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## DISSOLVED MERCURY LEVELS AND CHLOROPHYLL CONCENTRATIONS IN THE OFFSHORE WATERS OF THE NORTHEAST COAST OF INDIA

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### ABSTRACT

Dissolved mercury and total chlorophyll concentrations from the surface waters between 16°00' and 20°30'N (upto 1000 m depth zone) were estimated from the samples collected onboard FORV *Sagar Sampada* during October, 1988. The dissolved mercury levels showed an average value of 1.04 µg/l, ranging from 0.3 to 2.2 µg/l and the total chlorophyll to 0.423 mg/m<sup>3</sup> varying from 0.120 to 1.149 mg/m<sup>3</sup>. Mercury concentrations in the presently reported areas is within the tolerance limit but lie well above the risk concentration levels. The high levels of mercury observed can be attributed to the discharge from the major rivers adjoining the coast.

### INTRODUCTION

In recent years reports on hazards of mercury and organomercuric compounds have been appearing in literature. Mercury, a toxic pollutant can enter the coastal environment from industries. The level of mercury in sea water is about 0.2 ppb (Ehrlich, 1975). In the coastal waters subjected to mercury containing waste discharge, mercury content exceeds this level (Higgins and Burns, 1975). In Indian coastal waters high levels of mercury are reported from the coastal waters of Cochin (Balachand and Nambisan, 1986; Alavandi *et al.*, 1989), Thana Creek of Bombay (Zingde and Desai, 1981) and Binge Bay of Karwar (Kureishy *et al.*, 1986). These levels were linked to the discharge of effluents containing mercury into these coastal areas. The status of marine pollution including the mercury levels, around the Indian peninsula has been reviewed by Qasim and Sen Gupta (1980), Qasim *et al.* (1988) and Sanzgiry *et al.* (1988). This communication presents the mercury levels observed in the surface waters between 16°00' and 20°30' N in the northeast coast of India in relation to the standing stock of phytoplankton and mercury level reported earlier from other regions of Indian coasts.

### MATERIALS AND METHODS

Water samples from the surface collected from 14 stations onboard FORV *Sagar Sampada* in October, 1988 formed the material for the study. Station positions are given in Fig. 1. Water samples were collected in polythene containers of 5 l capacity, filtered through glass filters (GF/O.45µ), acidified with 5 ml of conc. HNO<sub>3</sub> and preserved in refrigerator for

mercury analysis. The filter papers were used for chlorophyll determination (Parsons *et al.*, 1985) with 90% acetone using UV/VIS spectrophotometer (551S - Perkin - Elmer). The preserved samples were analysed for dissolved mercury content by cold vapour atomic adsorption spectrophotometry (Hatch and Ott, 1988) using mercury analyser, MA 5800 A (ECIL). The average percentage recovery of total mercury from water was 84.5% by the procedure followed. The minimum detection limit was 0.2 ng/ml.

### RESULTS AND DISCUSSION

As shown in Table 1 the maximum level of mercury observed was 2.2 µg/l and the minimum level of 0.3 µg/l with an average value of 1.04 µg/l. Higher levels of mercury were observed at station 9 (1.9 µg/l) and 10 (2.2 µg/l), which are situated in the sea off the mouths of Devi and Kushbhadra rivers. These high levels can possibly be attributed to mercury containing waste discharged into these rivers and finally reaching the marine environment.

A comparative account of mercury concentration in the shelf waters along Indian coast is given in Table 2. From the available data, Binge Bay of Karwar appears to be more polluted than other areas. Dissolved mercury concentrations in the presently reported area is within the tolerance limit (0.1 mg/l, source ISI, 1981), but above the risk concentration levels (0.1 µg/l; Bernard, 1981) and higher than the levels reported by Sanzgiry *et al.* (1988). Comparison of these data may not be of much validity since the area of study and period of sampling vary and obvi-

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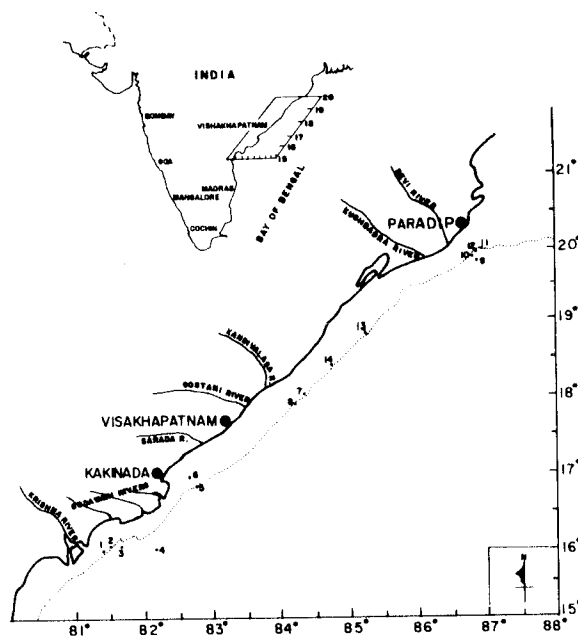


Fig. 1. Study area and the station positions along northeast coast of India.

ously lead to certain amount of discrepancy as the method of mercury analysis followed by various authors differ and also the instrumentation involved.

TABLE 1. Levels of dissolved mercury and total chlorophyll content from 14 stations of northeast coast of India

Station No.	Depth at each station (m)	Dissolved mercury levels ( $\mu\text{g/l}$ )	Total chlorophylls ( $\text{mg/m}^3$ )
1	100	1.1	0.398
2	200	1.1	0.361
3	500	0.3	0.411
4	1000	0.3	0.707
5	200	0.8	1.149
6	65	0.5	0.228
7	100	0.4	0.587
8	500	1.1	0.392
9	1000	1.9	0.120
10	500	2.2	0.342
11	200	1.1	0.274
12	900	0.8	0.444
13	65	1.4	0.188
14	150	1.5	0.314

TABLE 2. Comparative account of mercury concentrations in Indian waters in  $\mu\text{g/l}$

Areas studied	Mercury levels	Source
Binge Bay, Karwar	17.83	Kureishy <i>et al.</i> , 1986
Thane Creek, Bombay	0.247	Zingde & Desai, 1981
Cochin	1.02	Alavandi <i>et al.</i> , 1989
Tuticorin	2.04	Gopinathan*
Arabian Sea	0.078	Qasim <i>et al.</i> , 1988
Bay of Bengal	0.045	-do-
Indian coasts	0.2	Sanzgiry <i>et al.</i> , 1988
Northeast coast of India	1.04	Present authors

\*Personal communication from Dr. C. P. Gopinathan, R. C. of C. M. F. R. I., Tuticorin.

Total chlorophyll content from the 14 stations ranges from 0.120 to 1.149  $\text{mg/m}^3$  showing an average of 0.423  $\text{mg/m}^3$  which is parallel to the values reported earlier (Devassy *et al.*, 1983). It is imperative that mercury concentration and the population of phytoplankton and the flora and fauna at large are negatively correlated (Hollibaugh *et al.*, 1980). In our study no strong relationship was observed. Although there is no apparent deleterious effects observed on the biota of the northeast coastal waters during and after the period of study, the results indicate that the mercury levels in this area lie well above the minimum risk concentration and calls for detailed monitoring to curtail the further rise in the level of mercury. Constant monitoring for heavy metal level including mercury is warranted to find out whether these reported levels are accidental or a recurring phenomenon.

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