COMPARITIVE STUDY OF WATER QUALITY PARAMETERS IN GUDUVANCHERRY, URAPAKKAM AND PERUNGALATHUR VILLAGE PANCHAYATS

[1]Dr.A.LATHA, [2]ABITHAMEENAL.N, [3] PRIYADHARSHINI.R, [4]KAVIA.V, [5]ABINAYSINI A

[12345]DEPARTMENT OF CIVIL ENGINEERING, PANIMALAR ENGINEERING COLLEGE, BANGALORE TRUNK ROAD, VARADHARAJAPURAM, NAZARETHPET, POONAMALEE, CHENNAI-600123.

Abstract : Water is an elixir of life. It is a fuel that runs the life of humans. People, in chase of their greedy goals, exploit the nature in many ways and water is not an exemption from it. Of all the water present in the world, only 3% is found as freshwater which is meant to satisfy the daily needs of 7.9 billion people in the globe. India, is a vast country with 10,360 rivers in it. Inspite of it huge water network 70% of the water supply has been badly contaminated leading to huge scarcity of water . Because of the huge contamination rate India was cornered to 120th position among 122 countries in water Aids Water Quality Index. Lack of care and knowledge about the environment is one of the main reasons for the current fate of water. Our paper aims to get to know about the water quality in and around the surviving environments especially at 3 village panchayats namely Guduvanchery, Urapakkam and Perungalathur. We have also studied comparatively, the parameters of water there by, arriving at the best possible solutions to make the water quality better one.

Index Terms – **Water quality, contamination, physio-chemical parameters.**

I. INTRODUCTION

The water below the ground gets easily contaminated due to salinity, runoff from fertilizers, mixing various other chemicals, etc. The assessment of water quality involves the evaluation of water quality to check whether the groundwater suits the purpose of drinking and domestic usage. The study involves the collection of the water samples from the residential areas and analyzed for various physio-chemical and biological characteristics and the suggestive measures to be followed is given.

II.WATER QUALITY ASSESSMENT

The assessment of water quality brings in the attention of people towards the current prevalent problems. It helps to dispense a proper solution to protect the drinking water from over-exploitation and make it valuable for future usage. The setting up of appropriate water treatment units concerning new filtration techniques depends on water quality assessment criteria and to bring in time to time solutions that meet the standard basic norms. To check the water quality index, the various parameters such as pH, temperature, dissolved oxygen, electrical conductivity, TDS, alkalinity are all computed. The water quality parameters are analyzed concerning drinking water standards issued by WHO.

III.LOCATION

The samples are collected from 4 major hotspot locations across some stations from sources like Borewell water, Lake water and Panchayat water. The locations include Guduvancherry, Urapakkam, Perungalathur and Tambaram.

Fig 1. Locations map

IV.COLLECTION OF SAMPLES

The main sources of water at these locations are bore wells,open wells, Panchayat waters, lakes and packaged waters. We have collected the samples from borewells, panchayat water and lakes. The water has been analysed for 22 parameters namely Appearance, pH, colour, turbidity, electrical conductivity, total suspended solids, total dissolved solids, total hardness as $CaCO_3$, calcium hardness as $CaCO_3$, Magnesium hardness as $CaCO_3$, Calcium as Ca, Magnesium as Mg, Phenolphthalein alkalinity, Total Alkalinity, Chloride, sulphate, total iron, Silica, Residual Free chlorine, Carbonate hardness and non – carbonate hardness.

Fig 2: Water samples collected

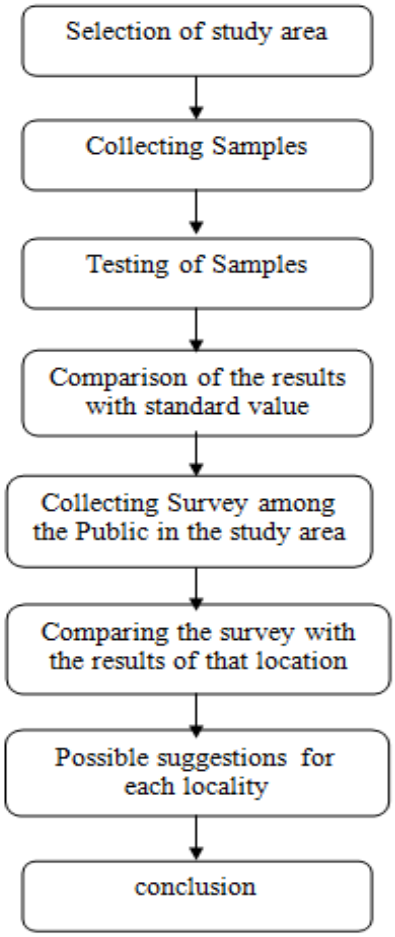
TABLE I

LIST OF SAMPLES COLLECTED

S.NO	LOCATION	LATITUDE AND LONGITUDE	SOURCE OF WATER
1.	GUDUVANCHERY	12°50'15.9"N 80°04'12.3"E	BOREWELL 1
		12°50'03.0"N 80°04'00.8"E	BOREWELL 2
		12°50'23.1"N 80°04'18.1"E	LAKE WATER
2	URAPAKKAM	12°51'34.3"N 80°04'07.0"E	BOREWELL 1

		12°51'34.6"N 80°04'07.1"E	BOREWELL 2
		12°51'34.5"N 80°04'10.9"E	PANCHAYAT WATER
3	PERUNGALATHUR	12°54'29.2"N 80°05'04.7"E	BOREWELL 2
		12°54'28.8"N 80°05'05.1"E	LAKE WATER
		12°54”38.4"N 80°04'54.1"E	PANCHAYAT WATER

V.METHODOLOGY



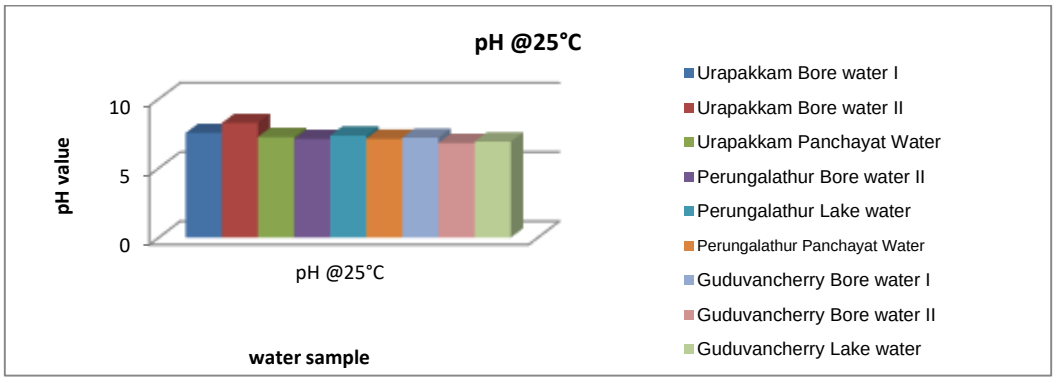
VI .ANALYSIS OF TESTED PARAMETERS

6.1 pH at 25°c

The normal range of pH for drinking water should be around 6.5 to 8.5. It sets the major standard for drinking water quality. They were tested on the basis of IS3025 PART 4 1983 RA 2017 codes. The result is shown in the graph below

GRAPH 6.I

pH AT 25°C

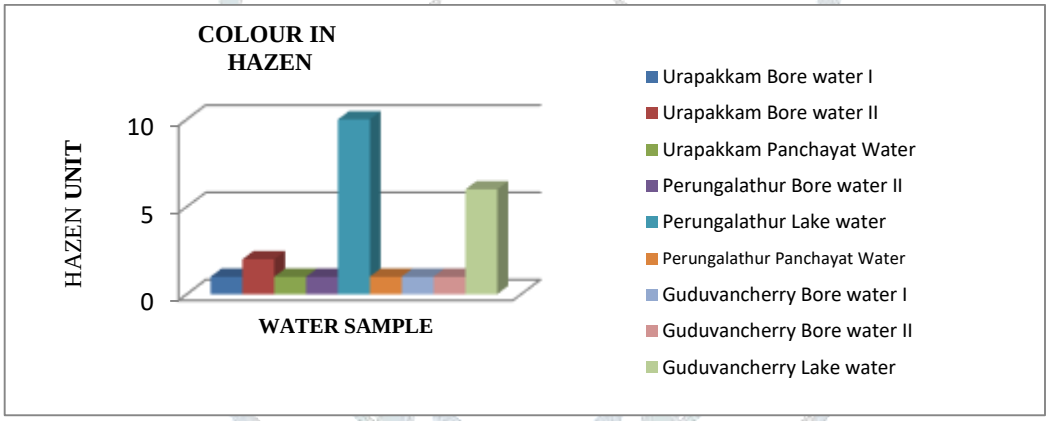


6.2 Colour of the water sample

The natural water is transparent in nature unless they are impacted by the colour of vegetable matters like peat, branches and leaves which imparts certain amount of natural colour to them. Exceptionally, natural water may be coloured due to the presence of colloidal ions.

GRAPH 6.2

GRAPH FOR COLOUR IN HAZEN UNIT

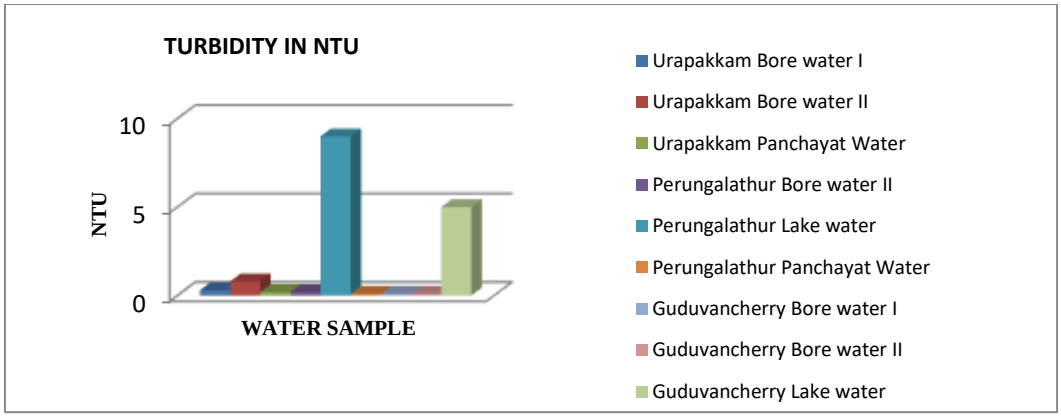


6.3 Turbidity in NTU

Turbidity is the measure of suspended particles which includes algae , sediments and organic matter present in it. They were tested on the basis of IS3025 PART 10 1984 RA 2017 codes. The result is shown in the graph below.

GRAPH 6.3

TURBIDITY IN NTU

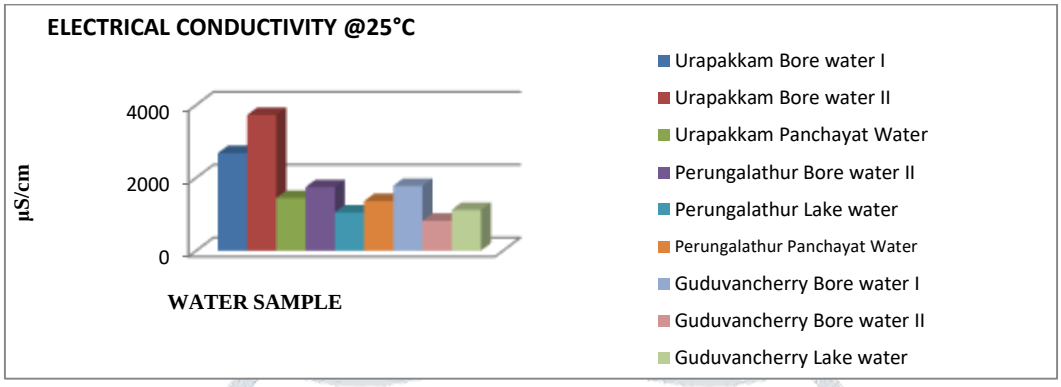


6.4 Electrical conductivity at 25°c

The water is composed of many dissolved solids in which it possess the ability to conduct electricity. They were tested on the basis of IS3025 PART 14 1984 RA 2017 codes .The result is shown in the graph below.

GRAPH 6.4

ELECTRICAL CONDUCTIVITY

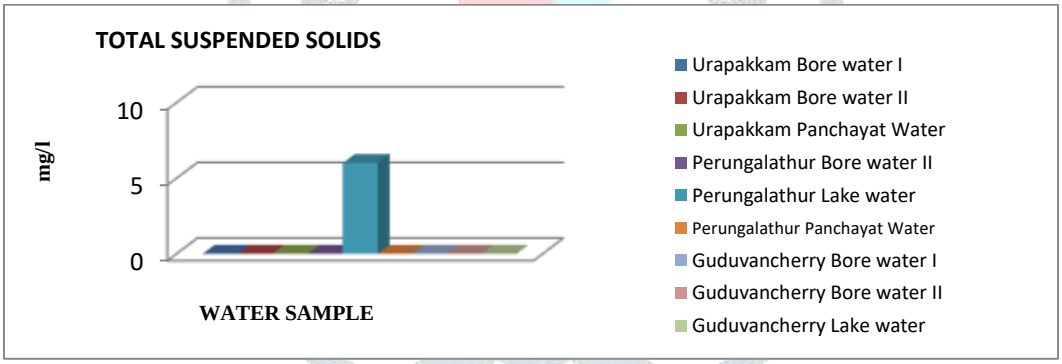


6.5 Total Suspended Solids

The solids suspended in the water is usually originally occurred in natural deposition or discharges into the water. They were tested on the basis of IS3025 PART 17 1984 RA 2017 codes. The result is shown in the graph below.

GRAPH 6.5

TOTAL SUSPENDED SOLIDS

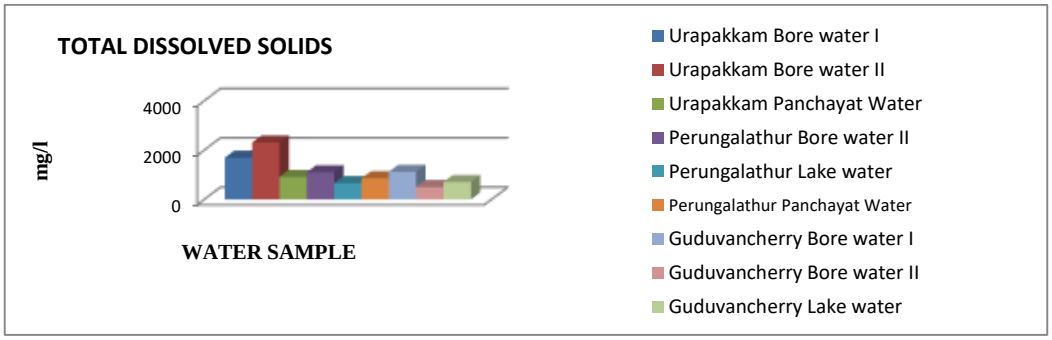


6.6 Total Dissolved Solids

Water is composed of many dissolved solids in it. Their origin can be either natural or solute present in the water. They were tested on the basis of IS3025 PART 16 1983 RA 2017 codes. The result is shown in the graph below.

GRAPH 6.6

TOTAL DISSOLVED SOLIDS

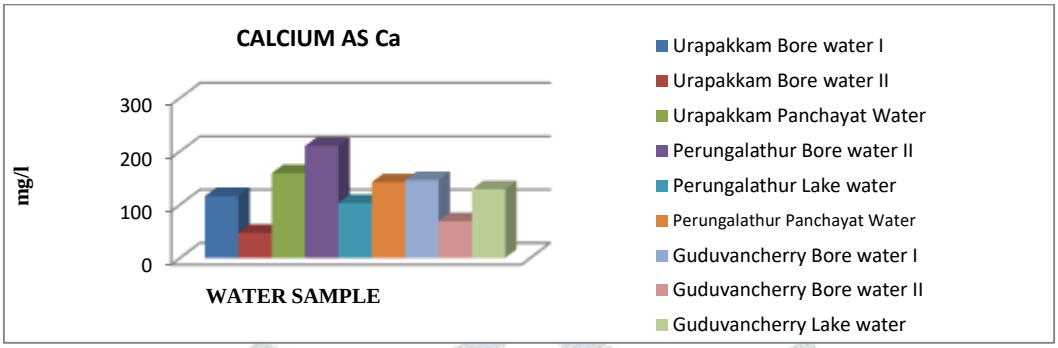


6.7 calcium as Ca

Calcium chemically noted as Ca originally occurs in rocks , bones and shells which eventually reaches the water in one or more forms. They were tested on the basis of IS3025 PART 40 1991 RA 2014 codes The result is shown in the graph below

GRAPH 6.7

CALCIUM AS Ca

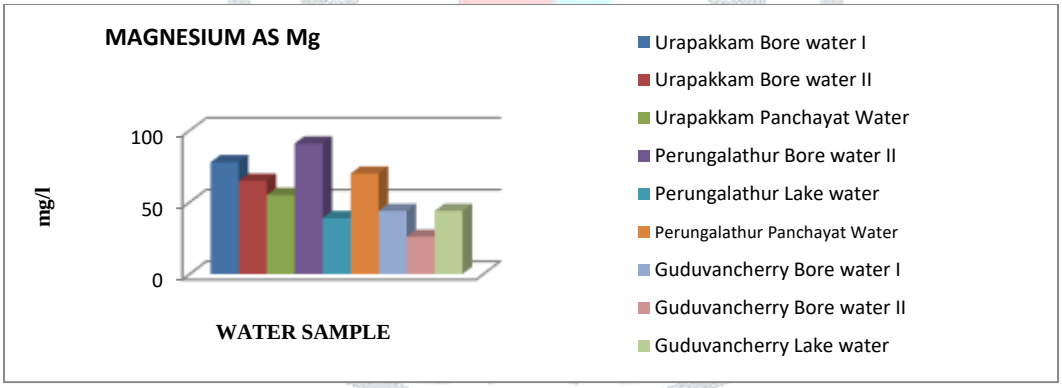


6.8 Magnesium as Mg

Magnesium- chemically called Mg, is the major constituent of geological formations which has indirect significance in health upon reaction with sulphates. They were tested on the basis of IS3025 PART 46 1994 RA 2014 codes. The result is shown in the graph below

GRAPH 6.8

MAGNESIUM AS Mg

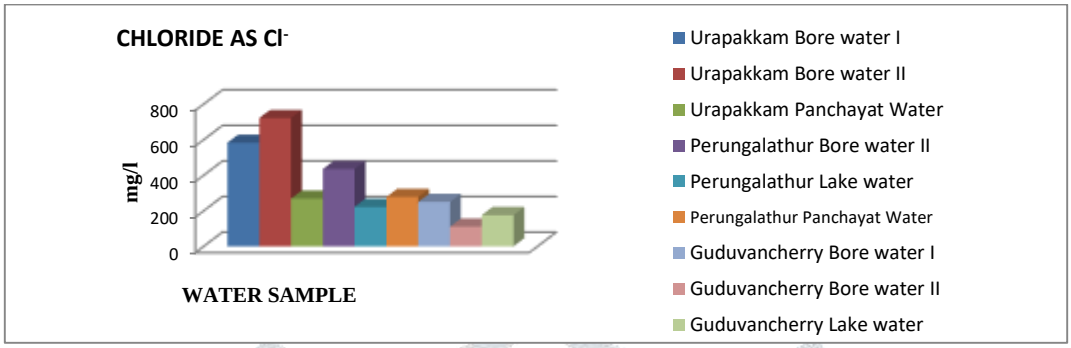


6.9 Chloride as Cl^-

Chloride with formula Cl^- exists in all water resources. Their concentration are highest in sea waters , sewage and industrial water. They were tested on the basis of IS3025 PART 32 1988 RA 2014 codes. The result is shown in the graph below

GRAPH 6.9

CHLORIDE AS Cl-

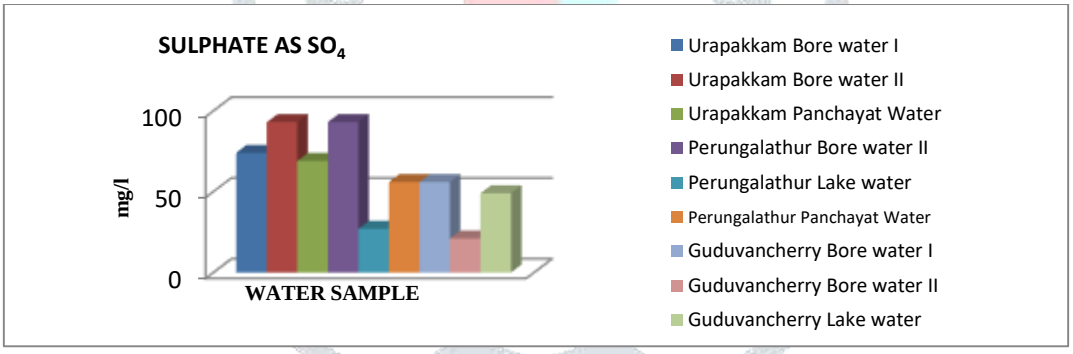


6.10 Sulphate as SO_4

Sulphate as known as SO$ has its origin from rocks and geological formations, discharges and so on. They have laxative effects when limits are exceeded. They were tested on the basis of IS3025 PART 24 1986 RA 2014 codes. The result is shown in the graph below.

GRAPH 6.10

SULPHATE AS SO_4

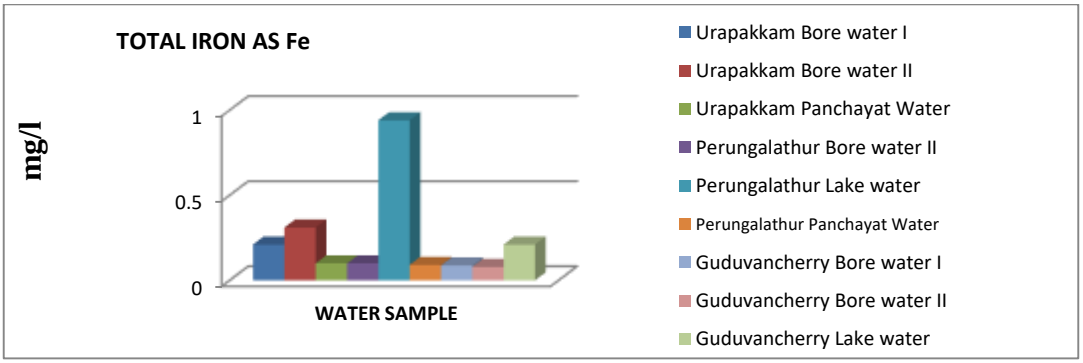


6.11 Total iron as Fe

Iron, chemically called Fe, the source of iron varies from geological formations such as acid drainage and effluent discharges. They were tested on the basis of IS3025 PART 53 2003 RA 2014 codes. The result is shown in the graph below

GRAPH 6.11

TOTAL IRON AS Fe

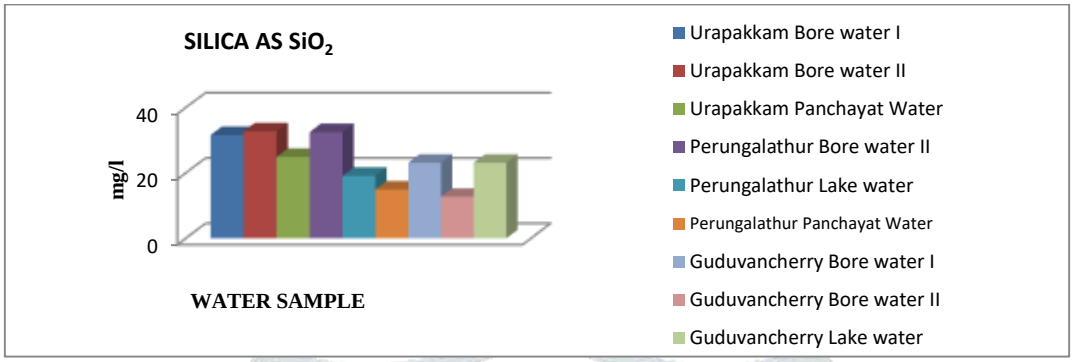


6.12 Silica as SiO_2

Silica known as SiO_2 has its origin from rocks and geological formations. They have no definite health implications in water. They were tested on the basis of IS3025 PART 35 1988 RA 2014 codes. The result is shown in the graph below

GRAPH 6.12

SILICA AS SiO_2

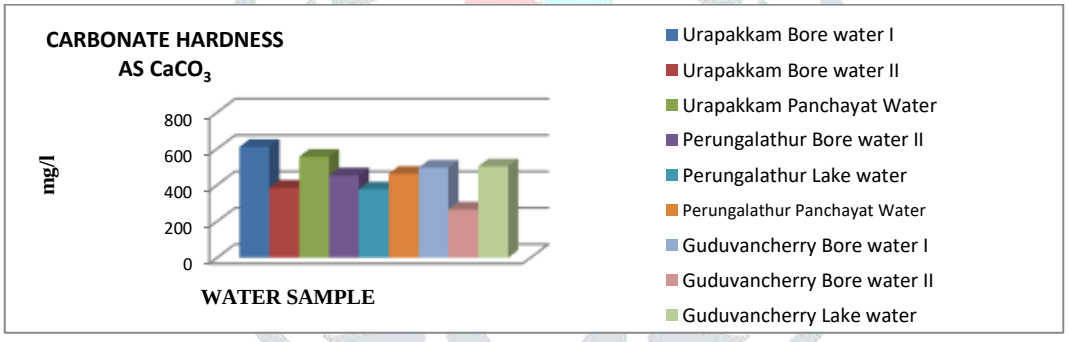


6.13 Carbonate hardness as $CaCO_3$

It is defined as the measure of the water hardness that is caused due to the presence of carbonate and bicarbonate anions. They were tested on the basis of IS3025 PART 21 2009 RA 2014 codes . The result is shown in the graph below.

GRAPH 6.13

CARBONATE HARDNESS AS $CaCO_3$

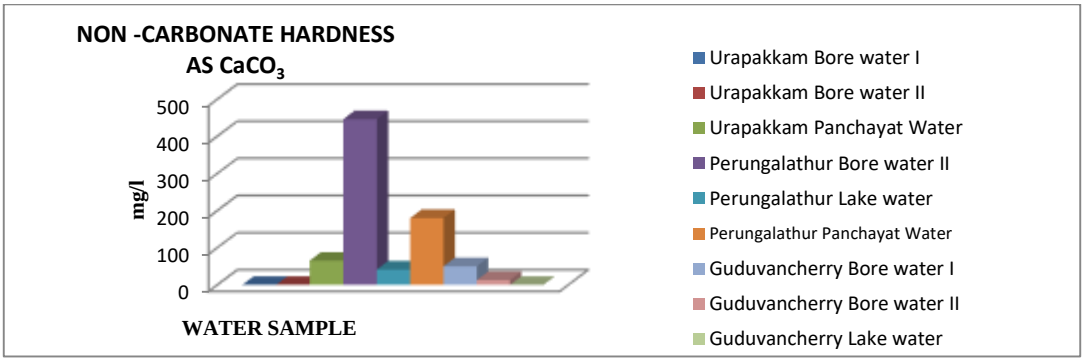


6.14 Non- carbonate hardness as $CaCO_3$

The total hardness that is generated mainly by the ions of sulphate and the measure of magnesium and calcium salts apart from magnesium chloride and calcium sulphate salts is referred as non carbonate hardness. They were tested on the basis of IS3025 PART 21 2009 RA 2014 codes. The result is shown in the graph below.

GRAPH 6.14

NON-CARBONATE HARDNESS AS CaCO3



VII. SUGGESTIVE MEASURES

1. Portable water recycling systems and drinking water filtration units.
2. Strictly avoiding the pour of cooking oil, fat, or grease down the sink which may lead to the contamination of groundwater, and Installing 'Fat Jar' to collect solid waste in the sink.
3. Cleaning and disinfection of boreholes to remove the mud, silt deposits, and other sediments.
4. Some of the cleaning techniques like activated carbon, Ultraviolet, and Ultra Filteration Techniques can be used to reduce deposition, dissolved chemicals, and heavy metals.
5. Awareness among the people to reduce the dumping of waste in water resources.
6. Frequent lab testing with specific intervals and adequate changes to be implemented in the water filtration units,
7. Proper handling of toxic chemicals, medicines, and recycling waste to the maximum before they are thrown or disposed of.
8. Proper waste Management Systems, Strict Assessments of water Quality, Standard, Robust, Modern filtration methods needs to be updated.

VIII.CONCLUSION

The borewell , panchayat and lake water samples have been carefully collected and examined for their physio- chemical characteristics. It is clear from the result that among the 9 samples collected in total during the pre monsoon season, 7 of them were found to be unsafe for drinking as they failed to meet the safe requirements. Thus ,we understood the nature of water in and around our locality and gained knowledge about its condition which makes us to act against the contamination of water pollution from our side. We expect the same from others to have a better water in the future.

REFERENCES

[1]District Groundwater Bronchure, Chennai District, Tamilnadu By T. Balakrishnan, Scientist-D, Government of India, Ministry of Water Resources, Central Ground Water Board, South Eastern Coastal Region, Chennai -November 2008

[2]Nanda Balan, M. Sivakumar, P.D. Madan Kumar, Department of Public Health Dentistry, Ragas Dental College & Hospital, Chennai, Tamilnadu, India, An Assessment of groundwater quality using water quality index in Chennai, Tamilnadu.

[3]Evaluation of ground water quality in chennai city and its suitability for drinking use – JASC: Journal of Applied Sciences and Computation - ISSN NO: 1076-5131

[4]Mikkelsen, P. S., Hafliger, M. Ochs, P. jacobsen, J. C. Tjell and M. Boller (1997).Pollution of soil and groundwater from infiltration of highly contaminated stormwater- a case study. Water Science and Technology, 36 (8-9): 325-330

[5]WHO - Guidelines for drinking-water quality, 4th edition, incorporating the 1st addendum

[6]Indian Standard DRINKING WATER — SPECIFICATION (Second Revision) © BIS 2012 Bureau of Indian Standards, MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG NEW DELHI 110002

[7]Evaluation of ground water quality in chennai city and its suitability for drinking use - jasc: journal of applied science and computations, ISSN NO: 1076-5131

[8]Xiao-nan ZHANG , Qiu-ping GUO, Xiao- xue SHEN, Sheng-wen YU Water quality, agriculture and food safety in China: Current situation, trends, interdependencies, and management - Journal of Integrative Agriculture