

Distribution of Arsenic in the Estuarine Zone of Two Tropical Rivers

S. K. MANDAL, N. MAJUMDAR, D. GANGULY, M. DEY, C. CHOWDHURY and T. K.

JANA

Department of Marine Science, Calcutta University,

35, B. C. Road, Kolkata- 700019, India

This study aims to collect and to collate the data on the distribution of arsenic in the river, ground and pore water of two tropical estuaries on the east coast of India. The Ganges originates from the Himalaya and the sea end of the river forms Hooghly-Matla estuarine system dominated by mangroves. The Mahanadi originates from the Mahakal Block Mountain in Chattishgarh and passing through the ridges of Eastern Ghats, older than Himalaya opens its mouth into the Bay of Bengal at the False Point. The river segregates into several channels forming a huge delta. The Ganges basin is characterized by varieties of soils out of which laterite and lateritic soils are mainly found in the high rain fall (over 120cm) area of the upland belt fringing the Gangetic alluvial plain in West Bengal. The total drainage basin of the Ganges is 1.06 million km². The Mahanadi drains an area of 0.14 million km² and basin consists of red and yellow soils. Granite and gneisses found in the upper parts of the basin contain water in the weathered mantle and along the rift and horizontal joints. Coastal alluvial tracts have fresh water formation near the surface and depth below 150m.

Spatial distribution of arsenic was found different and its concentration was found lower (237 – 4665 ng L⁻¹ in river water, 310- 19,900 ng L⁻¹ in pore water, 507 – 3552 ng L⁻¹ in ground water and 0.6-1.53 mg kg⁻¹ in sediment.) in the western part (Hooghly –Saptamukhi estuary) than that of eastern part, The Matla estuary (5999-13066 ng L⁻¹ in river water, 16799 ng L⁻¹ in ground water and 17421 ng L⁻¹ in pore water). Increased arsenic concentrations with increasing salinity in the mixing zone of the Hooghly estuary indicated that the As source from the mangrove ecosystem at the lower stretch of the estuary could be greater than that of river As source. In the Mahanadi estuary As concentration was found significantly greater than that of the Hooghly-Matla estuarine system and its distribution was found to be 5882-16872 ng L⁻¹ in river water, 15000 -21875 ng L⁻¹ in pore water and 11765 – 20000 ng L⁻¹ in ground water. Increased arsenic concentrations with decreasing salinity in the Mahanadi estuary indicated its riverine source. The use of arsenic containing pesticides in the past could leave large areas of agricultural land contaminated. The use of arsenic as copper chrome arsenate in preservation of timber could also led to contamination of the environment.

References

- [1] S.K. Acharya, S. Lahiri, B.C. Kaymahashay and A. Bhowmik. *Environmental Geology* **39**, 1127–1137 (2000).
- [2] M.O. Andreae. *Limnology and Oceanography* **24 (3)**, 440–452 (1979).
- [3] D. Das, G. Samanta, B.K. Mondal, R.T. Chowdhury, C.R. Chanda, P.P. Chowdhury, G.K. Basu and D. Chakraborti. *Environmental Geochemistry and Health* **18**, 5–15 (1996).