

# Heavy metal pollution and toxicity assessment in Mallorquin swamp: A natural protected heritage in the Caribbean Sea, Colombia

Fabio Fuentes-Gandara; José Pinedo-Hernández; Edwin Gutiérrez; José Marrugo-Negrete; Sergi Díez

## Abstract

This work reports the level and ecotoxicity impact of metals in the sediments of the Mallorquín swamp, a protected coastal lagoon in the Caribbean coast of Colombia. The distribution of metals was in the following decreasing order: Zn > Cu > Pb > Cd > Hg, showing statistically significant differences among sites. The average Pb and Cd concentrations in sediments were about 17 and 5 times higher, respectively, compared to those in background values. Several contamination indices suggested moderate contamination of Hg, Cu, and Zn, and strong pollution due to Cd and Pb. Multivariate analysis revealed spatial variations for metals and its anthropogenic origin, such as municipal and industrial wastewater discharges (Pb, Zn, and Hg) and agricultural activities (Cd and Cu). These findings showed the negative impact of human activities and the need to apply protective management strategies.

## Keywords

Metals, Sediment quality, Caribbean coast, Colombia, Anthropogenic pollution, Wastewater