Abstract number–264 Differentiated landscape based strategies for optimized implementation of drainage filter technologies targeting agricultural nutrient losses

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A shift of paradigm in the Danish agro-environmental regulation towards a more targeted mitigation of nutrient losses has increased the attention for targeted measures addressing specific nutrient transport pathways. Although subsurface tile drains is fundamental for food production of many soils, tile-drains at the same time may constitute rapid highways for nutrient losses by directly connecting fields with aquatic systems. Approximately 50% at the Danish agricultural area is tile-drained, and nitrogen (N) losses by subsurface drainage constitute a major transport pathway in the drain dominated catchments. Increased tile-drainage of agricultural soils in combination with the drainage of riparian wetlands has during the last century decreased the natural capacity of Danish catchments to transform and reduce nitrate-N leached from agricultural fields. Thus restoring the natural buffer capacity by implementing landscape (drainage) filters thereby restoring the natural N reduction capacity represent a mitigation strategy with a promising potential.

Surface-flow and subsurface-flow constructed wetlands (CWs) just approved by the Danish government, are new targeted measures to reduce agricultural drainage losses. A large number of CWs targeting nutrient losses in drainage water have been constructed in Denmark since 2010, and more than 1.500 CWs will be established in the coming years to full fill the specific nutrient reduction targets in Danish catchments for the current water plan period. A cost-efficient implementation of these measures however, relies on the implementation in areas with high coastal N loads. Thus a differentiated landscape based strategy for optimized implementation of drainage filter technologies targeting agricultural nutrient losses was developed for the Danish national N mitigation program. Four major criteria was prioritized to ensure a cost-efficient implementation of targeted drainage filter technologies: (i) required coastal reduction for the specific catchment, (ii) suitability of agricultural areas in terms of a drainage discharge dominated transport pathway, (iii) N losses by drainage must be quantitative significant, and (iv) implemented CWs should have a quantitative environmental impact in terms of reducing N loads to coastal water, thus taking into account the natural N reduction during transport from field to coastal water. The strategy for optimized implementation of drainage filters was approved by the Danish ministry for the implementation of CWs from 2018. Optimized implementation of riparian wetlands and surface-flow as well as subsurface-flow CWs will be demonstrated for three Danish catchments with variable characteristics.

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