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Project Design Matrix (PDM) by VOLTA BASIN AUTHORITY (VBA)

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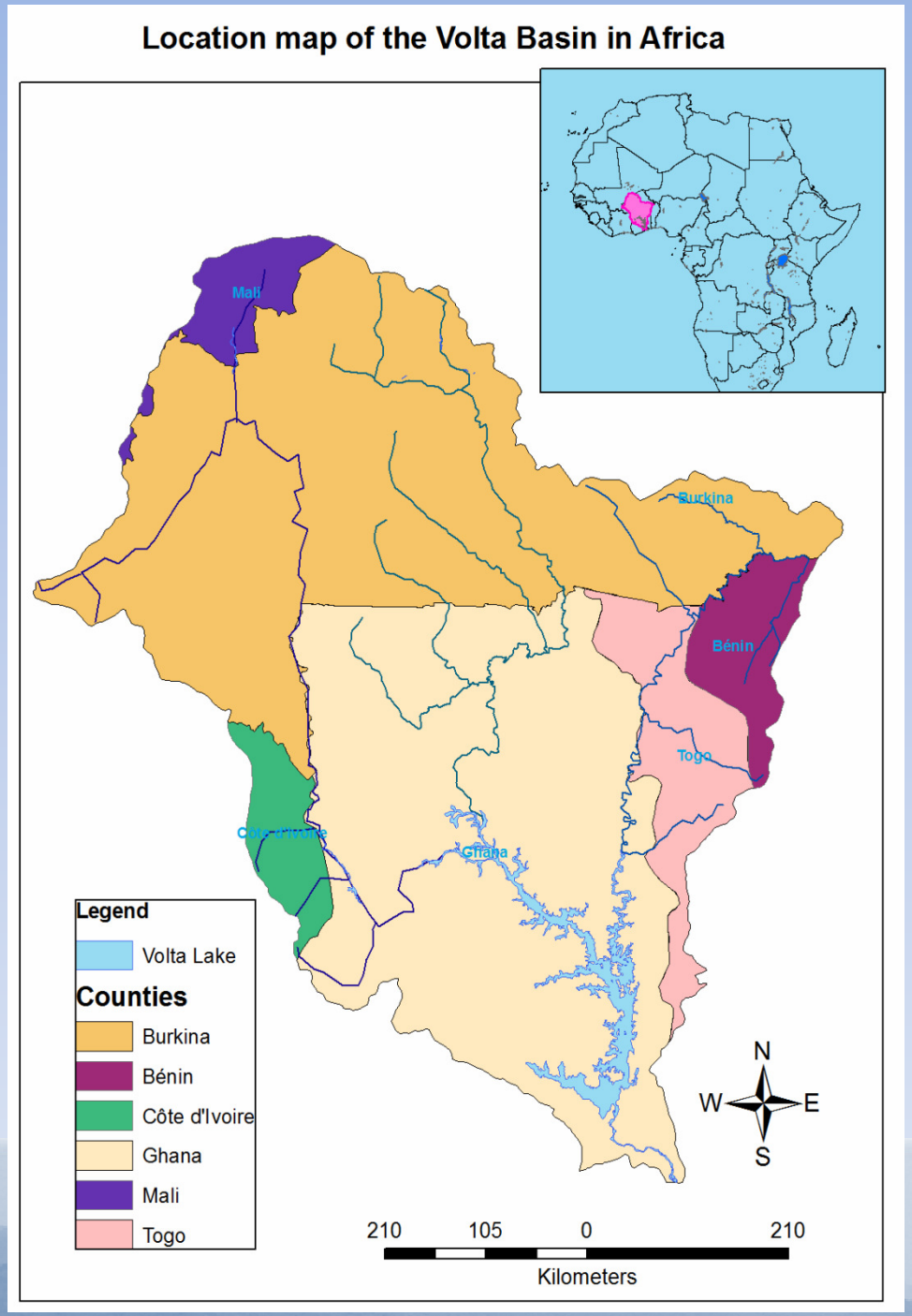

Volta Basin Member States

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

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

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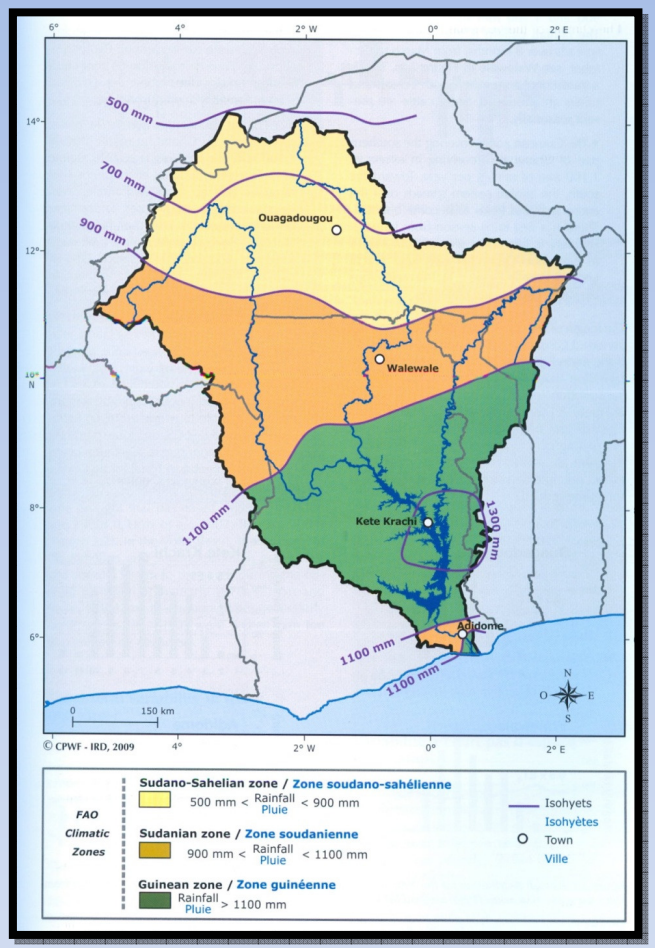
Rainfall and Agro-Ecological Zones and Water Resources

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

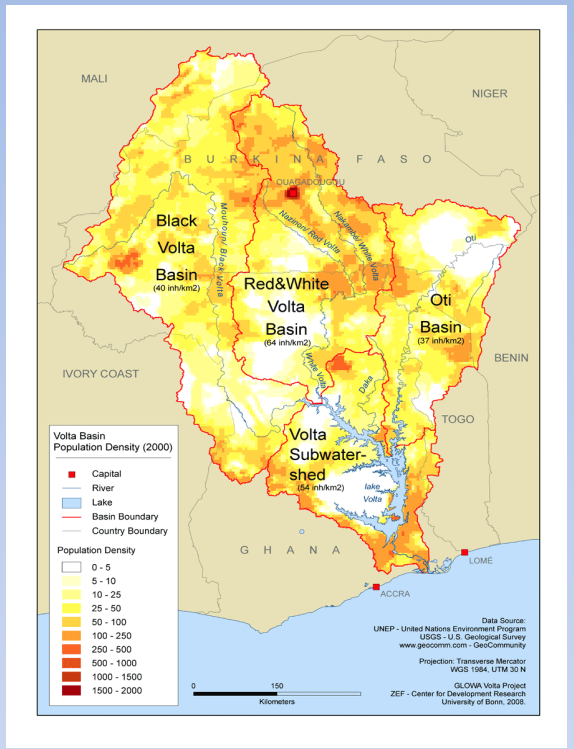


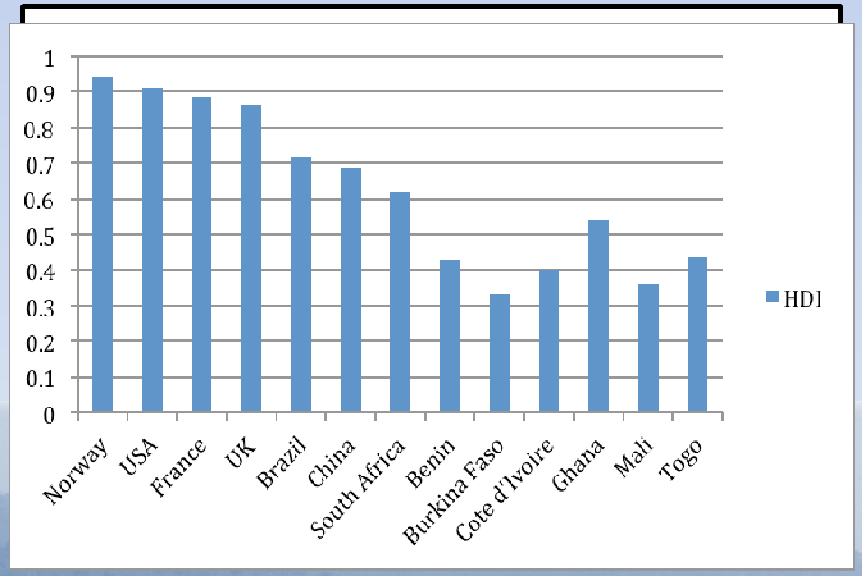
Surface Water Resources

Sub-basin	Area (km2)	Contribution
Black Volta	149,015	18%
White	104,749	20%
Oti	72,778	26%
Others		36%

Population

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



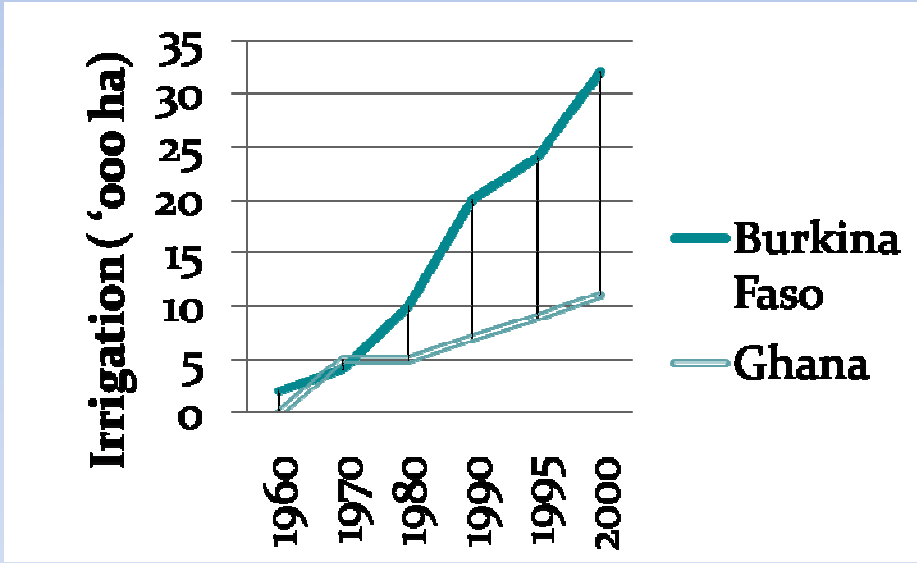


- **Export of primary commodities;**
- **2012 HDI mostly <0.5 (UNDP, 2012)**

Agricultural Production Systems

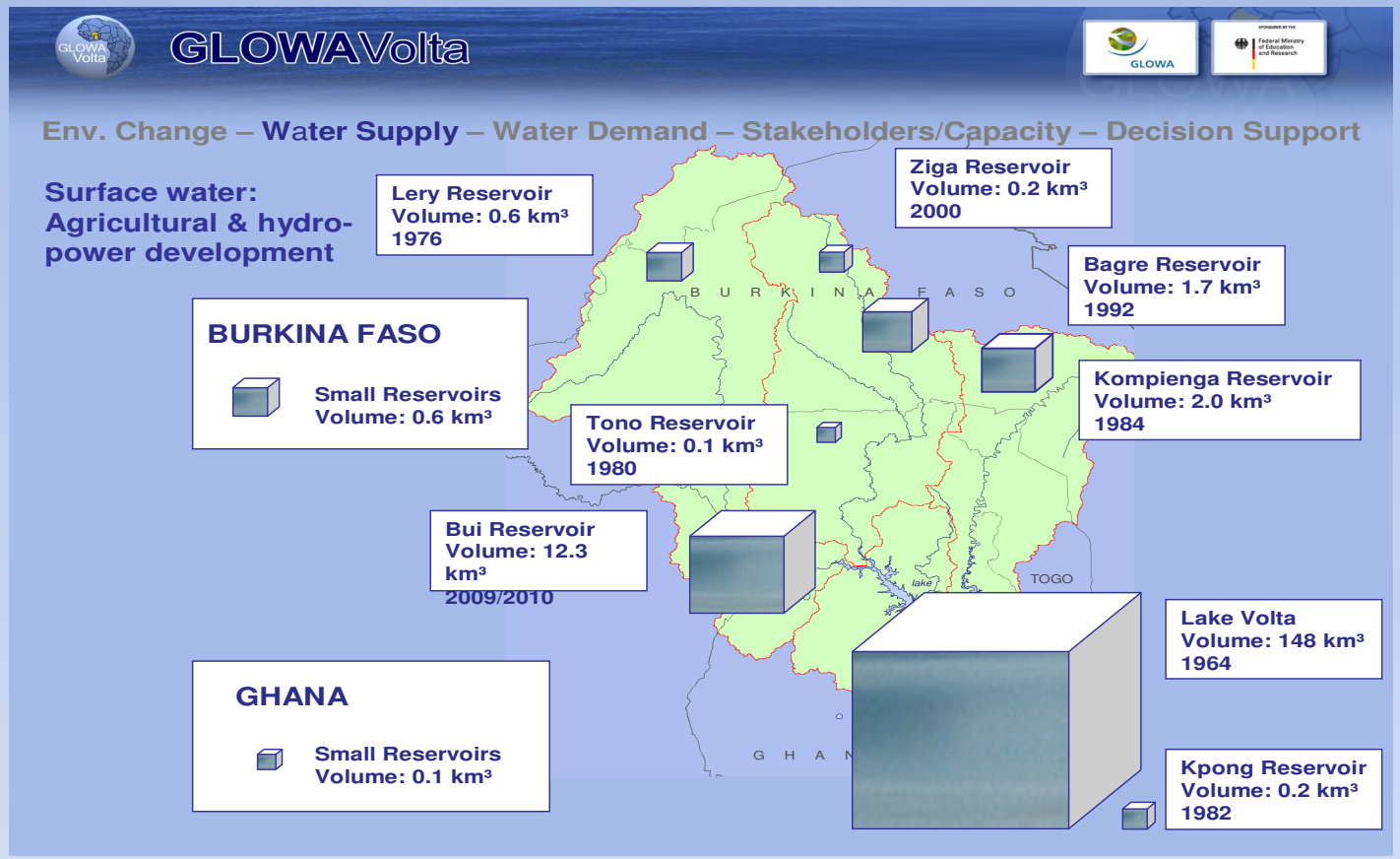
- Agricultural production about 40% of basin economic output;
- Most cultivation still rain-fed;
- Production increases largely due to expansion of agric. land;
- Cropping systems distributed in the agro-climatic regions;
- Livestock - important upstream water use;
- Fisheries in large reservoirs;

Irrigated agriculture relatively developed in BF



Climate Change Adaptation could lead to more water retention upstream

Development Challenges -Large Dams/Reservoirs



Top 2 Prioritised Water Resources Challenges

- ✓Degradation of Aquatic Ecosystems
- ✓Changes in water quantity and seasonality of flows

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

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Project purpose/ Outputs

The purpose of the project is to improve upon the quantitative and qualitative data in the basin

Outputs

1. **Demonstrate quantitative and qualitative improvement of water cycle observations**
2. **Demonstrate flood and drought early warning capability**
3. **Assess climate change impacts on floods, droughts and water-nexus**
4. **Prototype data and information integration and sharing systems**
5. **Improve observational, modeling and application capacity**

Activities and Key Leaders and Contributors

Lead Organizations

Volta Basin Authority (VBA) / AGRHYMET

1. **Demonstrate quantitative and qualitative improvement of water cycle observation:**

- **Transmitting** rain gauge data to the Lead Organization's Data Facility and sharing the data by Internet for producing bias-corrected satellite-based rainfall map to be disseminated to wide communities (WMO/HYCOS, ESA, TIGER-NET, NASA, NOAA, JAXA, DIAS)
- (**In-situ and satellite** observation data archive

  WMO/HYCOS, UNEP/GMES, UNESCO/G-WADI, UNESC-WMO/IGRAC, Tiger heritage, ODA project heritage, AMMA,
- **Reanalysis** (ECMWF, NCEP, JMA), ESA, NASA, NOAA, JAXA, CEOS Water Portal, GEOWOW, NASA-SERVIR, DIAS

Activities and Key Leaders and Contributors

- **Climate data archive** at least past 20 years which correspond to the availability of the GCM model outputs.

  WMO/HYCOS, Reanalysis (ECMWF, NCEP, JMA), ESA, NASA, NOAA, JAXA, CEOS Water Portal, GEOWOW, NASA-SERVIR, DIAS

- **Acquisition and installation** of integrated meteorological observation network covering the parts of the Volta basin.

  WMO/HYCOS, AfDB, EU, JICA.

2. Demonstrate flood and drought early warning capability

- Develop distributed physically-based hydrological models including simulation ability for runoff, evapotranspiration,
- soil moisture, ground water and vegetation growth. CREST, DIAS, science community
- Prototype real-time data integration systems for satellite data bias correction, hydrological modeling including data assimilation and information dissemination (ACMAD, ECMWF, National Weather Services, GEOWOW, NASA-SERVIR, UNESCO-IFI, UNESCO-Princeton Univ., DIAS)

Activities and Key Leaders and Contributors

3. Assess climate change impacts on floods, droughts and water-nexus

- Selection of GCMs which can express the regional climate (PCMDI, DIAS, science communities)
- Bias correction and downscaling (PCMDI, CORDEX, DIAS, science communities)
- Socio-economic data archive: GLOWASIS; Assessment of the changes of flood, drought and water-nexus (GLOWASIS, CORDEX, DIAS, science communities)

4. Prototype data and information integration and sharing systems

- Develop an integrated water portal for improving data accessibility and data sharing (CEOS Water Portal, GEOWOW, NASA-SERVIR, DIAS)
- Prototype a data integration and analysis and information dissemination system

5. Improve observational, modeling and application capacity

- Develop training modules and design and implement training courses (Tiger, UNESCO, NASA-SERVIR, RCMRD, ITC, UNU, UTokyo,
- Promote secondary educational program in collaboration with universities (ITC, UNU, UTokyo)

Thank you for your attention

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

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