Journal of Aquatic Biology and Fisheries Vol. 2/2014/ pp. 670 to 673

HEAVY METAL CONTAMINATION OF WATER BODIES NEAR HOSPITALS AREAS IN AND AROUND NAGERCOIL TOWN, KANYAKUMARI DISTRICT, TAMIL NADU

Shylasree, G.V.[1]* and Indirani, B[2].
[1]*S.T. Hindu College, Nagercoil-2, Kanyakumari District,*
[2]*Sree Devi Kumari, Women's College, Kuzhithurai, Kanyakumari District*
**Email: Sreeshyla.GV@gmail.com*

Received on: 10 October 2013, accepted on: 12 December 2013

Abstract: Ground water samples were collected during monsoon 2011 (Sep., Oct., Nov.,Dec.) and in post monsoon 2012 (Jan., Feb.) seasons. Heavy metals such as Cadmium, Copper, Zinc and Aluminium were analysed in the water samples collected from five hospital areas in and around Nagercoil Town, Kanyakumari District.

Key words: Ground water, Cadmium, Copper, Zinc, Aluminium.

INTRODUCTION

Our environment has witnessed a continuous and rapid deterioration which cause pollution in all its abiotic and biotic components. Like other developing countries water pollution in India also reaches in alarming situation. Lakes and rivers are deed and drying in India with no plan of recovery and receival. Due to pollution the quality and quantity of utilizable water decreases which ultimately results in Water crisis. So there is need for continuous evaluation of water quality and pollution level in order to promote better living conditions around the reservoirs and to save the reservoirs before there extreme worst condition of eutrophication contamination of environment with toxic heavy metals has become one of the major causes of concern for human kind. Heavy metals in surface water bodies, ground water, soils can be either from natural (or) anthropogenic sources. Currently anthropogenic inputs of heavy metals exceed natural inputs due to increased urbanization and industrialization. The heavy metals are absorbed by crops along with other plant nutrients. The present study was aimed at finding out the levels of contamination by the four toxic heavy metals (i.e) Cadmium (Cd) Copper (Cu) Zinc (Zn) and Aluminium (Al).

If the concentration of heavy metals increase in the environments, they may inhibit metabolic activities. These metals are non biodegradable and persist in nature for a long period and they are toxic to living being fairly in low concentrations (Hason *et al.*, 1986). For (e.x) the metals such as Cd, Hg, Pb are non essential element and are toxic even at low concentration and may cause physiological disfunction (Trivedy and Goel, 1984).

METHODOLOGY

The water samples from five borewells near Hospitals were collected in polyethylene bottles for analysis. The total Heavy metal contents in Water samples were estimated using Atomic Absorption Spectrophotometer.

RESULTS AND DISCUSSION

The samples were collected from near Hospital areas and the concentrations of the Heavy metals such as Cadmium, Zinc, Copper and Aluminium were found out (Table 1).

In the present investigation Cadmium metal ranges from 0.0 mg/l to 0.0330 mg/l in the water samples collected from near private Hospitals Stations I and V. This range is below the recommended levels of the 0.01 and 0.1 mg/l. The level of Cadmium in the water sample collected near Ayurvedic Hospital ranges from 0.0001 to 0.0074 mg/l Station (II). The Cadmium level ranges from 0.0001 to 0.0056 mg/l in the water sample collected near Government Hospital Station (III).

In the case of water sample collected from near a primary Health center ranges from 0.0016 mg/

Table 1. Concentration of heavy metals

Period	Cadmium				
	I	II	III	IV	V
Sep	+0.0014	0.0034	0.0035	0.0024	0.0330
Oct	+0.0052	0.0071	0.0056	0.0098	0.0098
Nov	+0.0001	0.0016	0.0011	0.0011	0.0050
Dec	+0.0064	0.0022	0.0001	0.0016	0.0012
Jan	0.0053	0.0001	0.0006	0.0033	0.0021
Feb	0.0025	0.0013	0.0011	0.0007	0.0000
	Zinc				
Sep	0.0309	0.0210	0.0041	+0.0003	0.0162
Oct	0.0060	0.0032	0.0089	0.00614	0.0315
Nov	0.1426	0.0021	0.036	0.0025	0.0121
Dec	0.0082	+0.0026	0.0010	+0.0038	+0.0047
Jan	0.0304	+0.0009	0.0020	0.0141	0.0070
Feb	0.0393	+0.0002	+0.0045	+0.0036	0.0151
	Copper				
Sep	0.0009	0.0007	0.0004	0.0001	0.0004
Oct	0.0010	0.0097	0.01500	0.0009	0.0085
Nov	0.0005	0.0003	0.0002	0.0003	0.0001
Dec	+0.0001	0.0018	0.0002	0.0009	0.0011
Jan	0.0117	0.0208	0.0007	0.0006	0.01895
Feb	0.0015	0.0104	0.0004	+0.0006	+0.0002
	Aluminium				
Sep	0.0004	0.0003	0.0000	+0.0000	0.0002
Oct	+0.001	0.0001	0.0001	0.0002	0.0003
Dec	0.0002	0.0001	+0.0001	0.0001	0.0001
Jan	0.0105	0.0005	0.0300	0.0003	0.0104
Feb	+0.0001	+0.0000	+0.0002	0.0001	+0.0001

I - Swarnagiri Street; II - Ayurvedic Hospital; III-Asaripallam Govt. Hospital; IV-Near a Health Center; V-Near a Private Hospital

l to 0.06 mg/l. These concentrations reveals that the conc. of Cadmium is below the desirable limit of 0.1 mg/l. The increase in concentration of Cadmium causes the disease Itai-Itai (Kobayashi, 1970).

Copper

The concentration of copper near private hospitals (Station I and V) ranges from 0.009 to 0.017 mg/l and 0.09 to 0.01 mg/l. The concentration is slightly higher in the post monsoon seasons. The desirable limit for drinking water is 0.05 mg/l. From this we can understand that the concentration is higher in the ground water sample from near a private hospital (Station V). The value ranges from 0.0003 to 0.02 in the water sample collected from near the Ayurvedic Government Hospital (Station II). The concentration is slightly higher in the post monsoon season due to lack of rain. The concentration of copper ranges from 0.01 to 0.02 in the water sample collected from near the Government Hospital (Station III). In the water sample collected from an area near a primary health center (Station IV) varies within a range of 0.03 - 0.6. The value is high in the monsoon season due to mixing of sewages from the hospital with the Ground water.

Aluminum

The concentration of Al is within the range of 0.0004 to 0.1 and 0.0001 to .01 mg/l in the water samples collected from areas near private Hospitals (Station I and V). The value is within

the permissible limit. The concentration ranges between 0.0001 to 0.08 in the water sample collected from an area near Ayurvedic Hospital (Station II). The concentration varies between 0.00 to 0.03 in the sample collected near Govt Medical College (Station III). The concentration lies within a range of 0.00 to 0.003 in the water sample collected from an area of station IV. These value lies within the desirable limit. The values are slightly higher in the post monsoon seasons due to lack of rain.

Shuman and Wood Ward (1977) suggested that in the fresh water system copper is strongly complexed with dissolved organic matter.

Zinc

High Zinc values are more likely to occur in acid surface waters (Alain *et al.*, 1994). In the present study the concentration of Zinc varies within a ranges within a range of 0.04 mg/l to 0.126 mg/l and it ranges within 0.0047 - 0.03 near private Hospital areas. In the water sample collected from near an Ayurvedic Government Hospital the conc. ranges within a limit of 0.0009 - 0.02 mg/l. For water samples collected from near Government Hospital the range is between 0.0045 - 0.03 mg/l. Lastly the concentration varies between 0.003 to 0.01 mg/l in the sample collected near a primary health center. All the values are within the permissible limit.

Fig. 1 to 4 shows the Concentration of Heavy metals at different sampling stations.

CONCLUSIONS

The concentration of Cadmium, in the water samples were below the desirable limit. The values were very low during monsoon due to mixing of rain water. The amount of Zinc was slightly higher in the monsoon season because of rainfall. During rainy season there is spreading of number of diseases which will increase the usage of many medicines. These medicines in the form of Hospital wastages will mix with the fresh water systems and will pollute it. Regarding the concentration of copper the values are slightly higher in the monsoon season due to mixing of hospital sewages. Considering the Aluminium concentration the values are slightly higher in the postmonsoon season due to lack of rain.

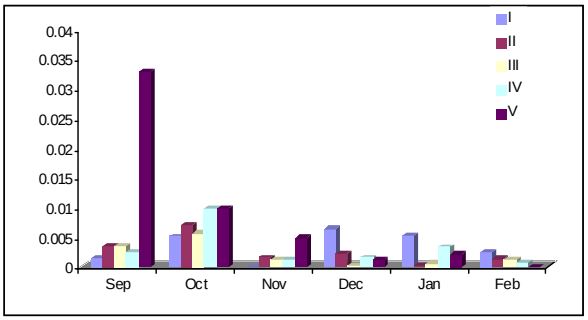

Fig. 1. Concentration od Cadmium (Cd)

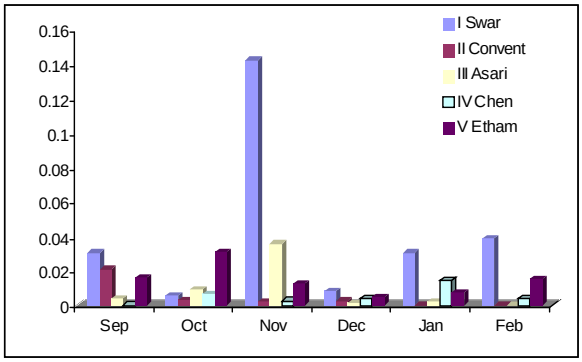

Fig. 2. Concentration od Zinc(Zn)

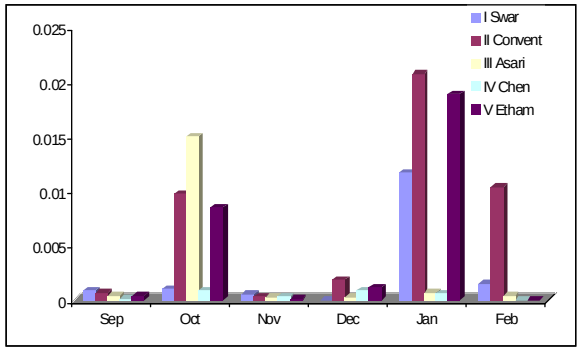

Fig. 3. Concentration od Copper(Cu)

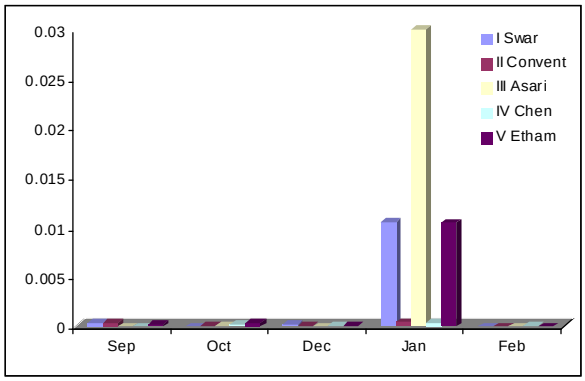

Fig. 4. Concentration od Aluminium (Al)

ACKNOWLEDGEMENTS

The authors are thankful to the management, principal of S.T. Hindu College. They are also thankful to the Director, CECRT, Karaikudi.

REFERENCES

Hasan, M.Z., Pande S.P. and Saxena, K.I. 1986. Heavy metals in aquatic environment water works Association, *J.Ecobiol.*, 10(1):63-66.

Trivedi, R.K. and Goel, P.K. 1984. Chemical and biological methods for water pollution studies. *Env. Publ. Aligarh. India 215-235.*

Kobayashi, J. 1970. Relation between ''Itai-itai" disease and river pollution by Cd from a mine advances in water pollution research. Vol.I Proc.5th international Conf. Pergamon Press, Sanfrancisco, pp. 1-7.

Shuman, M.S. and Woodward, G.P. 1977. Stability Constants of Copper Organic Chelates in aquatic samples. *Env. Sci. Tech., 11: 809-813.*

Alain, C.M., Bourg and Clotilde Bertin. 1994. Diurnal variations in the water chemistry of a river contaminated by heavy metals. Water, Air and Soil pollution. Netherlands, 86: 101-116.