

Physico-chemical, Biological and Ecotoxicological Characterization of the Water from Paraíba do Sul River in Brazil

Lucas Gonçalves Queiroz, Éryka Costa de Almeida, Flávio Kiyoshi Tominaga,
Flávio Teixeira da Silva, Teresa Cristina Brazil de Paiva*

University of São Paulo, Estrada Municipal do Campinho, S/Nº - Lorena, SP - Brazil
teresa@debiq.eel.usp.br

Keywords: Ecotoxicological characterization, *Daphnia similis*, *Pseudomonas putida*.

Extended Abstract

The Paraíba do Sul River basin is located in the Southeast region of Brazil and occupies an area of approximately 62,074 km², which corresponds to 0.7% of the country area. The basin is located in a region of great socioeconomic importance, being this one of the most industrialized and urbanized areas of the nation. Several factors promote the degradation of its water quality, among them: the inadequate disposal of garbage; indiscriminate deforestation and consequent erosion, causing the silting of rivers; misuse and uncontrolled of agrochemicals and disorderly occupation of the soil. About 90% of the municipalities have no sewage treatment plant. Thus, about 1 billion L of untreated domestic sewage are released in the Paraíba do Sul tributaries daily. In order to better understand the river dynamics and assess the quality of its waters, two collections of water samples were done in the main portions of the State of São Paulo, comprising dry and rainy seasons. The samples were collected from upstream and downstream points concerning four municipalities and then were subjected to physicochemical, biological and ecotoxicological analysis. Water samples analyzed showed pH of 6.6 ± 0.4 , temperature of $23 \pm 1^\circ\text{C}$, conductivity of $155 \pm 85 \text{ Sm/mm}^2$, dissolved oxygen of $4.2 \pm 0.5 \text{ mg/L}$, BOD of $3 \pm 1 \text{ mg/L}$, COD of $12 \pm 9 \text{ mg/L}$, total solids of $163 \pm 71 \text{ mg/L}$ and total volatile solids $106 \pm 48 \text{ mg/l}$. Among positive samples for the presence of coliforms termotolerantes, which corresponded to 68.75% of the analyzed points, the lowest concentration detected was $3.5 \times 10^2 \text{ MPN/100 ml}$, while at other points exceeded $1.6 \times 10^5 \text{ NMP/100 ml}$. Water samples collected at the end of the dry season showed no toxicity. However, the samples collected at the beginning of the rainy season showed acute toxicity in 25% of the points analyzed, using the *Daphnia similis* and chronic toxicity in 50%, from tests using the algae *Pseudokirchneriella subcapitata*. The results showed that the quality of the waters of the river Paraíba do Sul is compromised due to the large amount of effluent released in this water body. The high concentrations of organic matter, BOD and COD contents and possibly toxic compounds, linked to low levels of dissolved oxygen, promotes the degradation of the quality of its waters compromising not only the public supply, but also the dynamics of the aquatic ecosystem, and develop conditions for the overgrowth of microorganisms potentially harmful to aquatic biota and public health such as cyanobacteria.

Acknowledgement

CNPq, CAPES and FEHIDRO