

## Constructed wetlands for the treatment of runoff waters from arable land

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Constructed wetlands are among the publicly supported measures for protecting surface waters against nutrient load from agriculture in Finland. The aim of our work is to update the design criteria of efficient constructed wetlands for the Finnish conditions. Our data are collected from the wetland (Hovi) that we constructed in 1998 and from two longer existing wetlands (Flytträsk and Alastaro). Our results thus far suggest that (1) Residence time of water is a crucial factor for nutrient load reduction. In Finnish hydrological conditions where substantial part of the annual runoff takes place during snow melt period in spring, this means that wetland area should be preferably at least 2 - 3 % of its catchment. In Flytträsk, the area of which is 3 % of its catchment, the annual  $\text{NO}_3\text{-N}$  and  $\text{PO}_4\text{-P}$  loads were reduced by 14 % and 15 %, respectively. Meanwhile in Alastaro (0.5 % of its catchment), neither  $\text{NO}_3\text{-N}$  nor  $\text{PO}_4\text{-P}$  was trapped. (2) The higher the input concentrations the higher the reductions. Therefore, wetlands should be situated so that the field-% of their catchments is high. (3) Water should flow evenly over wetland (not via channels) in order to utilise the whole wetland area and to decrease the risk of resuspension of bottom material from the wetland. (4) Wetland vegetation plays an important role in nitrogen load reduction (denitrification). (5) If wetland is going to be constructed on a formerly fertilised field, the uppermost soil layer should be first removed in order to avoid the risk of phosphorus release from the wetland.