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Water Management Aspect Of Kayadhu River In Akhada Balapur, Dist. Hingoli Maharashtra With Reference To Total Dissolved Solids and Total Hardness

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Introduction

Minerals and some organic substances are present in water referred as total dissolved solids, A large number of salts are found dissolved in natural waters, the common are carbonates, bicarbonates , chlorides, sulphates, phosphates and nitrates of calcium, magnesium , sodium , potassium, iron, manganese. If their conc. increases beyond the natural limits 500 mg/l , the water becomes polluted.

High conc. of dissolved solids in irrigation water increases the salinity of the soil and produces distress in cattle and causes sealing in boilers and corrosion in water pipes.

A high content of dissolved solids elevates the density of water, influences osmoregulation of fresh water for drinking , irrigational and industrial purposes. It is especially an important parameter in the analysis of saline lakes, coastal ,estuarine and marine water. Total dissolved solids is having high values in such waters. The maximum conc. of total dissolved solids was during rainy season while the minimum value was found in winter because of stagnation (Ansari 1993). The excess amount of dissolved solids results into high osmotic pressure which in turn causes imbalance of osmotic regulation

Material and Methods:

Most of the salts and a variety of organic substances (except lipids) are soluble in water. Thus a water sample, either from surface, ground or marine source contains appreciable quantity of dissolved solids.

Procedure:

Total dissolved solid of river water samples collected from different sampling sites is determined by following Procedure. -100 ml of filtered sample was taken in a previously dried and weighed beaker and evaporated to dryness and weighed again. The amount of total dissolved solids calculated using formula.

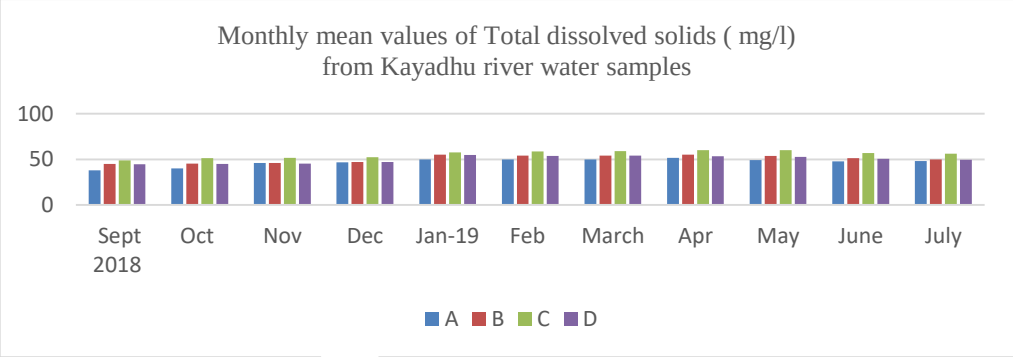
$$\text{T.D.S. mg/l} = \frac{(A - B) \times 10^6}{V}$$

A = Final wt. of the dish in gm.
B = Initial wt. of the dish in gm.
V = Volume of sample taken in gm.

Monthly mean values of Total dissolved solids (mg/l)
FromKayadhu river water samples
Year 2024-2025

Months	Stations			
	A	B	C	D
Sept 2024	38.0	44.9	49.0	44.8
Oct	40.0	45.21	51.3	44.9
Nov	46.0	45.9	51.8	45.5
Dec	46.8	47.2	52.3	47.1
Jan 2025	49.8	55.1	57.7	54.9
Feb	49.9	54.2	58.8	53.8
March	50.1	54.2	59.0	54.0
Apr	51.6	55.1	60.2	53.6
May	49.3	53.8	60.1	52.9
June	47.9	51.2	57.1	50.8
July	48.3	50.1	56.1	49.6

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Conclusion

In the present investigation the range of total dissolved solids was 145 to 500 mg/l at station A, 205 to 545 mg/l at station B, 235 to 550 mg/l at station C and 207 to 545 mg/l at station D from river Kayadhu at AkhadaBalapur . The values of TDS from Kayadhu river water are illustrated in table...

As the permissible level of T.D.S. for drinking water is 500 mg/l . In the Kayadhu river waer it was noted that maximum conc. of T.D.S. was during summer which increased in rainy season while the minimum values were found in winter probably because of the sedimentation proces and decrease in velocity of water In monsoon TDS values were noted above the permissible level.

Total dissolved solids were recorded in the range of 81 to 195 mg/l in Saigon river at Hochiminh city, Vietnam (viet, 1989) the total dissolved solids from river Godavari at Paithan , Maharashtra were recorded in the range of 300 to 470 mg/l The maximum valyue were noted in the month of may and minimum in the month of Nov. (Zafar Javeed 1991) In physico - chemical investigations of water from river Betwa , in M.P. the T.D.S. was recorded in the range of 84-403 mg/l (Datar and vashistha, 1992). Baruah et al. (1993) recorded total dissolved solids in the range of 100 to 450 mg/l in Gelabilriver ,Assam..In the ground water quality assesment from chidambaram town Tamilnadu, the T.D.S. noted was in the range of 750 to 1074 mg/l (Nagrajan et. al .199

Total Hardness

Introductions:-Hardness may be due to carbonate, non carbonates depending on nature of anion to which it is linked.The ions which are present in natural waters are calcium and magnesium. The total hardness may be due to the combination of calcium and magnesium ions. Hardness of water is not pollution parameter but indicates water quality. Temporary hardness is due to carbonates and bicarbonates while permanent hardness is due to sulphates and chlorides. Carbonate hardness refers to the amount of carbonate and bicarbonate in solution that can be removed or precipitated by boiling. This type of hardness is responsible for the deposition of scale in hot water pipes and kettles. Non carbonated hardness is caused by the association of the hardness causing cation with sulphate, chloride or nitrate and is referred to as permanent hardness because it can not be removed by boiling.

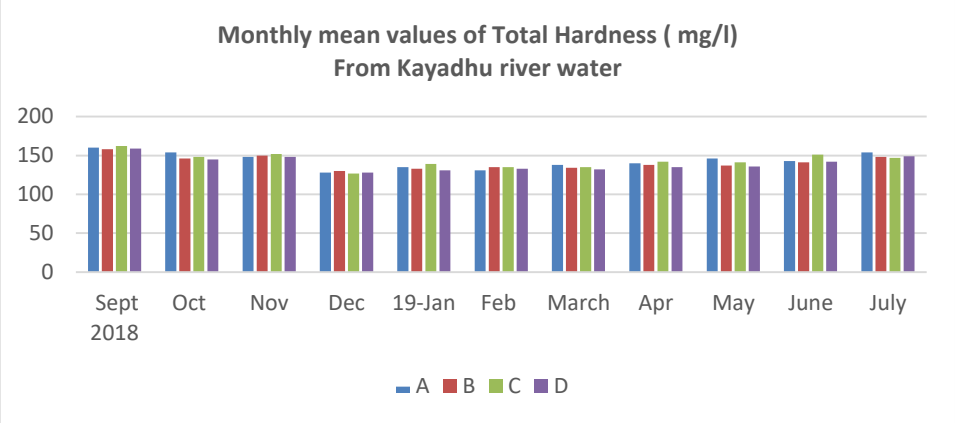
The hardness of water is inversely co-related with death rates from cardiovascular diseases but their insufficient proof that either calcium or magnesium in water is directly involved. The hardness has no known adverse effects on human health. However some evidance has been given to indicate its role in heart diseases (Peter, 1974) The water containing excess hardness is not desirable for drinking purpose it forms stone in kidney. Such water is also not desirable for potable as well as cooking purposes. The water having hardness above 200 mg/l may cause scale deposition in the water distribution system and more soap consumption.

Materials and methods :

Water sample for the study of total hardness was collected from the different stations and total hardness is calculated as

Monthly mean values of Total Hardness (mg/l) From Kayadhu river water samples
Year 2024-2025

Months	Stations			
	A	B	C	D
Sept 2024	160	158	162	159
Oct	154	146	148	145
Nov	148	150	152	148
Dec	128	130	126.6	128
Jan 2025	135	133	139	131
Feb	131	135	135	133
March	138	134	135	132
Apr	140	138	142	135
May	146	137	141	136
June	143	141	151	142
July	154	148	147	149



PROCEDURE:

1) In 50 ml sample 1 ml ammonia buffer (P^H 10+1) and a pinch of EBT indicator is added.
2) This was titrated against 0.01 N EDTA solution.
3) The end point was the conversion of wine red to blue.

Calculation

$$\text{Total hardness (mg/l)} = \frac{T \times 1000}{V}$$

(Caco3)

where,

T = Titrant in ml

V = Sample in m

Conclusion

The variations in total hardness values ware found to be in the range between 128 to 160 mg/l at station A, 130 to 158 mg/l at station B, 126.6 to 162 mg/l at station C and 128 to 159 mg/l at station D. The total hardness was found to be maximum in the month of september and minimum in the month of December at all the four stations.

Saxena et.al. (1966) found the total hardness ranged between 112 to 250 mg/l in river Ganga at Kanpur. Ghose and Sharma (1988) recorded the hardness varied from 80 to 180 mg/l in river Ganga at Patna. Tripathi and Pandey (1995) recorded the maximum hardness during summer and minimum hardness during winter from (Chandari Pond), Kalyanpur fish pond at Kanpur.

Minimum values of hardness were observed in rainy while maximum values during summer. High values of hardness are probably due to the regular addition of large quantities of sewage, detergents and large scale human use.

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