Estimation of the effect of nitrogen reducing measures in agriculture in Thuringian watersheds

Manfred Fink (1), Holm Kipka (1), Annika Künne (2), Frank Bäse (3), Peter Krause (1), and Wolfgang-Albert Flügel ()

(1) Institute for Geographie Friedrich-Schiller-University, Geoinformatics, Jena, Germany (Manfred.Fink@uni-jena.de), (2) Institute for Technology and Ressources Management in the Tropics and Subtropics Cologne University of Applied Sciences , (3) Institute für Geoecology, Landscape Ecology and Soil Science University Potsdam

In many parts of Germany and Europe one of the very important reasons for problems in achieving a good qualitative and status of water bodies as demanded by the European Water Framework Directive is diffuse nutrient leaching from agriculturally used areas. Diffuse nutrient leaching is the most important problem in the federal state of Thuringia (Germany) resulting in high nitrogen concentrations in many rivers. To improve the water quality in such rivers the following agricultural management options are envisaged:
• optimized fertilization
• cultivation of cover-crops and under sown plants
• use of minimum tillage methods
• buffer strips along the stream network
The aim of the presented study was the estimation of the effectiveness of such management options in terms of nitrogen reduction in the rivers of Thuringia. For this purpose the distributed water and nitrogen balance was simulated in three representative mesoscale catchments of the Gera (846 km^2), Lossa (233 km^2) and Helme (199 km^2) river using the process-oriented model J2000s. The individual management options were represented as different scenarios based on the validated status quo modelling. Additionally, data from the regional climate downscaling approach WETTREG (Scenario A1B) were used to estimate the impact of possible future climate change. The detailed results obtained in the three catchments were finally upscaled for the entire area of Thuringia. This projection was carried out with the help of representative landscape units found within the test catchments. These were extrapolated to similar landscape units of Thuringia. We will briefly show the used methodology along with the most important results and discuss the effectiveness of the management options.