



Testing the Spatio-temporal Transferability of a Hydrological Water Quality Model in Central Germany

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Numerous studies have shown that the changes in land cover/use affect significantly the hydrological regime, which in turn influence the surface water quality. It is known that, at the catchment scale, hydrological modelling is a favourable tool for discharge and nutrients transport (such as Nitrogen and Phosphorus) predictions. The semi-distributed hydrological water quality HYPE (Hydrological Predictions for the Environment) model, has been evaluated for different catchments, and has been shown to reliably reproduce the measured data. The aim of this study was to test the spatio-temporal transferability of the HYPE model in Central Germany. First, the spatial transferability of the HYPE model was tested using two mesoscale catchments with different physiographical characteristics. To achieve our goals, the Selke (463 km²) and Weida (99.5 km²) catchments, which are two small tributaries of the Elbe river basin were utilized. Second, the temporal transferability of the HYPE model was tested in the Weida catchment using different periods, where different patterns of nitrogen leaching were measured due to two considerable shifts in land use intensities and fertilizers application rates in 1990 and 1997.

For Selke, the HYPE model reproduced reasonably well the discharge and IN monthly loads (with lowest NSE of 0.86 and 0.69 for discharge and IN loads, respectively). Also, results showed that only a NSE of 0.30 was obtained for the Weida catchment, in situations where the same best-optimized values from Selke was utilized, reflecting the controlling factors of land use and topography on the runoff generation. However, when the physiographical characteristics of the Weida catchment were considered during the calibration and validation phases (1997-2000 and 2001-2004, respectively, daily data), the HYPE model could reasonably predict the measured discharge and IN concentrations with similar performance as the Selke. In addition, the temporal transferability of the HYPE model was tested successfully in the Weida catchment by representing the dynamics of IN concentrations during the periods of 1983-2004 by adjusting land use intensities and fertilizers inputs in three different periods, respectively. The preliminary results of this study will be discussed and presented.