

CONCENTRATION AND DISTRIBUTION EVALUATIONS OF TRACE AND RARE EARTH ELEMENT IN SAMPLE SEDIMENTS OF THE BILLINGS AND GUARAPIRANGA RESERVOIR SYSTEMS

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The Alto Tietê Water Resources Management Unit (UGRHI-6) of the São Paulo Metropolitan Region (RMSP) is composed of 34 municipalities and covers the upper part of the Tietê River. Due to excessive urbanization of the region, its water courses have lost their natural characteristics, resulting severe changes in water flow and quality. The present study evaluated the concentration and distribution of trace and rare earth elements in samples of surface sediment collected at strategic points in the Billings System (including Rio Grande and Guarapiranga Reservoirs). In order to determine the concentration of trace and rare earth elements (Ce, Eu, La, Lu, Nd, Sm, Tb and Yb) in the sediments, instrumental neutron activation technique (INAA) was used. Methodology validation was performed by the analysis of reference materials and Z score calculation. To evaluate the sources of anthropogenic contamination the enrichment factor (FE) and the geoaccumulation index (IGeo) were calculated using NASC, UCC and Guarapiranga region soil Reference Values. The results obtained were compared to the concentration guideline values established by environmental agencies, such as the CCME (Canadian Council of Ministers of the Environment) for As, Cr and Zn, as well as the values found in other published studies carried out in the region. Most of the analyzed points exceeded TEL values and, in some points, PEL values of, for these three elements, indicative of the poor quality of the sediments in these reservoirs. In general terms, the elements As, Cr, Sb and Zn through FE and IGeo calculations present enrichment at all points analyzed, in both collection campaigns, with the exception of the Rio Grande reservoir points. The region where the studied reservoirs are located receives untreated sewage as well as pollution from the urban occupation and industrial and mining activities, making it difficult to accurately identify the pollution sources of the reservoirs. The Billings Reservoir also receives waters from the Tietê and Pinheiros Rivers on rainy days. This study verified higher concentrations of the elements analyzed in the Billings Reservoir, indicating a greater contamination levels in relation to the other regions. This study revealed the need for frequent monitoring of sediment quality in the Billings and Guarapiranga Reservoirs as an important procedure for periodic evaluations of the of the basin water quality, considering its importance in the water supply for the Metropolitan Region of São Paulo.