



Capacity Building in the GLOWA Volta Project

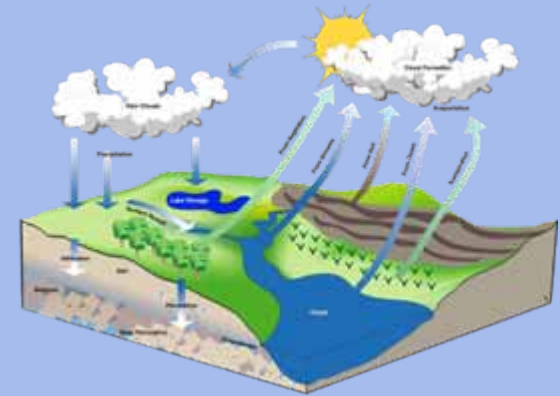
6. BMBF-Forum für Nachhaltigkeit

*Jens Liebe,
Charles Rodgers,
Nick van de Giesen
and
Paul L.G. Vlek*



Objectives

- **Integrated analysis** of the physical and social determinants of the hydrological cycle
- Scientifically sound **Decision Support System** for the assessment, sustainable use and development of the water resources of the Volta Basin
- **Development of “Human Capital”** via advanced education and training, co-operative research and stakeholder participation





What is “Capacity building” ?

The process of developing and strengthening the skills, abilities, and resources that organizations and communities need to survive, adapt, and thrive in the fast-changing world."

(after Philbin 1996)

A fundamental goal is to enhance the ability to evaluate and address the crucial questions based on an understanding of environment potentials and limits and of needs perceived by the people of the country concerned.

(after UNCED, 1992.)



“Capacity building” in GVP

- Human Capital
- Infrastructure & technological capacity
- Institutional capacity



“Enabling environment”





GLOWA Volta Capacity Building



North American Students

Name	Degree	Title of Thesis
Frazier, Tyler	Ph.D.	Agent Based Electricity Systems Modeling for the Republic of Ghana
Taylor, Joel	M.Sc.	Agent Based Electricity Data Quality Assessment and Use

European Students

Name	Degree	Department	Title of Thesis
Brunner, Albert C.	Ph.D.	Soils	Landscape approach to assess soil erosion and reservoir siltation in a semi-arid environment
Castro, Tere	Ph.D.	Geography	Problemas de Tránsito e Mobilidade em Meio Ambiente Urbano - Impactos em Transportes e Meio Ambiente
Cubric, Irena	Ph.D.	Geography	Time series analysis of satellite-derived monthly averaged products for hydrology applications in tropical and subtropical regions
Eggensten, W.	Ph.D.	Anthropology	How you live is how you die: Household water management, water rights and institutional change in Northern Ghana
Erdemoglu, Thomas	Dipl.	Informatics	Special Model Management auf Basis des COBOL-Paradigmas
Fischer, Jan	Ph.D.	Geography	Spatio-temporal Patterns of Rainfall in Northern Ghana
Fischer, Jan	Ph.D.	Hydrology	Large-scale soil moisture monitoring in the Volta Basin through observations and modeling
Geman, Marie	Ph.D.	Anthropology	Analysing institutions of water resources management in the Nkwanta (White Volta) New Basin, Burkina Faso
Grimberg, Karin	Ph.D.	Geography	Estimating land use and land cover changes in Southwestern Burkina Faso: a multi-sensor system approach
Hack, Jennifer	Ph.D.	Geography	Managing Social-Ecological Systems for Resilience: Perspectives in Small Reservoirs of Northern Ghana
Jung, Gerda	Ph.D.	Meteorology	Regional Climate Change and the Impact on Hydrology in the Volta Basin of West Africa
Kidwell, Joche	Dipl.	Informatics	Public-orientierte Geographische Informationswissenschaft für ein Projekt der Entwicklungsplanung (GLOWA Volta)
Laube, Wolfram	Ph.D.	Anthropology	Actors, Structures, Institutional Change, External Intervention and the Co-Institutionalization of Local Natural Resource regimes in Northern Ghana
Luka, Patrick	Ph.D.	Geography	Onset of Wet rainy season
Luthe, Jens	Dipl.	Geography	Estimation of Water Storage Capacity and Evaporation Losses of Small Reservoirs in the Upper East Region of Ghana
Martens, Miriam	Ph.D.	Hydro-Geology	Integration of remote sensing parameters by spatial-temporal modeling of the carbon budget of riparian soils in West Africa
Marin, Nicolas	Ph.D.	Hydro-Geology	Development of a water balance for the Atankrabi catchment, West Africa: A case study of groundwater recharge in a semi-arid climate
Mark, Andrew	Dipl.	Remote Sensing	AN SOGAL satellite Wetnessmap aus NOAA-AVHRR Daten und Vergleich mit Satelliten- und MMS Daten in der Savannennote Ghana
Neumann, R.	Dipl.	Geography	Statistische hydrologische Simulationen
Picman, Martina	M.Sc.	Geography	Participation in small irrigation dam management
Schneider, Patricia	Dipl.	Geography	Wasseranregungsprojekte als Entwicklungschance für Frauen unter Einfluss traditioneller Sozialstrukturen in Nord-Ghana
Schreier, Julia	Ph.D.	Geography	Simulating spatio-temporal land use and cover changes in the Aboakrom Basin, Upper East Ghana by developing a Ghana-LUGAS model
Schulze, Andreas	Dipl.	Geography	Blending the Wetnessanregungsprojekte für Upper East (Ghana) lokale Farmerberatung und dynamische Modellierung
Schumann, Benjamin	Ph.D.	Geography	Impact of migration
Schulze, David	Ph.D.	Meteorology	The surface energy balance over drying lands and forests in West Africa
Spethoff, Doreen	Ph.D.	Sociology	Water Vegetation, Civil Society and Knowledge: The Case of Upper Volta Water Supply in Ghana
van de Logt, G.	M.Sc.	Atmospheric Science	ECMWF reanalysis precipitation data compared to weather station precipitation measurements from Ghana for 1991 - 2001
van der Schoot, Charlotte	Ph.D.	Anthropology	Flowing structures and concrete struggles: Irrigation management and institutional change in centre-eastern Burkina Faso
Wagner, Sven	Ph.D.	Anthropology	Water balance in a poorly gauged basin in West Africa using atmospheric modeling and remote sensing information

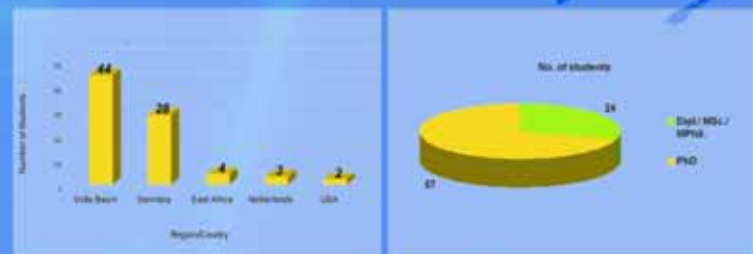
West African Students

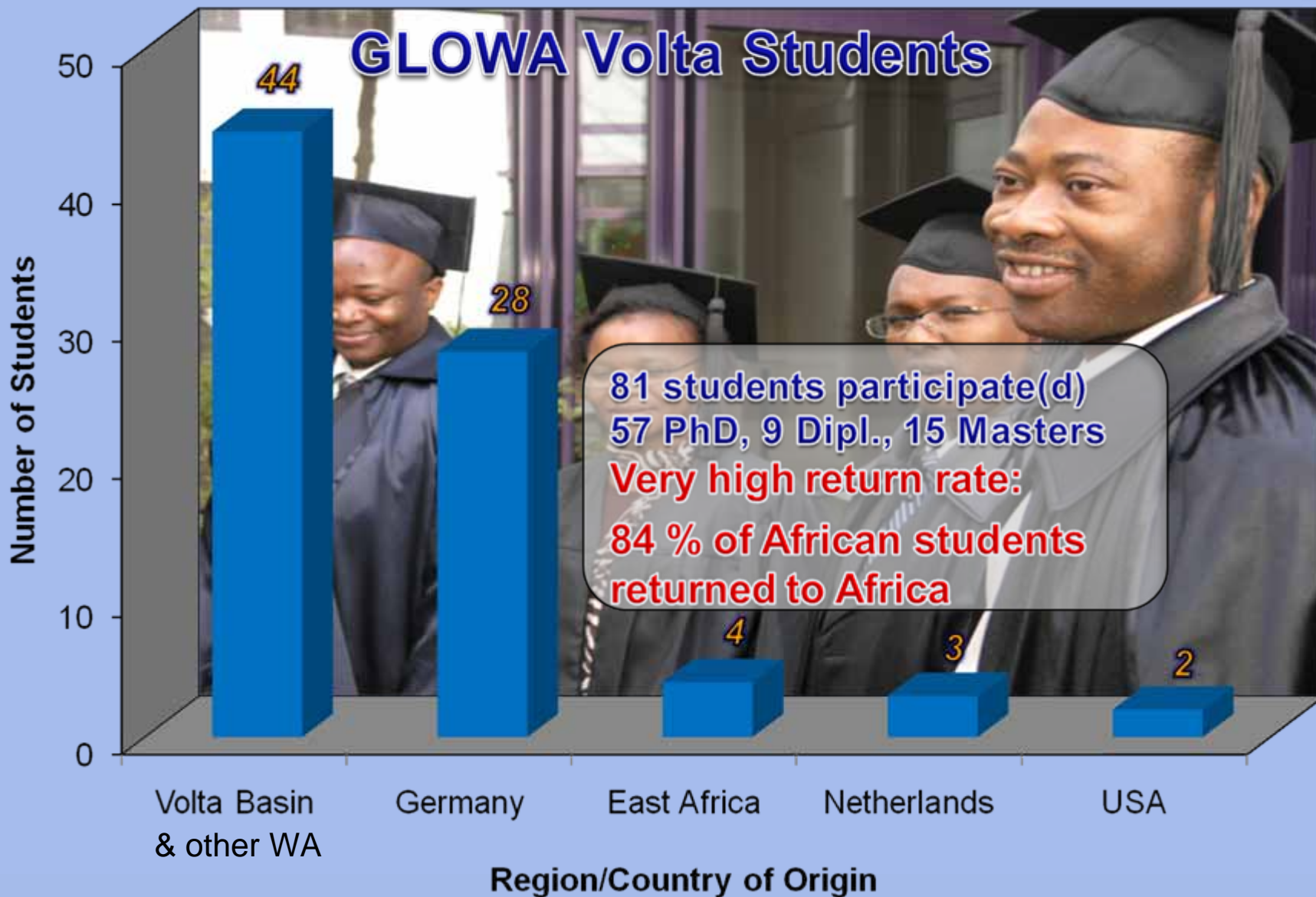
Name	Degree	Department	Title of Thesis
Ria Lim, Henrietta	M.Phil.	Soils	Remotely sensed soil moisture and soil water content in the Volta Basin of Ghana
Abdulla, Ahmed	M.Sc.	Agriculture	Microclimate and Physiological Responses of Sorghum (Sorghum bicolor L.) to Various Different Patterns of Drought
Aggrey, Wilson A.	Ph.D.	Soils	Soil characteristics and modeling of spatial distribution of saturated hydraulic conductivity at two sites in the Volta Basin of Ghana
Ahnu, Ayidre E.	Ph.D.	Agriculture	Surface runoff and infiltration processes in the Volta Basin, West Africa: Observation and Modeling
Amingo, Garabisa	Ph.D.	Oil Engineering	Modeling overflow in the Volta Basin of West Africa: A data-driven framework
Anhi, Sossiso G.	Ph.D.	Crop Science	Using Geospatial GIS Tools to Assess the Impact of Land Use Change on the Soil Water Content in the Volta Basin of Ghana
Asan Sumaleh Muhammad	M.Phil.	Geography	Transboundary Management of Water in the Bawku Area
Asare, Felix	Ph.D.	Geography	Economic Analysis of Decentralization in Rural Ghana
Ayeh, Martha	M.Phil.	Geography	Actors' Interest and collective Action: the Difficulties of Timely Marketing in Northern Ghana
Ayiah-Hai, John	Ph.D.	Physics	Predicting the Onset of the Rainy Season in Ghana Using Sea Surface Temperature in the Gulf of Guinea
Begam, Sumera Tanika	Ph.D.	Agriculture	The Impact of Biochar on Carbon and Nutrient Stocks as well as Effects in the Savannah of Northern Ghana
Begayid, Felix	Ph.D.	Oil Engineering	Impact of land-use intensity on evaporation and surface runoff: Process and parameters for eastern Burkina Faso, West Africa
Stewart, Adomas K.	Ph.D.	Natural Sciences	Modeling land-use change in the Volta Basin of Ghana
Cudjoe, Samuel K.A.	Ph.D.	Agriculture	Population and Land Use / Cover Dynamics in the Volta River Basin of Ghana, 1990 - 2010
Compaore, Houbou	Ph.D.	Geography	Terrestrial Ecosystem Services in the Volta Basin of Ghana: A Case Study of the Volta Basin, Northern, Upper East Ghana
Diallo, Emmanuel	Ph.D.	Geography	Local Knowledge and Adaptation to Environmental Change in Northern Ghana
Doudou, Shekou E.K.	Ph.D.	Geography	Land use and land cover study of the savannah ecosystem in the Upper West Region of Ghana using remote sensing
Fosu Mensah, Benedicta Yvonne	Ph.D.	Math. & Stats.	Modeling maize production and potential impact of climate variability and climate change in Sub-Saharan region of Ghana using APSIM
Howard, Nathaniel	Ph.D.	Math. & Stats.	Multivariate analysis of landscape data sets from northern Ghana: Networks and pattern metrics
Itoka, Joseph D.	Ph.D.	Physics	Upgrading of land surface parameters through remote sensing (RS) modeling
John Bawa, Aggrey W.	M.Phil.	Geography	Northern (Seasonal) Migration, Home Ties and Socio-Economic Development of the Kassena-Nankana District
John V.T. Ansongbren	M.Phil.	Geography	Southern (Seasonal) Migration, Home Ties and Socio-Economic Development
Kassi, Raymond	M.Phil.	Geography	Determination of Simsbah Heat Flux from Large Aperture Scintillometer Measurements in the Volta Basin of Ghana
Kassi, Raymond	Ph.D.	Geography	Models of probability and risk applied to water resources management in the Volta Basin under climate change
Kpogon, Dany S.	M.Sc.	Geography	Developing a standardized Procedure to Screen soil water content (SWC) values for soil quality
Kpogon, Dany S.	Ph.D.	Geography	Characterization of landuse and evaluation of the effect of land cover change on soil quality in the Ghana-Togo Savanna zone of Ghana
Mafuli, Otonuma	Ph.D.	Hydrology	Integrating multi-scale hydrological simulation into the impact of climate change on water resources use planning
Nemom, Adoma M.	Ph.D.	Geography	The influence of land use patterns on runoff and infiltration in a semi-arid savanna region of Ghana
Niamah, Ghazal Yaa	M.Phil.	Geography	The Role of Urban Water Supply in Ghana: The Role of Urban Organisations and the Water Crisis in Accra
Nyarko, Benjamin Kofi	Ph.D.	Hydrology	Resilient Wetland-River Flow Synergy: An historic Study of the White Volta Basin, Ghana
Obeng-Agyemang, Francis	Ph.D.	Economics	Allocation Water Resources for Agriculture and Economic Development in the Volta River Basin
Oduro, Emmanuel	Ph.D.	Geography	Estimation of groundwater recharge in the White Volta River Basin, West Africa
Ogunkunle, Philip G.	Ph.D.	Hydrology	Exploitation and comparative studies in the water balance of the Volta Basin: An assessment and GIS-based regional estimates
Osei-Ayee, Yaw Bomee	Ph.D.	Agriculture	Household Water Security and Water Demand in the Volta Basin of Ghana
Osei-Ayee, Yaw Bomee	M.Sc.	Agriculture	The development of new research indicators: The effects of formal and informal risk sharing schemes in Ghana
Parkeside, Susan	Ph.D.	Physics	Reducing the onset of the rainy season in the Volta Basin using maximum and minimum temperatures over the land surface
Sandvik, Jan-Peter	Ph.D.	Hydrology	Potential and availability of groundwater in the eastern part of the Volta lake basin in Burkina Faso
Sensuana, Alexander	Ph.D.	Anthropology	Local strategies of water resources management in Burkina Faso: The case of wells in the Nkwanta (White Volta) New Basin
Ta, Lucine	Ph.D.	Medicine	Modeling water balance components on the basis of functional vegetation parameters
Tetteh, Corneille	Ph.D.	Geography	Epidemiology of Malaria in a holoendemic area of rural Burkina Faso
Tink, Wilco	M.Phil.	Geography	The impact of mining on the members of the Aboakrom community in the Volta West District

East African Students

Name	Degree	Department	Title of Thesis
Togay, Daniel	Ph.D.	Agricultural Economics	The Economics of migration in the Volta basin of Ghana: Household and district-level analysis
Yilma, Tsigeleg	Ph.D.	Agriculture	Modeling farm irrigation decisions under rainfall risk in the White Volta Basin of Ghana
Yusuf, William	Ph.D.	Impacts Engr.	Assessing the impact of migration on the Volta Basin of Ghana
Milimo, Markatus V.	Ph.D.	Geography	Who's Missing the Boat? Actors, Qualities & Power in Negotiations: The Case of Gold Mining Concessions in Tarkwa Area of Ghana
			Productivity of Water in Irrigation Systems: Accounting for Water in Both Crop and Non-Crop Uses

84% of West African Graduates returned to the Basin





Development of Human Capital: Workshops and trainings

- 18 workshops and trainings organized in the Volta Basin in the past 2 years
- several hundred participants, trainees
- from farmer to scientist to policy makers
- technical training, impact assessment, coping strategies, ...

Geodatabase training



Estimation of the Onset of the Rainy Season



Infrastructure and technological capacity

GLOWA Volta Geoportal
on www.glowa-volta.de

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Management

- admin
- metadata
- meetings

Info

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Links

- GLOWA Volta
- ZEF
- Informatik III

You are logged in as **antorog**.

Welcome to the GLOWA Volta Geoportal

[search]

[view maps]

[share data]

Developed by:
 Computer Science Department III
 Center for Development Research
 University of Bonn

Funded by:
 Federal Ministry for Education and Research (BMBF)

Data search

- find and assess
- download

Interactive geodata

- ◆ compose, view and analyze on map
- ◆ download from map

Publish and share data

- ◆ index and administrate
- ◆ assign use rights
- ◆ upload for distribution



Infrastructure: tele-transmitted river gauges

GLOWA Volta Geoportal - Mozilla Firefox

http://131.220.109.6/Geoportal/dataviewer/?id=urn:x-gvp:37:ds-pri.glowa_hy_discharge_cache_ghana_20080924-20090120_hour

HydroTransmStations - presented by M... GLOWA Volta Geoportal

GLOWA Volta Geoportal

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You are logged in as **guest**.

Data Viewer

Internal ID: urn:x-gvp:37:ds-pri.glowa_hy_discharge_cache_ghana_20080924-20090120_hourly.v1.asc.dl
Title: Hourly waterlevel & discharge at Chache Station, Black Volta, Ghana. 2008-2009
Creator: Dr. Constanze Leemhuis, Center for Development Research Bonn (ZEF), leemhuis[at]uni-bonn.de
Contributor: Johann Mueller, Center for Development Research (ZEF), University of Bonn
Subjects (user defined): Hydrology, Catchment, Discharge, Waterlevel, Gauging Station
Subjects: Hydrosphere > Surface Water > Discharge/Flow
Hydrosphere > Surface Water > Rivers/Streams
Date: 2009-01-26
Access information: Only GLOWA Volta Members. Otherwise contact C. Leemhuis, leemhuis[at]uni-bonn.de
Resource type: Dataset
Formats: Comma Separated Values (csv)
Temporal coverage: 20080924 - 20090120
Spatial coverage: Black Volta, Volta Basin, Ghana, West-Africa
Languages: en
Access right: g:GVP-Members
Attribute: Discharge (m³/s)
Waterlevel (m)
Descriptions: River discharge derived from waterlevel (Rating Curve: $32.3089 * (\text{waterlevel} + (-0.524727))^{2.1}$) at Gauging Station Chache, Black Volta River, Ghana. Timespan: 20080924-20090120. No data missing. Measurements taken twice every hour within 1 minute.

Links to source entries:

Links to related entries:

Bounding box (decimal degrees):
North: 9.1700000
South: 9.1700000
East: 2.7200000
West: 2.7200000

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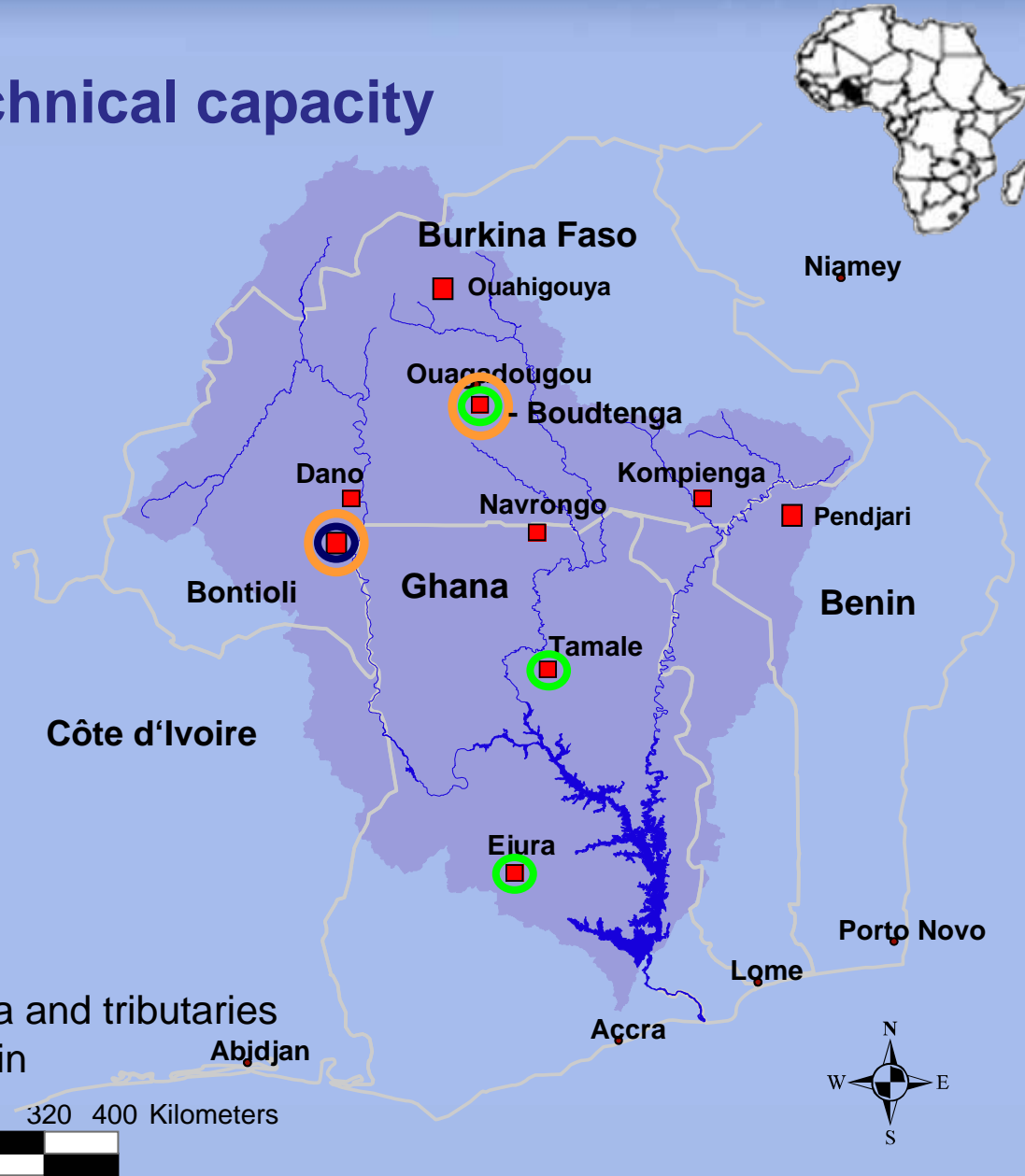
Infrastructural and technical capacity

- BON -

Biophysical Observation

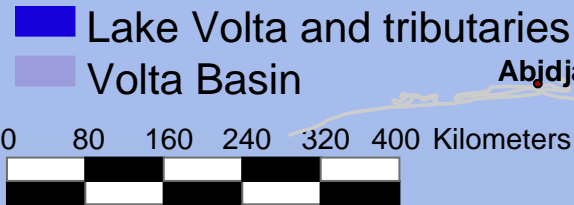
Network

In cooperation with

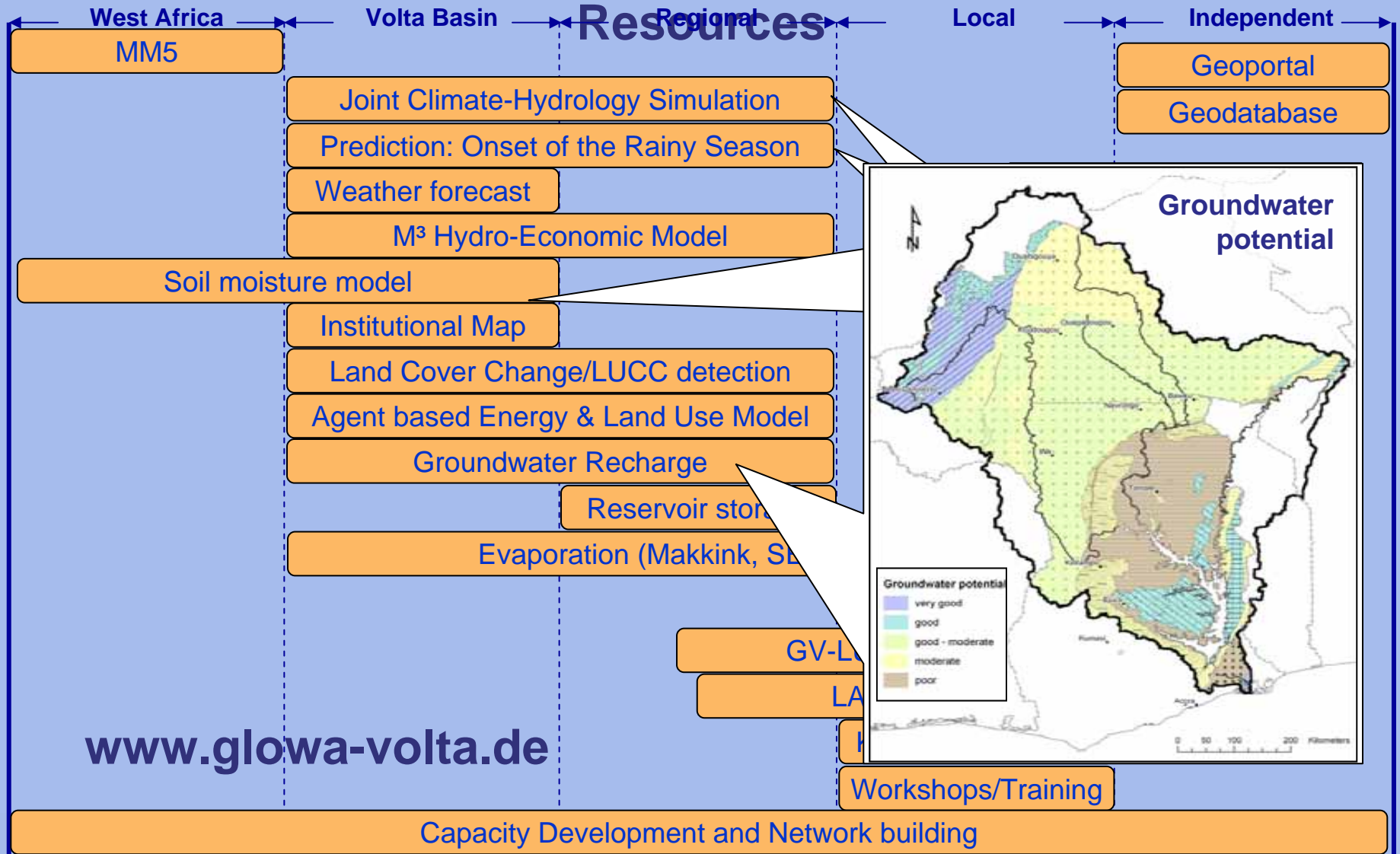


Legend:

- MicroMet.Station
- Scintillometer
- Eddy covariance
- Sap flow



GLOWA Volta Decision Support





Research Network – Research Infrastructure

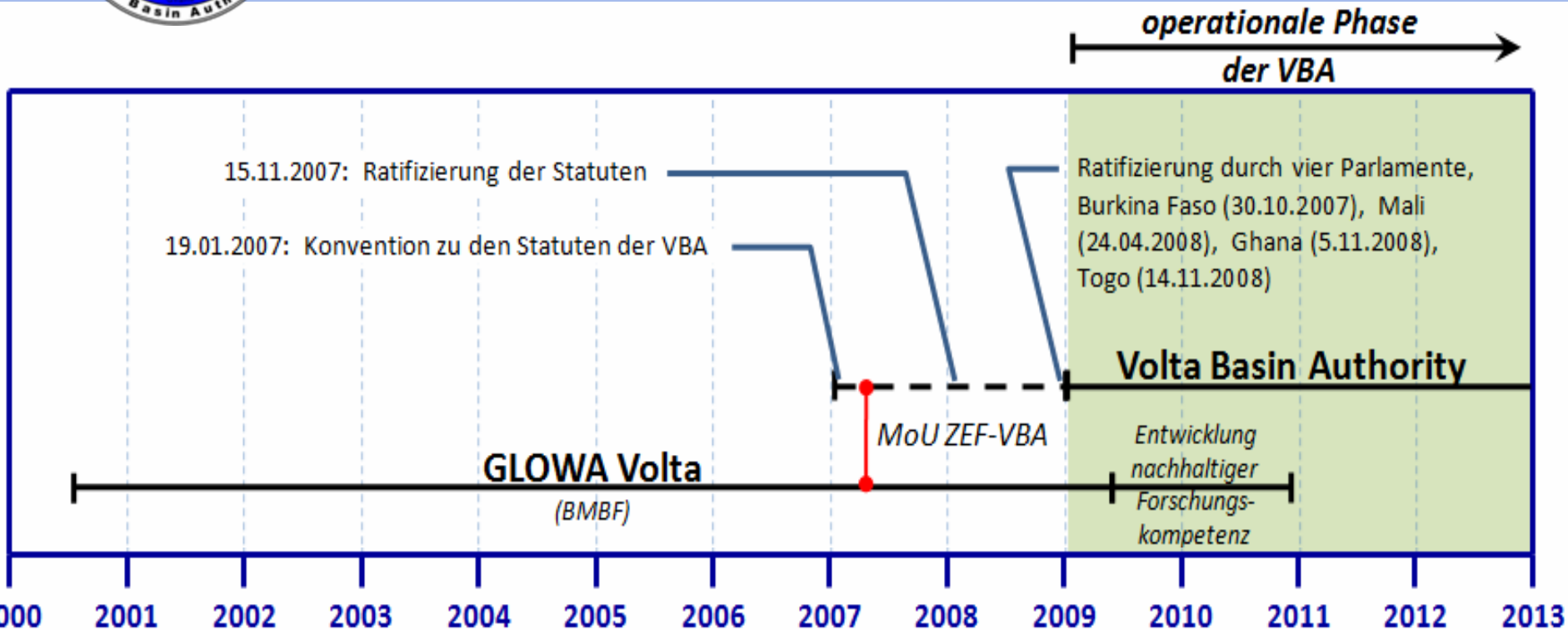
Not only N-S linkage,
also S-S collaboration

Interdisciplinary skills





Institutional capacity building: The Volta Basin Authority



Beyond GVP:

“Sustainable Development of Research Capacity based on the GLOWA Volta Project in West Africa”

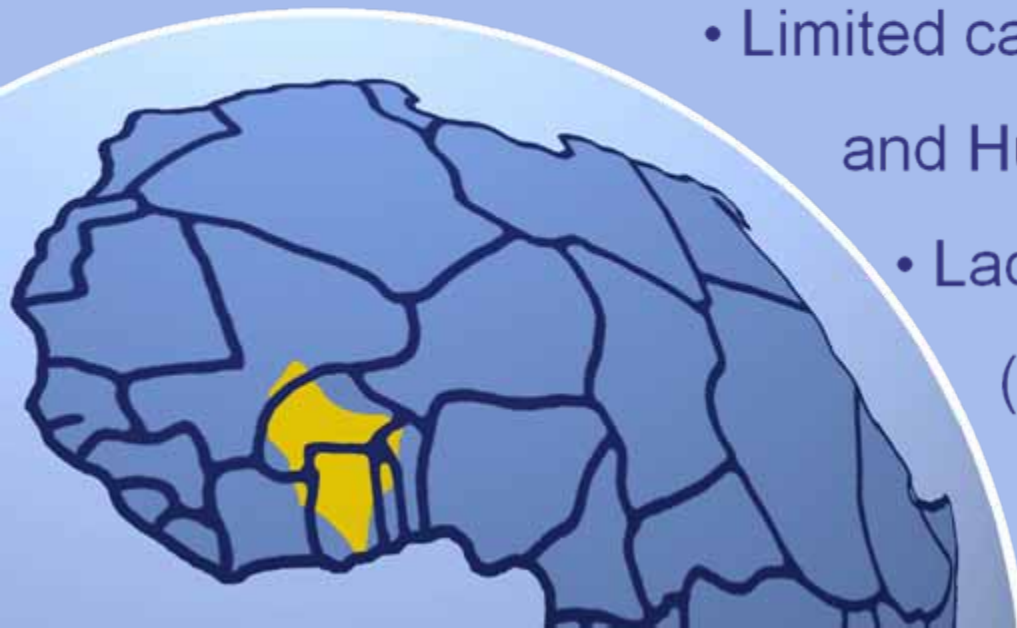
3 pillars:

- strengthening research capacity & networks in the Volta Basin based on GVP tools and models
- strengthening the Volta Basin Authority
- support implementation and use of GVP outputs



Prior to GVP


- Scattered data
- Non integrated approach
- Absence of coordination and dissemination of information
 - Lack of decision support tools
 - Limited capacity (Data Acquisition and Human Resources)
 - Lack of International collaboration (North-South & South-South)



Conclusions

Capacity building = Sustainable ?

- creates and improves local expertise
- creates a sense of ownership, acceptance of models
- it is a vehicle for the implementation of scientific results


A wide-angle photograph of a rural landscape. The foreground shows a field with rows of crops, possibly a vegetable garden or small farm. The middle ground is a flat, open area with scattered trees and a few small structures. The background is a hazy horizon under a clear sky.

**We gratefully acknowledge the generous support of the
German Federal Ministry of Education and Research**

Conclusions

Capacity building = Sustainable ?

- Persisting research networks have formed, capacity building successful
- Data scarcity is reduced, data sharing platform in place
- GVP provides Decisions Support Resources at different levels
- GVP supports the Volta Basin Authority

A wide-angle photograph of a rural landscape. The foreground shows a field with green cover crops and some trees. The middle ground is a flat, open area with scattered trees and a few structures. The background is a hazy horizon under a clear sky.

**We gratefully acknowledge the generous support of the
German Federal Ministry of Education and Research**