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SEASONAL CHANGES IN ENVIRONMENTAL WITH HEALTH RISK USING GEO-SPATIAL TECHNIQUES

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ABSTRACT--The present work paying attention on the regular variations in physic-chemical parameters of the Siruvani Water at a Coimbatore district, Tamilnadu during the pre-monsoon and winter season. The total six parameters are measured and analysis in the research work. The correspondence matrix of different physic-chemical parameters are measured and analyzed. There is a relationship among the ecologists and micro planners about the importance for conservation of Siruvani area based commercial water as sustainable source of water in rural communities. The inorganic toxic substances may be observed in the commercial area water is especially low or trace quantity. The present investigation indicated that the mean values of temperature, pH and total alkalinity are peak in summer period and lowest in winter period and signify standards of dissolved oxygen was maximum in winter season and lowest in summer season. The certain standards of total hardness, turbidity, chloride and trace metals are peak in the summer period and lowest in the monsoon period, in commercial water sampled. The poor water quality can produce in small earnings, low down product value and probable human health risks. Manufacturing is declined when the water has contaminants that can reduce growth, reproduction or still reason mortality to the cultured species. The water quality is significant for intake, farming, aquaculture and manufacturing use. ***Keywords: physic-chemical parameters, siruvani water, summer period, winter period.***

I . INTRODUCTION

Water plays an essential role in human's life. Water is an asset that has many usages, including recreation, transportation, and hydroelectric power, domestic, industrial, and commercial uses. Water, which is a part of everything that we do, when contaminated water has a negative impact on human health. Water pollution occurs when harmful substances—often chemicals or microorganisms—contaminate a stream, river, lake, ocean, aquifer, or other body of water, degrading water quality and rendering it toxic to humans or the environment. Water pollution not only increases your chances of falling ill but also affects your hair and skin. About two-thirds of the Indian homes don't get safe and clean drinking water, which increases the risk of waterborne diseases. About 200,000 people die every year for lack of access to safe water. Diarrhea is one of the most harmful diseases caused by water pollution, which is also one of the largest killers in India. Water also helps all forms of life and affects our health, lifestyle, and economic wellbeing. Food supply is also at risk as areas for wheat cultivation and rice cultivation face extreme water scarcity. UNICEF data said the estimated economic burden of waterborne diseases is approximately US$600 million as chemicals contaminate the water in 1.96 million homes. River water is an important surface water resource for households, agriculture (e.g., irrigation, animal husbandry) and industry (e.g., processing water and energy production). Moreover, rivers also provide many ecosystem services (e.g., tourism). River water quantity and quality strongly depend on its runoff system, the seasonal changes and the general soil and vegetation it flows through on its way to the sea. According to a world bank report titled 'Issues and Priorities for Agriculture', India has about 195 million hectares of land under cultivation. Of this, about 63% or nearly 125 million hectares is rain-fed, while remaining 37% or 70 million hectares of the agricultural land depends on irrigation.. In India almost 70% of the water has become polluted due to the discharge of domestic waste matter and industrial waste product into natural water source, Oil leaks, inadequate treatment of waste, poorsanitation and open defecation are the leading causes of water pollution in India. The improper management of water systems may cause serious trouble in availability and quality of water. Water quality can be classified into four types—potable water, palatable water, contaminated (polluted) water, and infected water. Only Potable water is safe to drink, pleasant to taste, and usable for domestic purposes. Since water quality and human health are nearly connected, water analysis before usage is of first importance. Certain physical, and chemical standards like pH, total hardness, alkalinity, chlorides, magnesium, nitrate which are studied to ensure that the water is edible and safe for drinking before it can be represented as potable. According to the Central Ground Water Board, BIS (IS_10500 and revised module IS 10500:2012) has specifications in Uniform Drinking Water Quality Monitoring Protocol. This standard has two limits i.e., acceptable limits and permissible limits in the absence of an alternate source. If any parameter exceeds the limit, the water is considered unfit for human consumption. Therefore; present study was aimed to study the comparative physicochemical analysis of five siruvani area-based water samples using standard methods for pre monsoon and winter period

II.SCOPE OF THE PROJECT

- We are creating the awareness for the society by the way of our experimental investigations and how to protect us between the seasonal changes of monsoons periods.
- We study the near by area district waters and we conclude which water source is best to drink and know how they are treated.
- We understand the harmful minerals presented in the collected water samples and know the effects of the harmful diseases during the seasonal changes.
- In future, we must know how the impure water causing our human bodies health, and also, we know what are all the health affecting factors.
- We can judge by the way of experimental investigation all the bore water sources and open well water sources are always depended upon the soils only

III.STUDY AREA

Our study area is located at 36km west of Coimbatore in the Western Ghats. Siruvani is the major source of drinking water for Coimbatore and it is known for its tasty water. The reservoir at siruvani was built for Tamilnadu by the Kerala government with fund gathered by the Tamilnadu government to meet the drinking water requirement of Coimbatore. The entrances on either side of the road across the dam are characteristic of the Kerala and Tamilnadu architectural styles. It is delimited between north latitude 10.938011degree and east longitude 76.687177degree covering an area of 105.65sqkm. The altitude of siruvani forest ranges between 500-2060m, the hills gradually descend to the siruvani reservoir which lies at about 800m. water drawn each day from the Siruvani dam located around 36km upstream from the city .at present 75mld of treated drinking water from the existing Siruvani

water supply scheme is being supplied to Coimbatore corporation with head works at attapady valley in Palakkad district of Kerala state at a distance of 40km from Coimbatore. The raw water is conveyed through a tunnel to the treatment plant at Siruvani adivaram after full scale treatment clean water is conveyed by gravity through 1000mm psc pipes to the superior service reservoir at Bharathipark from where it is fed to the service reservoirs in western zone of the town and distributed through the network of distributed system. In 2019, the corporation had increased the gap between water supply days after water level in Siruvani dropped significantly. There are nearly 30areas with population of nearly 3lakh peoples are consumed Siruvani water for their commercial and industrial utility. The taste sensation of the water has been attributed to the vegetation through which the water flows in attapady area.

In this consists of low dissolved oxygen (7.37+_0.32mg/l)and siruvani water had the lowest bod of (2.579+_0.1 mg/l) when compared to shanmuga river and it has lowest cod of (1.524+_0.1 mg/l) when compared to aliyar river.

The southwestern and northern parts are hilly part of the Western Ghats and enjoys pleasant climate all throughout the year. It receives both, south-west and north-east monsoons. The average rainfall is 2000-4500mm. The coldest months are December-January when the minimum temperature may dip to 10 degree Celsius. There are four to five dry month's duration of December-April. The maximum temperature is 30 degree Celsius to 32degree Celsius. Geology of this area compromises gneiss, charnockite, quartz biotite gneiss, and pegmatite, also the presence of gold in the attapadi region has been confirmed by Deccan gold mines. This gold having its own wide range of medicinal properties is a sure contributor to the richness of siruvani water.

IV. SAMPLE COLLECTION AND ANALYSIS

Water samples were collected in five different areas of siruvani line located in western Tamilnadu the samples were collected in both pre monsoon (February) and the winter (March). The sampling sites and their areas are shown in table 1. In each area the samples were collected in sterile polyethylene bottle. The samples were taken by both power pumping and the hand pumping. The power pumping is only used for collection of ground water to avoid contaminants. The samples were stored in 4 degree Celsius for further analysis. The collected samples were tested within 24 hrs. The parameters like pH, total hardness, alkalinity, chlorides, magnesium, nitrate, were analysed using standardprocedures.

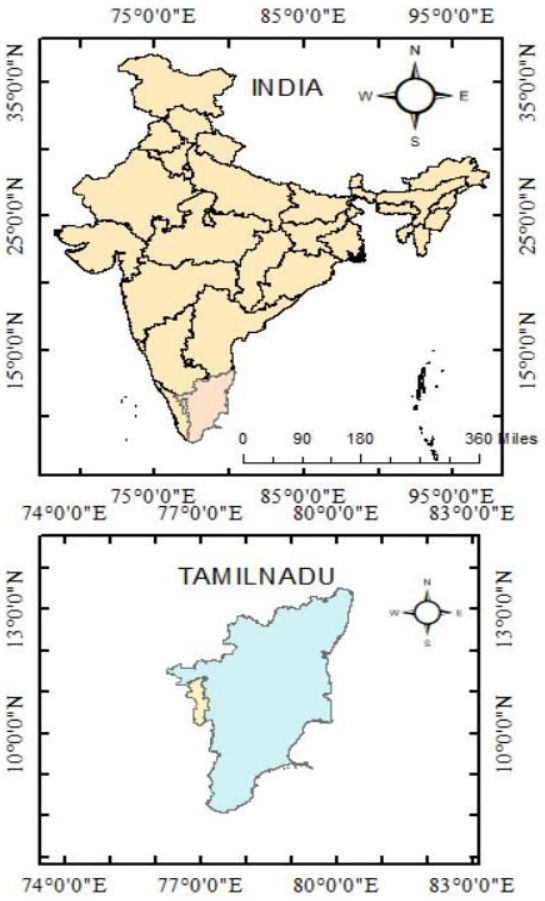

Fig 1. Map showing Coimbatore region in Tamil nadu

V. LOCATION OF SAMPLE COLLECTED AREAS

S.no	Sources	Location	District	Pumping
1	Siruvani water	Booluvampatti	Coimbatore	Hand pumping
2	Ground water	Karamarathur	Coimbatore	Power pumping
3	Surface water	Kallipalayam	Coimbatore	Hand pumping
4	Well water	Velandipalayam	Coimbatore	Power pumping
5	Municipal water	Saibaba colony	Coimbatore	Power pumping

Table 1. Sample Collected Areas

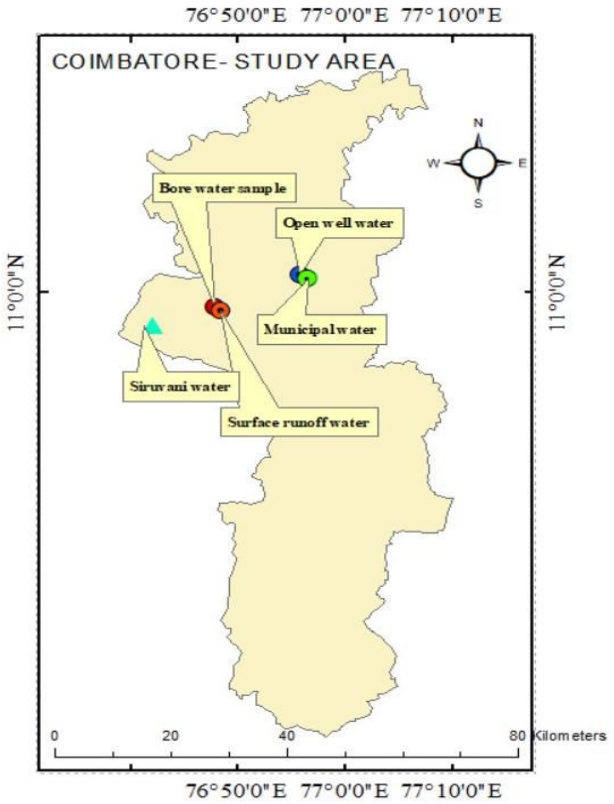

Fig 2. Map where the samples are collected

VI.EXPERIMENTAL INVESTIGATIONS:

pH :

It is a measure of how acidic/basic water is. The range goes from 0-14, with 7 is neutral. pH of less than 7 indicates acidity, whereas a pH greater than 7 indicates base. pH is really measuring of the relative amount of free hydrogen and hydroxyl ions in the water.

S.No	Sample	pH level (feb)	pH level (march)
1	Siruvani dam water	7	7.2
2	Surface runoff water	7.3	6.8
3	Bore water	6.7	6.5
4	Well water	6.9	7.1
5	Municipal Water	7.3	7.5

Table 3 . pH range for water sample

Alkalinity:

Alkalinity is a measure of the capacity of water to neutralize acids or hydrogen ions. Alkalinity can sometimes be referred as "Carbonate hardness". Alkalinity acts as a buffer if any changes are made to the water's pH value. The Alkalinity in the water will help keep the water's pH stabilized. High alkalinity is good to have in our drinking water because it keeps the water safe for us to drink. The amount of Alkalinity that should be in our water is 20-200 mg/L for typical drinking water. Alkalinity is basically dissolved minerals in the water that help neutralize the water we drink.

S.No	Collected samples	Alkalinity range (feb)	Alkalinity range (march)
1	Siruvani dam water	8mg/l	10mg/l
2	Surface runoff water	10mg/l	8mg/l
3	Bore well	620mg/l	580mg/l
4	Open well	560mg/l	620mg/l
5	Municipal water	108mg/l	158mg/l

Table 4 . Alkanity range for water sample

Hardness:

The water hardness is the amount of dissolved calcium and magnesium in the water. Hard water is high in dissolved minerals, largely calcium and magnesium. Depending on the hardness of your water, after using **soap** to wash you may have felt like there was a film of residue left on your hands. In hard water, soap reacts with the calcium (which is relatively high in hard water) to form "soap scum". When using hard water, more soap or detergent is needed to get things clean, be it your hands, hair, or your laundry. Water containing calcium carbonate at concentrations below 60 mg/l is generally considered as soft; 60–120 mg/l, moderately hard; 120–180 mg/l, hard; and more than 180 mg/l, very hard.

S.No	Collected samples	Hardness range (feb)	Hardness range (march)
1	Siruvani dam water	16mg/l	34.8mg/l
2	Surface runoff water	120mg/l	87.10mg/l
3	Bore well	1260mg/l	1351.59mg/l
4	Open well	376mg/l	383.26mg/l
5	Municipal water	102mg/l	52.26mg/l

Table 5 . Hardness range for water sample

Nitrate:

Nitrate is a compound that is formed naturally when nitrogen combines with oxygen or ozone. Nitrogen is essential for all living things, but high levels of nitratein drinking water can be dangerous to health, especially for infants and pregnant women. Nitrate is a compound that occurs naturally and also has many human-made sources. You cannot taste, smell, or see nitrate in water. Consuming too much nitrate can be harmful especially for babies. Drinking water with levels of nitrate at or below 10 mg/L is considered safe for everyone.

S.No	Collected samples	Nitrate range (feb)	Nitrate range (march)
1	Siruvani origin water	0mg/l	0mg/l
2	Surface runoff water	2mg/l	3mg/l
3	Bore well	11mg/l	13mg/l
4	Open well	20mg/l	30mg/l
5	Municipal water	1mg/l	2mg/l

Table 6 . Nitatre range for Water sample

Chloride:

Chloride is a naturally occurring element that is common in most natural waters and is most often found as a component of salt (sodium chloride) or in some cases in combination with potassium or calcium. Sodium chloride may impart a salty taste at 250 mg/l; however, calcium or magnesium chloride are not usually detected by taste until levels of 1000 mg/l are reached. Public drinking water standards require chloride levels not to exceed 250 mg/l..

S.No	Collected samples	Chloride range (feb)	Chloride range (mar)

1	Siruvani origin water	4mg/l	71.16mg/l
2	Surface runoff water	6mg/l	93.62mg/l
3	Bore well	1320mg/l	2958.8mg/l
4	Open well	130mg/l	337.07mg/l
5	Municipal water	23mg/l	59.92mg/l

Table 7 . Cholride range for Water sample

Magnesium:

Magnesium is a nutrient that the body needs to stay healthy. Magnesium is important for many processes in the body, including regulating muscle and nerve function, blood sugar levels, and blood pressure and making protein, bone, and DNA**.** The maximum permissible limit of Mg in drinking water is <30 mg/lit. it is preferably 1- 30 mg/lit.

S.No	Collected samples	Magnesium range (feb)	Magnesium range (march)
1	Siruvani origin water	2mg/l	4mg/l
2	Surface runoff water	3mg/l	4mg/l
3	Bore well	151mg/l	180mg/l
4	Open well	49mg/l	69mg/l
5	Municipal water	12mg/l	15mg/l

Table 8 . Magnesium range for Water sample

VII.COMPARISON CHART BETWEEN WINTER AND PRE MONSOON SEASON

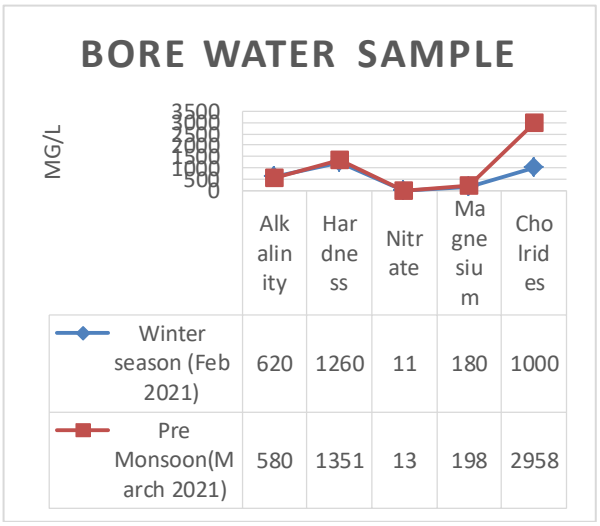

Fig 3. Graph showing the comparison between Winter and Premonsoon of Bore water sample

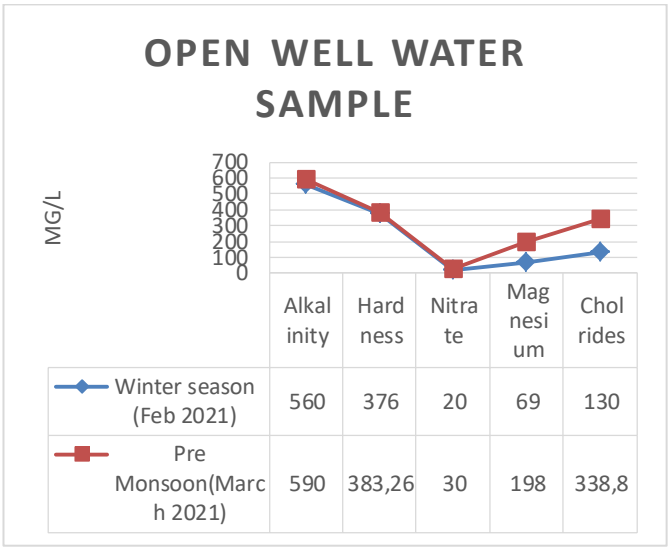

Fig 4. Graph showing the comparison between Winter and Premonsoon of open well water sample

Fig 5. Experiment Investigation in laboratory

VIII.CONCLUSION

- The results indicate between the winter and pre monsoon season should have various physical and chemical parameters by the way of conducted test.
- While comparing WHO standards of drinking water from siruvani dam water, surface runoff water and municipal water chains are within the acceptable limit, also it is safe to drink. So, we mainly concentrate open well and bore well water in siruvani based water line. These waters are exceeding the acceptable range of the drinking water.
- We conclude why the bore, open well water range should always going exceed acceptable limit. The bore well and open well sources are always depending upon the soil conditions.
- The alkalinity range of bore water is high in winter season, this cause kidney disease as possible. By the same way the hardness, chloride, nitrate and magnesium content of the water range in bore

well water as high range when comparing the open well water in pre monsoon season these seasonal variations of minerals may cause several types of health issues sometimes it may lead to coma or death.

- The alkalinity range totally varied in open well water as high-range comparing the bore well water in winter season. This may indicate how we are protecting us from kidney disease. This laboratory tests are very useful to create previous awareness to the society.
- The open well and bore well waters are same chemical parameters comparing to the other district open and bore well waters but it is the world's second best and pure water, we cannot accept how it happened.
- We conclude the usage of treating chemicals is very less amount in siruvani water supply chain when compared to other district water.
- And also, the highest microbial count was observed in other district water and lowest range observed in Siruvani source water.
- Finally, we judge from the lab tests and co-troughing the literature review there is no harmful minerals are presented in siruvani based water while comparing other district water.

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