

CONTRIBUTION OF AEROBIC AND ANAEROBIC PROCESSES TO WASTE DEGRADATION IN SUBSURFACE-FLOW CONSTRUCTED WETLAND

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Abstract

Constructed wetlands for wastewater treatment are conventionally designed as aerobic systems. It is thought that wetland plants transfer enough oxygen to meet the oxygen demand of the bulk water. However, no information is available on how much aerobic processes contribute to waste degradation in constructed wetlands. In this study, we hypothesized that in a constructed wetland both anaerobic and aerobic processes play important roles in waste degradation. BOD and DO data from field measurements were used to model BOD and DO deficit in subsurface-flow constructed wetlands. By dynamically distributing BOD to aerobic and anaerobic processes in each small compartment along the wetland at the percentages predetermined from the BOD model, DO concentrations along the wetland have been estimated. It was found that BOD might be met only up to 35% by aerobic processes, and the rest would be met by anaerobic processes. Data obtained from microelectronic studies also indicate that only a very small cylindrical space around individual roots remains aerobic under municipal wastewater loads, and the rest of the bulk solution is anaerobic.

Key words: constructed wetlands, aerobic, anaerobic, BOD model, DO model