Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Linking Slopes to the Wetland: Water and Nutrient Fluxes in an Inland Valley in Uganda

Claudia Schepp[1], Bernd Diekkrüger[1], Mathias Becker[2], Constanze Leemhuis[1]

[1] *University of Bonn, Dept. of Geography, Germany*
[2] *University of Bonn, Inst. Crop Sci. and Res. Conserv. (INRES) - Plant Nutrition, Germany*

Abstract

Due to prolonged periods of water availability, wetlands are of increasing importance for agricultural production and hence for food security in East Africa. However, in inland valley wetlands crop performance and particularly the temporal and spatial dynamics of the fluxes of water and nutrients are likely to be effected by the land use on the slopes and attributes of the wider catchment. Thus, a deeper understanding of the physical processes that link valley slopes to the wetland is of crucial importance to ensure their sustainable management. Water fluxes from adjacent slopes act as carrier for nutrients, e.g. nitrate, which frequently limit crop growth for small-scale farmers with limited monetary resources. We investigated the spatial and temporal distribution and translocation of water and soil-born nitrate under three types of land use on the slope, namely bare land, semi-natural vegetation and patchy crop agriculture. Soil N content was monitored during four consecutive rainy seasons at different slope positions. Water fluxes from surface runoff and subsurface interflow were quantified in runoff plots on the slope and in excavations at the bottom of the slope. Slope water pathways in the soil were analysed using ERI (electrical resistivity imaging) and profile drillings.

Water was delivered to the wetland mainly through a sandy loam layer at the bottom of the slope. Nitrogen content in soil water differed between the three land use types and different slope positions, with highest concentrations found at the bottom of the slope and on the bare soil plots. However, nitrate loads in soil water of the wetland were very low. Thus downslope positions seem to be of special importance for an improved crop use of the nitrate being translocated along the valley slope, before it is lost under the anaerobic soil conditions of the wetland.

Keywords: Nitrate, run-off water, sub-surface water, watershed, wetlands

Contact Address: Claudia Schepp, University of Bonn, Department of Geography, Mechenstrasse 73, 53129 Bonn, Germany, e-mail: s6clsche@uni-bonn.de