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TREATMENT OF SEWAGE AND INDUSTRIAL POLLUTION USING SOLAR ENERGY
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Abstract:

Ground water samples collected from different locations in and around Varahanathi River in Periyakulam district were analyzed for physico-chemical parameters such as temperature, Total hardness, P^H , TDS (Total Dissolved Solids), Electrical conductivity, Calcium (Ca), Magnesium (Mg), Sodium (Na), Potassium (K) and Chloride (Cl). Based on the multitudinous experimental results, it is arrived the conclusion that the adjoining ground water sources are terribly affected and the water becomes very salty with very high TDS and it is unfit for drinking purpose and some suitable treatments are necessary so as to keep the values of some parameters among fascinating limits of BIS standards for drinking water. Hence the polluted water is suggested to treatment process. The water treatment may carried initially by using RO system and later it will be treated by suitable modern methods like solar treatment, electro dialysis process, etc

Keywords— Ground Water, Polluted water, Effluents, BIS, RO

I. INTRODUCTION

In our daily life Water is absolutely essential to sustain life. In India ground water has a major role to satisfy the needs of domestic and agriculture purposes. In earth many sources being adversely affecting fresh water by various human activities. Periyakulam is facing water quality problems as well as drinking water shortage, especially during summer season. Contaminated water leads many health problems and scarcity of water makes human life unpleasant. Groundwater contamination is caused due the uncontrolled disposal of industrial and urban wastes and also the uses of chemical substances in agriculture process (fertilizers, herbicides and pesticides). The area is surrounded by many small scale industries and their effluents are discharged in to the river causing impact on the quality of the underground water. Many of these substances will be discharged into the waste-streams to percolate the sewage system. Numerous studies in recent decades have focused on the levels of sewage contaminants.

II. Scope and Objectives of the study:

The sewage from the houses located around the Varahanathi river and also from other canals discharged the polluted water into the river without any treatment. Hence the water quality in this river is badly affected. The contaminated water from the river seeps into the wells and bore wells and

thus pollutes the ground water sources around it. Water becomes salty and unfit for any use. Hence there is a need to study the impact of sewage water in the quality of river water.

2.1. Objectives:

- ❖ To analyze the physico-chemical parameters of the Varahanathi river water during monsoon.
- ❖ To analyze the ground water quality parameters in the water resources in and around the river

III. Materials and Methods:

Varahanathi River is located at Periyakulam Theni district. it is a revenue department. The area of the river is about. The pond capacity is about 0.9747million cum (or) 34.42million (FT).There are seven number of inlets adjoining in sewage water. The sewage from the habitant living around the pond at the distance of 5km are discharged through the drain into the pond, which leads to the pollution of the pond, at an alarming rate. During rainy season, the rain water collects in the river. The rain water is the main source of water to the wells and bore wells located around the ponds at a radius of 5km.The rainwater collected in the river is contaminated with sewage water, which percolate to the ground and reach the bore well and wells. This causes the pollution of the ground and well water, contamination makes the water very hard and salty, so the water becomes unfit for domestic and agricultural purposes. The polluted well and ground water used for agricultural purposes around the pond, this in turn affects the soil. It gets polluted slowly and become unfit for cultivation due to changes in the properties of the soil.

3.1. Analysis of the Contaminated Water:

S.No	Parameter	Method of Analysis
1	Colour	Visual comparison
2	Turbidity	Neplo turbidity meter
3	TDS	Conductivity method
4	Electrical conductivity	Conductivity meter
5	P ^H	P ^H Meter
6	Total hardness	EDTA Titrimetric method
7	Calcium	EDTA Titrimetric method
8	Magnesium	Calculation from Total Hardness
9	Iron	Spectrophotometer
10	Ammonia	Nessler's Method
11	Nitrite	Spectrophotometer
12	Nitrate	Spectrophotometer
13	Chloride	Silver nitrate
14	Fluoride	Colorimetric meter
15	Sulphate	Turbidity method
16	Phosphate	Spectrophotometer

IV. Results and Discussions:

4.1. Drinking Water Standards:

Environment standards for safe drinking water is recommended by Bureau of Indian Standards (BIS), World Health Organization (WHO), and European Economic Community (EEC) etc. Drinking water standard regulation of Bureau of Indian Standards (BIS) set to control the level of contamination in the drinking water. It considers the inputs from several organization i.e. Central, State, Semi Government, Municipal Corporation, Public Health Organization, etc. throughout the standard for setting process.

Sample collection	BIS Limit	S1	S2	S3
Appearance		Slightly blackish	Slightly blackish	Turbid
Color (Pt. Co-Scale)	5	Slightly blackish	Slightly blackish	Blackish
Odour		None	None	Objectionable
Turbidity NT units	5	14	10	86
Total dissolved solids mg/L	500	5675	1106	1926
Electrical conductivity in Microhos/cm		8440	1573	2785
pH	7.0-8.5	6.54	6.48	7.87
Alkalinity total as CaCO ₃		520	340	660
Total hardness as CaCO ₃ (mg/L)	300	1720	440	570
Calcium as Ca mg/L	75	200	86	152
Magnesium as Mg mg/L	30	198	43	38
Sodium as Na	–	700	128	290
Potassium as K	–	135	26	52
Iron as Fe mg/L	0.3	0.84	0.30	1.13
Ammonia as NH ₃ mg/L	–	5.28	0.83	76.36
Nitrite as NO ₂ mg/L	–	1.24	0.10	7.29
Nitrate as NO ₃ mg/L	45	14	10	19
Chloride as Cl mg/L	250	2250	270	640
Fluoride as F mg/L	1	1.0	1.2	1.2
Sulphate as SO ₄ mg/L	200	225	40	64
Phosphate as PO ₄ mg/L	–	4.14	9.99	7.74
Tidy's test 4 hrs as O ₂		4.06	4.13	13.55

4.3. Sensitive Parameters:

Parameters like TDS, EC, total hardness, calcium, magnesium, Iron and chloride are taken as sensitive parameters to indicate the water pollution by industrial effluent from different sources. It is observed that in all the sampling sites in and around Varahanathi river are high compared to the BIS Standards.

V. Conclusion:

An attempt has been made to study the impact of untreated sewage water in Varahanathi river in periyakulam. In fact the sanitary wastewater comprises about 90.9 percent of water along with microorganisms. The river water was used for bathing, washing and also agricultural purposes, but at present the river has become the place for collection of sewage water from the houses located in an around it to a radius of 1km. So the water is completely polluted and reaches an alarming degree of pollution. In order to evaluate the physical, chemical and microbiological parameters, the water samples from the river, wells and bore wells from the residence located in and around the banks of the Varahanathi river were collected. The physico- chemical analysis of water in the pond as well as the ground water sources around the river reveals high turbidity. High TDS shows that the water cannot be used for domestic purposes. The electrical conductivity, total hardness, high chloride content in the pond as well as in the ground water sources indicates that the water cannot be used for human consumption. During the rainy season the rain water harvesting in the river is essential to reduce the impact of sewage pollution by dilution. In order to improve the quality of ground water around the river a suitable R.O system can be used to remove salts present in the well water in primarily.

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