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Prediction of Dissolved Oxygen and Water Quality Modeling Using Computational and Mathematical Simulation BAEKJOON KANG, YOUN JOONG KIM, RICHARD KYUNG, Choice Research Group — For most aquatic life to continue its existence, they require some minimum concentration of dissolved oxygen. Therefore, in order to protect aquatic life, there must be a minimum concentration of dissolved oxygen. In other words, the prediction of the critical saturation deficit is crucial in preventing extinction of aquatic life. In analyzing bio-degradation, Streeter-Phelps Equation of biodegradable material, which is a one-dimensional model of oxygen concentrations in a river, is crucial to understand. The equation assumes waste or wastewater to enter at time, t = 0. After the biodegradable material enters the aquatic environment, the equation predicts the change in dissolved oxygen over a given amount of time. In this paper, DO and BOD were calculated for various water bodies including ponds, sluggish streams, and swift streams. For all the water bodies, this paper shows that DO was depleted faster than it was replenished, and the DO of the stream continued to drop until the rate of deoxygenation equals the rate of re-aearation. Also, depending on the range of reaeration constants, the DO and BOD of the bodies converge to equilibrium in different ways. The DO increases as the reaeration process occurs faster than the deoxygenation process.

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