A CORRELATION STUDY OF HEAVY METAL IN THAMIRABARANI RIVER REGION AT TIRUNELVELI DISTRICT, TAMILNADU

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ABSTRACT: *The increased prominence of urbanization and increase demand of surface water at has given rise to a concomitant upsurge of ecological disturbances together with groundwater pollution. Ten representative groundwater samples were collected from various parts of the in the monsoon, winter and summer seasons during 2014-2015 and 2015-2016 those water samples were analysed by standard analytic methods. As many as ten water quality parameters were taken into account in the correlation analysis. Some parameters were found within and some parameters beyond the permissible limit. Correlation coefficients between different of parameters were computed. Significant parameter correlation was found to exist between the pairs of parameters turbidity-alkalinity, turbidity-iron, EC, Na, TDS-EC, TDS-TH, EC-TH, THK and COD BOD. It is also observed that, some of the parameters were found to have weak correlation and some parameters have negative correlation.*

Key Words: *correlation study, thamirabarani, tirunelveli, ground water*

Introduction

Groundwater is one of earth's most vital renewable and widely distributed resources as well as an important source of water supply throughout the world. Its use in irrigation, industries and domestic usage continues to increase where perennial surface water sources are absent.

The quality of groundwater is significant as the case of quantity for all purposes .The pollution of groundwater is of concern, firstly because of increasing utilization for human needs and secondly because of the ill effects of the increased industrial activity (Jain et al., 2006).

Improper waste disposal and unscientific anthropogenic practices over the decades have adversely affected the surface and groundwater quality (Dash et al., 2006).

Objective of the present work

To analyse the physicho-chemical parameters of ground water at Tirunelveli and nearby villages in order to find the ground water quality of thamirabarani river region. To find a suitable remedial measure for the treatment of contaminated ground water using R.O.Plant.

To suggest the people using Reverse osmosis process to get good water quality.

Materials and method

Location of the study area:

The Tamirabarani river basin is one of the 17 river basins of Tamil Nadu and located in Tirunelveli and Thoothukudi districts. It is a perennial source of water supply for irrigation, drinking purposes and power gen- eration. The irrigation system of this basin is centuries old and well developed with its own ayacut system. Tamiraparaniriver originates from Agastiyarmalai on the Western Ghats, at an altitude of about 2000 m, with its number of tributaries (ie) Servalar, Manimuthar, Gatananadhi, Pachaiyar and Chittar forming a well defined, compact drainage basin and flows towards north- east initially and towards east in the middle and at the end confluences with Bay of Bengal near Pazhaya Kaayal .

This basin area has varied climatic conditions influenced by Southwest and Northeast monsoons. The sand carried by the river contains copper and hence the name 'Tamiraparani' which in Tamil means bearer of copper. Tamiraparani river originates from Agastiyarmalai on the Western Ghats, at an altitude of about 2000 m, with its number of tributaries Servalar, Manimuthar, Gatananadhi, Pachaiyar and Chittar forming a well defined, compact drainage basin and flows towards north- east initially and towards east in the middle and at the end confluences with Bay of Bengal near Pazhaya Kaayal.

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Station	Sample
Karaiyar dam	(RS_1)
Agasthiar	(RS_2)
Vickramasingapuram	(RS_3)
Ambasamuthiram	(RS_4)
Kallidaikurchi	(RS_5)
Cheranmadevi	(RS_6)
Kurukuthurai	(RS_7)
Tirunelveli	(RS_8)
Srivaikundam	(RS_9)
Eral	(RS_{10})
Atthur	(RS_{11})

Sample collection

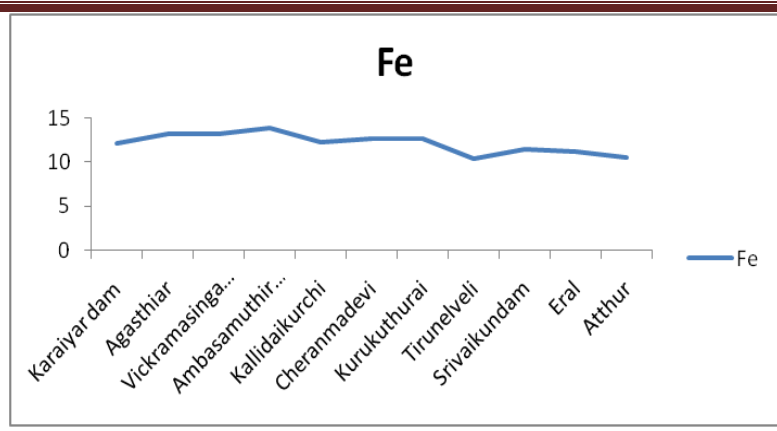
Sample Collection Water and sediment samples were collected from the sampling location during three months (January, February and March 2017).Water samples were collected are 10-15 cm depth in pre conditioned and acid rinsed clean polypropylene bottles washed polyethylene bottles Care was taken to minimize the exposure of samples to the atmosphere. The sample was acidified with Supra-pure grade nitric acid (5ml of 1m acid per litre of sample) and stored in refrigerator at constant low temperature to avoid evaporation.

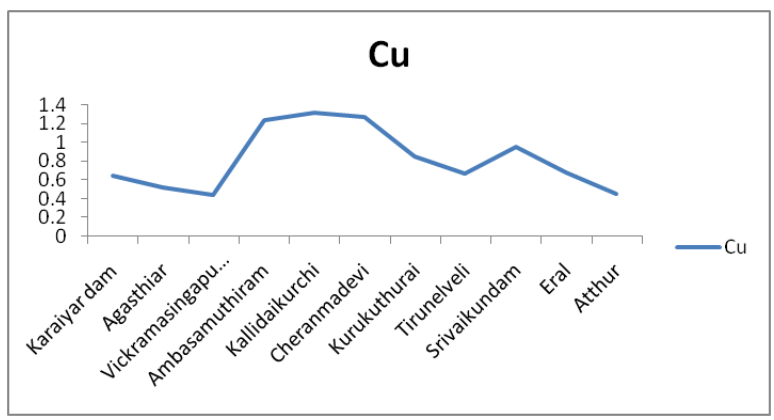
Station	Fe	Zn	Cu	Pb
Karaiyar dam	12.15	0.83	0.64	0.42
Agasthiar	13.2	0.48	0.52	0.38
Vickramasingapuram	13.29	0.60	0.44	0.26
Ambasamuthiram	13.93	0.79	1.24	0.30
Kallidaikurchi	12.28	0.81	1.32	0.52
Cheranmadevi	12.69	0.69	1.27	0.74
Kurukuthurai	12.72	0.48	0.85	0.64
Tirunelveli	10.45	0.54	0.67	0.41
Srivaikundam	11.52	0.52	0.95	0.26
Eral	11.29	0.84	0.68	0.58
Atthur	10.58	1.01	0.45	0.44

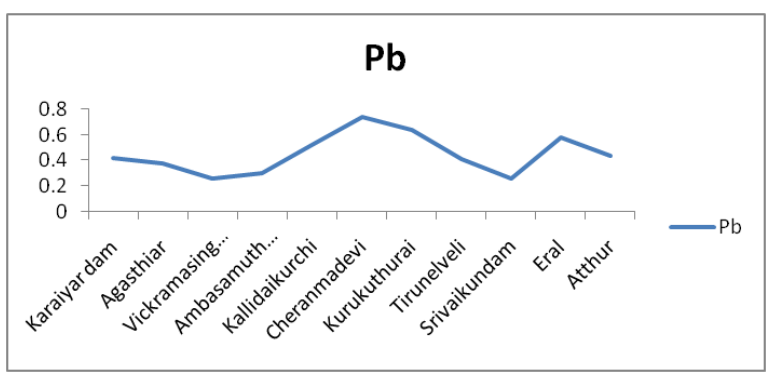
The higher concentration is 13.93µg g-1 in ambasamuthiram and vickramasingapuram and lower concentration 10.58 µg g-1. The higher concentration of zinc 0.83 µg g-1at karaiyar dam 0.81 µg g-1 kallidaikurchi the lower concentration 0.48 at agasthiyar.

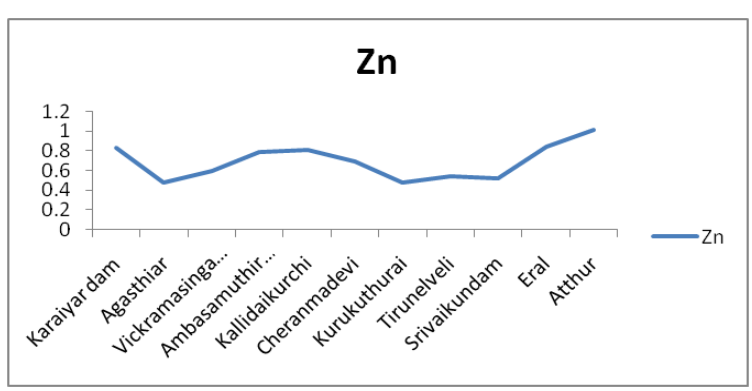
The higher concentration of 0.81 µg g-1 and 0.78 at ambasamuthiram, lower concentration Eral at 0.49 µg g-1. The higher concentration of copper in 1.32 at kallidaikurichi and 1.27 cheranmadevi the lower concentration is 0.44 and 0.45µg g-1at vickramasingapuram and atthur. Finally the presence of lead at 0.74 at cheranmadevi and lower concentration 0.26 at vickramasingapuram.

	Fe	*Zn*	*Cu*	*Pb*
Fe	1			
Zn	-0.25881	1		
Cu	0.322047	0.0488	1	
Pb	-0.10884	0.128393	0.3361	1









Heavy metal pollution of rivers and lakes is a matter of great concern in any ecosystem especially in wet lands and water masses due to human toxicity and bio accumulative effect. In this regard heavy metal pollution of thamarabarani River is of great interest due to its economic and domestic implication in

Chennai city generally pointed to lower concentration of heavy metal pollution compared to other areas of the world. [18] reported that the effluent from paper industry contains variety of organic and toxic heavy metals. Now days in our country so many Rivers are being polluted by heavy metals [19].

The higher concentration of metals observed during monsoon could be attributed to the heavy rainfall and sub sequent river runoff, bringing much industrial and land derived materials along with domestic, municipal and agricultural wastes, which include resides of heavy metal containing pesticides.

Iron has an essential role as a constituent of enzymes, such as cytochromes and catalase, and of oxygen transporting proteins, such as haemoglobin and myoglobin. In fresh waters, iron is also and important nutrient for algae and other organisms. Due to its high abundance with in the earth crust, Iron is ubiquitous in all fresh water environments and often reaches significantly higher concentrations in water and sediments than other trace metals. High iron concentration in fresh waters has long been considered a problem. In domestic use, iron-enriched waters may induce rust formation on plumbing fixtures, the staining of laundry and a metallic taste in drinking water. Hence, much effort has been put into the retention of iron in drinking water. The mining of iron rich ores has caused the degradation of many river ecosystems [20]. Excess of iron will also influence the presence of bacteria (Iron reducing) in fresh water. It affects target organs like liver, cardio vascular system and kidney [21].

Copper in the aquatic environment go along with a heavy growing automobile traffic. Copper metals have a tendency to from complexes with suitable organic species present in water. In the course of stagnation of water, the portion of Cu ions interact with organic species (coming from industrial wastes) having potential complexion ability to precipitate out as in soluble as complex and deposit on the river bed and percolate towards water table. The high concentration of Cu in water is toxic to human body and causes hypertensions, uremia and also produces pathological changes in brain tissues [19].

The levels of Zinc were found to be higher in all the sediment samples collected near industrial areas than the sample collected away from industrial area. Smelting of Zinc ores is the main source of pollution from Zinc. Municipal refuse, automobiles and agricultural use of pesticides and fungicides containing ZnSo4 are the additional sources of environmental pollution due to Zinc. Zinc is very essential micronutrient in human beings and only at very high concentration it may cause harmful effects. Zinc influences growth rate and bone development. The deficiency of zinc manifests itself by retardation of growth, anorexia, lesions of the skin and appendages, impaired development and function of reproductive organ [22].

Lead in water mainly comes from lead processing industries, or due to the use of lead pipes. Natural and untreated water supplies contain about 0.01-0.03 g/L of lead. Problems exist however in areas with soft slightly alkaline water which may dissolve lead from the lead pipes, plastic pipes in which lead has been used as a stabilizer [24]. Contamination of lead in water is a potential problem. The major biochemical effect of lead is its interface with haemo synthesis, which leads to haematological damage. Lead plays an important role in biomethylation. Higher levels of lead in the blood can cause kidney dysfunction and brain damage because it is toxic to the central and peripheral nervous system [22].

Treatment Process

These heavy metal are removed from ground water and surface water by using Reverse osmosis [23]and Zeolite process based on the process hardness causing ions are removed. Using solar energy heavy metal are removed. In the Zeolite process using zinc oxide (ZnO NP)nano particle (23) is activated the zeolite process to remove the heavy metal like Pb, Ni. Silver Nano particles AgNP for act as anti bacterial active compound.

CONCLUSION

The concentration of heavy metals from two different samples water and sediment from four different stations of thamarabarani river were determined. The results indicated that there was a low concentration of heavy metals in water than in sediment samples and river thamarabarani has significant basal contamination levels that do not reach those of clearly polluted areas. However there is a need for monitoring pollution levels in the river.

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