

VOLTA BASIN WATER ALLOCATION SYSTEM

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INTEGRATION OF.....

MM5-WASIM: Distributed processed based climate-hydrological model that simulates the spatial impact of climate variability on the water resources within the basin.

MIKE BASIN: Fast water allocation network model that integrates infrastructural development (e.g. small & large reservoir development).

NATIONAL BOUNDARIES: Spatially simulates the impact of different water policies on the water demand.



Figure 1: Delineation of hydrological-economic subcatchments accounting for national borders and large reservoirs location for VB-WAS.



Figure 2: Multipurpose small and medium sized reservoirs in the upstream regions of the Volta Basin (first picture) directly competes with hydropower generation at the Akosombo dam (second picture) and smaller hydropower plants in the lower parts of the Volta Basin.

VOLTA BASIN WATER ALLOCATION SYSTEM (VB-WAS)

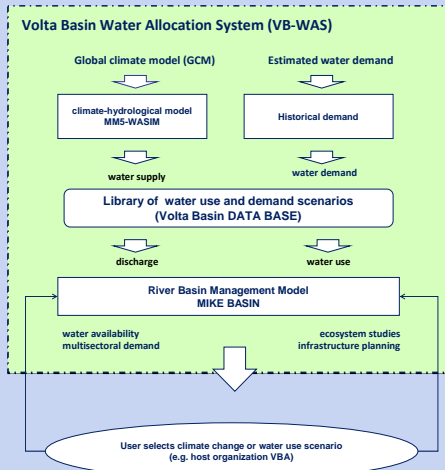
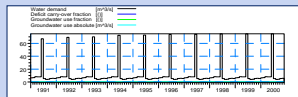


Figure 3: Structure of the Volta Basin Water Allocation System integrating the results of the climate hydrological model MMS-WASIM and infrastructural development with the network model Mike Basin.

Water user per catchment:

1. Small and medium reservoirs



Reservoirs fill up at the very beginning of the rainy season.

2. Surface water withdrawal depends on: population density percentage of population with safe access to water resources



3. Large reservoirs abstractions: large irrigation schemes hydropower



Figure 4: Set up of the network model Mike Basin for the Volta basin integrating different water users per subcatchment.

SMALL & MEDIUM RESERVOIRS DEVELOPMENT

- The impact of the small and medium reservoirs on the storage of lake Volta equals 6 km³ for the time period 1992-2000.
- For the period 1992-2000 the simulated yearly inflow to lake Volta was highly variable (11 – 59 km³).
- The impact of small and medium reservoirs on the water resources of the Volta basin is marginal compared to their multifunctional benefit during the the dry period.

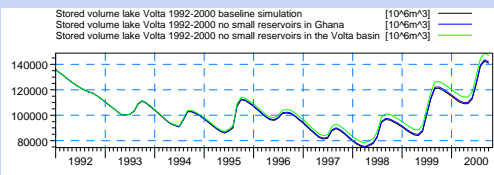


Figure 5: Simulated water storage of lake Volta (black line) vs. a reservoir scenario with no existing small and medium scale reservoirs within Ghana (blue line) and the basin (green line).



VB-WAS...

- is a powerful tool for **watershed management** considering the impact of climate variability.
- is coupled to a dynamic **hydrological-economic model** (M³ Water) for water policy scenario analysis.
- accounts for national water management strategies and can be used as a supportive tool for **transboundary water management**.

SPECIAL THANKS TO

Eva Youkhana
Sven Wagner
Irit Eguavoen
Sonabel Burkina Faso
Jan Friesen
Nick van de Giesen

Ghana Meteorological Agency
Hydrological Service Ghana (HSD)
Volta River Authority (VRA)
Danish Hydraulic Institute (DHI)
Gerald Forkuor
Bruno Barbier

Boubacar Barry
Wolfram Laube
Antonio Rogmann
Almut Brunner
Philippe Cecchi
Charles Rodgers