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Seasonal Variation and Assessment of Heavy Metal Contamination in the Sediments of Selected Perennial Ponds in Kanyakumari District, Tamil Nadu, India

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***Abstract*:- Pond sediments are an integral part of the pond ecosystem .Geochemical studies of sediments to evaluate the concentration of heavy metals are necessary as it helps to assess the eco toxic potential of the pond sediments. The occurrence of elevated concentration of trace metals in sediments found at the bottom of the water column can be a good indicator of man induced pollution rather than natural environment of the sediment by geological weathering. The presence of heavy metals in aquatic ecosystems is the result of two main sources of contamination; natural processes and natural occurring deposits and anthropogenic activities. In the fresh water environment, toxic metals are potentially accumulated in sediments and subsequently transferred to man through the food chain. Sediments were collected from five ponds during June 2016 to May 2017.The heavy metals like copper (Cu),iron (Fe),manganese (Mn) 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, wastes

INTRODUCTION

Metal pollution of aquatic ecosystems is becoming a potential global problem. 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 bio concentrated (or) bio accumulated in one (or) several compartments across food webs[2]. The distribution of heavy metals in sediments can provide an avoidance of the anthropogenic impact on aquatic eco systems and therefore aid in assessing the risks associated with discharge waste[3]. According to knowledge of metal fraction and their chemical forms in sediment is of great significance in determining remobilization potential of metal in the environment [4]. The heavy metals pollution in the aquatic systems is one of the largest threats to the environment that directly affects flora, fauna and human health. There are various sources of heavy metals; some originates from anthropogenic activities like draining of sewage, dumping of hospital wastes and agricultural activities. Pond sediments are important sinks for various pollutants like pesticides, heavy metals and also play a significant role in the remobilization of contaminants in aquatic systems under favorable conditions and in interactions between water and sediments. Exposure to heavy metals has linked to several human diseases such as development retardation (or) malformation, kidney damage, cancer, abortion, effect on intelligence and behaviors, and even death in some cases of exposure to very high concentrations.

The present analysis five sediment samples from the ponds were taken. Sample I is from Parikulam pond, Sample II is from Kudunkulam pond, Sample III is taken from Chunkankadai pond, Sample IV is taken from Pothiyarkulam pond, Sample V is taken from Nullikulam pond during June 2016 to May 2017.

EXPERIMENTAL SECTION

1 gm of the powdered dry sample was taken in a beaker and added 15ml 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.

RESULT AND DISCUSSION

In the present study the value of Cu was high in pond II (pre-monsoon season) in which there is mixing of waste water from nearby by hospiticals, workshops and also mixing of cosmetic wastes. The concentration of Fe was higher in pond II(pre-monsoon season) may be due to mixing of the sewage sludge, fertilizers, insecticides, municipal wastes etc .The concentration of Mn was higher in pond III(pre-monsoon season) may be due to mixing of the animal wastes, hospitical wastes, disposals from the nearby small scale industries, marble factories and discharges of fertilizers etc. The results were shown in the following tables (1,2,3) and figures(1.a,2.a,3.a).

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Table:1 Concentration of Cu (mg/kg)

PONDS	Pre-monsoon					Moonsoon					Post-monsoon				
	FEB	MAR	APR	MAY	MEAN	JUN	JUL	AUG	SEP	MEAN	OCT	NOV	DEC	JAN	MEAN
Pond 1	0.23	0.25	0.2	0.18	0.215	0.19	0.2	0.19	0.17	0.1875	0.21	0.18	0.15	0.18	0.18
Pond 2	0.35	0.38	0.3	0.32	0.3375	0.28	0.23	0.25	0.003	0.19075	0.002	0.002	0.001	0.15	0.03875
Pond 3	0.28	0.29	0.32	0.3	0.2975	0.25	0.23	0.24	0.2	0.23	0.19	0.19	0.19	0.19	0.19
Pond 4	0.2	0.25	0.21	0.21	0.2175	0.19	0.21	0.18	0.16	0.185	0.19	0.15	0.13	0.17	0.16
Pond 5	0.25	0.29	0.23	0.23	0.25	0.18	0.21	0.18	0.19	0.19	0.13	0.002	0.002	0.002	0.034

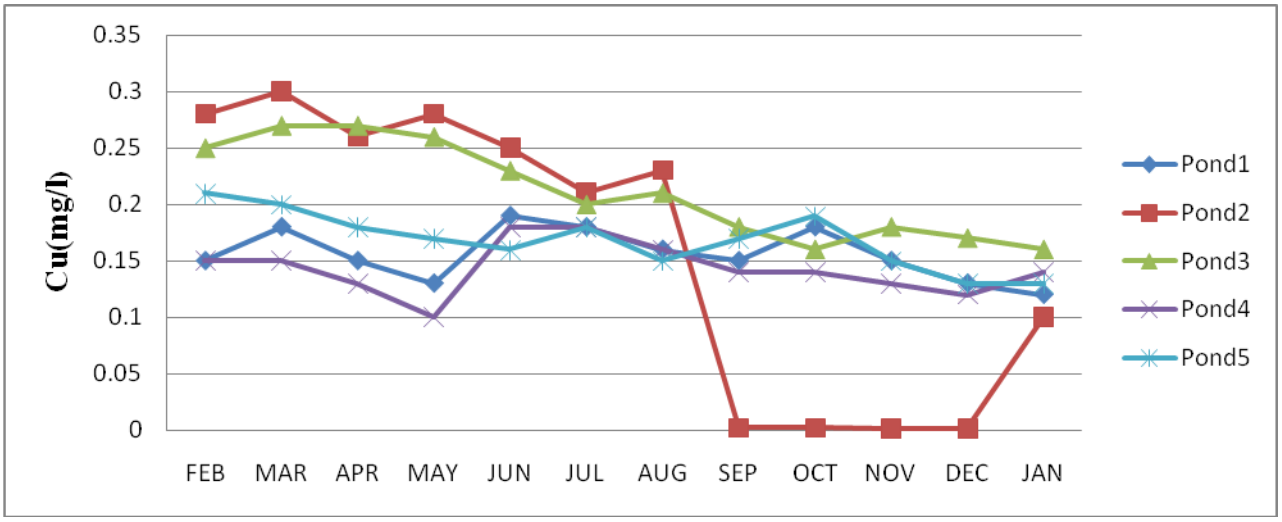

Fig: 1.a

Table: 2 Concentration of Fe (mg/kg)

PONDS	Pre-monsoon					Moonsoon					Post-monsoon				
	FEB	MAR	APR	MAY	MEAN	JUN	JUL	AUG	SEP	MEAN	OCT	NOV	DEC	JAN	MEAN
Pond 1	0.25	0.30	0.28	0.28	0.2775	0.25	0.24	0.21	0.19	0.2225	0.24	0.21	0.19	0.18	0.205
Pond 2	0.39	0.42	0.42	0.42	0.4125	0.25	0.21	0.22	0.19	0.2175	0.17	0.16	0.17	0.17	0.1675
Pond 3	0.35	0.38	0.39	0.35	0.3675	0.23	0.19	0.19	0.24	0.2125	0.21	0.21	0.19	0.25	0.215
Pond 4	0.28	0.29	0.28	0.31	0.29	0.24	0.23	0.20	0.18	0.2125	0.19	0.19	0.18	0.19	0.1875
Pond 5	0.28	0.23	0.25	0.24	0.25	0.19	0.19	0.18	0.19	0.1875	0.23	0.21	0.18	0.16	0.195

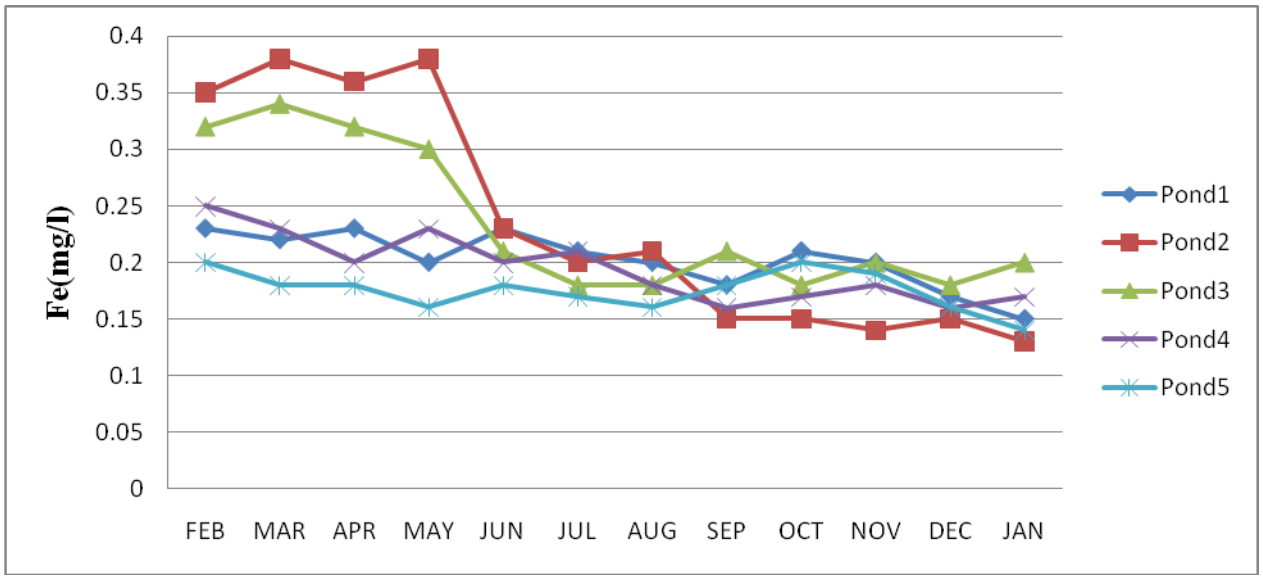

Fig: 2.a

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Table: 3 Concentration of Mn (mg/kg)

PONDS	Pre-monsoon					Moonsoon					Post-monsoon				
	FEB	MAR	APR	MAY	MEAN	JUN	JUL	AUG	SEP	MEAN	OCT	NOV	DEC	JAN	MEAN
Pond 1	0.25	0.23	0.27	0.25	0.25	0.21	0.19	0.20	0.19	0.1975	0.21	0.22	0.19	0.19	0.2025
Pond 2	0.38	0.40	0.38	0.38	0.385	0.24	0.25	0.22	0.19	0.225	0.21	0.19	0.15	0.18	0.1825
Pond 3	0.38	0.40	0.41	0.42	0.4025	0.23	0.24	0.25	0.24	0.24	0.19	0.24	0.21	0.19	0.2075
Pond 4	0.23	0.28	0.29	0.30	0.275	0.21	0.23	0.25	0.22	0.2275	0.18	0.18	0.17	0.18	0.1775
Pond 5	0.26	0.24	0.28	0.23	0.2525	0.21	0.24	0.23	0.24	0.23	0.19	0.19	0.17	0.14	0.1725

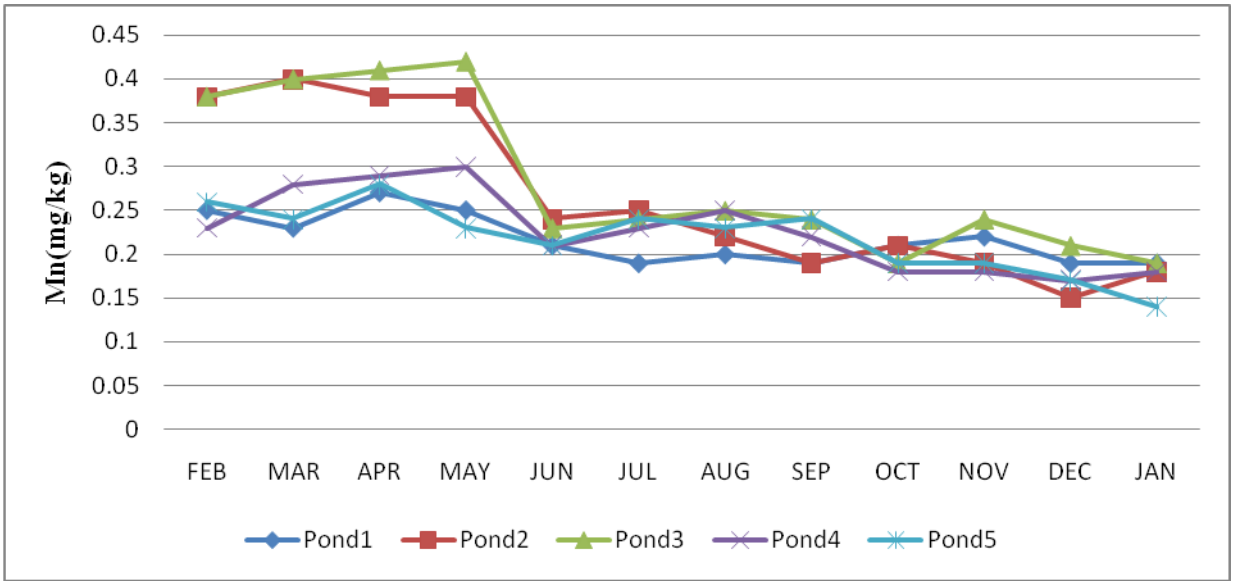

Fig: 3.a

CONCLUSION

Analysis of the sediments revealed that they are polluted by the wastages from hospiticals,sewage disposals, municipal wastes,fertilizers,insecticide etc.

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