

Physico – Chemical Analysis of Groundwater Quality in and around area of Panruti Block in Cuddalore district, Tamil nadu

1.R. PAZHANIRAJA 2. DR. N. LATHA

Research scholar department of chemistry Kandaswami Kandar's college.

Associate professor department of chemistry Kandaswami Kandar's college.

ABSTRACT:

The primary and most important source of drinking water in our country is groundwater which also supplies the majority of domestic, industrial and agricultural water needs. However, due to the growth of industries and the disposal of various types of waste into the ground so the Quality of ground water is currently in Question. In order to determine whether the ground water is potable in accordance with BIS and WHO standards. This project will test it based on a number of water parameters using the water quality index (WQI) and it will also use Arc GIS software to create spatial distribution map for the purpose of clearly representing and understanding the presence of various ground water parameters.

INTRODUCTION

Natural groundwater dissolved mineral and composition are influenced by the sort of environment it is located in which is frequently changing as a result of local industrial or development activity. The quality of ground water may differ from one location to another based on the external environmental circumstances which will be continuously changing as the result of human development. Therefore it is crucial to examine the groundwater that they should have in order to reach the level of potable water. The tests main focus will be on examining the chemical properties of water sample taken from a few towns and villages in Panruti Block of the Cuddalore District.

PURPOSES (OR) OBJECTIVES:

The Primary Goal of this study are to assess the ground water quality in and surrounding the panruti block areas.

- a) To compare the various Towns and Villages in and around Panruti Block with respond to the values of various water quality criteria
- b)To Classify the groundwater properties by mapping them using the spatial variation techniques employing GIS to provide a clear depiction of the many water elements that affect groundwater quality by being either vey few in number compound to their standard quantity or numerous compared to the necessary number.
- c) To determine whether ground water meets BIS measurement and the WQI technique for drinking water.

STUDY AREA:

Panruti is located at 11.77 N and 79.55 E. Panruti is located on the main line of highways.National highways NH-36 passes through this town connects Vikravandi and Mannargudi.The Gadilam river flows through the town and then the Pennai river is nearby Raniti has a hot and humid climate through out the year, with high temprature and higher levels of humidity the monsoon season brings heavy rainfall to the region while the winter season is relatively drier and more comfortable.

TABLE : 1

Sampling point of Panruti region

S.NO	Sampling point	Sampling point number
1	Meliruppru	S1
2	Melmambattu	S2
3	Kadampuliyur	S3
4	Sathipathur	S4
5	Siruvathur	S5
6	Alagappasamuthiram	S6
7	Thideekuppam	S7
8	Palapattu	S8
9	Poongunam	S9
10	Kelliriuppu	S10
11	Marungur	S11
12	Keelmambattu	S12
13	Vallan	S13
14	Sorathur	S14
15	Poongunam	S15

METHODOLOGY:

Water Sample were collected in previously sterilized poly ethylene plastic bottle with cup. The sampling has been carried out in month of February-2024. The samples in the Bottle were kept in the refrigerator. The physicochemical parameters were determined by BIS method.

TABLE: 2

Method Used for Estimation of Variation Physico Chemical Parameter

S.No	Parameters	Methods
1.	PH	PH - Meter method
2.	Electrical Conductivity	Conductometric method
3.	Bicarbonate	Titration method
4.	Chloride	Argentometric method
5.	Sulphate	Turbidity method
6.	Calcium	EDTA Titrimetric method
7.	Magnesium	EDTA Titrimetric method

8.	Sodium	Flame Photo meter
9.	Potassium	Flame Photo meter
10.	Carbonate	Titration method

RESULT AND DISCUSSION

PH:

PH is essentially a measurement of the acidity or basicity of water with range of 0 to 14. A water sample with the PH of less than 7 will be regarded as a acidic while one with a PH of 7 or more will be regarded as neutral 42.5% of the samples taken from there have acidic water while the next are within acceptance limits skin that have a high level may become dry, itchy and irritated. These findings show that melmambattuhas water with PH of 5.2 while meliruppu has a water with a PH of 7. To counter the effect of low PH and it to neutral level, sodium carbonate should be introduced into it water system.

ELECTRICAL CONDUCTIVITY

Drinking water should have an electrical conductivity of 200 to 800(hg/cm). The electrical conductivities of over 82.5% of the water samples from the village is high which means that salt contamination will increase and cause high salinity over bad taste. Sathipattu has a low EC (380 s/cm) while kadampuliur has a high EC (4000 s/cm). High ions in the water may be the cause of the high EC which will make it unsafe to consume. It is possible to set up a reverse osmosis system to lessen the excessive dissolved.

BICARBONATE

An excessive amount of bicarbonate will have an alkalizing impact on the water making it taste more bitter. There is just a trace amount of bicarbonate in every water sample. Bicarbonate levels should not exceed 300 – 500 mg/l. Alkalosis a disorder that raise the PH of tissue, frequently result in a high level of bicarbonate content (288.0 mg/l) while Alagappasamuthiram has a low bicarbonate value(17.08 mg/l) water system injection of mildly acidified water could aid in lowering the Bi-ions in the water. Carbonate can be treated in this cause by injecting a little amount of phosphoric acid or sulphuric acid.

CHLORIDE

A maximum of 250mg/l of chloride is allowed in drinking water. Chloride levels in 67.5mg/l of the water sources studied are higher than what is allowed which could lead to heart problem in those who consume them. Chloride increases the amount of metal in drinking water and impact a disagreeable taste and color by reacting with metal ions to generate soluble salts. Thideerkuppam (918.1 mg/l) has a low chloride value. Reverse Osmosis has a distance of two methods that can be used to reverse chloride from the water.

SULPHATE

It is allowed in water in no greater 200mg/l. The Sulfate concentration in the water sample is high in over 42.5% of the samples. A surplus of sulfate in the water can make it smell foul increased sulphate levels will cause diarrhea and dehydration water pollution levels in palapathu are high (48.4mg/l) while pocngunam has a lower level (367.4mg/l)

CALCIUM

The maximum amount of calcium allowed in water is 75 mg/l 15%of the water samples contain. Calcium levels that are allowed the permissible range is high level in water degrades its quality and increases the risk pf kidney stones in users. While keelirupu ground water has a high calcium content 252.2mg/l. Alagappasamuthiram ground water has a lower calcium value 18.83mg/l. The excess calcium and

magnesium in the water will be broken down by the addition of sodium carbonate to the water system to set up a reverse osmosis system to lessen the excessive sulphate one in the water.

MAGNESIUM

30mg/l is the maximum amount that can be present in drinking water. A one third of the samples that are collected had magnesium levels that were unacceptable. People who drinks water that is magnesium contaminated may get high blood pressure and cardiac problems. Marungur has a high magnesium content 95.7mg/dl while palapattu has a low magnesium level 1.944mg/l water softener are used to treat excess magnesium by exchanging the magnesium ions with sodium or potassium ions.

SODIUM

The maximum amount of sodium that can be present in drinking water is 200mg/l. Nearly 45% of the sample that were obtained go beyond the parameter's permitted limit. Water with a high sodium level will taste salty and may malfunction distillation or must exchange systems.

POTASSIUM

50mg/l is the maximum permissible level. According to BIS the permitted level is surpassed by 72.5% of the samples that were gathered. A high potassium intake can cause muscle weakness, paralysis and irregular heart beats. Reverse Osmosis is frequently used to remove extra potassium ions from water. While Keelmambattu ground water has a high potassium level vallom ground water has a lower potassium content.

TABLE :3PHYSICO – CHEMICAL CHARACTERISTICS OF GROUND WATER FROM PANRUTI BLOCK IN CUDDALORE

PARA METER	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
PH	6.5	6.7	6.8	6.6	6.7	6.8	6.9	7.2	7.3	7.5	7.4	7.6	7.7	7.8	7.9
Electrica l Conduct ivity	850	859	960	380	960	925	930	935	940	945	817	500	525	600	625
Bicarbo nate	315	325	337	340	17. 08	288	425	430	450	460	463	470	472	475	466
Chlorid e	270	200	272	282	291	261	918	147. 4	282	287	263	210	220	221	223
Sulfate	220	225	217	213	209	207	205	367. 4	49. 4	221	190	185	187	185	183
Calcium	68	63	54	78	40	80	45	57	59	252 .1	18.8 3	67	69	70	71
Magnesi um	12	20	18	17	35	15	37	1.94	41	25	95.7	27	21	23	24

Sodium	210	220	180	140	145	155	160	220	215	217	217	173	180	185	190
Potassium	57	57	63	40	52	35	55	37	57	38	59	55	45	43	44

CONCLUSION

The test and analysis revealed that more than 57.7% of the village water are highly polluted ground water three of which were severely polluted making too dangerous for people to use for domestic purposes.

Those water sources with poor water quality indices were also found to be unfit for drinking. Therefore, it is advised to use the above-mentioned treatment techniques on an polluted water sources before allowing for public use.

The majority of the communities have deteriorating water quality

which must be treated appropriately to avoid negative health effects according to the analysis of water quality.

The water quality indexes calculation and BIS standard on the other hand show that certain localities have water quality that ranges from exceptional to good. Chloride and potassium are the two main chemical characteristics that are consistently above the allowable limits in the sampling location following by electrical conductivity. For the majority of the issues with water quality, reverse osmosis is determined to be most effectively treatment about the exceeding of the allowable limits because it can make such chemical parameters harmless.

REFERENCES

1. Adhikari.S.Gupta, S.K and Banarjea S.K heavy metal content of city sewage and sludge journal of Indian society of soil science 41. 160-172 (1993)
2. Feigin.A, Ravina and Shalhavel J. Irrigation with treated sewage effluent
Management for environmental protection advanced series in agricultural 17,224
3. Naswai R-P, singh N and Gupta A-P. Effect of different sources of irrigation on the physico-chemical properties of soil.Indian journal of environmental and agriculture, 3-27-34 (1988)
4. Venkateswara Rao.B physico-chemical analysis of selected ground water samples of Vijayarvada rural and urban in Krishna district,Andra pradesh, Int.J environmental science, 2(2),710-714 (2011)