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Feasibility study of pond systems for sewage treatment and agricultural reuse

연못 시스템에 의한 오수처리와 농업적 재이용 타당성 분석

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A pilot study was performed from July 2002 to April 2004 to examine the feasibility of the pond system for further polishing of treatment wetland effluent to agricultural reuse of reclaimed water. Pond was operated as a intermittent-discharge pond during winter period, and continuous flow system during growing season. The constructed pond system was installed in Konkuk Univrsity and the effluent from septic tank of school building was used as an influent to wetland system. The effluent of the wetland was used as an influent to pond systems. In continuous flow system, the results were as follows. The concentrations of total coliform (TC), fecal coliform (FC), and *E. coli* were in the range of 10^5 MPN/100mL, and they were reduced to less than 10,000 MPN/100mL on average after wetland treatments, showing over 95 % removal. And they were further reduced to less than 1,000 MPN/100mL in average, showing over 85 ~ 93 % removal after pond treatment. Turbidity and SS were improved effectively on average and their pond effluent concentration was about 3 ~ 5 NTU and 5 ~ 10 mg/L respectively. BOD₅ concentrations were also reduced substantially to 8 ~ 16 mg/L with about 80 ~ 90 % removal rate after wetland and pond treatment systems. Nutrients removal was relatively low and removal rate for T-N and T-P was less than 43 and 44%, respectively after wetland and pond treatment. In intermittent-discharge system, the results were as follows. The concentrations of total coliform (TC), fecal coliform (FC), and *E. coli* were in the range of 80 ~ 1400 MPN/100mL on average. Average Turbidity and SS were each 5 ~ 8 NTU and 8 ~ 25 mg/L, BOD₅ concentrations were 7 ~ 14 mg/L and T-N and T-P were each 40 ~ 95 mg/L and 4 ~ 5 mg/L. Water quality parameters showed that the concentrations reduced gradually for melting time. Considering stable performance and effective removal of bacterial indicators as well as other water quality parameters, low maintenance, and cost-effectiveness, pond system was thought to be an effective and feasible alternative for agricultural reuse of reclaimed water, and partial discharge time of pond water in March is suggested. This paper describes a preliminary result from pilot study and further investigations are recommended on the optimum design parameters before full scale application.