



Reservoir impact assessment in sub-Saharan Africa: The Volta Basin Water Allocation System (VB-WAS)

C. Leemhuis (1), G. Jung (2), R. Kasei (1), and J. Liebe (1)

(1) Center for Development Research (ZEF), Div. Ecology and Natural Resources, Bonn, Germany (leemhuis@uni-bonn.de),

(2) Institute for Atmospheric Pollution (IIA-CNR), Italy

In the Volta River Basin, infrastructure watershed development with respect to the impact of climate conditions is hotly debated due to the lack of adequate tools to model the consequences of such development. The Volta basin drains an area of approx. 400 000 km² of the subhumid to semiarid West-African savannah zone and is shared by six riparian countries. The region is characterized by erratic rainfall patterns, and domestic and agricultural water users in the upper regions of the Basin complete with hydropower generation in the south for increasingly scarce water resources. There is an ongoing debate on the impact of further development of small, medium and large reservoirs on the water level of Lake Volta.

The GLOWA Volta Project (GVP) has developed a Volta Basin Water Allocation System (VB-WAS), a decision support tool that allows assessing the impact of infrastructure development in the basin on the availability of current and future water resources, given the current or future climate conditions. The simulated historic and future discharge time series of the coupled climate-hydrological model (MM5/WaSiM) serve as input data for a river basin management model (MIKE BASIN). MIKE BASIN uses a network approach, and allows fast simulations of water allocation and of the consequences of different development scenarios on the available water resources. Furthermore it is possible to up set up climate scenario time series scenarios for an assessment of the consequences of extreme climate conditions.

Within a case study analysis the impact of small and medium scale reservoir development on the water resources of the Volta basin has been evaluated under different climatic conditions. For the evaluation of the impact of large reservoir development in particular the impact of Bui dam, which is under construction on the Black Volta River in Ghana, on the water level of Lake Volta has been simulated with the VB-WAS model. The VB-WAS model allows a quantified impact assessment of small, medium and large scale reservoir development within the Volta basin and can be used as an objective communication basis for water management issues.