



## **Phosphorus losses from artificially drained lowland catchments in North-Eastern Germany**

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Phosphorus is a major plant nutrient and thus frequently responsible for the eutrophication and ecological damage of rivers, lakes and seas. In Germany, the total annual (1998 to 2000) losses of phosphorus (P) to inland surface water bodies from diffuse and point sources amounted to 33 kt. Due to improvements of the wastewater treatment, the P emissions from point sources have been considerably reduced during the last decades. Thus, the diffuse inputs will become more and more important if a further reduction of the nutrient losses is intended as demanded by the European Water Framework Directive (WFD). In the course of the implementation of the WFD, the identification of major sources and transport pathways is required, but in North-Eastern Germany, information on the role of tile drainage is largely missing.

Thus, the dynamics and the extent of the total phosphorus and the orthophosphate-phosphorus losses as well as the precipitation and the discharge were monitored at different scales for three six-months winter seasons to identify P transport pathways and processes at different scales within a small, extensively artificially drained lowland catchment in Mecklenburg-Vorpommern (North-Eastern Germany). The measurement stations were located at a collector drain outlet (4.2 ha), at two ditches draining 85 ha grassland and 179 ha arable land, respectively, and at the brook of a catchment (15.5 km<sup>2</sup>) dominated by mixed agricultural land use.

Average P concentrations in the discharge of the collector drain, the ditch draining arable land and the small brook were with 0.036 to 0.044 mg/l total P and 0.030 to 0.037 mg/l orthophosphate-P low. Elevated concentrations at the collector drain outlet

and in the adjacent ditch of up to 0.391 mg/l total P and 0.299 mg/l orthophosphate-P occurred during intensive snowmelt events which presumably caused preferential flow processes in the loamy sand with numerous biopores. Probably due to the remobilisation of phosphorus under anaerobic conditions, average concentrations (0.137 mg/l total P and 0.076 mg/l orthophosphate-P) in the ditch draining grassland on degraded peat soils were significantly higher than at the other sites dominated by mineral soils. The phosphorus losses were with a maximum of 270 g/(ha\* 6 month) total P and 211 g/(ha\* 6 month) orthophosphate-P low. Besides the event-based behaviour of the P losses and the possible occurrence of high P concentrations due to preferential flow, our study has clearly shown that the highest risk of eutrophication in this lowland landscape originates from drained, degraded and intensively used peatlands.