

IMPETUS: Implementing HELP in the Upper Ouémé basin[#]

M Christoph¹, A Fink¹, B Diekkrüger², S Giertz², B Reichert³ and P Speth^{1*}

¹ *University of Cologne, Institute for Geophysics and Meteorology, Kerpener Str. 13, D-50923 Köln / Germany*

² *University of Bonn, Institute of Geography, Meckenheimer Allee 166, D-53115 Bonn / Germany*

³ *University of Bonn, Institute of Geology, Nussallee 8, D-53115 Bonn / Germany*

Abstract

Regional climate models that take into account land-use changes indicate that in the future, a general decrease in rainfall, together with prominent surface heating, can be expected for sub-Saharan Africa and the region north of the Sahara until 2050. Due to high population growth, land use changes rapidly and influences water availability and water demand. In this context, the research project IMPETUS ('An Integrated Approach to the Efficient Management of Scarce Water Resources in West Africa') offers a range of options for sustainable management of different components of the hydrological cycle. Target areas are the Ouémé basin in Benin and the Drâa catchment in Morocco. This paper concentrates on the Ouémé basin.

Based on plausible scenarios of future economic, demographic, and climate developments, the effects of land use, land cover change, climate change, and demographic development on water availability and water demand are quantified. Scenarios of future water availability and water demand for the Upper Ouémé (Benin) catchment are discussed. To calculate water availability, the output of a regional climate model was linked to a hydrological model that also considered land use change calculated by a cellular automata model. Future water requirements were computed by linking population growth and per capita water demand, which was derived from a regional survey. Furthermore, the need for water for animal husbandry was considered.

The results of the 'business as usual' scenario, combined with IPCC Scenarios A1B and B2, through the year 2045 are presented. The results reveal a significant decrease in water availability (surface water and groundwater) due to a decrease in rainfall and a significant increase in evapotranspiration. Although total water consumption increases strongly, it represents only about 0.5% of the yearly renewable water resources. Comparing these data, it may be concluded that water scarcity is not a problem in Benin. However, water availability shows high temporal variations due to the rainy and the dry seasons. Even if physical water scarcity is not a limiting factor, access to water in some parts of the catchment is limited due to economic factors.

Keywords: HELP, IMPETUS, Benin, Morocco, Decision Support Systems, global change, information systems, loosely coupled models, problem clusters, scenario development, water availability, water demand