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Estimation of runoff change caused by possible deforestation in two hilly catchments

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The impact of possible deforestation on runoff formation in two medium-size basins in South Bohemia region was assessed. The Lenora basin is a mountain catchment with the area of 180 km2. It is located in a relatively unaffected territory of the Sumava Mts. The second one, Malse basin is 490 km2 large. It is located on the Czech borders and partly stretches into Austria. The Novohradske Mts. in the upper parts of this basin represent the most forested area without anthropogenic influence. These two areas without big forest damages seemed to be suitable territory for investigation of discharge tendencies caused by deforestation. Beside that, both basins are presently endangered by the bark beetle activity and occurrence of acid rains. For the rainfall-runoff simulation the hydrological model HSPF (Hydrological Simulation Program - Fortran) was chosen. The model was implemented within WMS (Watershed Modeling System) - a multipurpose environmental analysis system for performing watershed- and water-quality based studies. The simulations with the HSPF model were performed in semi-distributed mode taking into account the land-use data. In the selected basins, the vegetation cover at its present state was analyzed and simplified for the needs of the rainfall-runoff simulations. The results of rainfall-runoff simulations under present conditions were then used as a comparative basis for the discharge change evaluation. For each basin, simulations were performed for three different scenarios of possible vegetation cover changes, each scenario represented a hypothetical decrease of the forest area by 15, 30, and 50%, respectively. The result show an increase of discharges in both catchments, especially in case of the peak flows. Also, a strong dependence of the simulation results on the estimation of the model parameters was evident. Parameters connected to the vegetation characteristics could only hardly be specified, mainly due to their high spatial variability. The study was supported by the research grants GA ASCR KJB300600602 and AV0Z20600510.