



Evaluation the effect of riparian zones on nitrate removal at the river basin scale using the SWAT model

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In this paper, a modified version of the The Soil and Water Assessment Tool (SWAT), referred to as SWAT_LS, which takes into account interactions between landscape units, was applied in the Odense river basin, an agriculture-dominated and a densely tile-drained river basin.

The objectives of this paper are to (i) evaluate the effect of the SWAT modifications in flow and nitrogen simulations by comparing with the original SWAT model taking into account parameter uncertainty, and (ii) estimate the effect of riparian zone in nitrate removal in the Odense river basin. The results showed that compared to the original SWAT2005, SWAT_LS gave improvements in the simulation of flow and nitrate fluxes evaluating based on the Nash-Sutcliffe coefficients. Taking into account parameter uncertainty by running Monte-Carlo simulations, SWAT_LS had a considerably higher number of parameter sets that resulted in satisfactory performances (behavioral models) in both daily and monthly time steps. It implies that SWAT_LS performed better than SWAT2005 by giving higher probability to get a satisfactory representation of the modelled river basin although uncertainty bounds are compatible between the two models. Considering parameter uncertainty, it was also shown that presently, riparian zones in the Odense river basin is only able to remove 4 ~ 17% nitrate fluxes by denitrification because a majority of riparian zones are artificially drained and dominated by tile drainage. However, if all riparian zones in the area are not drained and is able to fully perform their retention function, the effectiveness of riparian zones for nitrate removal will increase dramatically up to 25 ~ 85%.