Modeling Coliform Mortality in Waste Stabilization Ponds

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Abstract
The mechanisms of the reduction of fecal coliforms were investigated in pilot-scale and full-scale wastewater stabilization ponds under tropical climatic conditions. Field studies were conducted in pilot and large waste stabilization ponds with pond depths ranging from 1.0 to 1.82 m and hydraulic retention time between 4.3 and 11.2 d, to develop and verify the model. The observation made indicates that sunlight intensity, pond depth, and pH were the key input parameters to the model. In a multifactor developed model, the bacterial mortality rate constant for pH, k(pH) was 0.0135 d-1 and the ratio of rate constant for the light mortality term to light attenuation coefficient k(s)/K was 5.67 x 10(-4) m cm2/cal. The model was successfully verified by simulation with data obtained from field-scale pond systems in Tanzania and from two other pond systems reported in the literature. A brief model application, including the prediction of water pH, is given to aid the designer.