3rd Science for the Environment Conference
Aarhus Denmark 1-2 October 2015

A NEW EMISSION-BASED APPROACH FOR REGULATION OF N LOSSES FROM AGRICULTURAL AREAS TO SURFACE WATERS

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ABSTRACT

In recent years a large focus has been placed on exploring different mitigation options that can assist in reducing nitrogen (N) emissions from agricultural areas. However, the spatial variability in landscape, geology and hydrology entails significant differences in the vulnerability of catchments to intense agricultural activities. Hence, if rigid regulations of N emissions are applied without considering this variability, it will not necessarily lead to an optimum balance between applied fertilisers, yields and loss of excess N to the surrounding surface waters. Therefore, the overall purpose of this pilot study is to develop a concept for regulation of nutrient emissions to surface waters based on a comprehensive stream monitoring design in order to measure the temporal and spatial transport of N at sub-catchment scale. The purpose of such a monitoring design is twofold: i) quantification of the actual N emissions from a given agricultural sub-catchment or even individual farms; ii) quantification at sub-catchment scale of nitrate retention that may ultimately lead to a more precise regulation of N emissions from agricultural areas to surface waters.

Three catchments subdivided into several sub-catchments in Denmark will be studied during the period 2014-2017. Hydrometric stations have been established at the outlet of the drainage networks continuously measuring water stage. In addition, daily water samples and weekly grab samples of water are taken and weekly discharge measurements conducted. Sub-catchments are monitored by weekly grab samples of stream water and biweekly discharge measurements. The water samples are analysed for different N forms. Based on this monitoring program and knowledge of point source discharges, background N losses and N retention in surface waters it is possible to conduct a load apportionment for calculation of N emissions from agricultural fields. It is expected that the first results from the stream monitoring can give an overall picture of the spatial and temporal variability of the N loads and constitute a platform for evaluating the measurement setup.