Geophysical Research Abstracts, Vol. 8, 04882, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04882

Assessing the potential for controls on floodplain water balance and water quality due to the alteration of land management practices

S. Krause (1), A. Bauer (2), A. Habeck (3), J. Jacobs (4), M. Morgner (2), A. Bronstert (2)

(1) Centre for Sustainable Water Management, Lancaster Environment Centre, UK, (2) Institute for Geoecology, Dep. for Hydrology and Climatology, Potsdam University, Germany, (3) Potsdam Institute for Climate Change Research, Water Group, Potsdam, Germany, (4) Institute for Geoecology, Dep. for Landscape Planning, Potsdam University, Germany, (s.krause@lancaster.ac.uk)

Floodplains and wetlands in Central Europe have been affected by intensively changing landuse and management conditions within the last century. Formerly intensively agricultural used areas are often more extensively used today and nature conservation issues became more important. Nevertheless, a majority of floodplain water bodies are still under different pressures and alternative landuse targets of different stakeholders produce conflicts in management policies. The European Water Framework Directive (WFD) demands the evaluation of the status and, if necessary, the improvement of the surface and groundwater quality of water bodies. Therefore the current status of water bodies, as well as pressures on them, the risks and potential strategies for improvement need to be characterised As detailed knowledge about impacts of landuse management changes on the the hydrology of floodplains and wetlands is often insufficient, impact assessment and the resulting argumentations are not always adequate. Exemplary for lowland floodplains in Central Europe a set of reasonable land use and management scenarios was developed for the Lower Havel river basin in North-eastern Germany. The scenarios were analysed for their ability to gain a sustainable improvement of the floodplain water balance as well as of the surface water and groundwater quality. The coupled groundwater - water balance model IWAN was used for the quantification of potential changes of the floodplain water balance and of the interactions between the groundwater and surface waters. It was possible to prove that the assumed land

use changes effect the floodplain water balance only insignificantly although lateral processes as infiltration and evapotranspiration were modified. However, these alterations of vertical fluxes are widely compensated by the lateral impact of groundwater - surface water interactions within the intensively drained parts of the floodplain. The analysis of a further scenario assuming the deactivation of the currently very dense drainage network showed a more intensive change of the seasonal variability of the floodplain water balance which could possibly establish a compromise between agricultural and nature conservation targets. It could be proved that the effect of drainage reduction would cause a higher retention of the floodplain water balance during the dry summer season and that the ecological important flooding events from autumn to spring would mainly effect wetlands with a high river connectivity which are of minor importance for agricultural use only. A generally high importance of groundwater supply from the floodplain to the total river discharge could be quantified during the ecologically important low flow summer season. It was shown that a reduction of fertilizer and manure application could cause an improvement of the groundwater quality but that a subsequently improvement of the surface water quality would be limited to summer months only when the proportion of groundwater runoff on the river discharge exceeds its maximum.