Use of digital soil maps and pedotransferfunctions with respect to spatial soil water movement

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Groundwater protection is traditionally an important concern in Austria, because almost all drinking water supply is abstracted from groundwater. Nevertheless, groundwater contamination is a serious problem mainly in agricultural areas due to intensive application of fertilizers and pesticides. In particular nitrate concentrations in groundwater increased dramatically during the last decades. Current groundwater monitoring often shows values exceeding the legal limit of 50 mg l-1. As the pollutions originate from diffuse sources only spatial approaches can classify the contamination. That presumes spatial information about land use, weather and soil type to identify sensitive spots and areas, respectively.

The objective of this work was to focus on water storage capacity and water permeability, which are the most important soil parameters regarding deep percolation of water and nutrients. Both parameters can vary within field size, because Austrian plains mostly consist of heterogeneous soils developed from alluvial sedimentation. In this regard two areas regarding groundwater contamination are described: the Marchfeld in the northeast of Austria with an agricultural area of 76.000 ha and the Grazer Feld in the southeast with 5.900 ha.

Plant available water storage capacity and water permeability were estimated by means of pedotransfer functions. Out of many possibilities the expert system for the calculation of hydrological soil parameters after BAUMER (1989) was chosen. The digitized Austrian soil map (ÖBK, 1976) serves as basis for the calculation provid-

ing the input parameters particle size distribution, humus and gravel content for each horizon. The estimated parameters showed good correlations compared with measured data. Furthermore, the GIS application "ArcView" was used for the implementation of the pedotransfer functions with the "Dialog Designer" and "Avenue". The linkage of GIS, soil database and pedotransfer functions provides a powerful tool for calculation of percolation. The integration of pedotransfer functions over a user interface in a GIS can simplify decision making of spatial problems e.g. for future perspectives regarding agricultural and landscape management. Once the whole data are available for a region, a detailed consulting in definite fields for multiple tasks can be done.

Using this developed tool for spatial modeling, the water storage capacity and the water permeability is presented for the two agricultural areas. Areas of soils with similar characteristics can be classified regarding the investigated parameters. A comparison of different regions was done and will be shown.