Geophysical Research Abstracts, Vol. 9, 07539, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07539

Required N-surplus reduction by agriculture to reach environmental targets for nitrate loads to the groundwater of catchment areas

R. Kunkel(1), M. Eisele(2), W. Schäfer(2), B. Tetzlaff(1) and F. Wendland(1)

(1) Agrosphere, ICG-IV, Research Centre Jülich GmbH, 52425 Jülich, Germany, (2) Geological Survey of Lower Saxony; Stilleweg 2, 30655 Hannover, Germany

The implementation schedule for the EU water framework directive requires the creation of monitoring programmes for water bodies according to the intensity of the pollution risk by the end of 2006. Until 2009 river basin district management programmes have to be established followed by the implementation of measures from the management plans (until 2012). Within the EU LIFE Environment project WAgriCo (Water resources management in co-operation with agriculture) state-wide measures to reduce nitrogen inputs to groundwater are developed and tested for their applicability in three pilot water bodies in the Federal State of Lower Saxony, Germany.

An agro-economic/hydrologic-hydrogeologic model system is used to couple nutrient surpluses by agriculture and other diffuse sources to the relevant runoff components (groundwater recharge, direct runoff). This allows, by use of a residence time/nitrate degradation model, the area-differentiated quantification of the nitrogen emissions into groundwater and surface waters. Because the approach considers denitrification processes in the soil, the N-surplus reduction required to reach the target nitrate concentration below agricultural areas can be determined. The need of regionally adopted nutrient reduction measures with respect to environmental targets is discussed and compared to possible N-surplus reductions by the implemented measures.

As environmental target for nitrogen reduction measures the nitrate concentration in recharged groundwater is considered. A value of 50 mg NO_3/l in recharged groundwater is used as a conservative starting point. This value, however, is not to be applied to each individual site, but is regarded to be an average value for a larger area defined by the intersection of a groundwater body and hydrogeological homogenous units.

To investigate the necessary extent of agricultural nitrogen reduction measures the required total reduction of N-surpluses from agriculture to achieve the environmental target needs to be quantified. This required reduction, however, depends on the shares and associated N-inputs of the different landuse types in the investigated areas and may be expressed by a landuse type specific target Nitrate concentration in recharged groundwater.

Based on the determination and ranking of target areas to implement measures (Kunkel et al, 2006), the required N-surplus reduction by agricultural nitrogen reduction measures with respect to environmental target values is presented.

References:

Kunkel R., Eisele W., Schäfer W. and Wendland F. (2006): *Planning and implementation of nitrogen reduction measures in catchment areas based on a determination and ranking of target areas.* Proceedings of the10th International Conference on Diffuse Pollution and Sustainable Basin Management, 18.-22.9.2006, Istanbul, Turkey.