Spatial distribution of the concentration of nutrients in sediments in the Araruama hypersaline Lagoon - RJ, Brazil

Julio Cesar Wasserman[*1], Kaylanne Montenegro[2], Teresa Guimarães[2], Aline Almeida[2], and Ricardo Keim[2]

[1]Networ of Environment and Sustainable Development - Universy=ity Federal Fluminense (REMADS-UFF) – Av Litorânea, Campus Praia Vermelha, Niterói, Brazil

[2]Network of Environment and Sustainable Development - Universy=ity Federal Fluminense (REMADS-UFF) – Av Litorânea, Campus Praia Vermelha, Niterói, Brazil

Abstract

Organic pollution in coastal lagoons causes serious effects on the ecosystem structure, creating imbalances that can cause algal blooms and fish mortalities. A solution commonly proposed is the opening bars of the lagoons to the sea, increasing the water exchange rate and diluting contamination. However, these solutions does not consider the storage of nutrients in the sediment, which, in contact with the low concentration water can cause an intense remineralization (diffusion) given by the increase of the gradient between sediment and water. This study was conducted in the hypersaline lagoon Araruama, Rio de Janeiro, Brazil. The distribution of ammonium, nitrite, nitrate, phosphate, in the porewater and total phosphorus and nitrogen of the sediment was made, in order to evaluate the potential for phosphorus and nitrogen diffusion into the water column. The results were presented in distribution maps of the lagoon. Nutrients present relatively high concentrations in the interstitial water with values of 2.600 mg L-1 nitrate in the oxydized areas and values of 900 mg L-1 of ammonium in the reducing areas. Dissolved phosphate display higher concentrations in the Eastern portion of the lagoon, probably under a strong influence of the city of Cabo Frio, where concentrations of dissolved phosphate may reach 2700 mg L-1. Total phosphorus in the sediments show a similar behavior, displaying concentrations of up to 4400 mg L-1. Given the results, it can be noted that the lagoon has been severely contaminated with nutrients these last few decades, due to contributions coming from rivers and the discharge of sewages. With the distribution maps of these nutrients in the lagoon, it is going to be possible to construct models of diffusion of the nutrients to the column and to preview the mechanisms that control the remineralization, if the laggon is connected to the sea.

Keywords: Nutrients, Hipersaline Lagoon, Sediments, Interstitial water

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[*]Speaker