Removal Mechanisms of Nitrogen in Waste Stabilization Ponds

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Abstract

The aim of this research work was to determine the major nitrogen transformation and removal mechanisms in primary and maturation ponds. To accomplished this objective, nitrogen mass balance in waste stabilization pond system was determined using a dynamic mathematical model in order to elucidate the biological nitrogen transformation mechanisms that are effective for removal of nitrogen in this pond system. Results show that nitrogen removal efficiency in a primary facultative pond unit was 13.2%, which was largely due to net loss of organic nitrogen to sediments (9.76%) and denitrification (3.42%). On the other hand, maturation pond removed 15.2% of nitrogen received in the influent with denitrification (13.55%) being the major pathway for nitrogen removal. Ammonia volatilization was not a predominant mechanism for nitrogen removal in both primary facultative and maturation ponds. The major nitrogen transformation routes were mineralization and ammonia uptake in the primary facultative pond, but ammonia uptake by microorganisms was a predominant nitrogen transformation mechanism in maturation pond.

Keywords

Nitrogen removal;
Maturation pond;
Primary facultative pond;
Denitrification;
Sedimentation;
Volatilization