Bull. Environ. Contam. Toxicol. (1993) 51:96-98

Environmental Contamination and Toxicology

Mercury Contamination of Groundwater around Hussain Sagar Lake

R. Srikanth, A. Madhu Mohan Rao, Anees Khanum, and S. R. P. Reddy

Department of Botany, Osmania University, Hyderabad-500 007, India

Exposure of man to toxic metals has generated justified global concern ever since Minamata Bay disaster in late 1953. Since then studies on heavy metal contamination of aquatic ecosystem has been increasingly emphasised (D´itri and D´itri, 1977). Among the various sources of pollution, the most important source is however, the waste water fed directly into the aquatic system. This has resulted in the transformation of lakes into sewage depots. Lake Hussain Sagar is a typical example of an industrially polluted lake, situated in the heart of the city. The lake is heavily contaminated by various toxic metals (Mazharuddin et al.,1985). The lake has an area of 4.43 Km with mean depth of 2.5 m. The main sources of water to the lake is the Kukatpally channel, which passes through the industrial belt. More than 400 industries which manufacture various chemicals, drugs, paints and machine tools are located on its bank (Simachalam, 1975). The source of metals is from leakage of overload industrial belt sewer lines which run parallel to the stream, frequently discharging industrial wastes directly into the lake.

In the recent past, the lake Hussain Sagar has been studied from ecological and toxicological perspectives (Zafar, 1966 and Prahlad and Seenayya, 1985). But its impact on the quality of groundwater by seepage is rather overlooked. The object of the present study is therefore aimed at understanding the extent of mercury pollution in the lake. Secondly to know the extent of groundwater contamination by mercury. This study will help to delineate the area of groundwater pollution and serve as baseline data of contamination for further investigation.

MATERIALS AND METHODS

Surface water samples were taken directly from motor boat from six different sites on the lake. Groundwater samples were taken from borewells from a radius of 1-2 Kms. from the lake. The samples were brought to laboratory in properly washed polyethylene bottles rinsed with dil HCl. Immediately after sampling water was treated

---

Send reprint requests to R.Srikanth at the above address.

with HCl to reduce the pH to less than 2 to prevent mercury from evaporating. Samples were later digested following the standard procedure (APHA, 1980) and analysed on a Perkin-Elmer 2380 flameless atomic absorption spectrophotometer.

RESULTS AND DISCUSSION

The concentration of total mercury found in groundwater is presented in Table-1. It is clear from the table that concentrations of total

Table 1. Concentration of total mercury in groundwater around Hussain Sagar Lake (µg/l).

Source	No.of samples	Range	Mean±S.D.
Water samples collected at 1 Km radius from away the lake.	10	6.1-15.0	9.4±0.06
Water samples collected at 2 Km radius from away the lake.	10	3.1-9.2	5.2±0.08

mercury in Hussain Sagar lake was elevated when compared to those of an unpolluted system. The concentration of dissolved mercury in unpolluted fresh water varies between 0.2 and 0.1 µg/l (Moore and Ramamoorthy, 1984). In the present study the mean concentration of total mercury in the lake water was higher than the permissible level (2 µg/l) recommended by various governmental agencies compiled by Calabrese (1978). Further, the concentration of mercury in the surface water of the lake has increased enormously over past five years, when compared to the earlier work of Prahlad (1986) who reported the mean concentration of mercury to be around 7.5 µg/l.

The total mercury concentrations in almost all the groundwater samples analysed were found to be higher than the permissible level of 2 µg/l for potable water (Calabrese, 1978). Although none of the groundwater samples were within the safe levels, the degree of contamination of groundwater were higher at 1 km radius than those of samples collected farther away from the lake (2 km radius). It can be concluded that metal contamination of the lake has a direct impact on ground water quality. In order to prevent further pollution of the lake, remedial measures that has to be undertaken include dredging operation to remove mercury laden sediment and treatment of industrial effluent for metal removal before being discharged into the lake.

REFERENCES

American Public Health Association (1980) Standard methods for examination of water and waste water including bottom sediment and sludges . 14th ed. 201-203.

Calabrese J Edward (1978) Drinking water standards. Their origin and rationale. In:Methodological approaches to deriving environmental and occupational health standards. Wiley Interscience Publication, New York.

D´itri PA, D´itri FM (1972) (ed) In:Mercury contamination - Human tragedy. Wiley Interscience Publication, p 22.

Mazharuddin Khan Md, Jairaj G, Seenayya G (1985) Distribution of heavy metals in surface sediments of Hussain Sagar lake,Hyderabad, India. In:Proc.National Seminar on Pollution Control and Environmental Management, NEERI, Nagpur, India 3:66-75.

Moore JW, Ramamoorthy S (1984) Heavy metals in natural waters. Applied Monitoring and Impact assessment, Springer-Verlag,New York.

Prahlad K, Seenayya G (1985) In situ compartmentation and biomagnification of copper and cadmium in industrially polluted Hussain Sagar lake, Hyderabad, India. Arch Environ Contam Toxicol 15: 417-425.

Simhachalam MJ (1975) Water pollution due to the industrial wastes in main feeding channel of Hussain Sagar lake. In:Hazards of Environmental Pollution, Bombay 219-234.

Zafar AR (1966) Limnology of Hussain Sagar lake, Hyderabad, India. Phykos 5(182):115-126.

Received December 20, 1990; accepted January 15, 1993.