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## TARGETED REGULATION OF AGRICULTURAL N LOAD TO DANISH MARINE WATERS

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### ABSTRACT

Nitrogen (N) loading from diffuse sources to Danish marine waters was reduced by 41% in the period 1990-2012 by a suite of general measures. However, further reduction could be required to reach goals of the EU Water Framework Directive. Existing regulation requires sub-optimal fertilization leading to yield reductions and low protein content of the crops. A more differentiated regulation could combine optimal fertilization on most fields with a low loss of nitrogen to marine recipients. The model prototypes was designed to environmentally differentiate the farm specific N-load and replace the current general measures, taking into account 1) targets of N-loading to marine recipients and 2) properties of N-retention from the field to marine recipients. The first model distributes part of the N-quota evenly among farms in a catchment – the remaining part is differentially distributed according to N-leaching and N-retention properties of the soil of each farm. Farmers can increase their N-quota by implementing measures to reduce N-leaching, i.e. establishing wetlands, using catch crops, reduction of fertilizer-N, etc. The second model distributes the allowed N load of the recipient evenly among the farms. In this model farmers can meet the required maximum N load by use of measures and through best management practice. The two models were tested in a case study involving 30 farmers, representing different types of agriculture from catchments with different N-loading targets and N-retention properties. Each farmer prepared plans for crop rotations and N-reducing measures for both models and for different levels of N-loading targets, optimizing economy and yield under the given circumstances. Results show that 50-90% of the participating farmers increases their economic income and also reduce or maintain current N load compared to present-day regulations. Few farms experienced significant economic losses. Farmers generally placed N-reducing measures in areas with low N-retention. Especially measures as catch crops and early sowing of winter cereals were used, while wetland establishment was popular on drained areas in one of the catchments.



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