

ECOLOGICAL RISK ASSESSMENT FOR A TROPICAL URBAN AQUATIC ECOSYSTEM: JACAREPAGUÁ LAGOON

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Abstract

The Jacarepaguá lagoon (JPAL), with a surface area of 3.7 km², is part of a coastal lagoon complex formed by three other lagoons in the city of Rio de Janeiro. Real estate speculation and lack of adequate sanitation infrastructure resulted in the clandestine discharge of sewage in the lagoon. This study aimed to develop an Ecological Risk Assessment for the JPAL, using three lines of evidence (LoE): Water Quality LoE, Ecotoxicological LoE and Ecological LoE. During four bimonthly campaigns in 2019, surface water samples were collected at five sampling points in the JPAL, and one reference point upstream the area of influence where JPAL is located. The Water Quality LoE was based on physical-chemical parameters to estimate the Water Quality Risk. The Ecotoxicological LoE was based on chronic ecotoxicity assays with the microalgae *Chlorella vulgaris* and the microcrustacean *Ceriodaphnia dubia* to estimate the Ecotoxicological Risk. The Ecological LoE was based on the analysis of the richness and abundance of local algae species to estimate the Ecological Risk. The environmental risk was estimated by integrating the risks of the three LoE. The estimated Water Quality Risk for JPAL was 0.68±0.06, classified as high (0.5-0.75). The estimated ecotoxicological risk was 0.78±0.22, classified as very high (0.75-1.0). Three sampling points had a very high risk in 75% of the samplings. The estimated Ecological Risk was 0.72±0.08, classified as high risk. The estimated Environmental Risk for JPAL was 0.79±0.13, which is considered a very high risk. Additionally, 55% of the monitored sampling points had an Environmental Risk >0.75 (very high). In summary, the JPAL ecosystem is currently facing an advanced stage of pollution and degradation, which requires urgent action. Urgent actions are required to stop the clandestine discharge of sewage in JPAL.

Keywords: Tropical lagoon, Water quality index, Environmental Risk, Biodiversity, Lines of evidence.