above table the sample collected from lake were more alkaline as compared to tubwell and dugwell, the average variation in pH was Lake water>Borewell>Dugwell according to BIS and WHO the normal range for pH would be 6.5 to 8.5 the pH range of water from different sources were not beyond the permissible limit were observed.

3.3.Electrical conductivity(EC): Electrical conductivity is the capacity of water to conduct electric current due to the presence of oppositely charged ions in the water bodies which is generally measured with the help of conductivity meter.it gives the ideas about the soluble salts present in the water bodies. In the present study the electrical conductivity observed was low in case of lake water as compare to the dugwell and tubewell water.the good quality of water should have EC less than 0.25 mS/cm.

3.4.Total Dissolved Solid (TDS): TDS represent the total dissolved solid present in the water samples. It can be determined as the amount of residue left after the evaporation of the filtered water sample. TDS increases due to the disposal of solid material by various human activities, increase in TDS of water imparts bad test and odour which make it unsafe for drinking purposes. It was observed that the TDS of water from different sources varies as Lake Water>Borewell>Dugwell water. Acording to drinking water quality standard limits recommended by BIS and WHO TDS limits up to 500 are desirable and maximum permissible limits up to 2000 TDS.

3.5.Calcium(Ca) and Magnesium(Mg): Calcium and Magnesium determines the hardness of water if the salt of calcium and magnesium present in the water is high the hardness of water is more.it was observed from the table the variation in hardness of water with respect to sources was not much more remarkable.

3.6.Sodium(Na): Sodium from water samples determined by using flame photometer a characteris radiation produced due to excitation of electrons is measured at 589 nm for Na filter. In the present study observed that the concentrations of sodium was higher than that of potassium in samples of all sources. The normal range of sodium in acceptable water should be 0 to 4.0 meq/l in all sources estimated Sodium present in permissible limits.

3.7.Potassium(K): Potassium from water sample was determined by spraying the ions into the flame, a characteristic radiation is produced due to excitation of electrons in the flame photometer. Intensity of this characteristic radiation measured at 768 nm. Potassium is helpful to maintain the level of sodium in the body however increase in the intake of potassium in the body may couse adverse effect. people with kidney disease or other conditions, such as heart disease, coronary artery disease, hypertension, diabetes, adrenal insufficiency, pre-existing hyperkalemia, the potassium concentration in all sources of water present in acceptable limits.

3.8.Carbonate (CO_3) and Bicarbonate (HCO_3): Carbonate and Bicarbonate can be determined by titration of water sample against dilute sulphuric acid using phenolphthalein indicator and methyl orange indicator. In the present study it was observed that the carbonate analysis carried out shows that carbonate present at non detectable limits.

3.9.Chloride(Cl): Chloride from water samples were determined by using argentiometric method also known as Mohr's method when neutral solution of potassium chromate titrated with water sample gives the end point.chlorine in water will acts as disinfecting agents its presence will not act as poisonous to human but increase in concentration may disturb the life cycle of aquatic organisms. The normal range of chlorides would be 0 to 2.0 meq/l, in present study observed that chloride concentration in all sources of water were more than normal limit.

3.10.Sulphate(SO_4): sulphate in water derived from the oxidation of sedimentary rocks of sulphite of metals like nickel, lead, copper and Iron. The excess concentration of sulphate causes noxious odours to water.

3.11.SAR: It represents the Sodium absorption ratio this is related to irrigation water quality parameter and determines from the concentrations of alkali and alkaline earth metals in water samples. It indicates the suitability of water for irrigations to agriculture.

3.12.RSC: RSC stands for residual sodium carbonate and it is calculated for irrigation water to indicates the alkalinity hazards for soil. The normal range of RSC in normal water should be 0.5 to 1 and expressed in meq/l it was observed in the present study the RSC values were greater than the normal range as specified above.

4.Conclusion: The study reveals that all physicochemical characteristics of water were under the acceptable limits. The result shows that, no more variation in water quality parameter with respect to sources was observed. When compare with the standard data of water quality as specified by WHO and BIS the quality of water from this region was medium for agricultural and drinking use.

5.References:
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