

Self-Decay Study Using Streeter & Phelps Model

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The water sources have a natural capability to reduce the quantity of pollutant in water, by physico-chemical and biological processes. It is the water self-decay. In microbiological terms, this capability may be evaluated over the reaction among the deoxygenation and reaeration into the water.

The mathematical model of Streeter & Phelps is classical and threats the relation of both phenomena. It describes how the dissolved oxygen (DO) decreases in the stream along a certain distance through the substrates biodegradation, measured by the biochemical oxygen demand (BOD) [2].

This study presents the application of this model in a stream that is part of one of the watersheds that provides water to Cantareira, a system that carries and supplies 50% of water needs in So Paulo megalopolis [1].

It is the stream Tatu, that crosses the city of Limeira and presents, over its course, several contamination sources and higher and lower degradation scenarios [1]. For analysis and discussions, water samples were collected along the watercourse, to obtain the remaining BOD concentration of the stream and the concentration of the oxygen remaining in water, through lab water experiments.

The results of these analyses and subsequent simulations indicate that the collection points with higher BOD are those nearest the contamination sources, with consequent lower DO and less water self-decay along the path.

With the parameters, it was possible to evaluate the watercourse oxygen behavior and therefore the self-purification capability in this environment, and the results of the simulations allow also an understanding of the biological impact size of the discharge in the stream.

References

- [1] B. C. Manzano, Evaluation of the genotoxicity of waters impacted by domestic and industrial effluents of a highly industrialized region of Sao Paulo State, Brazil, *Environ Sci Pollut Res*, Springer, 2014.
- [2] H. W. Streeter; E. B. Phelps, *A study of the pollution and natural purification of the Ohio river*, US Public Health Bulletin **146**, 1925.