



Nitrogen, phosphorus and suspended solid retention efficiency in two constructed wetlands in Latvia

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Water quality monitoring results obtained at surface flow and subsurface flow constructed wetlands in Latvia are presented in this study. During the observation period of 33 months (2014-2017) water quality parameters such as nitrate-nitrogen ($\text{NO}_3\text{-N}$), ammonium-nitrogen ($\text{NH}_4\text{-N}$), total nitrogen (TN), orthophosphate-phosphorus ($\text{PO}_4\text{-P}$), total phosphorus (TP) and total suspended solids (TSS) were monitored twice a month using a grab sample approach. Retention efficiency for monitored water quality parameters was calculated based on their concentrations at the inlet and outlet.

Nutrient retention in the surface flow constructed wetland receiving agricultural drainage from an agricultural catchment was examined in this study. The contributing drainage area to the constructed wetland is 73.6 ha. The monitoring results obtained during this study showed a reduction within the constructed wetland for all examined parameters. The concentrations of total nitrogen and total phosphorous were reduced on average by 16%, and 36%, respectively. In some cases, an increase in nutrient concentrations in water leaving the wetland was observed. Suspended solids were retained on average by 58% during the study period.

The subsurface flow constructed wetland was designed to treat storm water collected from a farmyard with 77% of hard surface used for agricultural equipment and solid manure storage. The storm water is routed through a pipeline system to a sedimentation pond as a pre-treatment plant. Subsequently the water is pumped to the horizontal subsurface flow constructed wetland with the surface area of 160 m². The concentrations of total nitrogen and total phosphorous were reduced on average by 34%, and 82%, respectively. Higher removal efficiency at the studied constructed wetland was observed for phosphorus compounds as these compounds are mainly retained through physical processes such as filtration and absorption occurring in a filter media. The concentrations of suspended solids were relatively high at the inflow and these concentrations were reduced on average by 59% at the outlet of the constructed wetland.

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