

Reduction of nitrogen and phosphorus loads to European rivers by riparian buffer zones



Riparian buffer zones play an important role as nutrient pollution controls for rivers. We provide a harmonized, explorative quantitative and spatially explicit continental assessment of nitrogen and phosphorus potential retention in riparian buffer zones along the European river network CCM2 (Catchment Characterization and Modelling). Diffuse emissions of nutrients from fertilized cropland and pasture, based on a statistical model (GREEN (Geospatial Regression Equation for European Nutrient Losses)), are partitioned into surface and subsurface flow pathways based on the innovative SUGAR (Surface water/Groundwater contribution index) index. Surface flow N and P emissions are assumed to undergo attenuation as a function of riparian buffer width. In contrast, the attenuation of subsurface flow emissions and emissions from wetlands is assumed to be independent of buffer width. Buffer attenuation follows a nutrient-specific negative exponential decay function. For the study area, we estimate retention in surface runoff emissions of 33% for nitrogen and 65% for phosphorus. The results represent a valuable data source for water basin management with respect to water quality improvement, in particular buffer zone restoration.

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