

## EFFECTIVE MITIGATION OF P LOSSES BY FOCUSING ON HIGH RISK AREAS

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According to the EU's Water Framework Directive, costs of mitigation methods for improving water quality should be evaluated for implementation of cost-effective methods. In Norway, a work is going on to define costs of mitigation methods for P losses from different sectors. In general, the results are pointing to agriculture as the most cost-effective sector for methods to mitigate P loss. However, the effect of mitigation methods in agriculture shows great variability with the highest effect for areas defined as high risk areas and sometimes low effect of mitigation methods implemented on areas with low risk of P losses.

Since the early 1990's subsidies for reduced tillage in Norway, has been given to farmers according to erosion risk of their soils. Detailed soil maps for agricultural areas define the erosion risk class for each field and are used to define the level of subsidies for each farm. The erosion risk classes are 1: < 500 kg/ha; 2: 500-2000 kg/ha; 3: 2000-8000 kg/ha 4: >8000 kg/ha and subsidies has primarily been given to reduced tillage in erosion risk class 3 and 4.

The effect of reduced tillage has been modelled for different tillage methods on the different erosion risk classes based on data from lysimeter studies in south-eastern Norway (Lundekvam, 2002). For example, the effect of no autumn tillage compared to autumn tillage on P loss from soils in erosion risk class 3 was estimated to approx. 5 kg P/ha, whereas the corresponding effect in erosion risk class 2 was approx. 1.5 kg P/ha. Anticipating that the cost of no tillage are the same for soils in the two erosion risk classes, the cost-effectiveness will be 60 Euro/kg P in erosion risk class 3 and 200 Euro/kg P in erosion risk class 2.

Implementation of mitigation methods at the landscape scale, e.g. buffer zones along water ways and constructed wetlands, will also have a higher effectivity with higher input of sediments and P, while the costs of building a constructed wetland do not change much according to the amount of P retained. Accordingly, the constructed wetland has a higher cost-effectiveness in areas with high erosion compared to areas with low erosion and corresponding P loss.

Defining risk of P losses and effect of mitigation methods are hence a prerequisite for the most cost-effective mitigation strategy. The risk of P losses may be defined by the P index, comprising the combined effect of mitigation methods on P status, erosion and retaining of P in the landscape. Though calculations of cost-effectiveness include huge variation and uncertainty, they may guide managers as to which mitigation methods should be prioritized within a catchment and on which areas.