Diurnal Cycles of Variation of Physical–Chemical Parameters in Waste Stabilization Ponds

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Abstract

Diurnal fluctuations of pH, dissolved oxygen (DO), water, air temperature and sunlight intensity were investigated in the waste stabilization ponds at the University of Dar es Salaam. The variation of these parameters followed the diurnal pattern of light intensity. The rate of oxygen production based on first order linear regression analysis was between 0.02 and 0.36 mg/l per h with high production rate being observed in secondary facultative ponds. The rate of utilization of dissolved oxygen (total respiration) during the night by the microbial population in the pond ranged between 0.016 and 0.435 mg/l per h. The average rate of increase of pH during the day was 0.0006–0.243 units of pH per h, and the rate of decrease was 0.0003–0.101 units of pH per h. The ponds receiving low organic loading showed high diurnal variation of physical–chemical parameters. The relationship between average hourly DO and pH followed a polynomial trend with the coefficient of regression (R^2) ranging from 0.76 to 0.82. It may be concluded that the diurnal variation of the parameters in the WSPs is due to hourly and daily variation of light intensity.

Keywords

Algal biomass;
Diurnal cycle;
Oxygen production and utilization rate;
Primary facultative pond;
Secondary facultative pond;
Maturation ponds