Nutrient modelling in an area of intensive livestock husbandry – facing the demands of the WFD

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Intensively used agricultural regions are especially concerned by the new regulations of the Water Framework Directive (WFD) because nitrogen and phosphorus emissions of livestock husbandry can be a diffuse source of groundwater pollution.

The Hase River Catchment in Northern Saxony (Germany) covers an area of approximately 3 000 km² and is heavily shaped by intensive livestock husbandry, in particular pig production. The five administrative districts in the Hase River Catchment have the highest pig density of all districts in Germany. They hold 4.7 million pigs, which corresponds to almost 20% of the pigs in Germany. Livestock density in the region is 2.1 animal units per hectare agricultural area on the average which is twice as much as the German average[1].

In the ongoing research work for estimating groundwater pollution by diffuse sources two parameters are considered: 1) groundwater pollution potential due to natural conditions and 2) calculated nutrient emissions[2]. For the investigation of the groundwater pollution potential the DRASTIC model is used[3]. The DRASTIC index which was grid-based calculated for the investigation area states a high groundwater pollution potential in relation to all parameters considered in DRASTIC (e.g. depth to water, net recharge, aquifer media, soil media, topography, impact of the vadose zone media, conductivity). In a second step, nutrient emissions and future land use scenarios will be calculated with the aid of the STOFFBILANZ model [4].

The aim of the study is the identification of areas that should receive maximum priority in the programme of measures. These areas combine high emissions and a great pollution potential so that measures conducted there are expected to be highly efficient.

The results of both models will be discussed in an actors' platform. The University of Osnabrück has been carrying out a triennial research project since October 2003 in attendance with the Agricultural Chamber of Weser-Ems. Important regional actors participate in an actors' platform. The models allow for trying out possible scenarios in order to ultimately establish a common development plan for meeting the demands of the WFD.

References

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