



# **3<sup>rd</sup> GEOSS African Water Cycle Coordination Initiative Workshop**

**4-5 February 2013**

**Art Suites Hotel, El Jadida, Morocco**

**VOLTA RIVER BASIN**

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# Presentation Plan



- 1. Volta River Basin**
- 2. Water Resources management and use issues in basin**
- 3. Urgent needs in Basin**
- 4. Planned actions**

# Riparian Countries

Volta basin



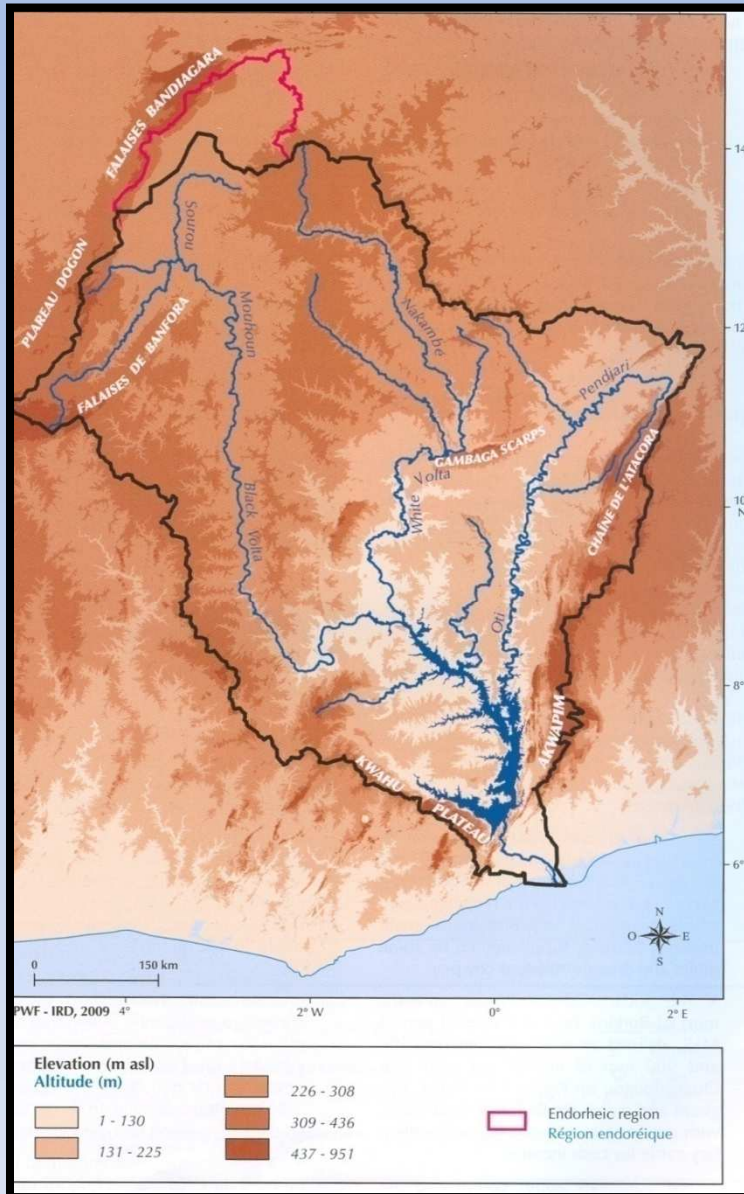
Country	% of Basin Area	% of Country
<b>Benin</b>	<b>3.41</b>	<b>12.1</b>
<b>Burkina Faso</b>	<b>42.9</b>	<b>62.4</b>
<b>Cote d'Ivoire</b>	<b>2.48</b>	<b>3.1</b>
<b>Ghana</b>	<b>41.6</b>	<b>70.1</b>
<b>Mali</b>	<b>3.12</b>	<b>1.0</b>
<b>Togo</b>	<b>6.41</b>	<b>45.0</b>

# Basic Information on the Volta Basin

- Catchment Area: About 400 000 km<sup>2</sup>
- Transboundary basin shared by 6 countries: Benin, Burkina, Côte d'Ivoire, Ghana, Mali & Togo
- 85 % of the area of the basin is shared between BF and Ghana
- 3 main sub-basins:
  - Black Volta (Mouhoun ): 150 000 km<sup>2</sup>
  - White Volta (Nakambé): 105 000 km<sup>2</sup>
  - Oti: 70 000 km<sup>2</sup>



# Surface Waters



Sub-basin	Area (km <sup>2</sup> )	% Contribution
<b>White Volta</b>	<b>104,749</b>	<b>20</b>
<b>Black Volta</b>	<b>149,015</b>	<b>18</b>
<b>Oti</b>	<b>72,778</b>	<b>26</b>
<b>Others</b>		<b>36</b>



# Surface water monitoring sites

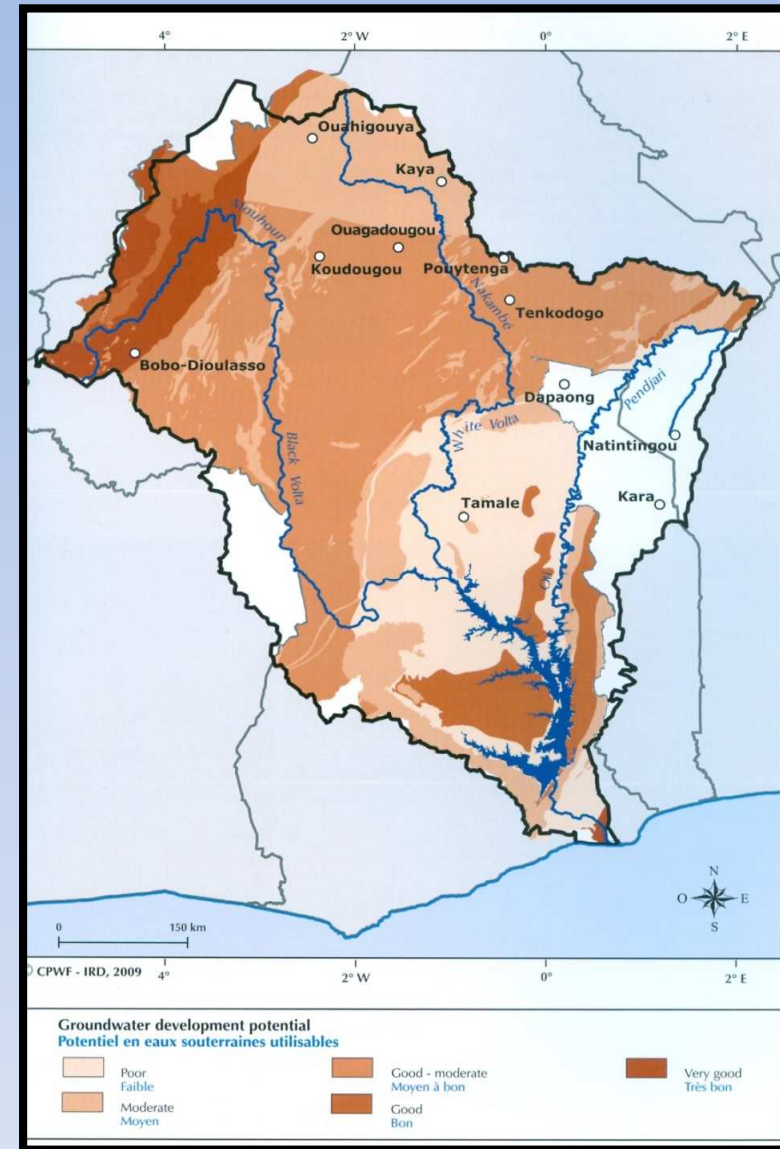
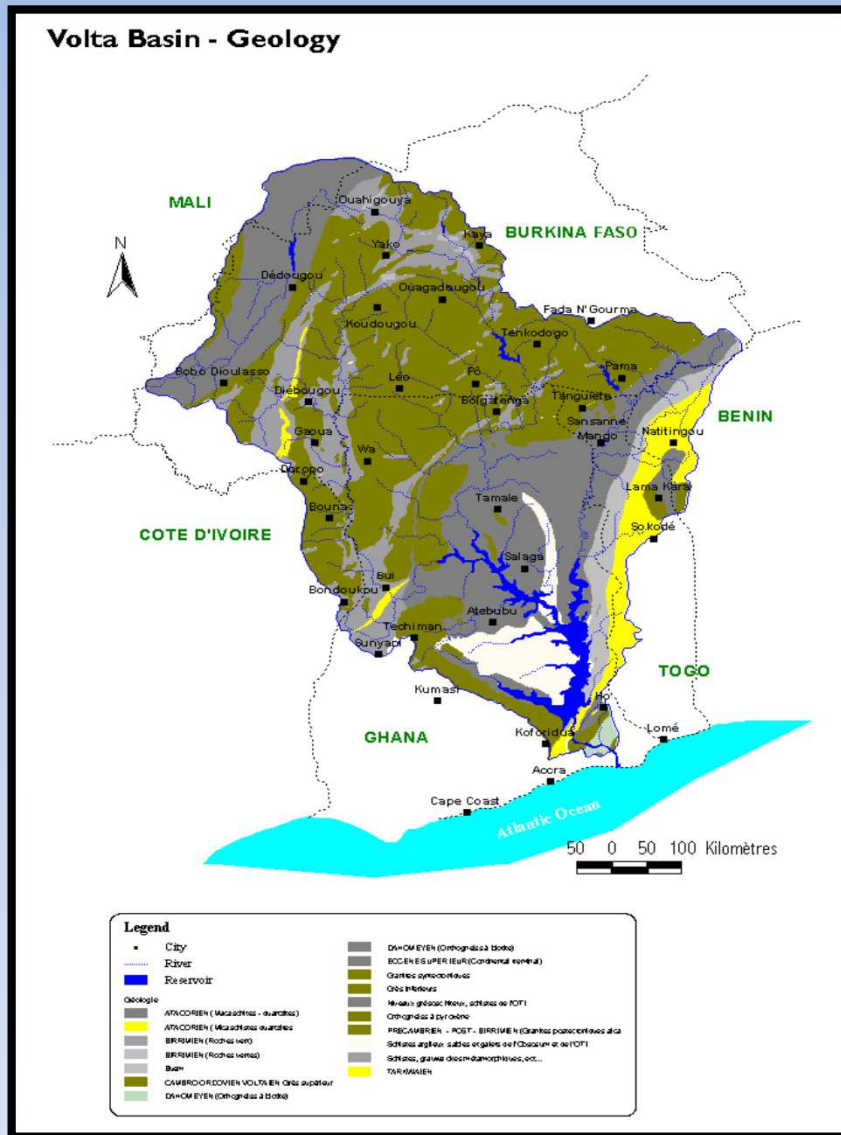


Novembre / November 2010

Sources de données / Data sources: FAO, Volta-Hycos, IRD-SIEREM, Glowa Volta  
Les limites administratives, notamment les frontières entre Etats, n'ont aucune valeur juridique

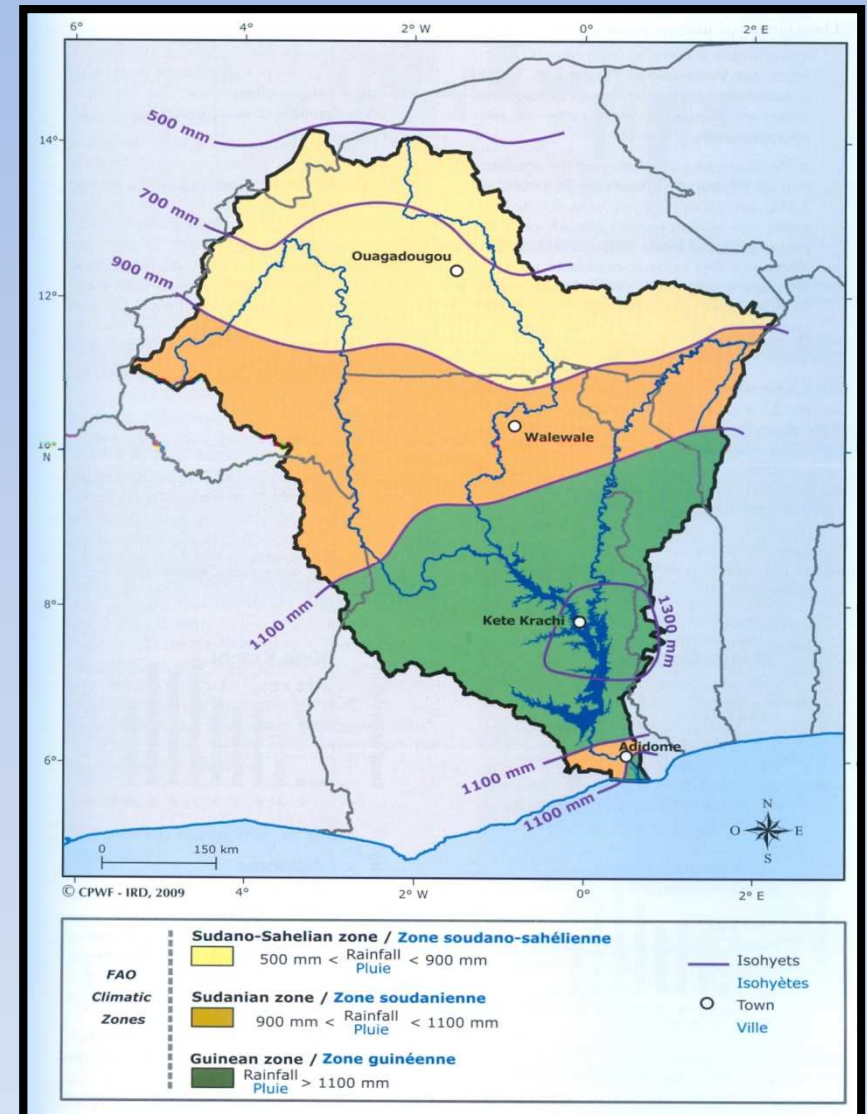


# Groundwater Resources



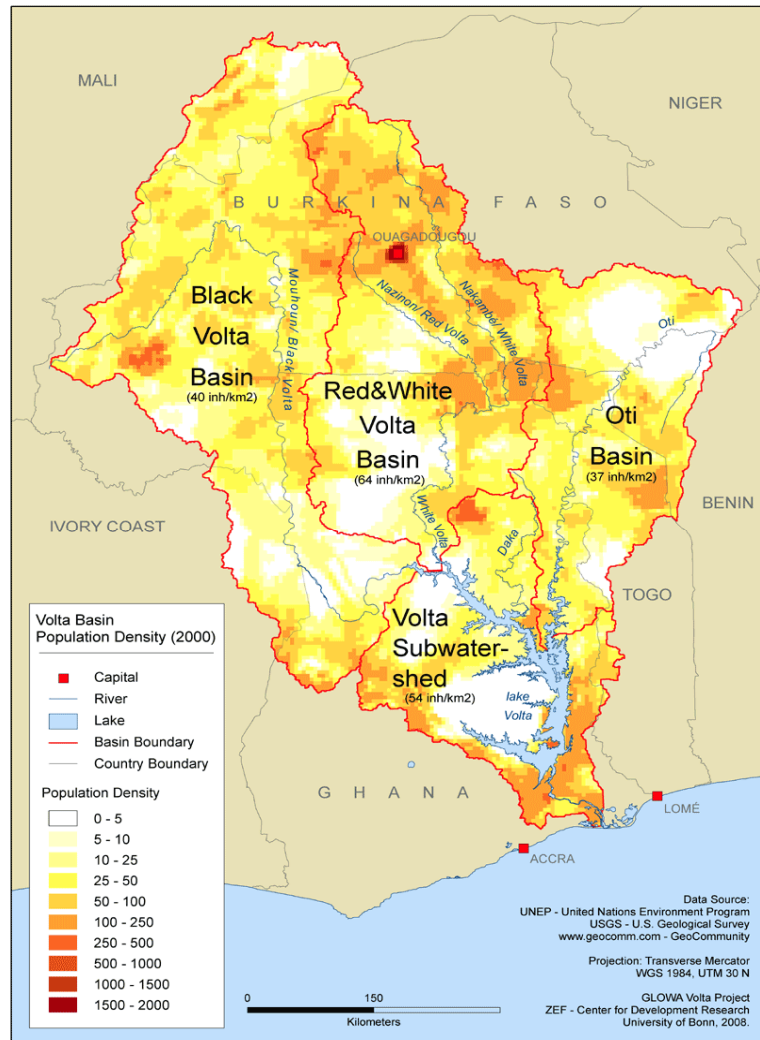
# Rainfall and Agro-Ecological Zones

- i. Spatial variability - **south-north gradient**;
  - ii. Medium-term variability - **alternating dry & wet periods basin-wide**;
  - iii. Strong spatial and short-term variability **within a given season**
- **The Sudano-Sahelian Zone: 500-900 mm – BF and MA**
  - **The Sudanian Zone: 900-1,100 mm – northern GH, CI, BE & TG**
  - **The Guinean Zone: >1,100m; bimodal rainfall; southern GH**



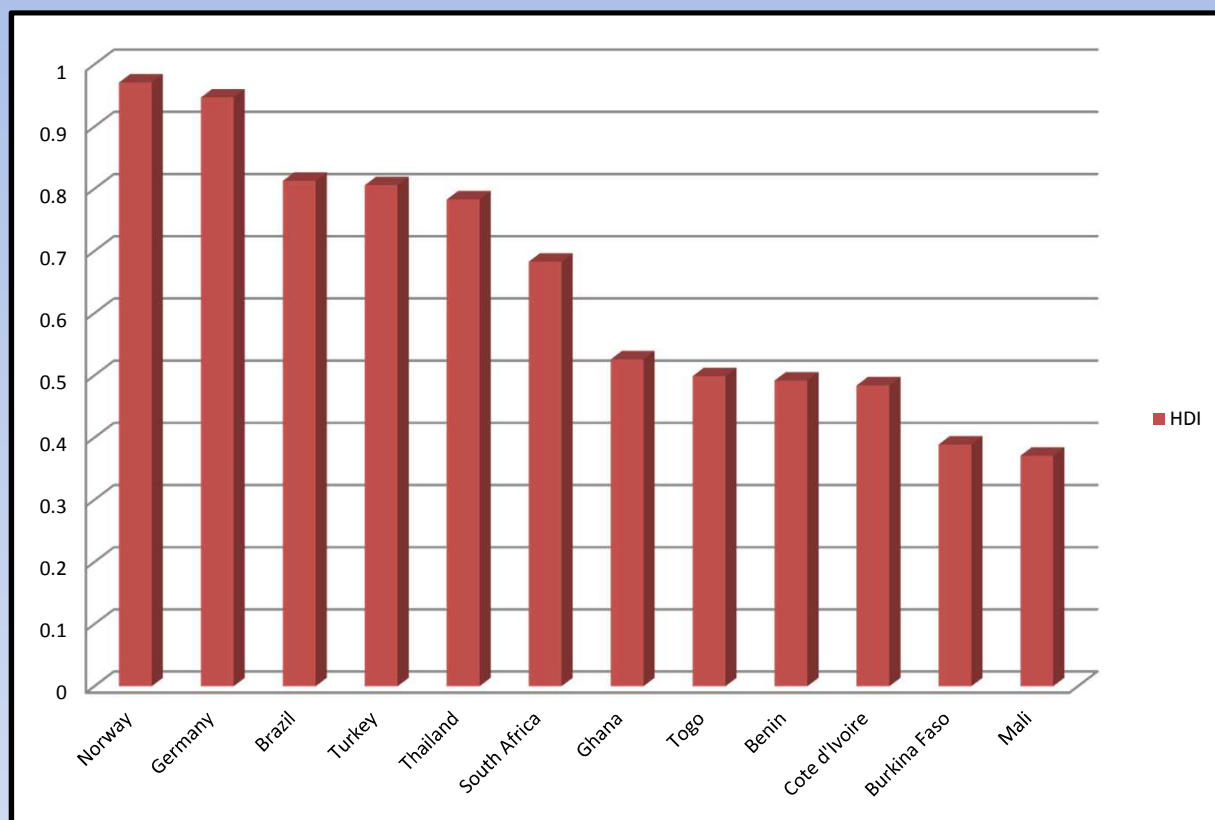


# Population



- **Basin population 18.6 million in 2000;**
- **Projected to reach 33.9 million in 2025;**
- **Rural pop. 70% ;**
- **Live on natural resources**

# Economic Profile



**Export of  
primary  
commodities;  
2009 HDI <0.5**

**HDI of Volta Basin Countries and  
Other Areas**

# 2. Water Resources

## Management and use Issues

### Current Challenges in Basin

**UNEP/GEF Volta TDA - 8 priority transboundary concerns:**

- **Changes in water quantity and seasonality of flows**
- **Degradation of Aquatic Ecosystems**
- **Degradation of Surface Water Quality/Pollution**
- **Invasive Aquatic Species**
- **Land Degradation/ Loss of Vegetative Cover**
- **Loss of Biodiversity**
- **Water related diseases**
- **Coastal Erosion**



## 2. Water Resources Management Issues

### Other challenges include:

- **Insufficient political support,**
- **Lack of financial resources,**
- **Gaps in information,**
- **Insufficient stakeholder participation and**
- **Poor institutional coordination and collaboration.**



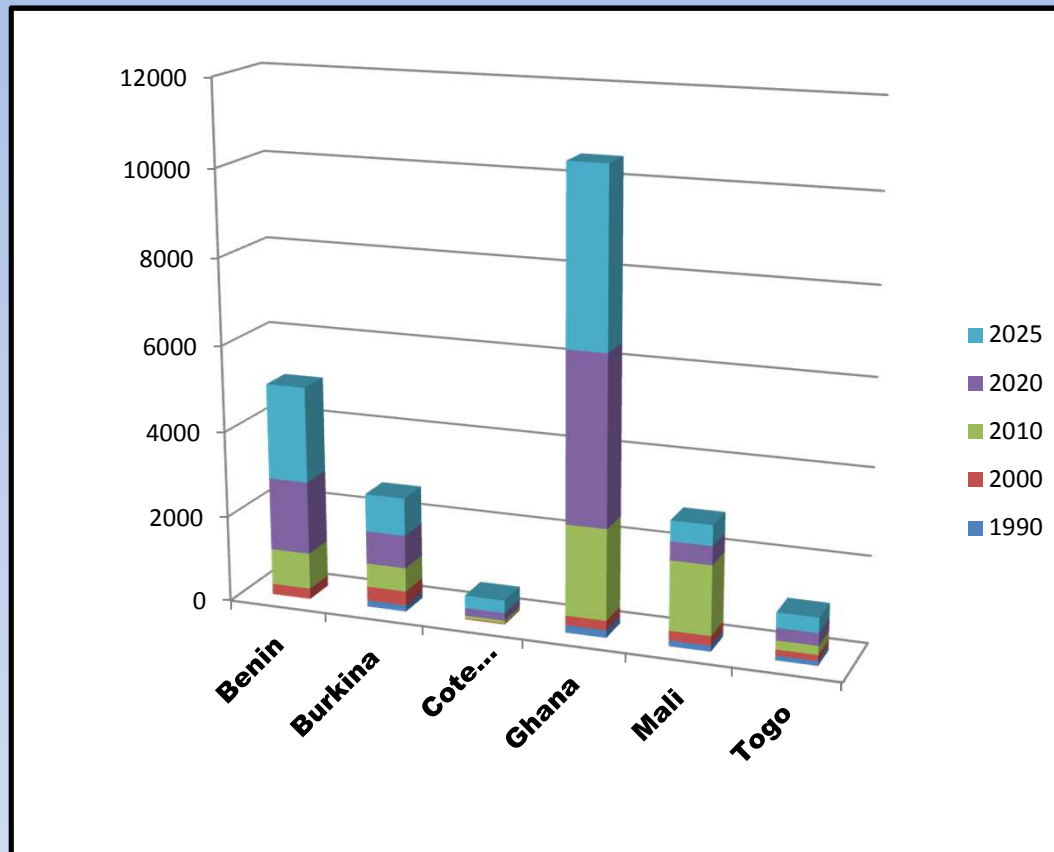


# MANDATE OF VBA

- 1. Promote permanent consultation tools among the parties for the development of the basin;**
- 2. Promote implementation of IWRM and equitable distribution of the benefits resulting their utilization;**
- 3. Authorize the development of infrastructure and projects planned by the stakeholders, which could have substantial impact on water resources;**
- 4. Develop joint projects and works;**
- 5. Contribute to poverty alleviation, sustainable development in the Volta basin, and for better socioeconomic integration in the sub-region.**



# Water Demand



- **Consumptive uses:** domestic water supply, crop irrigation and livestock;
- **Non-consumptive:** hydropower generation, fisheries, recreation and tourism.
- **Water demand** projected to increase > 1000% 2000 - 2025.

## WEAP model Projections:

- Ouagadougou to experience shortages in dry months, from 2013;
- By 2030 only 42% of Bagre irrigation demand will be met;
- The conditions will worsen in very dry years.

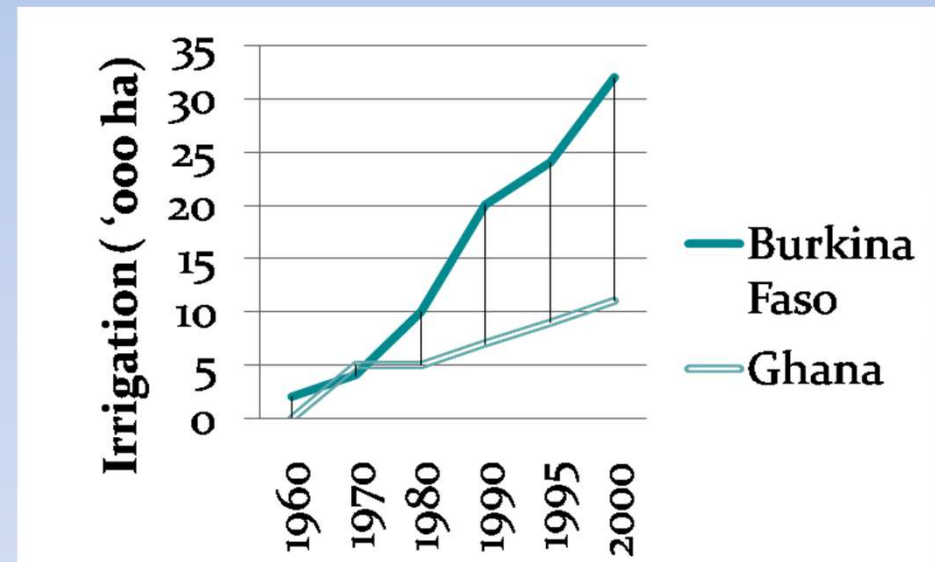
# Agricultural Production Systems

- **Agricultural production about 40% of basin economic output;**
- **Most cultivation still rain-fed;**
- **Production increases largely due to expansion of agric. land;**
- **Cropping systems distributed in the agro-climatic regions;**
- **Livestock - important upstream water use;**
- **Fisheries in large reservoirs;**

## Specific negative impacts

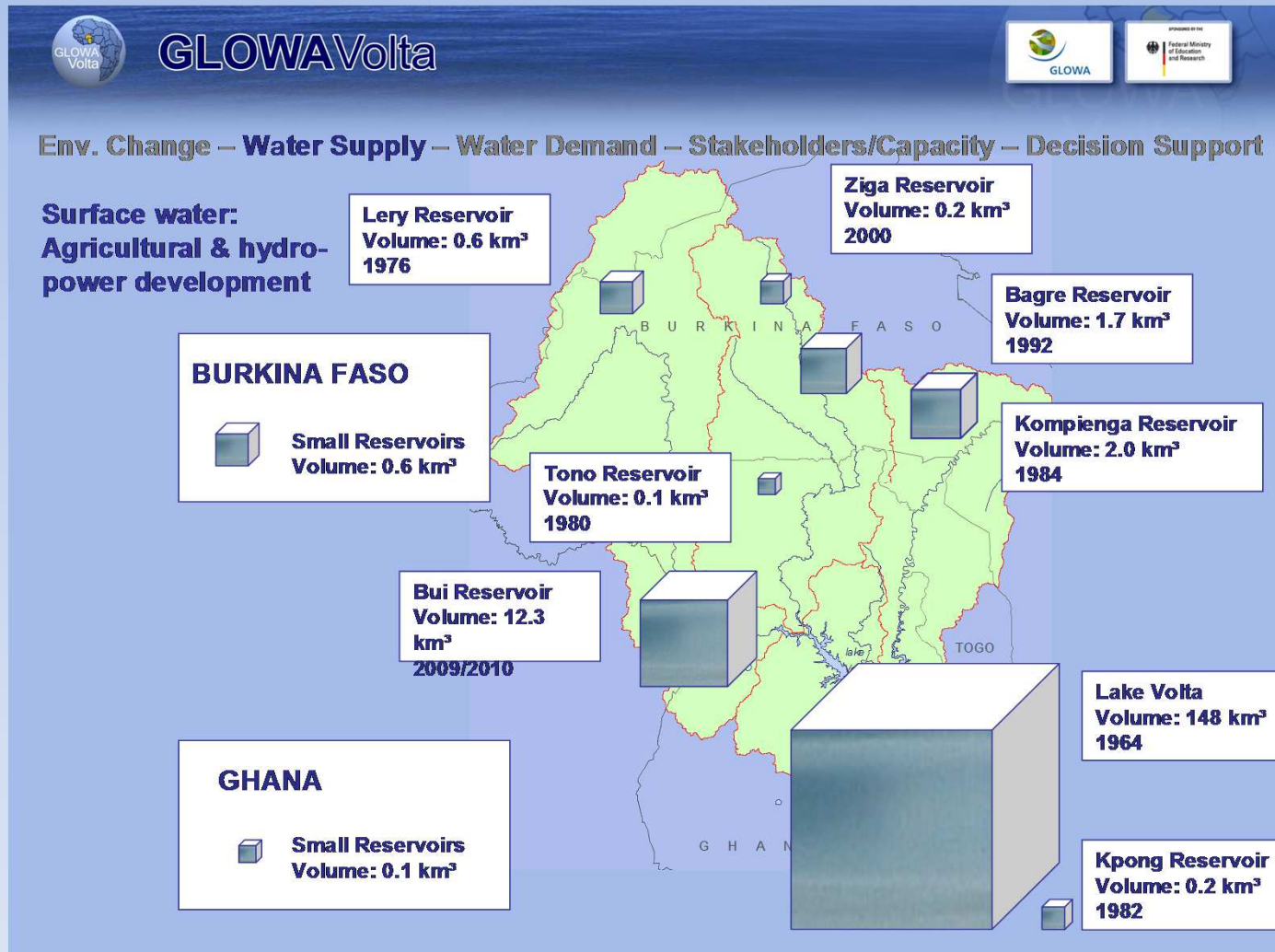
- **Forests over-exploitation and degradation: for firewood, charcoal and lumber, cash crops, over-grazing;**
- **Loss of top soil, erosion and salinisation;**
- **Over-exploitation of fisheries**

Irrigated agriculture relatively developed in BF



# Development Challenges

## -Large Dams/Reservoirs



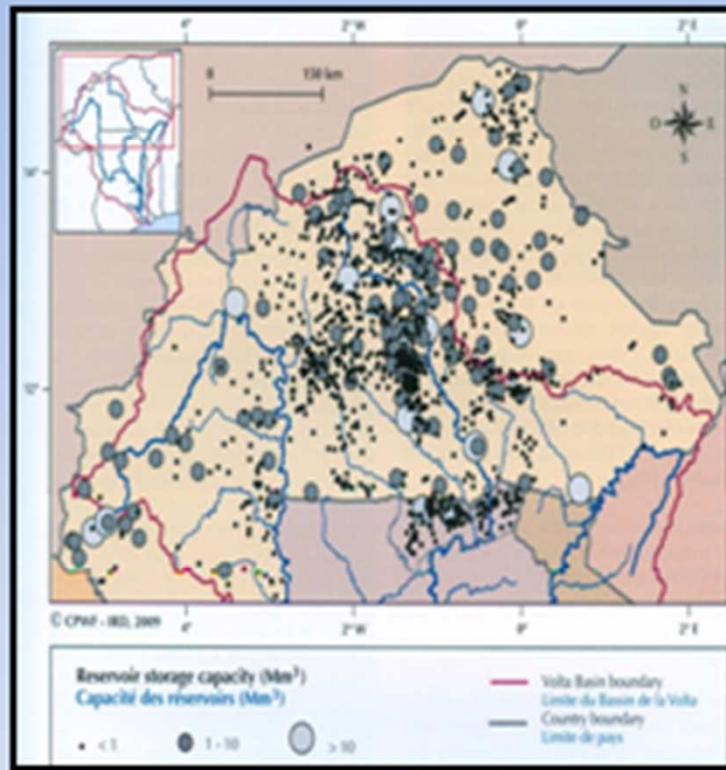


# Hydropower Dams

Sub-basin	Location	Year	Capacity (MW)
<b>Current</b>			
<b>Lower Volta</b>	<b>Akosombo</b>	<b>1964</b>	<b>912</b>
<b>Lower Volta</b>	<b>Kpong</b>	<b>1981</b>	<b>160</b>
<b>Black Volta</b>	<b>Bui</b>	<b>Construction</b>	<b>400</b>
<b>Oti</b>	<b>Kompienga</b>	<b>1984</b>	<b>14</b>
<b>White Volta</b>	<b>Bagre</b>	<b>1992</b>	<b>16</b>
<b>Oti</b>	<b>Benin</b>		<b>14</b>
<b>Planned (e.g.)</b>			
<b>Black Volta</b>	<b>Samendeni</b>		<b>62</b>
<b>Oti</b>	<b>Juale</b>		<b>87</b>
<b>White Volta</b>	<b>Pwalugu</b>		<b>48</b>
<b>White Volta</b>	<b>Daboya</b>		<b>43</b>



# Small Reservoirs in the Volta Basin



## In response to continuing drought conditions –

- **Rapid upstream expansion of small reservoirs since 1970s;**
- **80% of small reservoirs in BF;**
- **Future expansion expected;**
- **Initial predicted impact on hydropower generation is minimal compared to climate change;**
- **Small reservoirs are important for water supply & fisheries;**
- **But responsible for spread of some water related diseases.**

# MITIGATING FLOOD IMPACT

- **SONABEL VRA collaborative meeting & data sharing**
- **Sub-regional level** - Regional Study on Transnational Flood Impacts and Preparedness Mechanisms
- **Millennium Challenge** Account Project in Burkina Faso is collaborating with the GEF Volta
- Planned training in Hydrological Modeling and Flood Forecasting



# Climate Change Adaptation

## Some Adaptation to Climate Change

- Introduction of new crop varieties e.g., early maturing and drought-resistant species;
- Land management to improve water soil moisture needed for optimal crop growth, e.g., rain harvesting (Challenge Program on Water and Food Phase-CPWF 2)
- Prediction of the onset of the rainy season through the use of empirical models.
- Reservoirs for water storage and use in the dry season





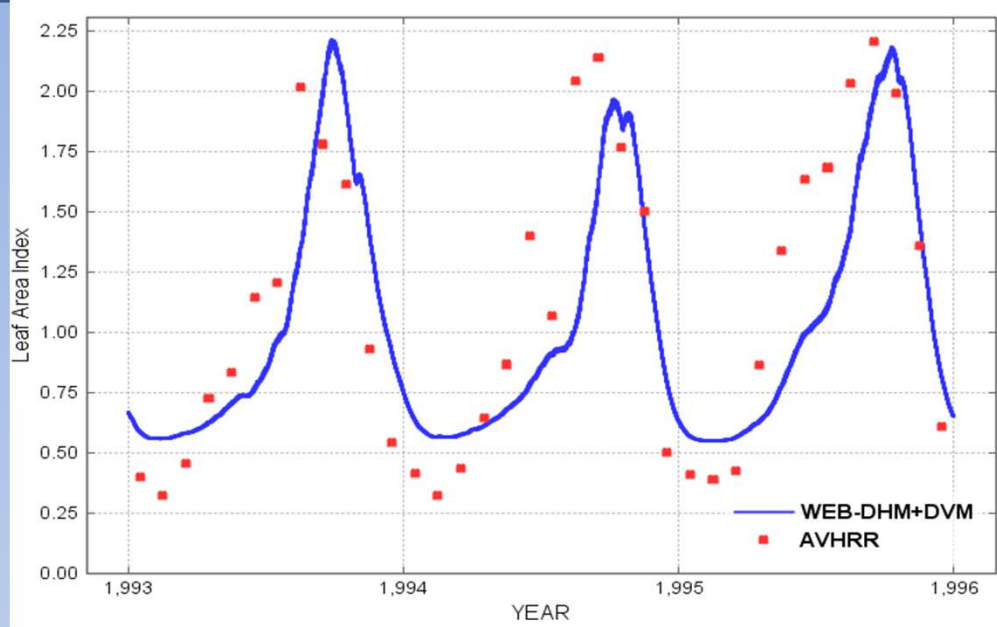
# Climate Change Adaptation

- WASCAL Programme

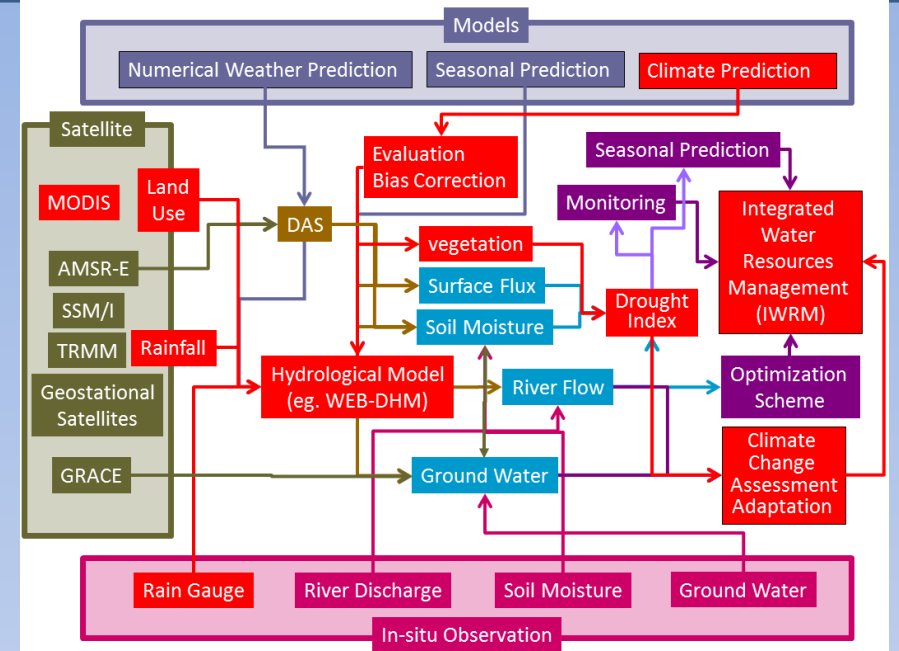


# PRELIMINARY RESULTS FROM COLLABORATIVE WORK- UNIV OF TOKYO /VOLTA BASIN



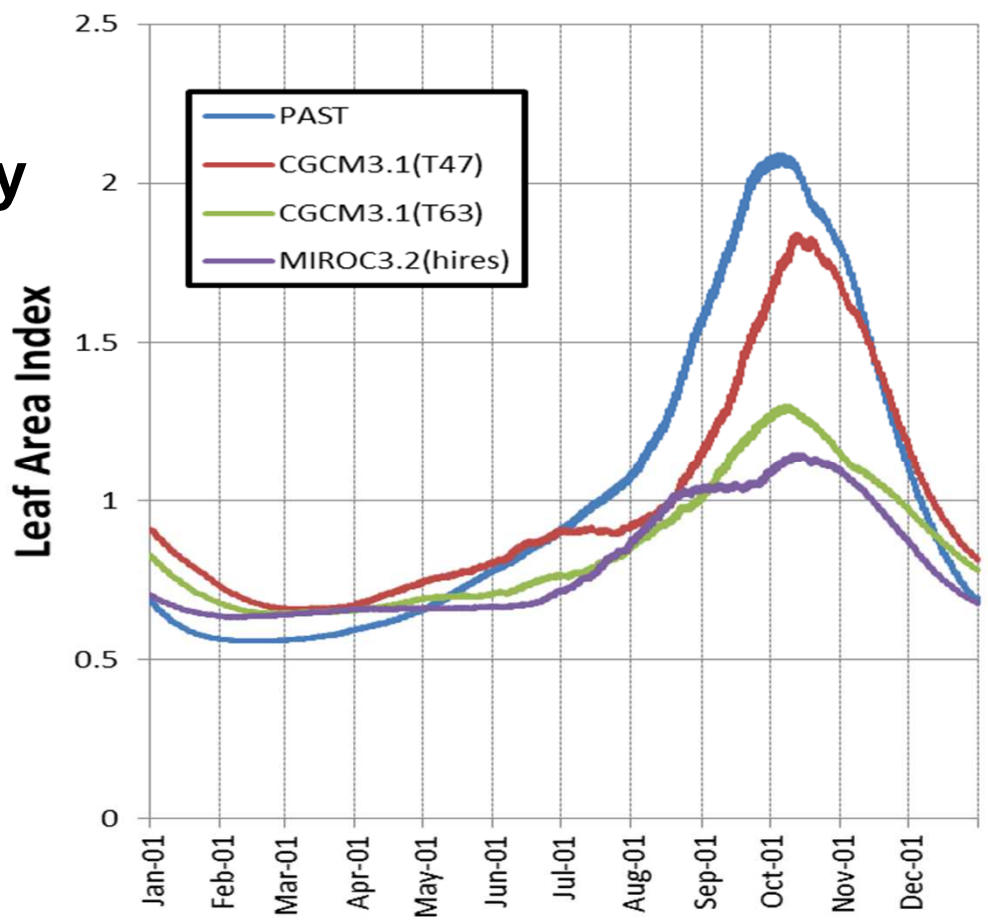


**Upper:** Simulation of the seasonal change in vegetation in West Africa and validation by using the satellite data.



## ***Climate Change Impacts on Vegetation***

**Right:** Impact of climate change on vegetation dynamics in the river basin of West Africa by using the selected GCM outputs after the bias correction.



# Urgent needs in basin

- **It is necessary to focus on the prevention and integrated risk management of disasters** in response to increased intensity and frequency of natural disasters (floods and droughts) which reduce the resilience of communities in the basin;
- To move from subsistence to growth agriculture so as to improve upon food security in the basin.





# Urgent needs in basin

- Hence, the need for climate smart agriculture, attention on rain-fed agriculture, and greater focus on risk management.



# Urgent needs

- Climate Change impacts negatively on economic growth and erodes the gains from the countries development.
- strengthen climatic database and information systems
- promoting the use of climatology and meteorology in multi-sectoral planning



# Urgent needs

- Setup early warning systems
- Promote an integrated approach on environmental issues in particular articulating climate change adaptation as well as disaster risk reduction efforts.



# 1. Developing Integrated Monitoring Systems

- Near-real time observing systems by coupling satellite and in-situ measurements
- Linkage of meteorological, hydrological and agricultural observations
- Long-term and comprehensive climate observational data





## 2. Developing Integrated Early Warning Systems

- Weather and seasonal prediction coupled with hydrological and agricultural prediction.
- Optimization systems for reducing disaster risks and increasing societal benefits



# 3. Assessing Climate Change Impacts for Adaptation

- Effective use of climate model projection including multi-model analyses, bias correction and downscaling.
- Assessment system of the climate water food nexus



# Actions continued

4. Developing Data and Information Integration and Sharing Systems

5. Promoting Capacity Building Programs

## **SCHEDULE**

- Two (2) years of integrated research-oriented feasibility study
- Three (3) years operational program



*Thank you for your attention*



Bénin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Togo

Autorité du Bassin de la Volta (ABV)

