

## THE LEVELS OF CERTAIN HEAVY METALS IN MARINE ORGANISMS FROM AGUADA BAY (GOA)

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### ABSTRACT

The levels of manganese, iron, cobalt, nickel, copper, zinc and mercury have been measured in marine organisms from Aguada Bay which is one of the major fishing zones in Goa.

The concentration of metals varied from species to species. The observed levels were normal and below toxic limits.

*Key words:* Heavy metals. Aguada Bay. bioaccumulation, muscle.

Wide use of metals in different chemical forms by the industrial, agricultural and domestic sectors has resulted in a great deal of concern about the release of toxic metals in the environment. Increasing awareness of ecological hazards to human life, arising from the discharge of toxic metals from urban and industrial sources have invoke considerable interest in the study of levels and fate of trace metals in the aquatic environment. Various organisms are known to accumulate metals to levels greatly in excess of those in their environment (Stenner and Nickless, 1975; Zingde, Singbal, Moraes and Reddy, 1976; Zingde, Singbal and Reddy, 1979). In Goa a major part of the population consume fishes caught from the Aguada Bay (Fig. 1).

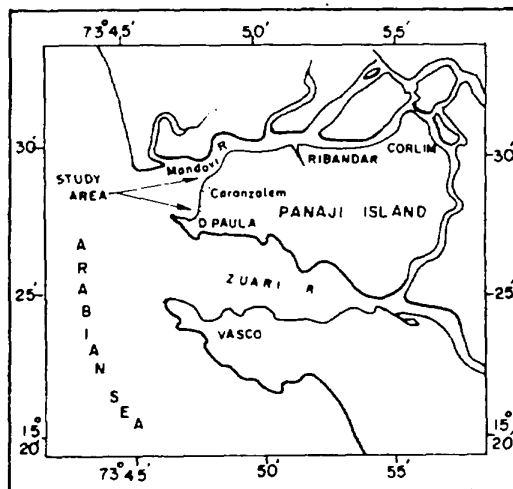


Fig. 1 Map showing trawling area (A and B).



macerated, weighed and analysed in duplicate. For the analysis, standard methods for heavy metals were adopted. The levels of heavy metals found in species analysed are given in Table I.

**Manganese:** The mean concentration of manganese among the fishes analysed was 1.16 ppm, although concentrations upto 3.82 ppm were found in individual fish such as *Cynoglossus semifasciatus* and minimum concentration of 0.25 ppm were found in *Dussumieri acuta* though in certain species, it was not detectable. Kureishy, Sanzgiri and Braganca 1981, have reported the maximum concentration of 12.36 ppm in *Sphyaena picuda* from Andaman Sea. Though the accumulation of manganese varies from species to species, the present work shows that the marine animals have little tendency to accumulate manganese although high levels of this metal have been reported in coastal waters of Goa (Zingde, Singbal, Moraes and Reddy, 1976; Anonymous, 1979).

**Iron:** Among the fishes analysed iron ranged from 2.96 to 22.17 ppm. The highest level was found in *Clupea ilisha*. The high concentration of iron in seawater around Goa (Anonymous, 1979) also contributes in accumulation of the iron in organisms. The maximum level of iron in marine organisms reported is 400 ppm (Bowen, 1966).

**Nickel:** In the present study nickel levels ranged from 1.3 to 5.6 ppm. The concentration of nickel in *Thrissocles purava*, *Leiognathus splendens*, *Dussumieri acuta*, *Sardinella fimbriata* and *Parapenaeopsis stylifera* are not detectable. Kureishy, Sanzgiri and Braganca (1981) also observed that nickel is not detectable in most of the marine organisms from Andaman Sea.

**Copper:** In general, the concentration of copper varied from 0.16 to 0.82 ppm. Among the metals measured the levels of copper were the lowest.

**Cobalt:** The levels of Cobalt varied from 1.82 to 4.23 ppm which is far below the toxic level (10 ppm). This concentration do not appear to be toxic to most aquatic organisms (Portman, 1972). The mean level of cobalt was 3.13 ppm but in some species it was in undetectable levels.

**Zinc:** In all the species, zinc was found to be most abundant of the metal measured. Highest levels of 22.0 and 22.66 ppm were recorded in *Elupeiidae ilisha* and *Hemirhampus marginatus*, the lowest value of 4.44 ppm was recorded in *Johnius dussumieri*.

**Mercury:** In the present work some fishes were analysed for the total mercury content (Table I). Higher concentration of mercury (0.41 ppm) was found in *Sardinella fimbriata* and the lowest concentration (0.12 ppm) in *Tachysurus dussumieri*. Samples of edible mussels *Paphia malabarica* showed an average concentration of 0.23 ppm. There are several reports which give different ranges of concentrations of mercury in fishes and zooplankton along the west coast of India (Somayajulu and Rama, 1972; Tejam and Haldar, 1975). The levels of mercury reported were below the permissible limit (0.5 ppm) (Tejam and Haldar, 1975).

The present levels of trace metals in the marine organisms from Aguada Bay are comparable with the earlier works in estuarine and open sea (Zingde,

Singbal, Moraes, Reddy, 1976; Zingde, Singbal, Reddy, 1979; Kureishy, Sanzgiri, Braganca, 1981). The present study indicates that Aguada Bay is free from heavy metal pollution.

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#### REFERENCES

- Anonymous, 1979. Master plan for pollution control of the rivers Zuari and Mandovi. *NIO Tech. Rep. No. 02/79*, Part I, National Institute of Oceanography, Goa.
- Bowen, H.J.M., 1966. *Trace elements in biochemistry*. Academic press, London and New York, 184-185.
- Kureishy, T.W., S. Sanzgiri and A. Braganca, 1981. Occurrence of some trace metals in fishes from the Andaman Sea. Unpublished.
- Portman, J.E., 1972. The levels of certain metals in fish from coastal waters around England and Wales. *Aquaculture*, **1**: 91-96.
- Stenner, R.D. and G. Nickless, 1975. Heavy metals in organisms of the Atlantic coast of S.W. Spain and Portugal. *Marine Pollution Bulletin*, **6**: 89-92.
- Somayajulu, B.L.K. and Rama, 1972. Mercury in seafood from the coast of Bombay. *Science*, **44**: 207-208.
- Tejam B.M. and B.C. Haldar, 1975. A preliminary survey of mercury in fish from Bombay and Thana environment. *Indian Journal of Environmental Health*, **17**: 9-16.
- Zingde, M.D., S.Y.S. Singbal, C.F. Moraes and C.V.G. Reddy, 1976. Arsenic, copper, zinc and manganese in the marine flora and fauna of coastal and estuarine waters around Goa. *Indian Journal of Marine Sciences*, **5**: 212-217.
- Zingde, M.D., S.Y.S. Singbal and C.V.G. Reddy, 1979. Observations on pollutants of Velsao Bay (Goa). *Mahasagar - Bulletin of the National Institute of Oceanography*, **12**: 69-74.