



Tropentag, October 11-13, 2006, Bonn

“Prosperity and Poverty in a Globalised World—  
Challenges for Agricultural Research”

## Soil Erosion in the Upper Ouémé Catchment (Benin) Considering Land Use and Climate Change — a Modelling Approach

CLAUDIA HIEPE, BERND DIEKKRÜGER

*University of Bonn, Geographical Institute, Germany*

### Abstract

Soil degradation is a severe problem in Africa. The resulting decline of crop yields threatens food security and forces poverty, migration and land use conflicts. Therefore effective measures against soil degradation are crucial for the achievement of the UN Millennium goals. Prior intervention areas with especially high risks should be identified.

In this study, which is part of the German integrated water resource management project IMPETUS, soil erosion by water has been studied in the Upper Ouémé Catchment (15.000 km<sup>2</sup>) in sub-humid Central Benin. Field studies in 2001/02, performed by Junge (2004), revealed that soil loss rates on agricultural fields were 10x higher on fields than on savannah land. Cotton and yam fields were the main contributors. The quantification of soil erosion at the regional scale for longer periods required a modelling approach. The semi-distributed continuous erosion model SWAT (Soil Water Assessment Tool) has been chosen. In 2004 soil transects were studied in order to parameterise a French soil map. For the years 1998 to 2004 the model was successfully calibrated and validated against daily measurements of total discharge and suspended sediment concentration at various outlets in the catchment. Subsequently, the model was applied for different scenarios of climate and land use change until 2025 using spatially explicit results from the regional climate model REMO and the land use/land cover change model CLUE, produced by other IMPETUS members. Land use changes lead to a strong increase in erosion rates, whereas lower precipitation reduced water and sediment yield significantly. Recent and future areas with high erosion risk in the catchment were identified. Based on field observations and farmer interviews in 2005, recommendations for a sustainable soil management are given. In future, the SWAT model shall be combined with the EPIC model to study the effect of agrarian management strategies on crop yield and soil degradation.

**Keywords:** Africa, Benin, IMPETUS, modelling, soil degradation, SWAT, water erosion