ABSTRACT

Environmental modelling is lately becoming to be one of the most important decision support systems. Hydrological models present significant potential for use especially in area of surface and groundwater protection. In the diploma thesis, the Soil and Water Assessment Tool (SWAT) was used to evaluate nitrate surface water pollution in nine catchments situated in Křivoklátsko protected area during the period of 2003 – 2010.

Modelling process consist of assorted consequent steps. First the hydrological model of each catchment was created. Afterwards the sensitivity analysis was conducted to select most sensitive model parameters. Calibration process was carried out after the parameters selection using
SWAT-CUP automatic calibration tool. Model results were visualized and evaluated.

The results of the model suggested, that the area of interest was not widely endangered by nitrate pollution. Within each catchment the critical source areas of nitrate pollution were identified. It was observed that these areas are related with intensive agricultural areas. Nitrate leaching ranged from 6 $kg.ha^{-1}$ to 10 $kg.ha^{-1}$ per year in agriculture areas. Some areas exceed this amount. Nitrate loss from most of the area of interest ranged from 0 $kg.ha^{-1}$ to 4 $kg.ha^{-1}$ per year. Concentrations of nitrates in modeled streams didn't exceed limits given by nitrate direction. Average concentrations of nitrates in the streams ranged from 6 $mg.l^{-1}$ to 15 $mg.l^{-1}$. Higher concentrations (> 20 $mg.l^{-1}$) were observed in some intensive agricultural areas. Few reaches indicated average concentration higher than 35 $mg.l^{-1}$ due to point source influence.

Model appeared sensitive especially to parameters controlling surface runoff, subsurface flow, denitrification and nitrate percolation. Base flow was overestimated especially in small catchments. Statistical evaluation of model showed weak simulation performance. Nevertheless simulated average nitrate concentrations were similar to measured average nitrate concentrations. Due to model data uncertainty a better model performance cannot be expected.

Key words:

Nitrates, Křivoklátsko protected area, land use, water pollution modelling, SWAT.