# Nitrification–Denitrification in a Coupled High Rate – Water Hyacinth Ponds

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**Abstract**

Nitrogen transformation was studied in a coupled high rate and water hyacinth (*Eichhornia crassipes*) ponds at the University of Dar es Salaam. Samples of wastewater were collected and examined for water quality parameters which were used as input parameters in a mathematical model. A conceptual model was then developed to model various processes in the system using STELLA 6.0.1 software. The studGupta and Sujathay demonstrated the dominant nitrogen transformation process in high rate pond (HRP) was nitrification, but denitrification dominated in water hyacinth pond (WHP). In a HRP denitrification and volatilization accounted for 69.1% and 23.8% of removed nitrogen, respectively. On the other hand, denitrification and net sedimentation were the major nitrogen removal mechanisms in WHP accounting for 81.9% and 13.1% of removed nitrogen, respectively. Model results indicated that 1.22 g $N/m^2$ day and 0.37 g $N/m^2$ day of nitrogen was removed in presence and absence of biofilm, respectively. The decrease in nitrogen removal in absence of biofilm, demonstrates the importance of biofilm attached onto plants. It was concluded that incorporation of HRP improved denitrification in WHP because it enhanced formation of more nitrates in HRP in order to promote denitrification in wetland unit due to anoxic conditions.

**Keywords**

Denitrification;
High rate pond;
Nitrification;
Nitrogen removal;
Water hyacinth pond