Comparison of semi-natural and constructed wetlands for agricultural wastewater treatment

Jin Xu\textsuperscript{a,*}, Shang Lien Lo\textsuperscript{b}, Ligang Xu\textsuperscript{c}, Ran Gong\textsuperscript{a}

\textsuperscript{a}Department of Environmental Engineering, Nanjing Institute of Technology, Nanjing 211167, P.R. China, Tel./Fax: +86 25 86118974; email: lgxu@niglas.ac.cn
\textsuperscript{b}Graduate Institute of Environmental Engineering, National Taiwan University, 71 Chou-Shan Rd., Taipei 106, Taiwan
\textsuperscript{c}State Key Laboratory of Lake Science and Environment, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Beijing, China

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\textbf{ABSTRACT}

An experiment was carried out to assess the effectiveness of two different wetland systems in the treatment of agricultural wastewater. East River wetland is a semi-natural riparian wetland system, with three functional units, grit chamber, organic oxidation pond, and surface flow wetland unit. The functional units were planted with umbrella plant (\textit{Cyperus alternifolius} L.), canna (\textit{Canna indica} L.), calamus (\textit{Acorus calamus} L.), etc. Yaonigou wetland is a kind of constructed wetland, with different wetland plants. The wetland removed the significant amount and the degree of total suspended solids and biochemical oxygen demand (BOD), respectively, from agricultural wastewater. The results demonstrated that the effluent concentration of ammonia, nitrite, nitrate, and total nitrogen of East River riparian wetland increased in spring and summer, decreased in autumn and winter. On average removal rates for nitrogen compounds ranged from 70.45 to 97.59% for ammonia, 7.87 to 96.25% for nitrite, and 12.5 to 77.8% for nitrate, while the phosphorus removal rate was 56.0–89.90% for soluble phosphorus and 11.11–67.86% for total phosphorus. Comparatively, the purification efficiency of pollutants of Yaonigou wetland was better than East River riparian wetland. Most of the phosphorus concentrations in East River riparian wetland were very low due to the low concentration of influent agricultural wastewater. However, the phosphorus concentration of influent and effluent was high in Yaonigou wetland system. Significant difference was observed between the two wetland systems in relation to agricultural wastewater treatment. Based on these results, it may be concluded that the combined action of microbes and the plants residing in the constructive wetland was the effective for agricultural wastewater treatment.

\textit{Keywords:} Wetlands; Water pollution; Nitrogen; Phosphorus

*Corresponding author.

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