

Clay-bound P retention in wetlands

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Introduction

Eight constructed wetlands, situated in agricultural areas in the south of Sweden, were investigated with respect to phosphorus (P) retention. The wetlands receive stream water from areas dominated by clay soils, where P is usually transported mainly in particulate form.

Hence, the most important retention mechanism in these wetlands should be *sedimentation*.

Aims

The aims of this on-going study are to investigate the following:

- > The quantitative retention of total suspended solids (TSS) and P in the respective wetlands
- > The spatial distribution of different size fractions in wetland sediments
- > If differences in TSS and/or P retention can be explained by catchment characteristics and wetland design factors

Materials and methods

The wetlands

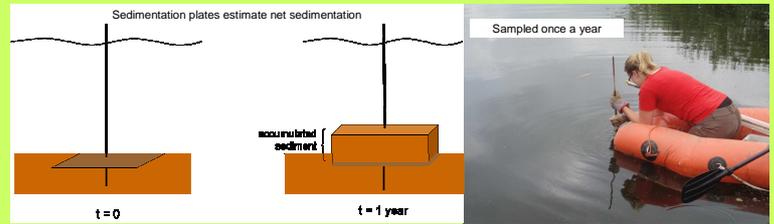
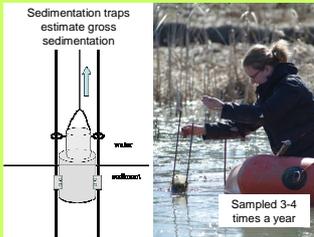
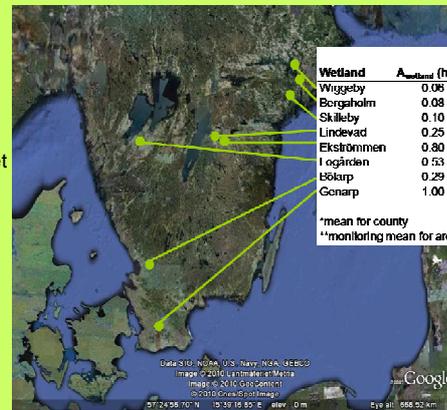
- Situated in agricultural areas in the south of Sweden dominated by clayey soils
- Differ in size, design, hydraulic and P load

Sediment studies

- Sedimentation plates have been placed in all wetlands to estimate annual variation in net sedimentation
- Additional sedimentation traps have been placed in three of the wetlands, to estimate gross sedimentation
- Accumulated sediment on plates are sampled once a year and in traps 3-4 times a year

Future analyses

- > Sediment analyses
 - > Total phosphorus (TP), organic content
 - > Sequential extraction (bioavailable P → Fe-P → Al-P → Ca-P → residual P)
 - > Size fractionation
- > Possible relationships between TSS and P retention and catchment characteristics will be investigated statistically



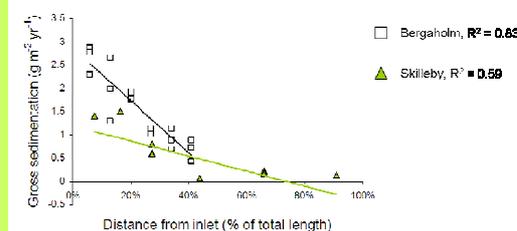
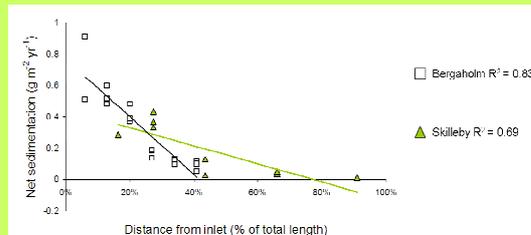
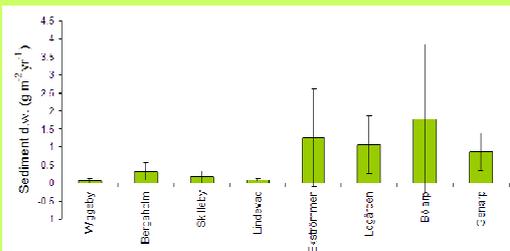
Preliminary results

In the first year, net sediment accumulation varied significantly between the wetlands (ANOVA, $p < 0.05$) and ranged between 0.04 and 1.70 $\text{g m}^{-2} \text{yr}^{-1}$. There was no correlation between sediment accumulation and runoff or A_w/A_c .

In two of the wetlands, there was a clear decrease in net sedimentation (plates) from inlet to outlet ($p < 0.05$). A similar relationship was found for gross sedimentation (traps) in the same wetlands.

In two wetlands (Bölarp and Skilleby), the sediment was darker and less consolidated towards the outlet (visual observation).

This indicates sedimentation of internally generated particles (e.g. litter and detritus). The origin of the darker sediment will be revealed as the samples are analysed.



Current status

At the moment, more information is collected for this study, including:

- > Wetland design (area/width, depth profile etc.)
- > Chemical properties of the sediment sampled from plates and traps
- > Catchment characteristics (soil type, topography, soil management etc.)



Sediment accumulated on a sedimentation plate for one year

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