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A STATISTICAL EXAMINATION OF THE QUALITY OF GROUNDWATER IN A FEW VILLAGES IN COASTAL REGION OF SANTHABOMMALI

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Abstract

After air, water is arguably the most valuable asset to humanity. Even while water covers up the majority of the earth's surface, relatively little of it is really exploitable, making it a very scarce resource. Thus, caution needs to be exercised in the usage of this valuable and finite resource. Water must be suitable preceding usage because it is used for a variety of uses. In order to assess whether water sources are healthy or not, regular monitoring is also necessary. In addition to being a sign of deteriorating environmental conditions, unhealthy water bodies pose harm to the ecology. Poor water quality in industries can lead to risks and significant financial loss. As a result, the condition of water has a significant impact on the environment and the economy. Analysing the quality of the water is therefore necessary before using it for any purpose. Evaluation of water quality today uses a few established techniques despite years of investigation. Sample collection, maintenance, and inspection are governed by certain rules. For the benefit of analysts and investigators, the normative sequence of operations is briefly outlined below. This study was conducted in five distinct villages in the santhabommali mandal of Srikakulam: *Jagnnadhapuram*, *Mulapeta, Bavanapaadu*, *Kothalingudu*, *and Lakkivalasa* Twenty groundwater samples that were collected during the pre-monsoon period were used in the study. Samples were collected from several bore wells and wells utilising an erratic testing procedure in an attempt to evaluate the chemical characteristics of the water quality parameters. The study looked at the ideal amount of groundwater in each of the five coastal villages in the Santabombali mandal: *Jagnnadhapuram*,

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Mulapeta, Bavanapaadu, Kothalingudu, and Lakkivalasa with the goal of trying to generate the water appropriate for human consumption.

Key Words: pH, sulphates, chloride, nitrates, TDS, and TH.

1. Introduction

Rain, snow, fog, or any additional form of rainwater that escapes into the atmosphere and settles to the crust of the planet is either incredibly pure or completely free of impurities. Such forms of precipitates are rare in naturalistic ecosystems due to the abundance of chemicals included. Purity waters become incapable of supporting life as a result of environmental chemical degradation. Before absorbing atmospheric gases, water first collects them from its surroundings. The kind and amount of these factors define the properties of water. The detrimental effects that various water quality variables have on the well-being of humans, livestock' well-being, and irrigated ecosystems have led to the development of norms and standards for water purity by numerous boards and organisations of the Bureau of Indian Standards (BIS). The state of groundwater is significantly impacted by waste streams, agricultural runoff, and industrial byproducts. The main problems affecting groundwater assets involve improper disposal of heavy waste, inappropriate or uncontrolled aquifer extraction, improper transportation of heavy waste off-site, and inappropriate use of herbicides and organic matter in rural operations.

2. Study Area

In the Srikakulam District of Andhra Pradesh, there is a Mandal named Santhabommali. The Mandal is eight metres above sea level and has 120 villages and 34 panchayats. The city next door is Srikakulam City. Figure 1 shows the examination of the mandals of Santhabommali.

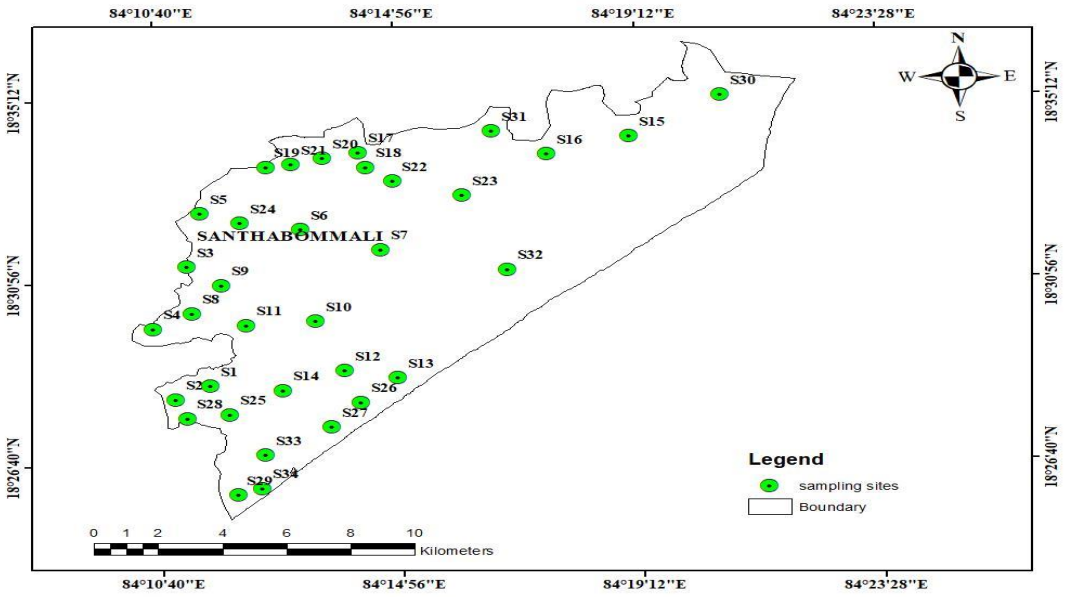

Figure 1: Examine Mandal Area Map of the Villages

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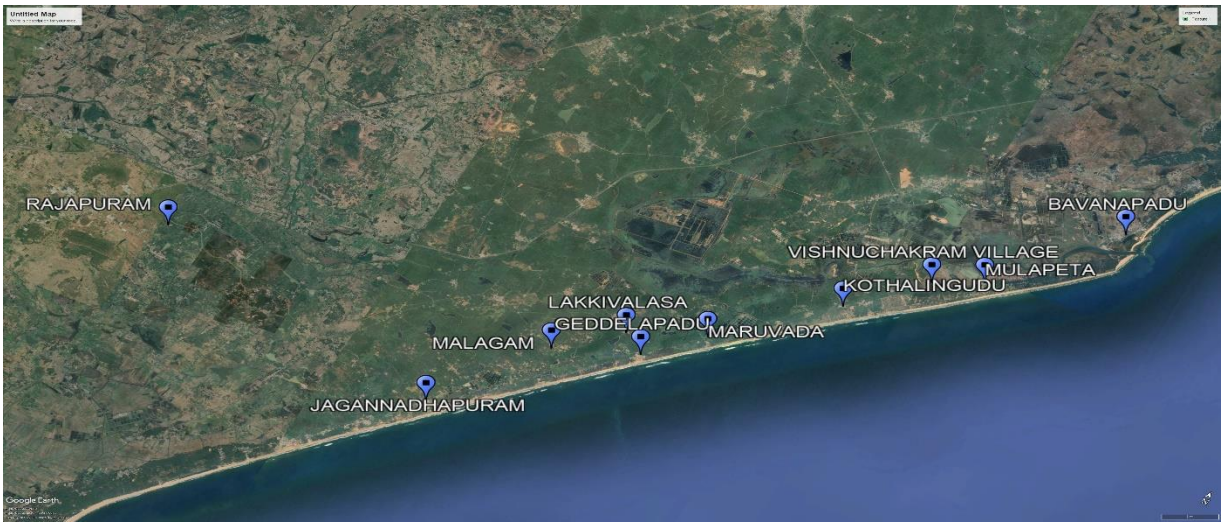

Figure 2: A few coastal sampling stations in the study region

3. Objective of Study

The primary field of study is Santabombali Mandal, which entails figuring out the most effective ways to purify water, contrasting allowable levels with Indian norms, and examining the properties of samples of groundwater collected from five distinct localities.

4. Methodology

In preparation for chemical analysis in the Chemistry Laboratory, groundwater samples have been collected from the villages of Jagnnadhapuram, Mulapeta, Bavanapaadu, Kothalingudu, and Lakkivalasa using hand pumps. Using accepted laboratory procedures, the chemical characteristics of magnesium, pH, electrical conductivity, nitrates, and chlorides were examined. The project's goal is to assess groundwater migration in the research region before the monsoon season. Water sample collection was conducted in accordance with the procedures specified in the UNESCO report. The research findings that were collected precisely documented every single specimen that was obtained at the study region. Safety precautions are taken before sending samples to the lab in bottles (APHA 1998). The techniques for water analysis are listed in Table 2.

5. Results and Discussions

The relevant findings for chemical variables related to the water condition of groundwater specimens collected 2021 prior to the monsoon are displayed in Table 1. Figures 2 through 8 show graphs of pH, EC, TDS, TH, chlorides, sulphates, and nitrates, which correspond to the several villages in the focus area.

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Table 1. Results of 2021 pre-monsoon groundwater samples collected in the study area

S. No.	Sampling Stations	pH	EC (mmhos/ cm)	TDS (mg/l)	Cl (mg/l)	TH (mg/l)	Sulphate (mg/l)	Nitrate (mg/l)
1	Jagannadhapuram:S1	8.6	1476	938	174	268	68	30
2	Jagannadhapuram:S2	8.2	1475	932	180	254	66	24
3	Jagannadhapuram:S3	8.1	1480	935	192	258	64	26
4	Jagannadhapuram:S4	8.0	1471	939	185	262	70	28.5
5	Mulapeta:S1	8.3	3250	2452	492	511	184	40
6	Mulapeta:S2	8.4	3242	2449	482	518	188	42
7	Mulapeta:S3	8.2	3245	2440	478	512	182	46
8	Mulapeta:S4	8.1	3247	2445	486	515	186	44.2
9	Bavanapaadu:S1	8.5	4112	2882	572	229	250	30
10	Bavanapaadu:S2	8.2	4120	2889	566	228	256	28
11	Bavanapaadu:S3	8.3	4118	2880	565	220	252	25
12	Bavanapaadu:S4	8.9	4116	2884	570	225	253	26.5
13	Kothalingudu:S1	8.1	3869	2450	488	314	52	14
14	Kothalingudu:S2	8.5	3858	2446	486	312	48	10
15	Kothalingudu:S3	8.4	3862	2452	480	316	49	13
16	Kothalingudu:S4	8.2	3866	2449	484	318	51.2	12
17	Lakkivalasa:S1	8.4	1910	1209	238	434	68	29
18	Lakkivalasa:S2	8.1	1909	1206	231	428	62	34
19	Lakkivalasa:S3	8.2	1900	1204	232	430	64	32
20	Lakkivalasa:S4	8.3	1904	1208	235	432	66.2	31.5

Table 2: Methods for Groundwater analysis

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Test Conducted	Units	Principle of the method
P^H	levels	pH meter
Electrical conductivity	Millimhos	Digital conductivity meter
TDS	mgl^{-1}	Titration Method
TH	mgl^{-1}	Titration Method
Ca and Mg	mgl^{-1}	Titration Method
Chlorides	mgl-1	Titration Method
Nitrates	mgl^{-1}	Spectrophotometry

Source: Public Health Association (APHA) of America, 1998

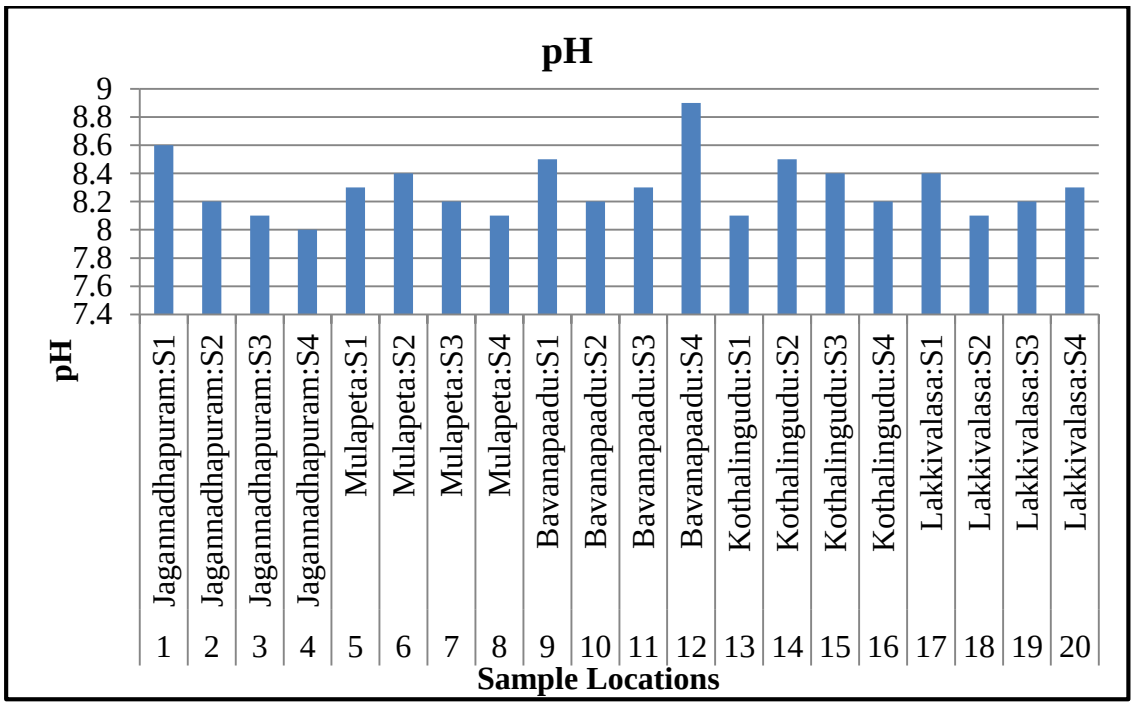

Figure 3: pH represented graphically

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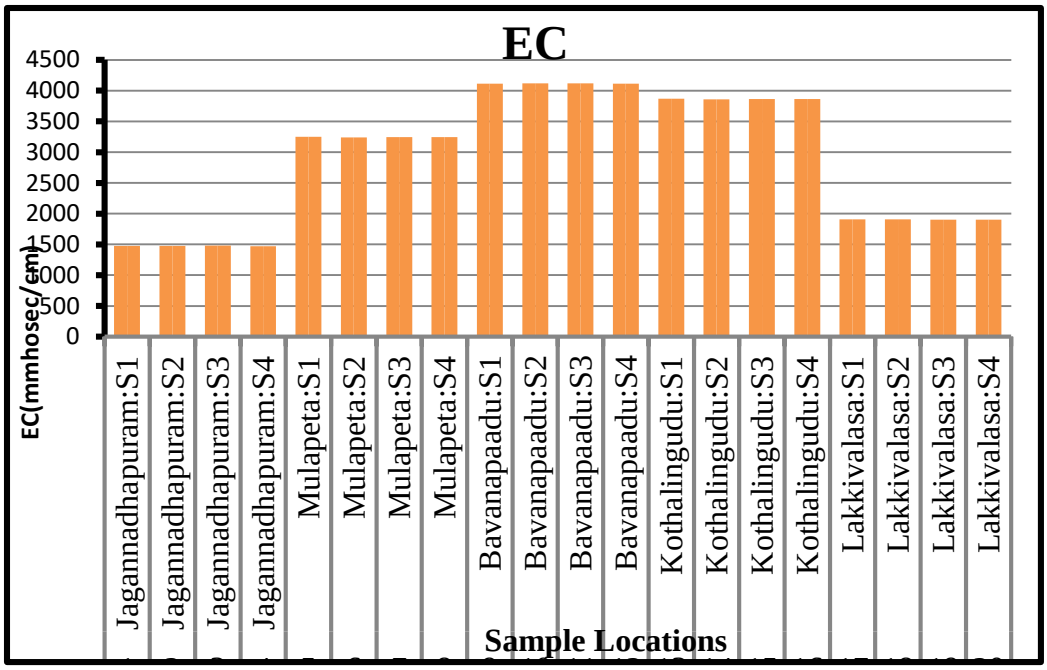

Figure 4: Graphical representation of EC

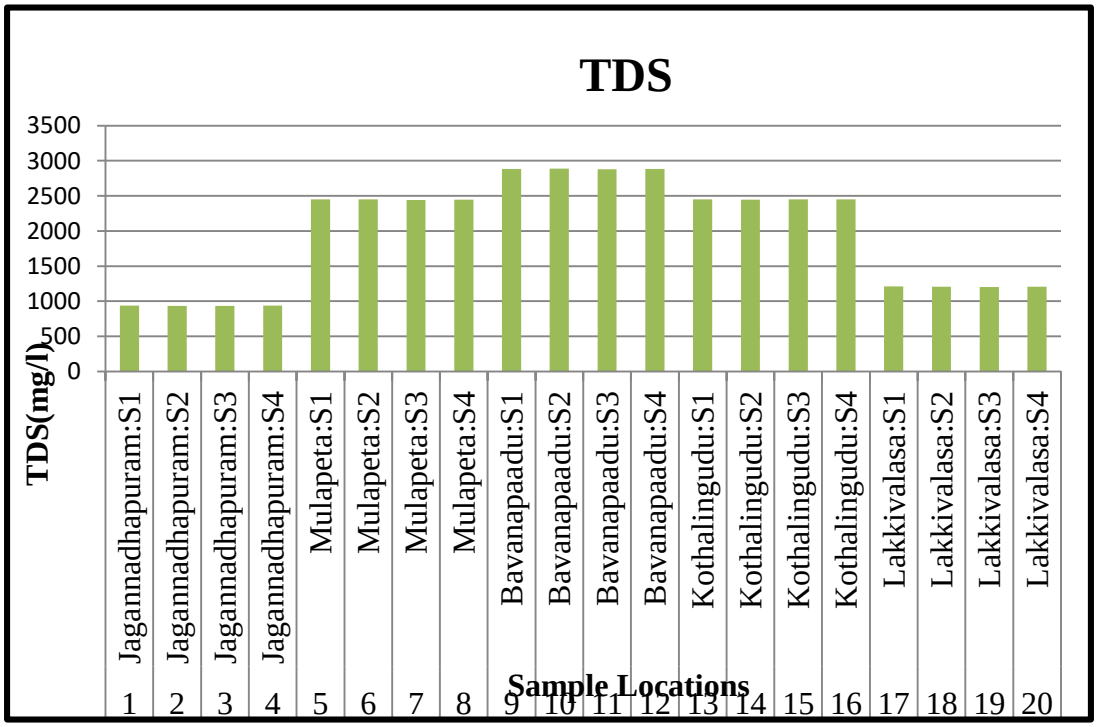

Figure 5: Graphical representations of TDS

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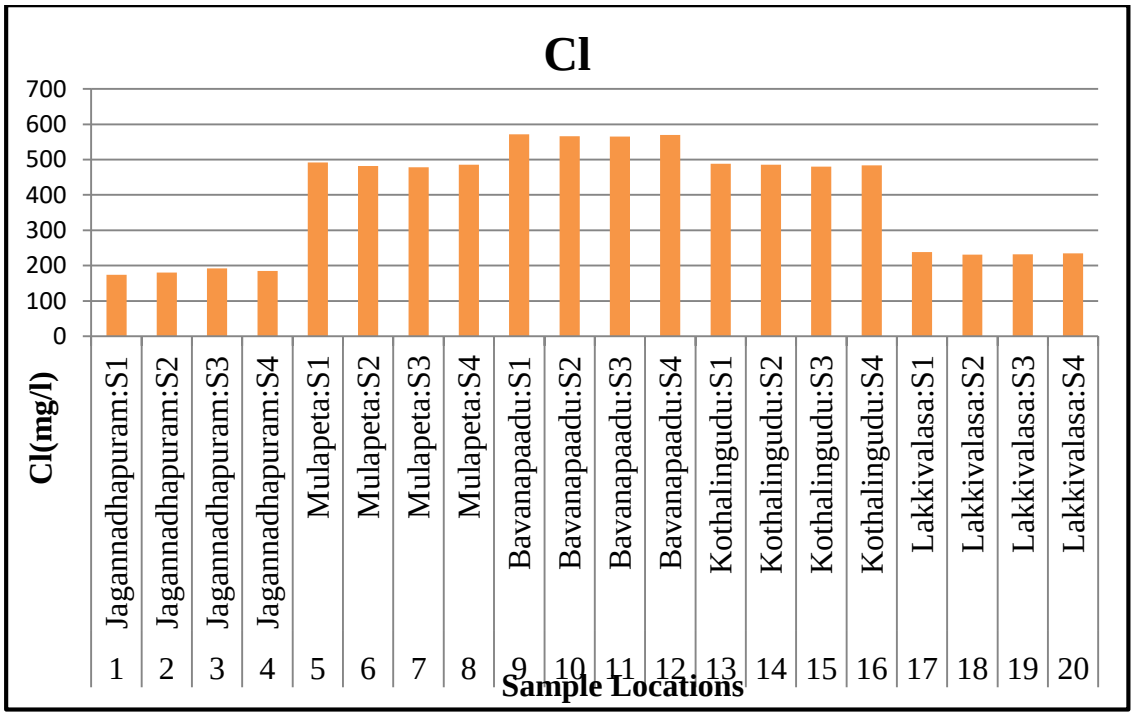

Figure 6: Graphical depiction of Cl

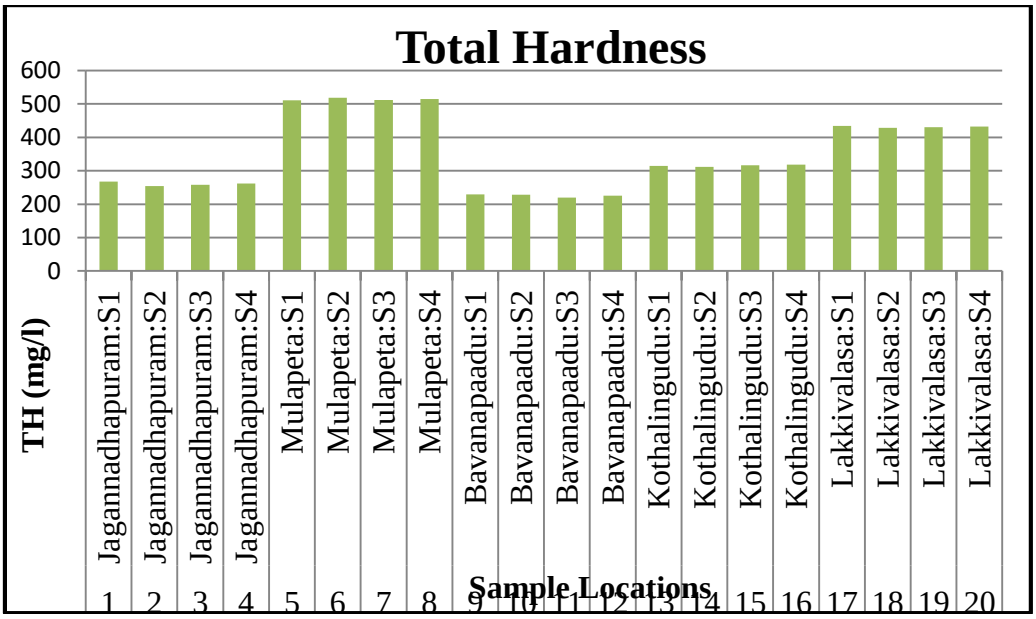

Figure 7: **Graphical representations of TH**

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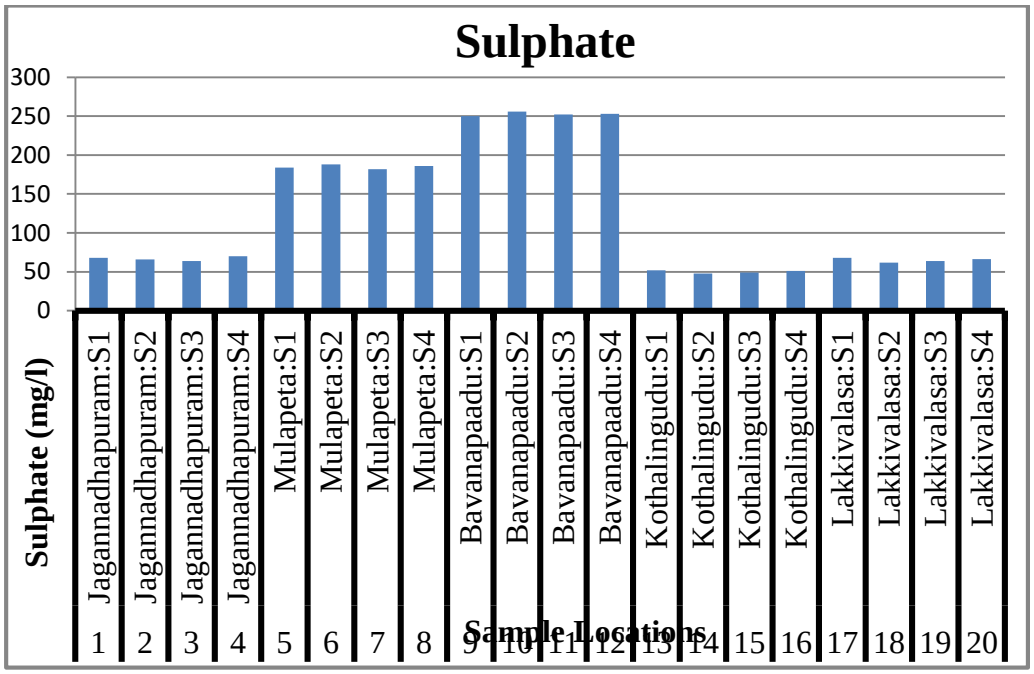

Figure 8: Graphically represented of Sulphates

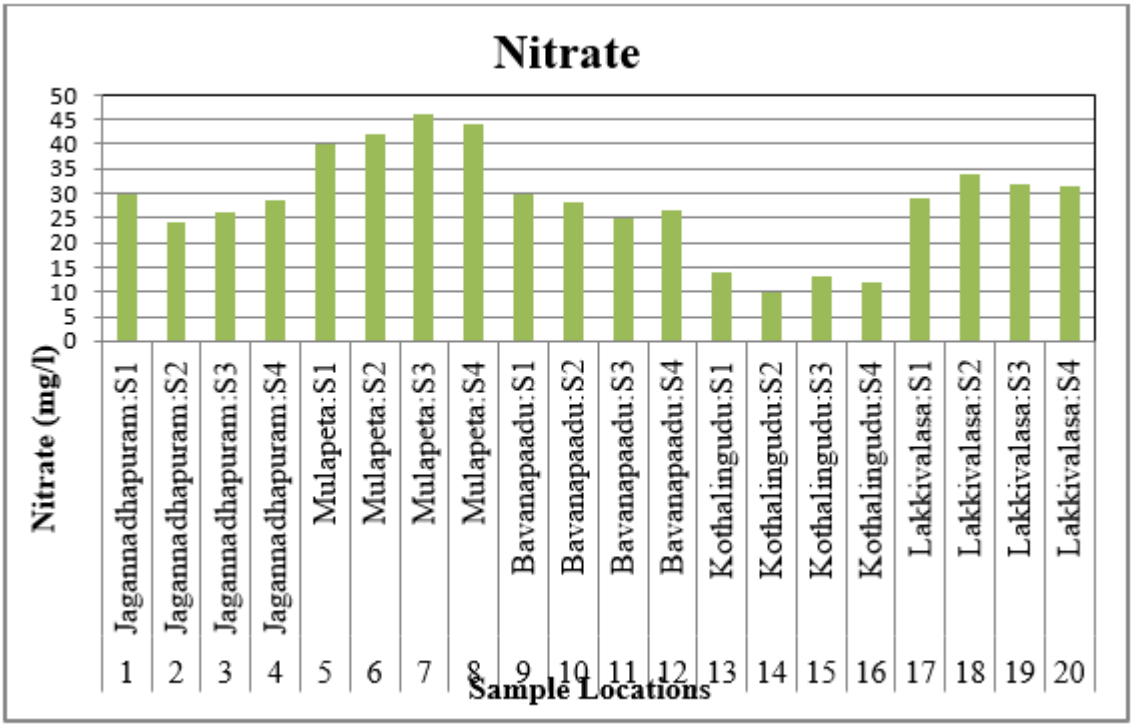

Figure 9: **Graphical representations of Nitrates**

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6. Conclusions

The study Mandal locations of Jagnnadhapuram, Mulapeta, Bavanapaadu, Kothalingudu, and Lakkivalasa have groundwater that is biassed towards smaller creatures when contrast to the constraints allowed by the World Health Organisation. It was found that many specimens had a small amount of sporadically salinized water in them, that total hardness levels were underneath acceptable limits but marginally dangerous, that the levels of nitrates were underneath proper bounds but somewhat safe, and that levels of chloride were within permitted bounds but somewhat protected. Using preventative pollution technology, using water wisely, and maintaining adequate hygiene are all necessary for increasing the public's consciousness.

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