

Assessment of River Water Quality using Survival Analysis

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Extended Abstract

In Brazil, several companies use river water in their production activities, e.g. ethanol producers, steel mills, mining companies, among others, which is returned to the rivers after specific treatment. Therefore, it is necessary to carry out studies to verify whether the specific treatment used is correct.

Although chemical analyses are the most used to check the quality of water returned to the environment, they are expensive and do not offer exposure for long periods. On the other hand, in the literature the use of planarians as bioindicators of water quality is discussed, as unlike classical toxicology tests, animals are able to capture the effects of long-term exposure. Other reasons why they become indicators of environmental samples is because they are easy to cultivate, have a low cost and, because they are organisms considered simple from a phylogenetic point of view, these animals can be used as an indicator of the risk of exposure to pollutants for more complex organisms [1].

Studies on the sensitivity of flatworms have been presented in the literature, such as: the ability of freshwater planarians to regenerate when they come into contact with pollutants [2]; freshwater planarians have a wide geographic distribution, biological plasticity, ease of cultivation in the laboratory, sensitivity to different contaminants and regenerative capacity, and for this reason they have been used as test organisms in ecotoxicological tests [3].

In this survey, data from a company that operates in the petrochemical sector, located in the city of Paulínia, state of São Paulo, Brazil, was used. The company collects water from the Jaguari River to use in its production activities (cooling of tails), and after specific treatments, returns water to the river. To compare the quality of the water returned to the river, samples from five different locations were collected: L1- Breeding site for flatworms; L2- water from the river before use; L3- water from the river after use; L4- Source of the river; L5- Downstream of the Atibaia River.

Four water samples were collected from each location and, in each sample, ten planarians of the *Dugesia Tigrina* species were inserted, totalling 200 samples. Animals' lifetime was monitored for 30 days. In order to compare the lifetime of planarians for different locations, Kaplan-Meier estimates were calculated. Afterwards, the log-rank test was applied to verify if there was a significant difference between the survival curves. Finally, the exponential regression model was adjusted, considering locations as an explanatory variable. Based on the results of the analysis, it was found that the median lifespan of flatworms inserted into the water that is returned by the company after use is practically half the median lifespan of flatworms inserted into the water before being used by the company, indicating a significant increase in existing toxic pollutants.

References

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