Analysis of Drinking Water Quality at Kuttippuram

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ABSTARACT
A preliminary analysis of drinking water samples collected from Kuttippuram of Malappuram were conducted in order to know the effects of flood on drinking water after 5 years. Samples of water were collected from different sources like open wells and tube well. The physical parameters and chemical parameters were carried out. Most of the parameters like conductivity, total dissolved solids, dissolved oxygen, calcium hardness and magnesium hardness were found within permissible limits. And more than 99% of samples were found fit for drinking purpose which indicates that the water quality has survived from the adverse effect of the flood during 2018.
Key Words*: Drinking water quality-Physical and Chemical analysis-effect of flood*

I.   INTRODUCTION

Safe and readily available drinking water is the primary need of every human being. The task of delicate balancing ratio of available and exploitable water resources and sustaining their quality is most relevant in our country, where rainfall distribution is uneven and confined to 3-4 months in a year. The only major source of water availability in Kerala is the annual rainfall, and the per capita water availability through rains in the state is less than Maharashtra and Rajasthan[1].Acute shortfall of rain in monsoon, poor watershed management, lavish use of water for domestic and agricultural purposes affect the naturally existing dynamic equilibrium among the environmental segments, leading to a state of pollution of water. The quality of water is of vital concern for mankind since it is   directly linked with human welfare [5, 6.] It has been reported that in the developing countries, pollution of ground water may cause 80% of human diseases and WHO has estimated that nearly 5 million deaths occur every year from polluted drinking water[7]

Floods are playing greater role in causing environmental problems in an area. These cause damage to the drainage systems which results in raw sewage to spill out into bodies of water. Flood water picks up numerous contaminants from roads, farms, factories and storage building, including sewage and chemicals. 80% of Kuttippuram town has been badly affected by the current devastative flood and torrential rains. 40% houses, animals, household items and other belongings were swept away by heavy flood in Kuttippuram. Around 10houses were totally destroyed while about 400 were damaged. After flood people in Kuttippuram were suffered a lot of problems with drinking water. However, during these last years the five quality of water has been improved.

The present study is aimed to evaluate how much drinking water quality has improved in Kuttippuram after flood and their possible remedial measure and recommendation to make the water fit for human consumption.

II.   METHODOLOGY

Sampling:

Generally two litters of sample are sufficient for physico and chemico analysis. The sample containers have to be labeled[5.]

In the present study, samples were collected from 10 wells in a random basis, in Kuttippuram town in and around the river Nila. The samples were collected as per the standard procedure during May 2023, for the analysis.

III.   RESULTS AND DISCUSSION

The data of physical and chemical parameters of the samples are presented in table.3.

The colour , odour and taste of the samples collected from the study area have no desirable problems .

The pH is an indicative of acidity or basicity of water. The desirable pH range necessary for drinking water is from 6.5 to 8.5. The pH of water samples in the study area ranged from 5.70 to 7.75. From this data, we can say that sample no. 1 (5.70) has a lower pH value than the standard value.

Turbidity is a measure of the light scattering potential of water caused by the presence of colloidal and suspended Material. The limit of turbidity value for drinking water is specified as 5 to 10 NTU. The data shows that the values for all samples are within the safe limits .The observed turbidity value in the sample 10 is slightly high when compared with other samples.

The conductivity of drinking water is 200-800µS/cm. The observed conductivity of water samples ranged from 223 to 531µS/cm. That means the values are within the permissible limits.

According to the Bureau of Indian Standard (BIS) the prescribed limit of TDS is 300 ppm. Generally, the TDS level between 50-150 is considered as the most suitable and acceptable. The TDS values of in water samples varied between 106 to 270 ppm which means the values except samples 6 and 7 are within the permissible limits. The high values may be due to low quantity of water or due to run off water from the ground. Using an RO Water Purifier can be the best solution to reduce drinking water TDS.

Dissolved oxygen is one of the most fundamental parameters in water, as it is to the metabolism of all aerobic aquatic organisms. The permissible limit of DO for drinking water is 6.5-8 ppm.DO values of water samples varied between 5.0 to 7.9 ppm. In most of the cases, dissolved oxygen is present less. Methyl orange acidity gives minerals acidity and total acidity using phenolphthalein gives both mineral and CO_2 acidity. Excess acidity is harmful to fish and aquatic life.

The hardness of water is due to the presence of soluble bicarbonates, chlorides and sulfates of calcium and magnesium. Water which does not give lather with soap is hard water. According to WHO, the value of total hardness of water, 0 to 60 mg/L (milligrams per liter) is classified as soft, 61 to 120 mg/L as moderately hard, 121 to 180 mg/L as hard, and more than 180 mg/L as very hard. Total hardness is not high indicating absence of contamination by Ca and Mg salts from detergents and soaps of the bathing places. Generally surface waters are softer than ground water. From the observed values we can clearly say that, Sample no.4, 6, 7 are moderately hard and all others are soft.

The desirable limit for total alkanity is 200mg/L. The values of total alkanity of water samples varied from 4 to 16 mg/L.

The upper limit of calcium concentration in drinking water is specified as 75 mg/L (ISI, 1983). The Ca content of water samples varied between 16 to 62 mg/L. The observed values are within the permissible limits.

The upper limit of magnesium concentration in drinking water is specified as 30 mg/L (ISI, 1983). Magnesium content in water samples varied between 6 to 46.The observed values are within the permissible limit except sample no.4 and sample no.7.

IV.   CONCLUSION

With a view to create awareness among the people about the quality of water they use for drinking and other domestic purposes, this study has been under taken. Assessments of the water samples for pollution are made by comparison of the assessed values of all parameters with the corresponding standards prescribed for drinking water by various agencies like BIS, WHO etc.

There were report that most of the water resources in Kuttippuram have been badly contaminated as a result of the flood during 2018. But after 5 years it has become possible to reduce it drastically by adopting proper treatment like bleaching and coagulation using scientific methods with the help of the health staff. The present study reveals that almost all the open well and tube well water are palatable, potable and suitable for drinking purposes. However the proper maintenance of water is necessary for health. For example chlorination can produces virus free water from faecally polluted source water. Therefore the present study suggests the need for water quality management in the area of study and the residents must be educated for safe drinking water.

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Table 1 The description of the location of sampling sites

SAMPLE NO:	NAME	SOURCE
1	Private	Open Well
2	Private	Open well
3	Private	Open well
4	Private	Bore well
5	Private	Open well
6	Hassan Vaakayil (H)	Open well
7	Private	Open well
8	Private	Open well
9	Private	Open well
10	Private	Open well

Table 2 Methods used analysis

No	Parameter Determined	Method Used
1	pH	pH Metry
2	Conductivity	Conductivity meter
3	Turbidity	Nephelo Turbidity Meter
4	Total Dissolved Solid	Conductance
5	Dissolved Oxygen	Winkler's Method
6	Alkalinity/Acidity	Titrimetric
7	Total Hardness	EDTA Titration
8	Ca & Mg Hardness	EDTA Titration

Table 3

Sample no	1	2	3	4	5	6	7	8	9	10
Colour	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless
Odour	Odourless	Odourless	Odourless	Odourless	Odourlless	Odourless	Odourless	Odourless	Odourless	Odourless
Temperature(°C)	30°C	30°C	30°C	30°C	30°C	30°C	30°C	30°C	30°C	30°C
PH	5.70	6.59	6.72	6.44	6.78	6.60	7.00	7.75	6.70	6.46
Turbidity (NTU)	2.00	3.36	1.25	1.98	4.67	2.82	2.63	1.94	4.72	5.12
TDS (ppm)	106	197	133	247	158	270	263	195	140	114
EC (µS)	223	410	286	516	338	525	531	401	290	242
DO (ppm)	7.9	5.9	5.8	6.7	5.5	6.3	5.4	5.0	6.5	7.3
Acidity (mg/L)	33	31	95	85	29	59	27	6	41	40
Alkanity (mg/L)	6	14	10	16	10	16	12	6	4	4
Total hardness (mg/L)	30	68	50	86	54	74	108	62	54	30
Calcium hardness (mg/L)	16	54	32	46	34	48	62	36	34	24
Magnesium hardness (mg/L)	14	14	18	40	20	26	46	26	20	6