

# ARSENIC CONTAMINATION AND DISPERSION IN THE ENGENHO INLET, SEPETIBA BAY, SE, BRAZIL

V. F. MAGALHÃES<sup>1</sup>, C. E. V. CARVALHO<sup>2</sup> and W. C. PFEIFFER<sup>3</sup>

<sup>1</sup> UFRJ, CCS, NPPN, Brazil, e-mail: valeria@nppn.ufrj.br; <sup>2</sup> Universidade Estadual do Norte Fluminense, Laboratório de Ciências Ambientais, CBB, Campos dos Goytacazes, RJ, Brazil, e-mail: carvalho@uenf.br; <sup>3</sup> UFRJ, CCS, IBCCF, Brazil, e-mail: wolf@ibccf.ufrj.br

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**Abstract.** Arsenic distribution and dispersion in sediments of the Engenho Inlet and the Sepetiba Bay were investigated in order to evaluate the extent of the contamination caused by a metallurgical plant installed in the Sepetiba Bay watershed. The ore used in the smelting process, the soil around the plant, and ore waste collected inside the plant were also analyzed for As. Very high As concentrations in the strongly and weakly bound fractions (up to 63 000 and 52 700  $\mu\text{g g}^{-1}$ , respectively) were found in the ore waste. The soils also contained high concentrations of both the strongly and weakly bound fractions (748 and 636  $\mu\text{g g}^{-1}$ , respectively), although the ore itself contained lower levels of the two fractions (63 and 13  $\mu\text{g g}^{-1}$ , respectively). The sediments of the Engenho Inlet had a high degree of contamination (up to 347  $\mu\text{g g}^{-1}$ ) decreasing toward Sepetiba Bay where the lowest concentrations were found (up to 50  $\mu\text{g g}^{-1}$ ). Although lower concentrations were found in the Sepetiba Bay sediments, they are 5 times higher than the world average. The results showed that there is an As transport from the Engenho Inlet to the Sepetiba Bay. These results suggests that the bay's fish and mollusk stock may be contaminated. This contamination may adversely affect the health of the local population, whose main protein supply is seafood.

**Keywords:** arsenic, ore, ore waste, sediments, soil, suspended particles, tropical bay

## 1. Introduction

On a global basis, the principal direct sources of Arsenic into aquatic systems include domestic and industrial wastewater, electric power plants, base metal mining and smelting, and atmospheric fallout of contaminated aerosols (Nriagu and Azcue, 1990). Indirect sources include leaching of slag heaps, ore bodies, and the residues of pesticides and fungicides from soil.

Sepetiba Bay is a semi-enclosed bay with an area of 519 km<sup>2</sup> and a perimeter of approximately 128 km. It is located 60 km from the city of Rio de Janeiro, between 22°54'06" and 23°04'18" latitude, and between 43°33'42" and 44°02'30" longitude (Fig. 1). The bay is the center of various extractive activities, such as recreation, tourism, fishing, mangrove logging. Industrial sites and army installations, are located in large harbours within Sepetiba Bay. These activities pose a significant environmental impact to the area.

Heavy metal contamination in Sepetiba Bay has been widely studied by several authors who consider it to be moderately contaminated (Lacerda, 1983; Pedlowsky,



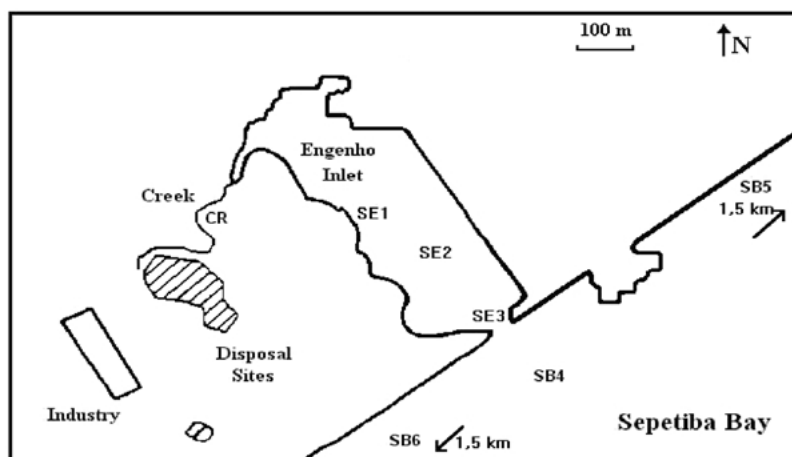
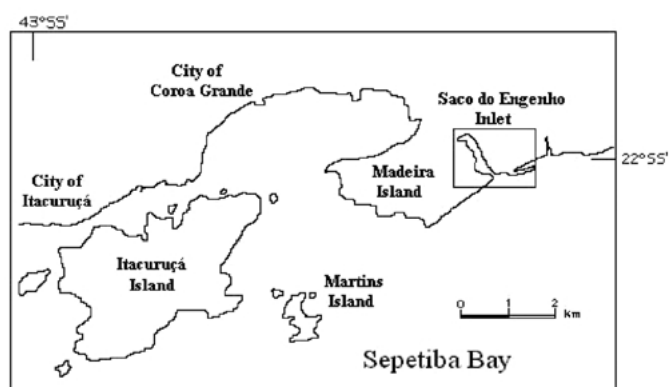
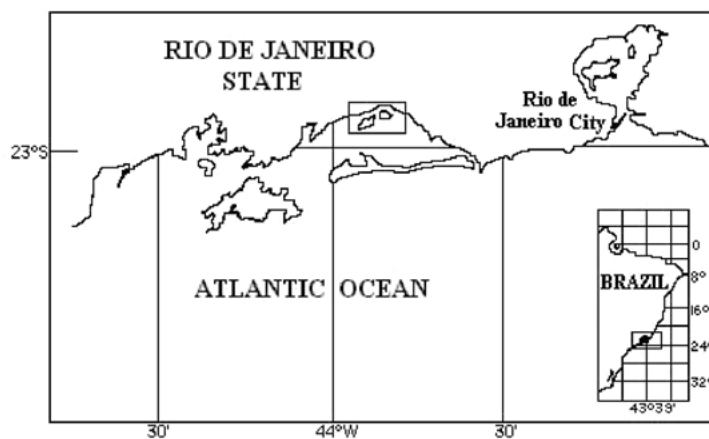


Figure 1. Maps of the studied area.