



## Bathroom wastewater treatment in constructed wetlands with planting, non-planting and aeration, non-aeration conditions

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### ABSTRACT

This study aims to examine the treatment of graywater (GW), especially bathroom wastewater, using subsurface-flow constructed wetlands (CWs) in an apartment complex. It analyzed the removal of organic matters and nitrogen, the status of a wetland by depth, and microbial communities under the conditions of aeration and non-aeration at the inlet section, and planting and non-planting. The results of this study show that aeration at the inlet section and planting affect ORP,  $\text{SO}_4^{2-}$ , and nitrogen by water flowing distance and water depth in a wetland. The result of  $\text{COD}_{\text{cr}}$  removal seems to satisfy the Korean standard (below 20 mg/L ( $\text{COD}_{\text{mn}}$ )) of reuse water quality in all three operational conditions. The aeration at the inlet section has the advantages of effectively removing organic matters at the inlet section, thus preventing its clogging, and removing nitrogen through the nitrification. Aeration at the inlet section and planting are expected to have a positive effect on the wetland status and GW treatment. Therefore, aeration at the inlet and planting will be helpful to construct and operate an artificial wetland in residential areas such as a multi-family housing complex. Ammonia-oxidizing bacteria including *Nitrosomonas*, *Nitrospira*, *Nitrosococcus* and denitrifying or nitrate-reducing bacteria such as *Thiobacillus*, *Achromobacter*, *Pseudomonas*, *Micrococcus* belong to the classes of  $\beta$ -proteobacteria,  $\gamma$ -proteobacteria, and Actinobacteria. These microbial communities found in this study seem to contribute to nitrogen removal. But, the roles of microbial community in CWs need to be further investigated, both qualitatively and quantitatively.

*Keywords:* Greywater; Constructed wetland; Planting; Aeration; Microbial community; Apartment complex

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