

MODELING OF PHOSPHOROUS TRANSPORT INTO SURFACE WATER BODIES ON REGIONAL AND CATCHMENT SCALE – A STUDY FOR SAXONY

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Complying the aims of the EU-Water Framework Directive great efforts will be necessary in order to reduce the yields of sediments and sediment-bound nutrients of surface water bodies. As a result of excessive nutrient inputs many water bodies suffer from deleterious eutrophication. One important source of nutrients in surface water bodies is soil erosion. Primarily phosphorus can be transported into the stream network by erosion processes, because it is strongly attached to soil particles. For this reason soil conservation measurements become exceedingly important.

In this context the study aims to identify the main areas of sediment production in Saxony and to locate the points at which sediment and sediment-bound phosphorus is delivered to surface water bodies. Based on the EROSION 3D simulation model the yields of sediment and attached phosphorus are estimated on catchment scale. Regarding these calculations it has to be considered, that phosphorus is predominantly attached to the fine-grained soil particles which are transported preferentially by surface runoff while less contaminated bigger particles remain on site. As a result phosphorus is enriched in the eroded sediment compared to the phosphorus contents of the eroded soils. For this reason it is essential that EROSION 3D provides the grain size fractions (clay, silt and sand) of the transported sediment. Additionally the phosphorus concentrations within the grain size fractions have to be known in order to calculate the amount of phosphorus transported into water bodies from sediment yields. Previous studies show, that phosphorus concentration in the clay-fraction is approximately by the factor 2 higher compared to the total soil sample. In the silt-fraction the phosphorus concentration is approximately equivalent to the concentration in the total soil sample.

Another precondition for the comprehensive application of EROSION 3D in Saxony is the availability of a consistent input data set on regional scale which was lacking so far. Therefore, as a first step of the study it was necessary to create an area wide input data set for Saxony including all relevant relief, soil and land use data.. Additionally the parameterization software DPROC was extended by an interactive area selecting tool with a simultaneous data clipping, which simplifies the handling of large data sets very much especially in order to parameterize different land use scenarios .

Up to know the EROSION 3D based simulation of phosphorous transport into surface water bodies is successfully validated for several hydrological watersheds in Saxony. Work on the regionwide simulation of sediment and phosphorous yields are in progress based on the complete parameter set of all saxonian surface water catchments.