

Nitrogen removal in wastewater stabilisation ponds

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ABSTRACT

The objective of this work was to evaluate the nitrogen removal in a wastewater stabilisation pond (WSP) system and to assess the relative contributions of ammonia volatilisation and nitrification–denitrification to the overall N-removal. The water quality at the inlet and outlet of each treatment stage of the Mèze-France WSP system was monitored fortnightly, from July 2003 to August 2004. The mean nitrogen removal was 65%. Nitrogen removal was higher in summer (89%) than in winter (38%). Maturation ponds provided the bulk of the nitrogen removal. The water quality was monitored from April 1st to July 13th 2005 at the inlet and outlet of the third 2 ha maturation pond. Volatilization has been assessed through literature data complemented by specific experiments. Ammonia volatilisation was low. Nitrification took place during warm periods. In June, oxidised nitrogen content reached 30 mg L⁻¹, then decreased when denitrification occurred. Nitrification–denitrification seems to be the major pathway for nitrogen removal in this maturation pond in hot seasons. A dynamic mathematical model was elaborated to simulate the nitrogen transformations. Organic nitrogen, ammonia and oxidised nitrogen contents in the pond effluent were simulated successfully. The model showed that during the period considered nitrification–denitrification and volatilization were respectively responsible for 82 and 18% of the overall nitrogen removal.

Keywords: Ammonia volatilisation; Denitrification; Nitrification; Nitrogen removal; Wastewater stabilisation pond

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