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**Research Article**

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# Heavy metal contamination in the sediments of pond water samples in and around Nagercoil Town, Kanyakumari district

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**ABSTRACT**

*Sediments were collected from four ponds near hospital areas during post monsoon 2011 (Sep, Oct, Nov, Dec) and Pre-monsoon 2012 (Jan, Feb). The Heavy metals like zinc, copper, cadmium, mercury concentrations were found out. From the results the amount of Heavy metals and hence contamination level of sediment samples were analysed.*

**Key words:** Heavy metals, Sediments, Hospital wastes, Cadmium, Mercury.

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## INTRODUCTION

Sediment is the loose sand, clay, silt and other soil particles that is deposited at the bottom of body of water.[1] Heavy metals are bioconcentrated (or) bio accumulated in one (or) several compartments across food webs.[2] The distribution of heavy metals in sediments can provide an evidence of the anthropogenic impact on aquatic ecosystems and therefore aid in assessing the risks associated with discharged waste.[3] According to[4] knowledge of metal fractions and their chemical forms in sediment is of great significance in determining remobilization potential of metals in the environment. Studies on the distribution and forms of heavy metals in sediments can provide the actual environmental impact and bioavailability. Heavy metal contamination of the sediments of the Hospital areas may be attributed due to the usage of medical devices, CFL bulbs, dental products, some drugs, particularly Ayurvaid and Unani drugs also contribute.

In the present analysis four sediment samples from the ponds near hospital areas were taken. Sample I is from an Estuary (Mannakudy), Sample II is from Karimannikapuram Pond near two private hospitals, Sample III is taken from Putheri pond which is also surrounded by hospitals, Sample IV is taken from a pond 3km away from Nagercoil (Chunkankadai pond) which is nearer to private hospitals, small scale industries etc.

## EXPERIMENTAL SECTION

I gm of the powdered dry sample was taken in a beaker and added 15 *ml* 1:1 Nitric acid. The content was soaked for about 24 hours. Then it was filtered and analysed for the concentration of heavy metals using AAS.

## RESULTS AND DISCUSSION

In the present study the value of Cu was high in Station I which is an estuary. The concentration of zinc was higher in Station IV in which there is mixing of waste waters from the nearby hospitals and also mixing of the animal wastes, disposals from the nearby small scale industries, marble factories etc and also since station IV is surrounded by fields the higher valve may be due to the discharges of fertilizers containing zinc. After series of natural processes, the water borne Zn finally accumulates in the sediment, and the quantity of Zn contained in the sediments

reflect the degree of the pollution for the water body[5]. Regarding the concentration of mercury the higher concentration was found in Station IV which may be due to mixing of hospital waste waters which include medical equipment leakage, laboratory chemicals, medicinal wastes etc. The concentration of cadmium was found to be higher in Station IV and Station II which may be due to the application of phosphate fertilizers in Station II which are a major source of cadmium input into the sediment. The higher value in Station IV may be due to mixing of municipal wastes, sewage sledges, Animal wastes etc. The results were shown in the following tables (1, 2, 3, 4) and figures (1.a, 2.a, 3.a, 4.a).

**Table 1 : Concentration of Cu (mg/kg)**

| Stations | Sep | Oct | Nov | Dec | Jan. | Feb | Mean |
|---|---|---|---|---|---|---|---|
| $S_1$ | 0.0105 | 0.0006 | 0.0510 | 0.0274 | 0.6659 | 0.9802 | 0.2892 |
| $S_2$ | 0.0071 | 0.0200 | 0.0195 | 0.0249 | 0.5503 | 0.9162 | 0.2563 |
| $S_3$ | 0.0075 | 0.0192 | 0.0209 | 0.0152 | 0.3309 | 0.8135 | 0.2024 |
| $S_4$ | 0.0079 | 0.0919 | 0.0143 | 0.0395 | 0.6632 | 0.8175 | 0.2723 |

**Fig. 1.a**

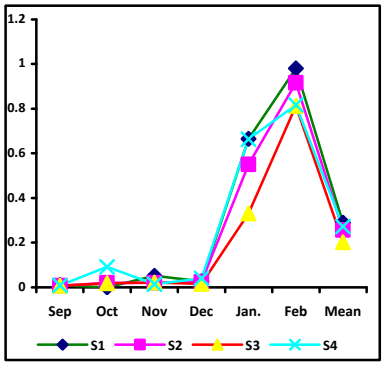



**Table 2 : Concentration of Zn (mg/kg)**

| Stations | Sep | Oct | Nov | Dec | Jan. | Feb | Mean |
|---|---|---|---|---|---|---|---|
| $S_1$ | 0.0337 | 0.1127 | 0.0510 | 0.0274 | 0.1029 | 0.2141 | 0.0903 |
| $S_2$ | 0.0511 | 0.1627 | 0.0193 | 0.0249 | 0.2135 | 0.0909 | 0.0937 |
| $S_3$ | 0.1077 | 0.2555 | 0.0205 | 0.0152 | 0.1721 | 0.0674 | 0.1064 |
| $S_4$ | 0.531 | 0.5769 | 0.0143 | 0.0395 | 0.1036 | 0.0812 | 0.2244 |

**Fig. 2.a**

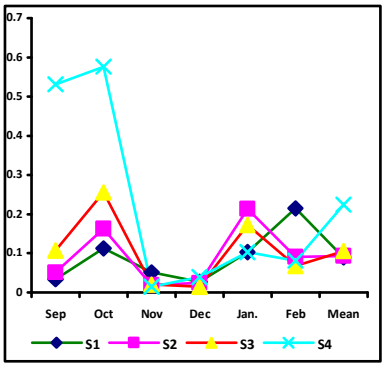



**Table 3 : Concentration of Hg (mg/kg)**

| Stations | Sep | Oct | Nov | Dec | Jan. | Feb | Mean |
|---|---|---|---|---|---|---|---|
| $S_1$ | 0.9053 | 1.80 | 1.94 | 1.94 | 2 | 2.2 | 1.7975 |
| $S_2$ | 0.9036 | 1.90 | 1.92 | 1.96 | 2.2 | 2.4 | 1.8806 |
| $S_3$ | 0.9050 | 1.80 | 1.99 | 2 | 2.1 | 2.3 | 1.8491 |
| $S_4$ | 0.9039 | 1.64 | 1.88 | 2 | 2.4 | 2.6 | 1.9039 |

**Fig.3.a**

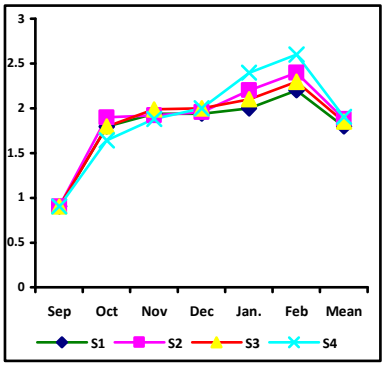
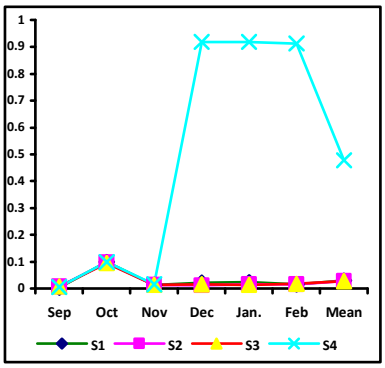



**Table 4 : Concentration of Cd (mg/kg)**

| Stations | Sep | Oct | Nov | Dec | Jan. | Feb | Mean |
|---|---|---|---|---|---|---|---|
| $S_1$ | 0.0046 | 0.0999 | 0.0147 | 0.0215 | 0.0243 | 0.0149 | 0.0299 |
| $S_2$ | 0.0088 | 0.0975 | 0.0133 | 0.0121 | 0.0153 | 0.0164 | 0.0272 |
| $S_3$ | 0.0076 | 0.0954 | 0.0142 | 0.0160 | 0.0143 | 0.0175 | 0.0275 |
| $S_4$ | 0.0068 | 0.0983 | 0.0158 | 0.9186 | 0.9188 | 0.9125 | 0.4784 |

**Fig.4.a**




## CONCLUSION

Analysis of the sediments revealed that they are polluted by the wastages from hospitals, sewage disposals, fertilizers, insecticides etc.

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