



ClimDev-Africa

Climate and Infrastructure in Africa's Major River Basins

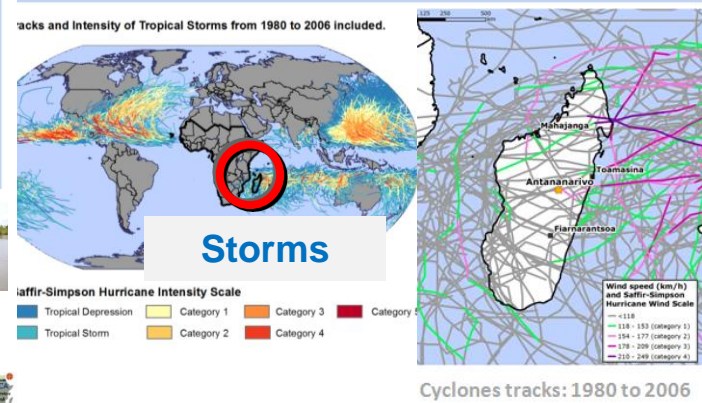
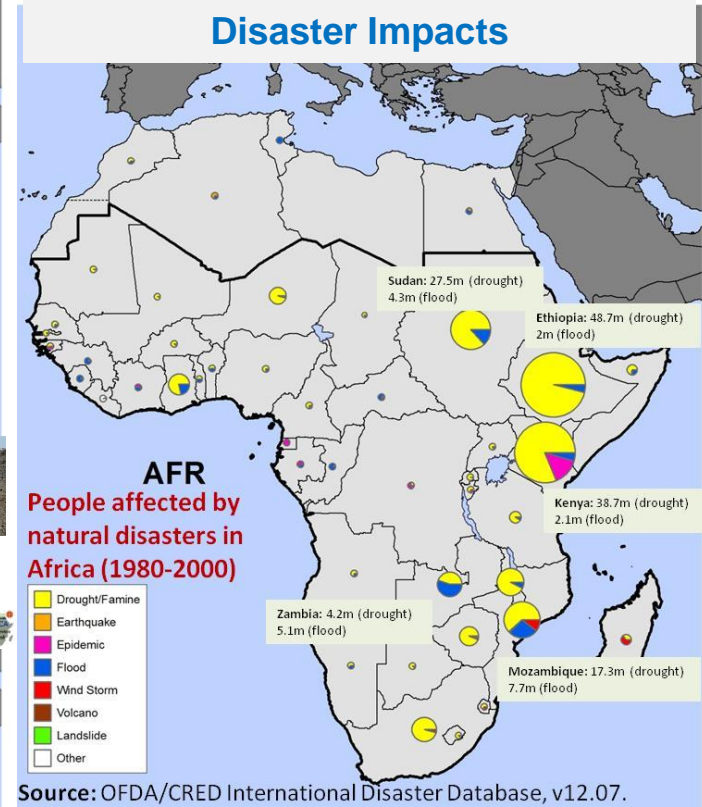
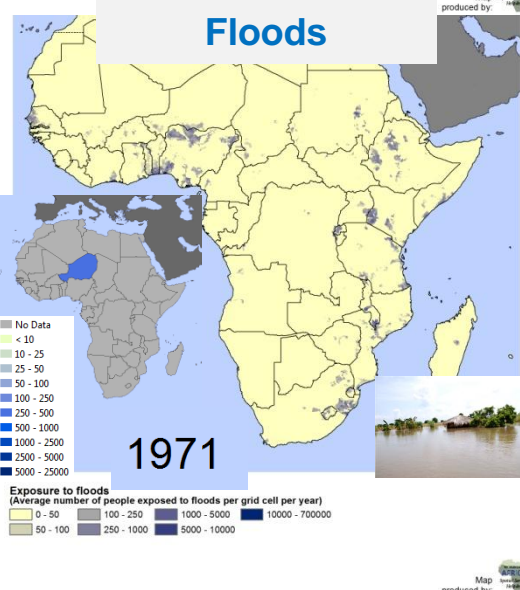
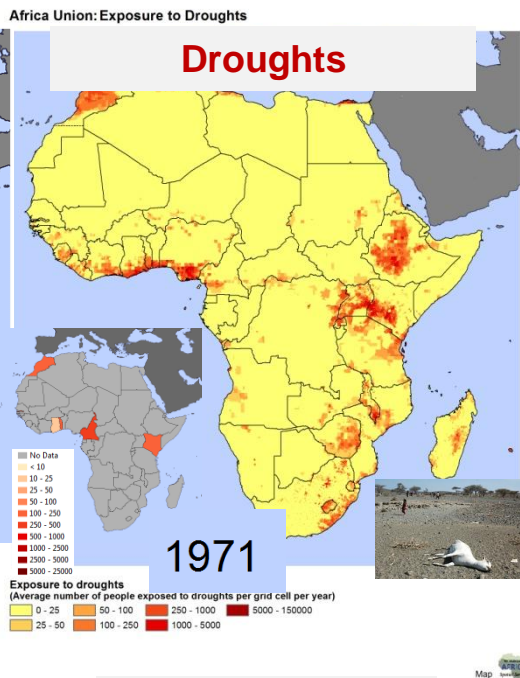
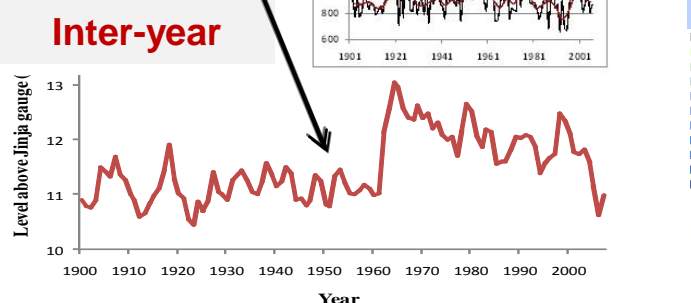
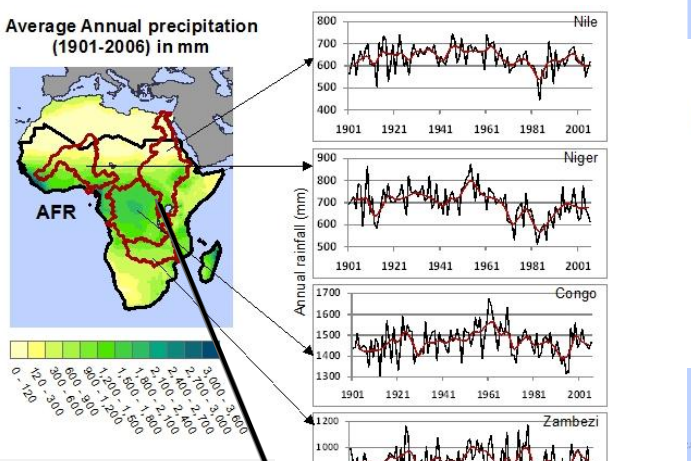
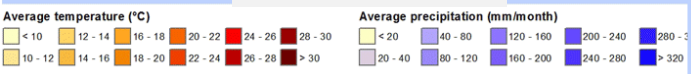
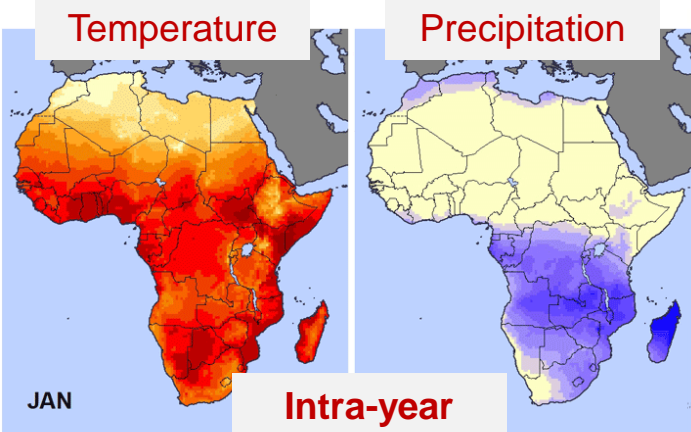


Dr. Nagaraja Rao Harshadeep
The World Bank

Presentation at
Second Climate Change and Development in Africa Conference
Sub-Theme II: Sustainable Energy Access for All Africans by 2030
Session: Water-Agriculture-Energy and Climate Change Nexus
October 20, 2012
Addis Ababa



Africa currently faces many climate risks...

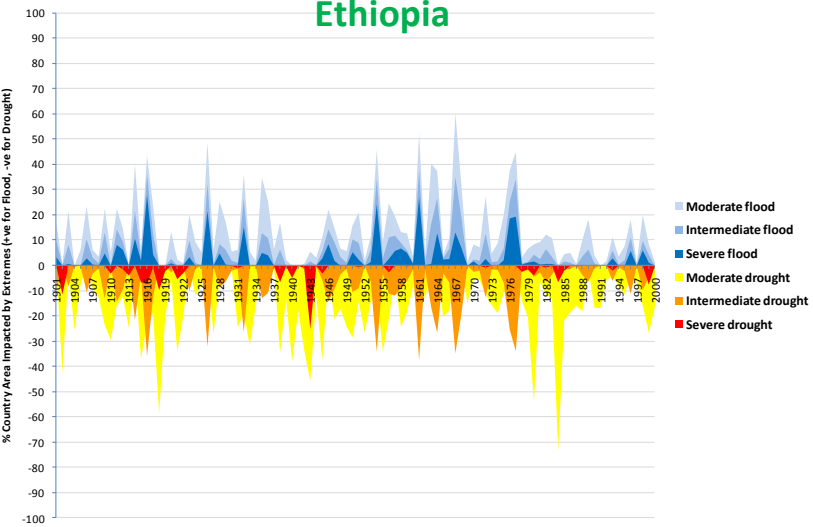


...and there is more in store...

Climate variability will remain...

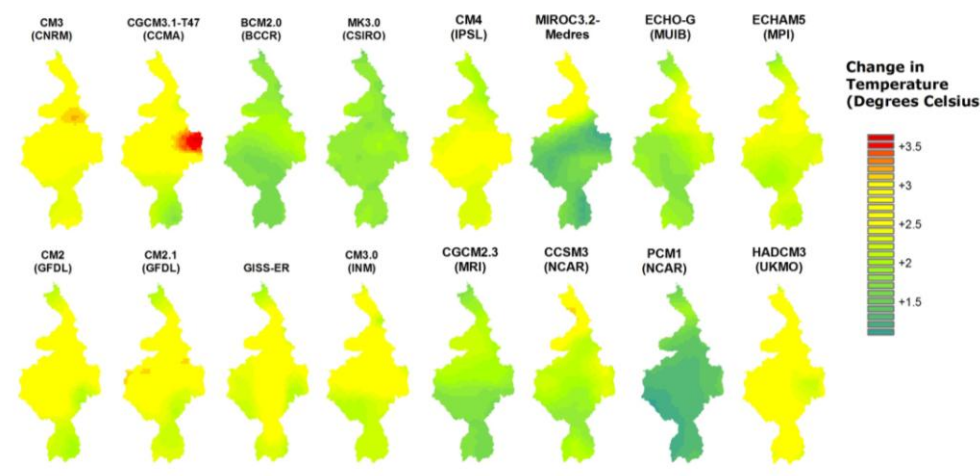
Historic Climate Variability

Weighted Anomaly of Statistical Precipitation (WASP) Index
Ethiopia



Temperatures will rise...

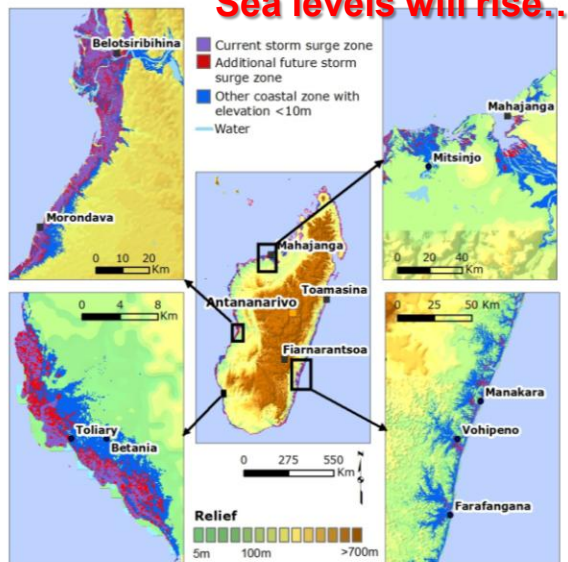
Nile Basin - Differences between GCMs, in terms of Change in Annual Temperature by the 2050s



This map shows the temperature change projected by the considered climate model, under the A2 scenario for 2040 - 2069 as compared to 1961 - 1999. Map displays gridded data (cell size=0.5dd).
Disclaimer: The boundaries, colors, denominations, and other information shown in any map do not imply any judgment on the part of the World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

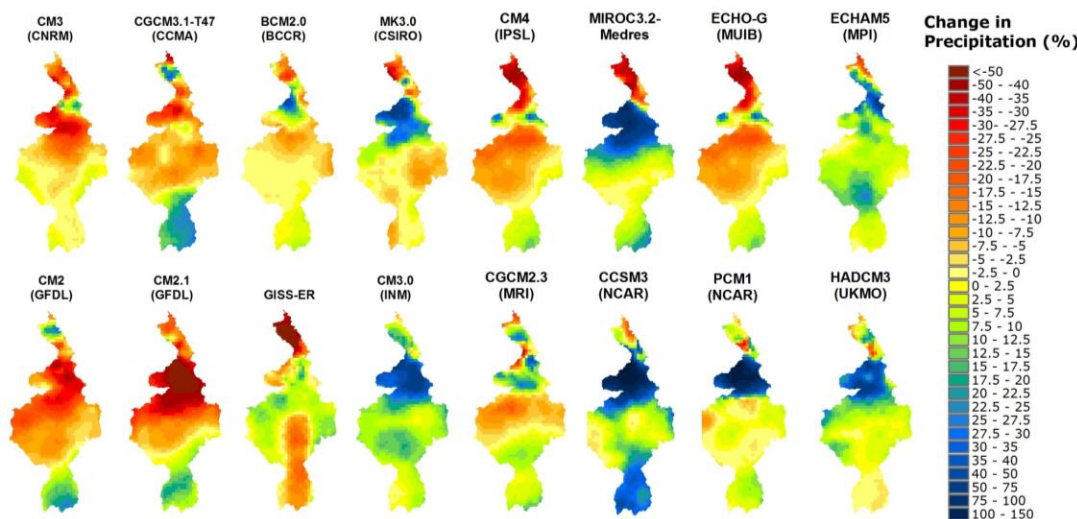
Sources: WCRP's CMIP3 (Meehl et al. 2007), downscaled by Maurer et al. (2008), rivers (Aquastat, FAO, 2006).

Sea levels will rise...

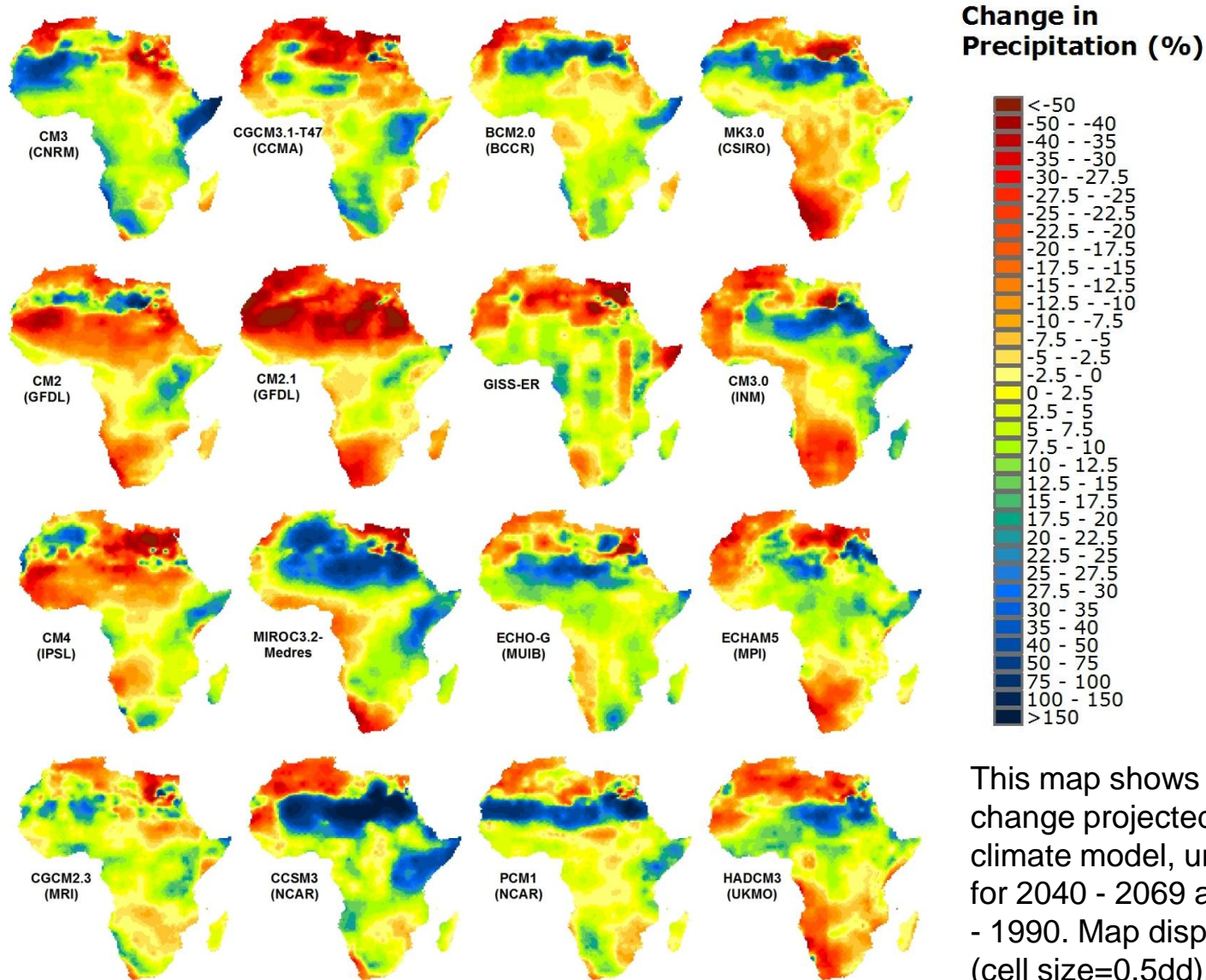


Precipitation will ?

Nile Basin - Differences between GCMs, in terms of Change in Annual Precipitation by the 2050s



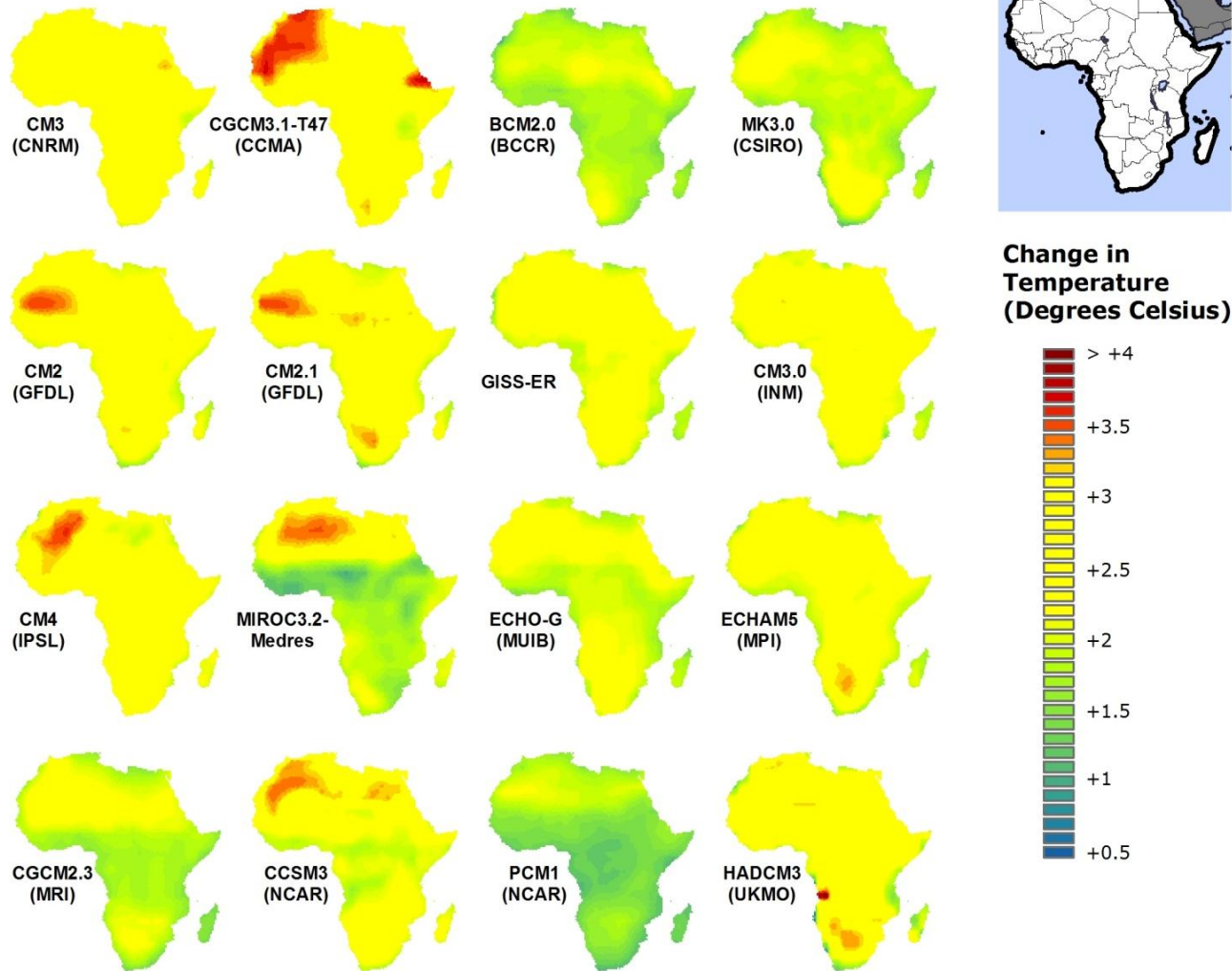
Precipitation Change in Africa by 2050s - which GCM is right?



This map shows the precipitation change projected by the considered climate model, under the A2 scenario for 2040 - 2069 as compared to 1961 - 1990. Map displays gridded data (cell size=0.5dd).

Sources: WCRP's CMIP3 (Meehl et al. 2007), downscaled by Maurer et al. (2008).

Temperature Change in Africa by 2050s – GCMs more in agreement

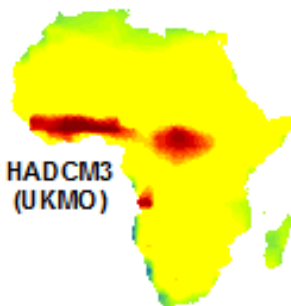
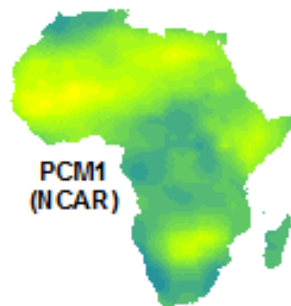
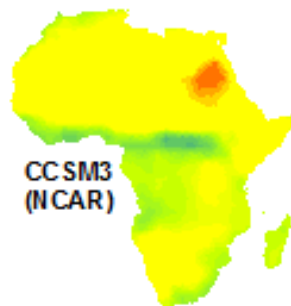
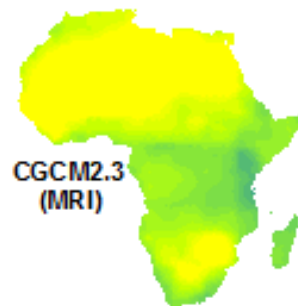
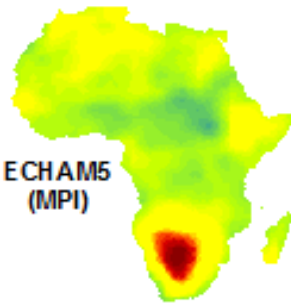
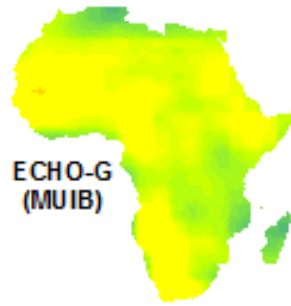
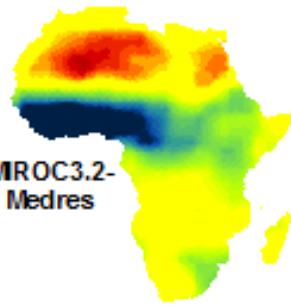
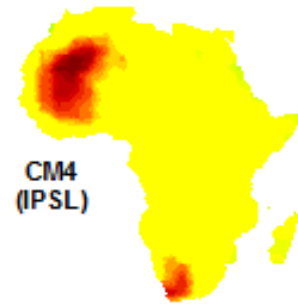
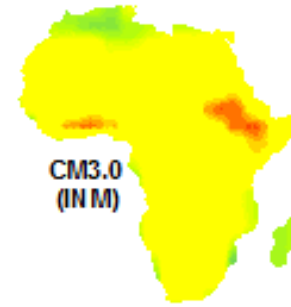
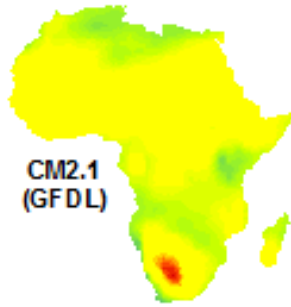
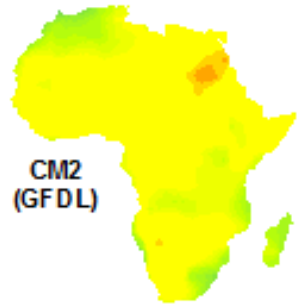
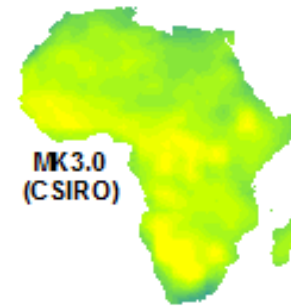
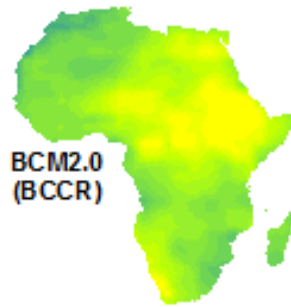
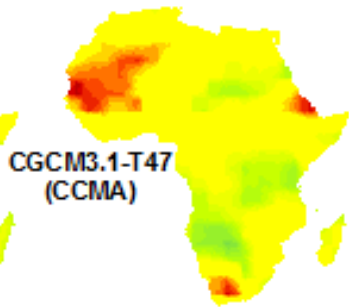
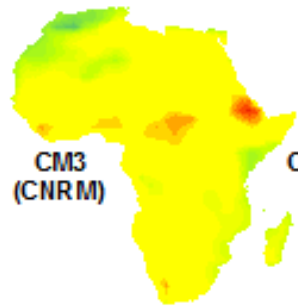


This map shows the temperature change projected by the considered climate model, under the A2 scenario for 2040 - 2069 as compared to 1961 - 1990. Map displays gridded data (cell size=0.5dd).

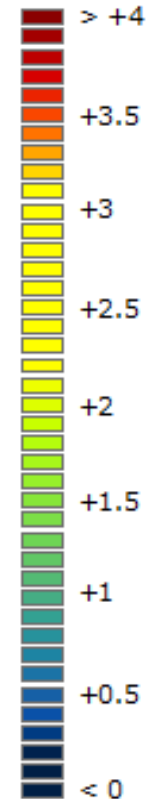
Sources: Based on data from the Climate Wizard (<http://www.climatewizard.org> developed by The Nature Conservancy, The University of Washington, and the University of Southern Mississippi).

January

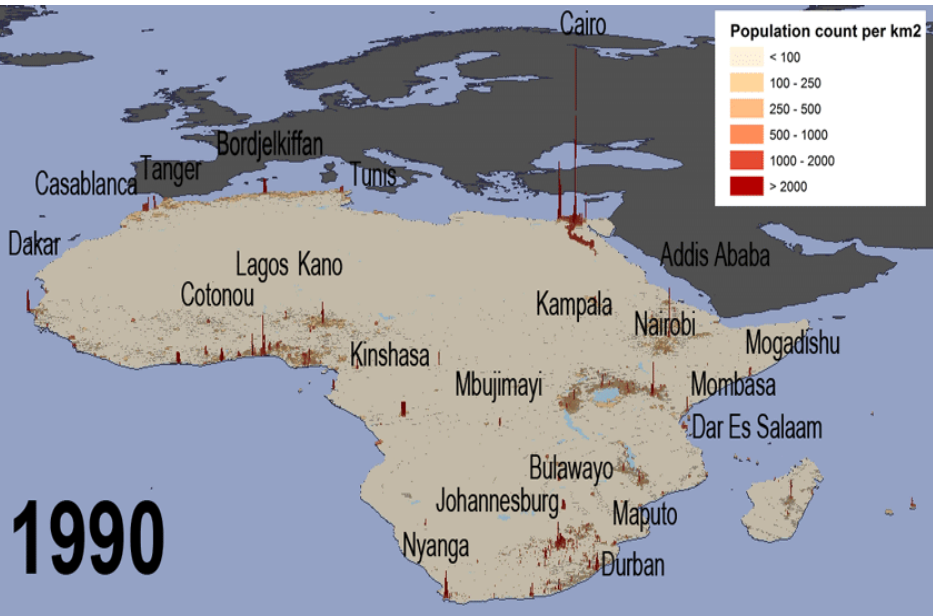
How about Monthly?



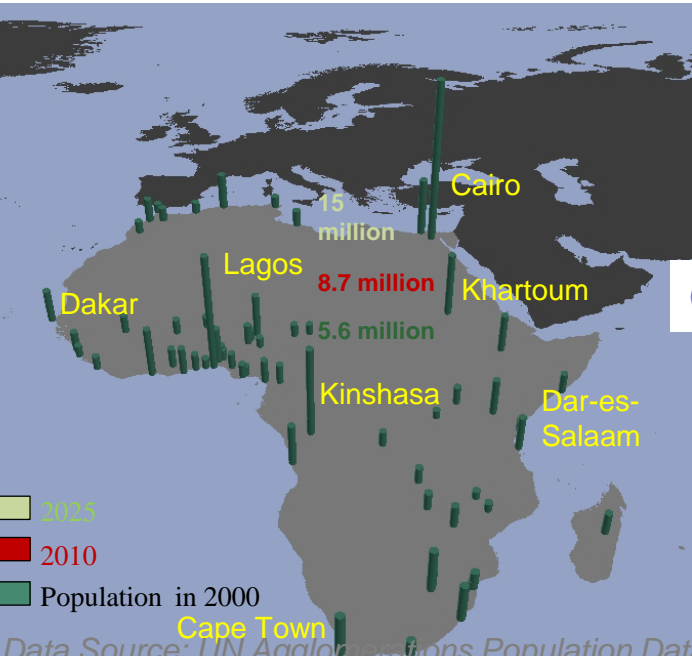
Change in
Temperature
(Degrees Celsius)



Other things are also changing...

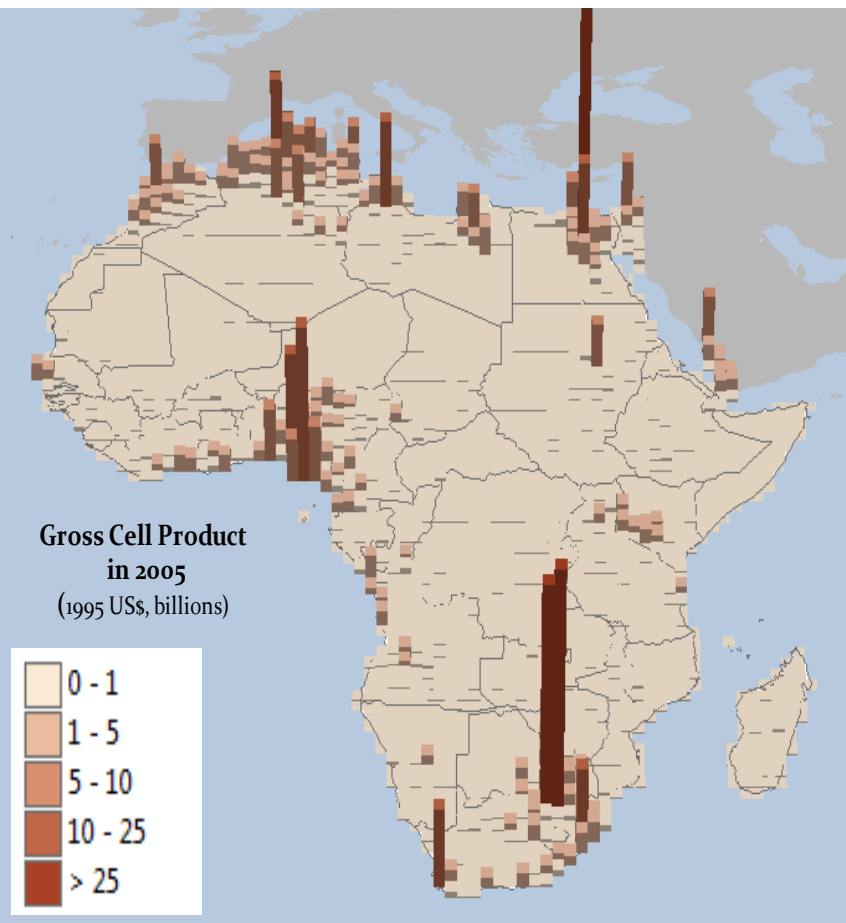


Growing Population



Growing Cities

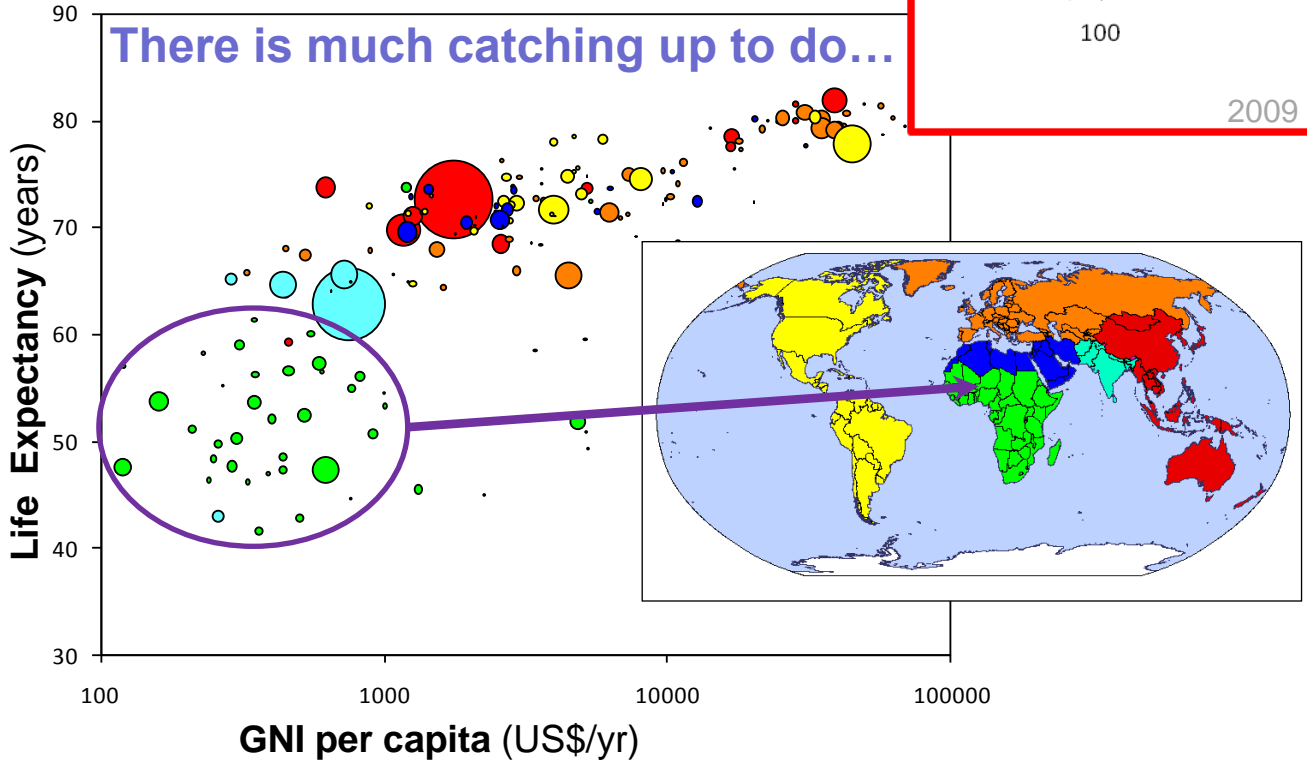
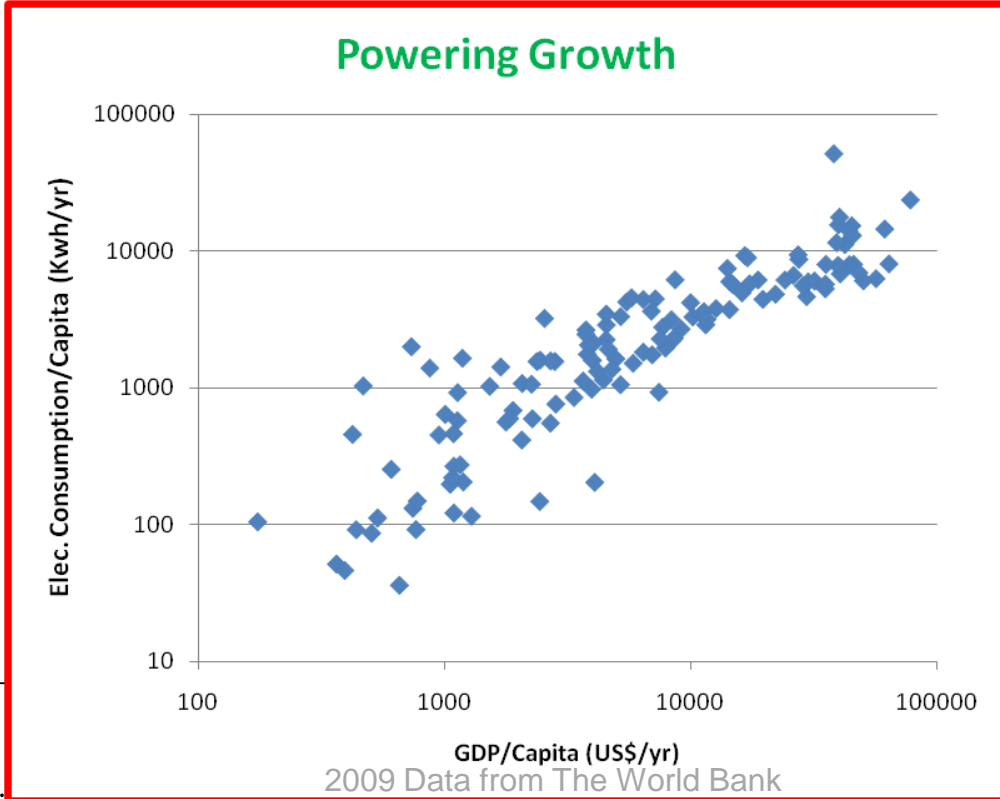
Growing Economies



Source: The World Bank AFR Water Resources in a Changing Climate, 2010 based on data from GECON GDP Dataset, Yale University 2010

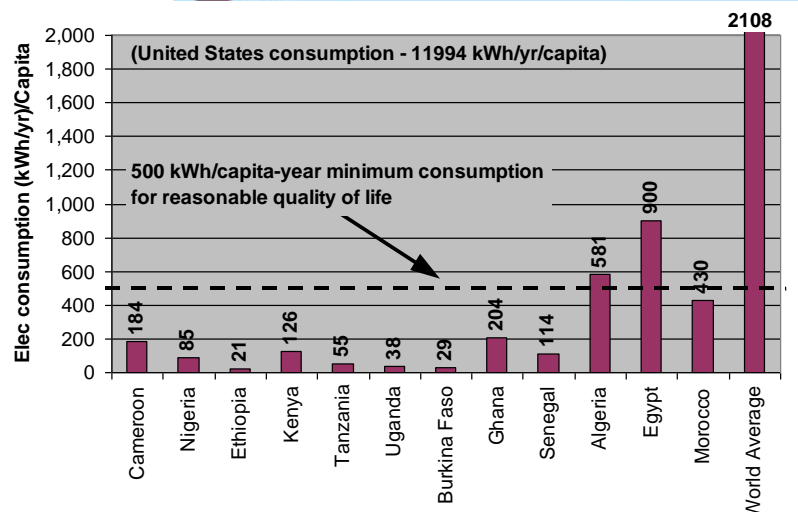
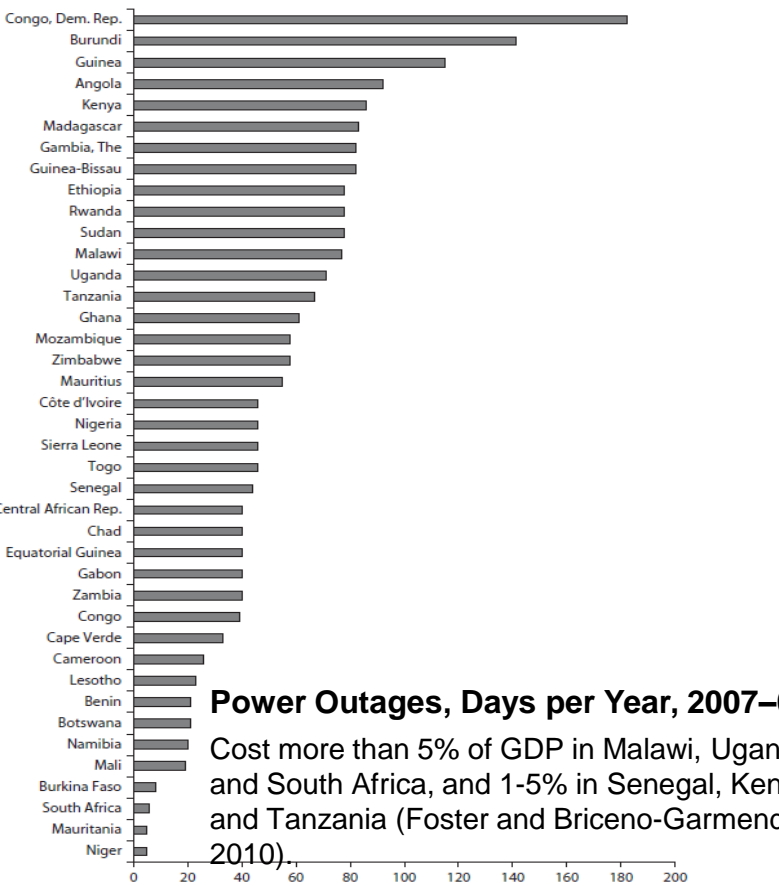
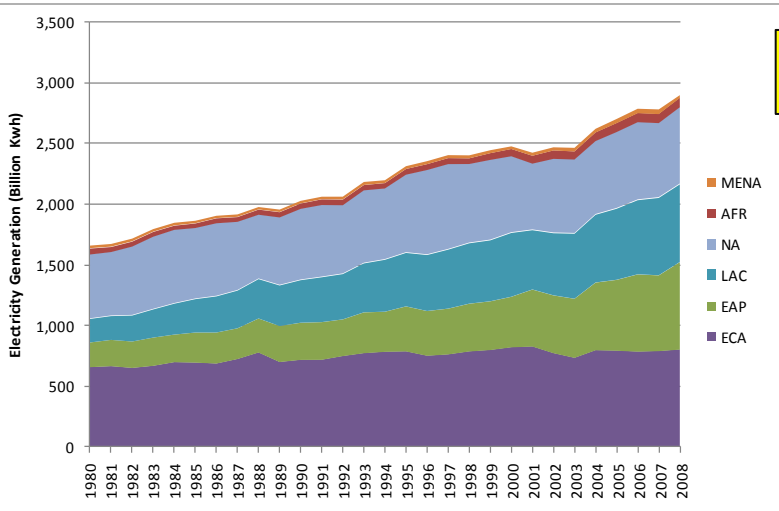
Data Source: UN Agglomerations Population Data

Why is Electricity Critical for Development in Africa?



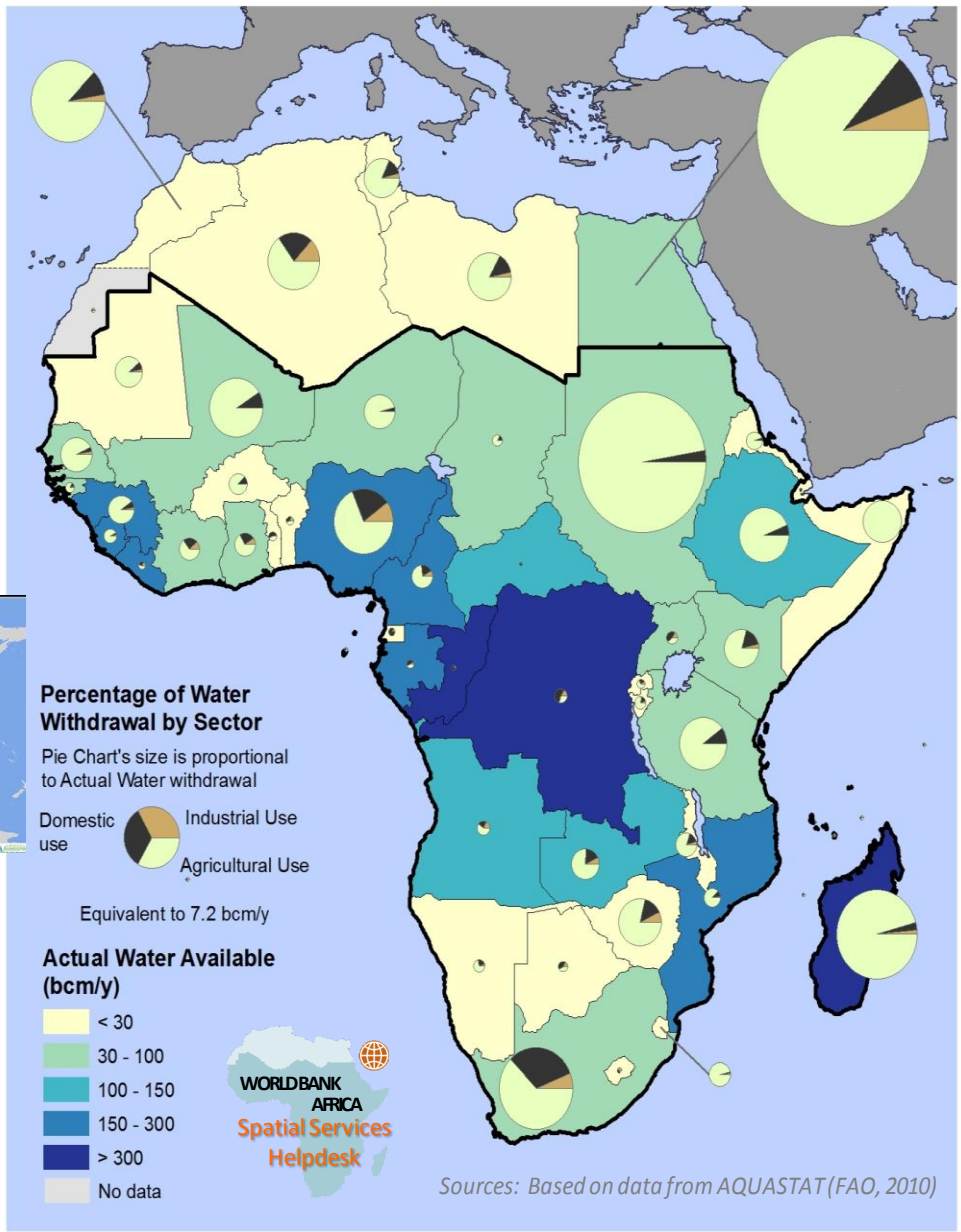
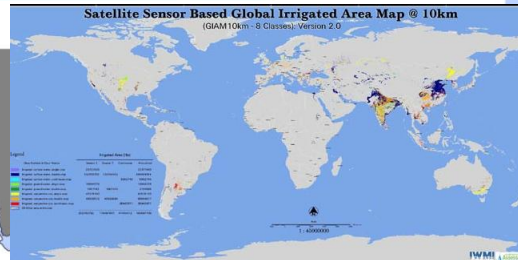
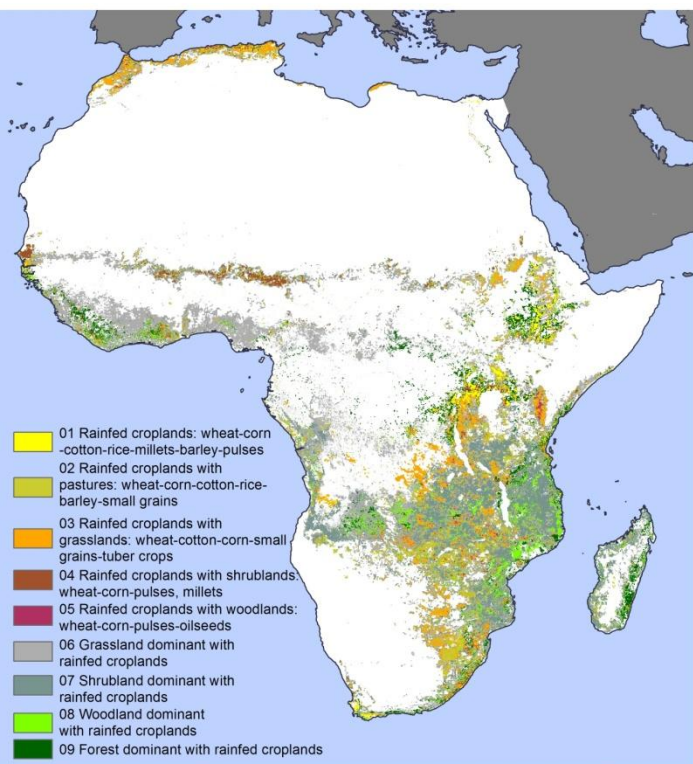
HYDROPOWER

Hydropower potential is one of Africa's most promising drivers for green growth



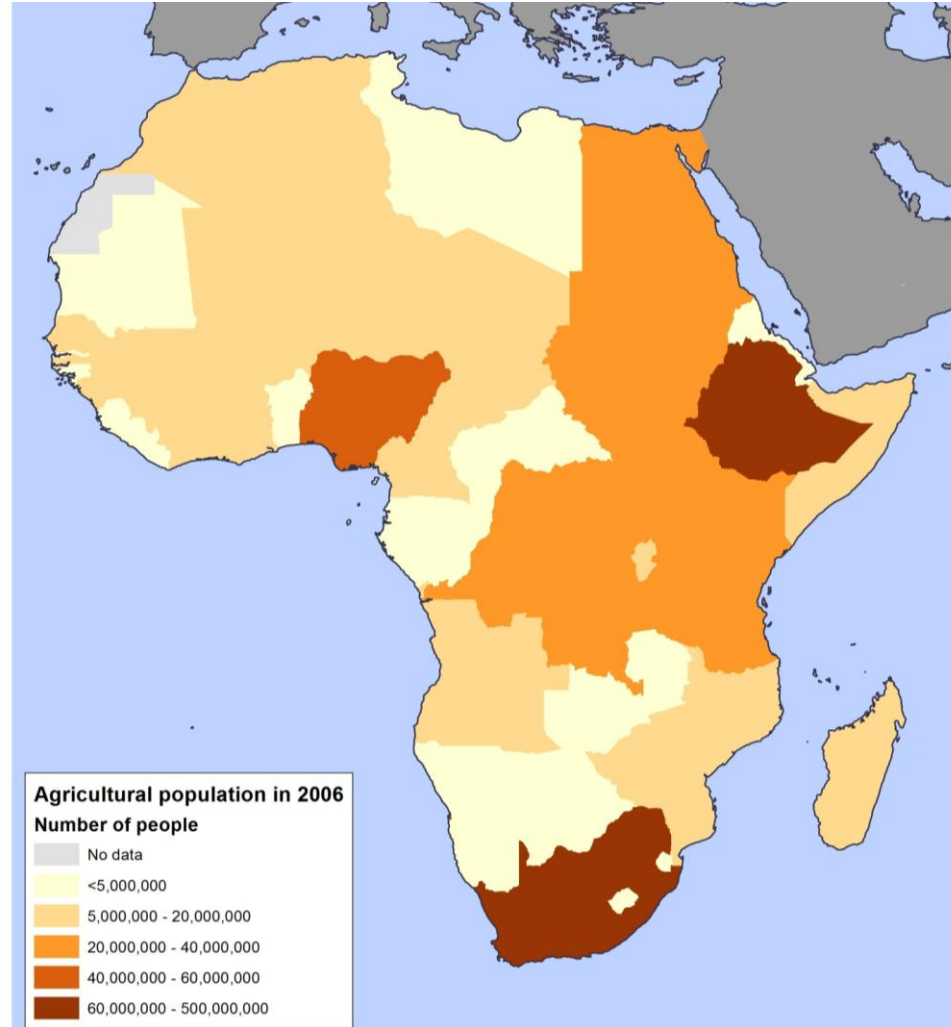
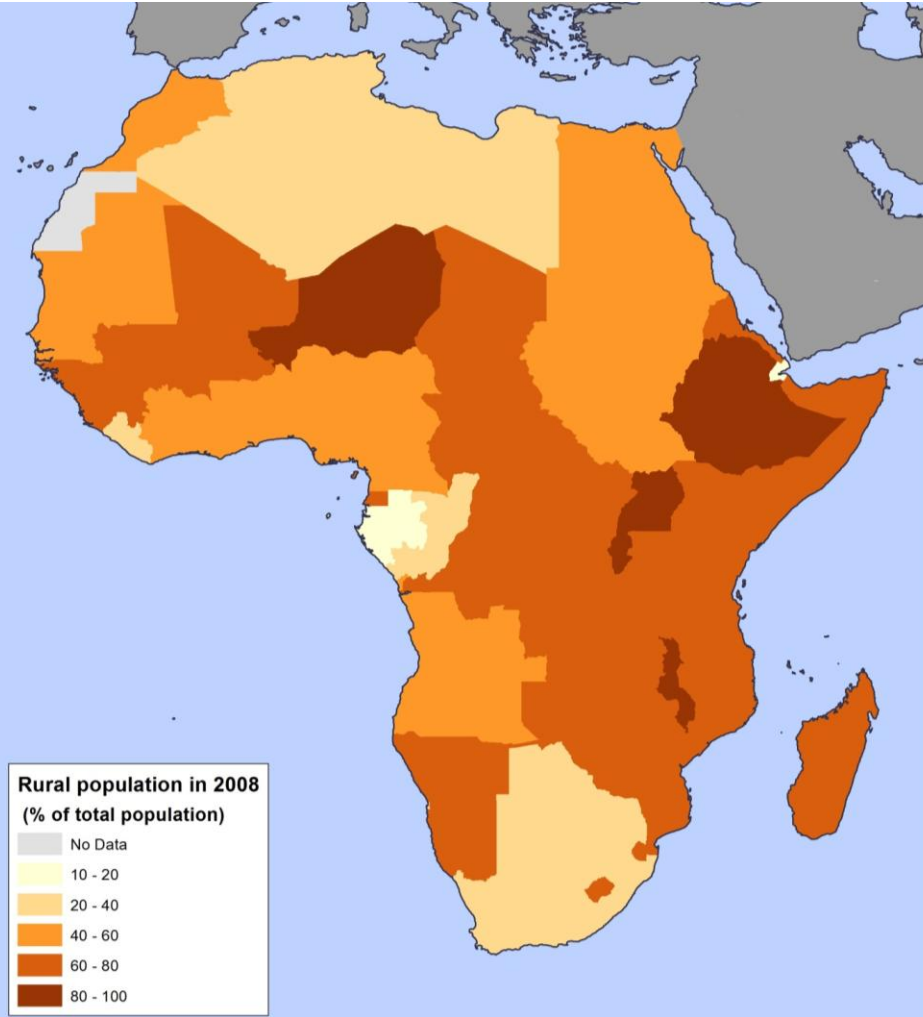
Source: Enterprise Survey database; World Bank 2008.

AGRICULTURE



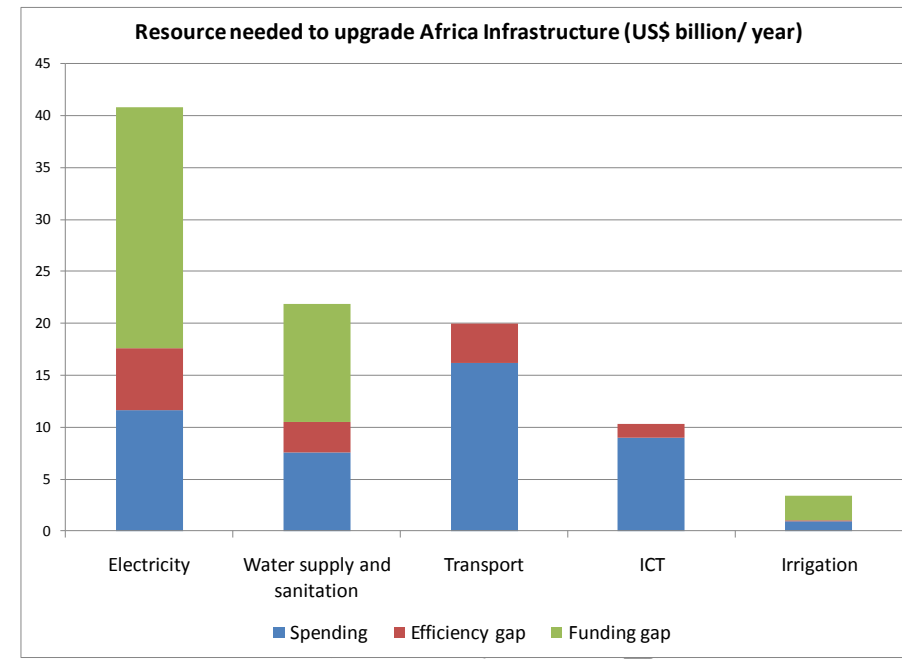
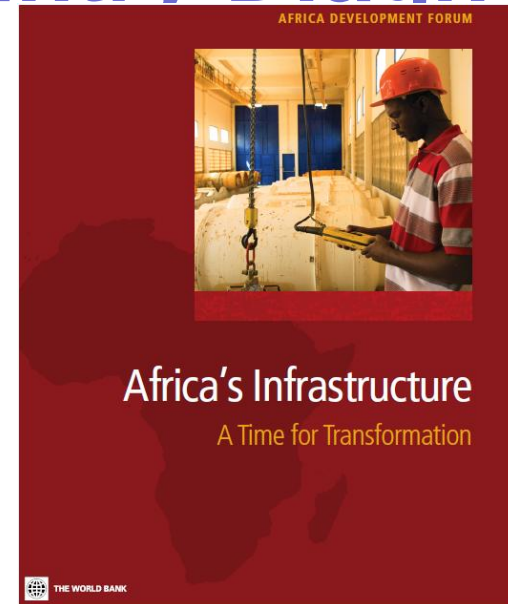
Africans live largely in rural areas...

...and depend on Agriculture...



Africa Infrastructure Country Diagnostic

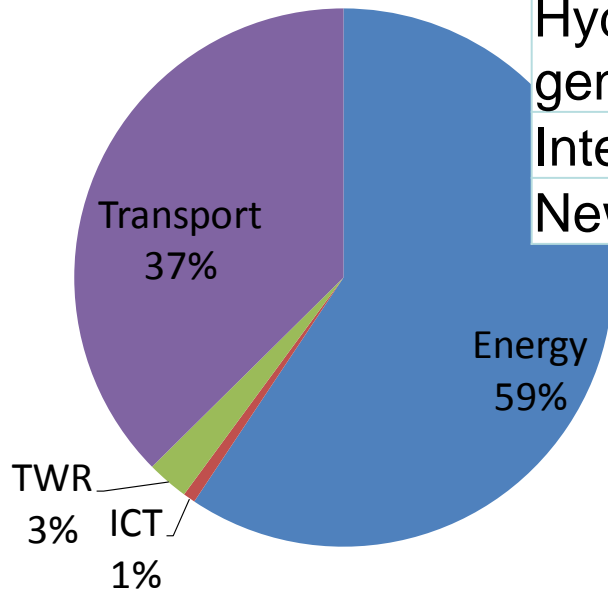
- Major knowledge program on Africa's infrastructure needs for energy, transport, water, and ICT
- Partners: AUC, NEPAD, RECs, AfDB, DFID, PPIAF, AFD, EC, KFW
- Comprehensive overview of current infrastructure status, policy, institutional and financial challenges
- Concludes that Africa needs to spend US\$93 b/yr to catch-up on infrastructure with rest of developing world
- Estimates made under a “no climate change” presumption



PIDA confirms the scale of Africa's infrastructure challenge

Sector	Target by 2040
Modern highways	37,300 km
Modern railways	30,200 km
Port capacity	1.3 billion tons
Hydroelectric power generation	54,150 MW
Interconnecting power lines	16,500 km
New water storage capacity	20,101 hm ³

Cost of Priority Action Plan
2012-2020 (US\$ billion)



Why a new study?

1. Few existing national, sub-regional and regional infrastructure development plans address climate change implications
2. Existing studies on climate change tend to:
 - Focus on impact
 - Address one sector at a time
 - Provide limited project-level insights on adaptation responses
3. Climate science is evolving

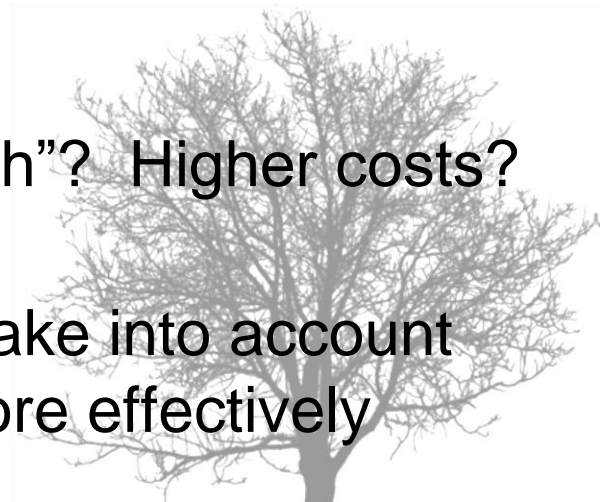


Why is the Climate Sensitivity of Infrastructure important?

- 1. Role:** Such Infrastructure is critical to economic growth and poverty alleviation efforts
- 2. Long Life:** CC will impact; potential “Regret” of poor design/operation is too high: cannot plan, design, and manage infrastructure as in past
- 3. Efficiency:** Need to use scarce resources wisely for robust infrastructure

⇒ Need for Infrastructure to “Adapt or Perish”? Higher costs?
Co-benefits?

⇒ But How? Need new methodologies to take into account climate variability and climate change more effectively



Africa Climate and Infrastructure Diagnostic

Objectives

1. **Quantify the impacts** of climate change on performance of infrastructure in the water (irrigation, water supply, hydro-power), power pool, and transport sectors in Sub-Saharan Africa
2. Identify, demonstrate and cost, **robust adaptation approaches** for planning, evaluating and designing specific infrastructure investments in the face of climate uncertainty
3. Formulate actionable **recommendations** for policy makers (at the regional, sub-regional and national levels) on how to enhance the **climate resilience** of infrastructure development, and help **mobilize the required resources**



Scope



Water-Related



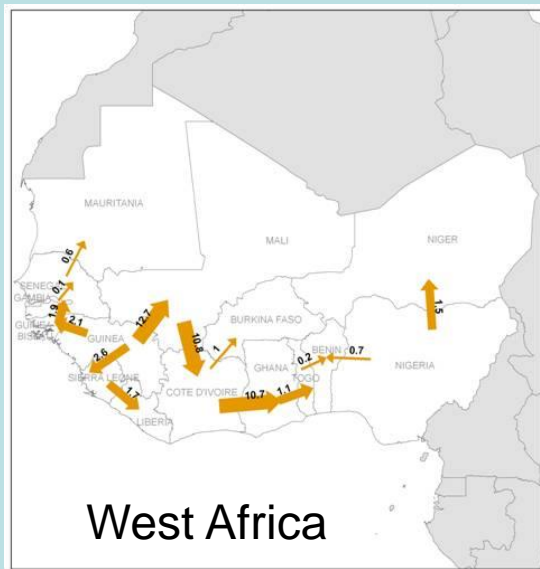
Power Systems/Power Pools



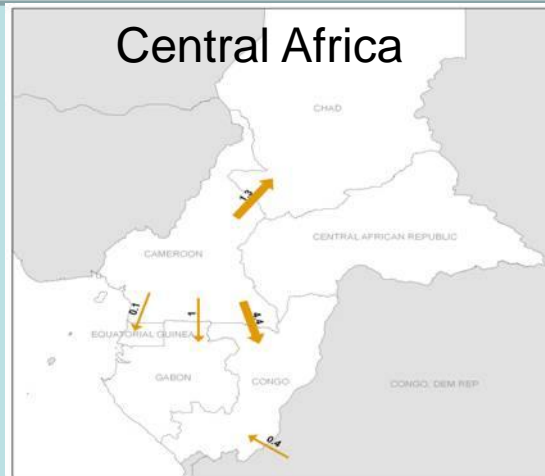
Transport



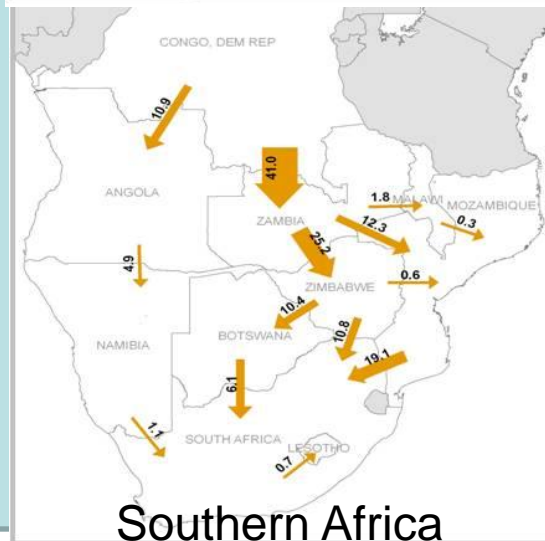
Support regional integration: The case of power pools



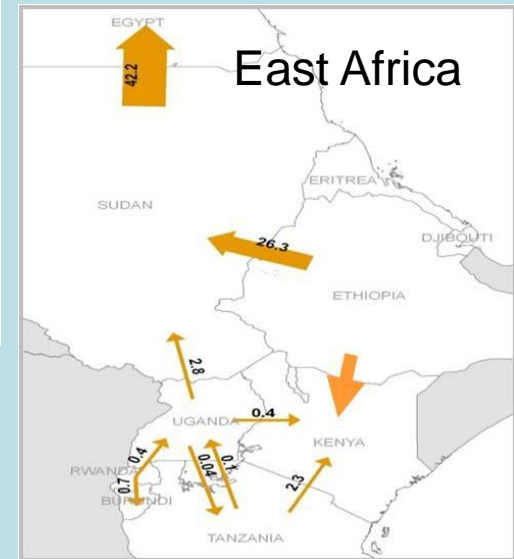
West Africa



Central Africa



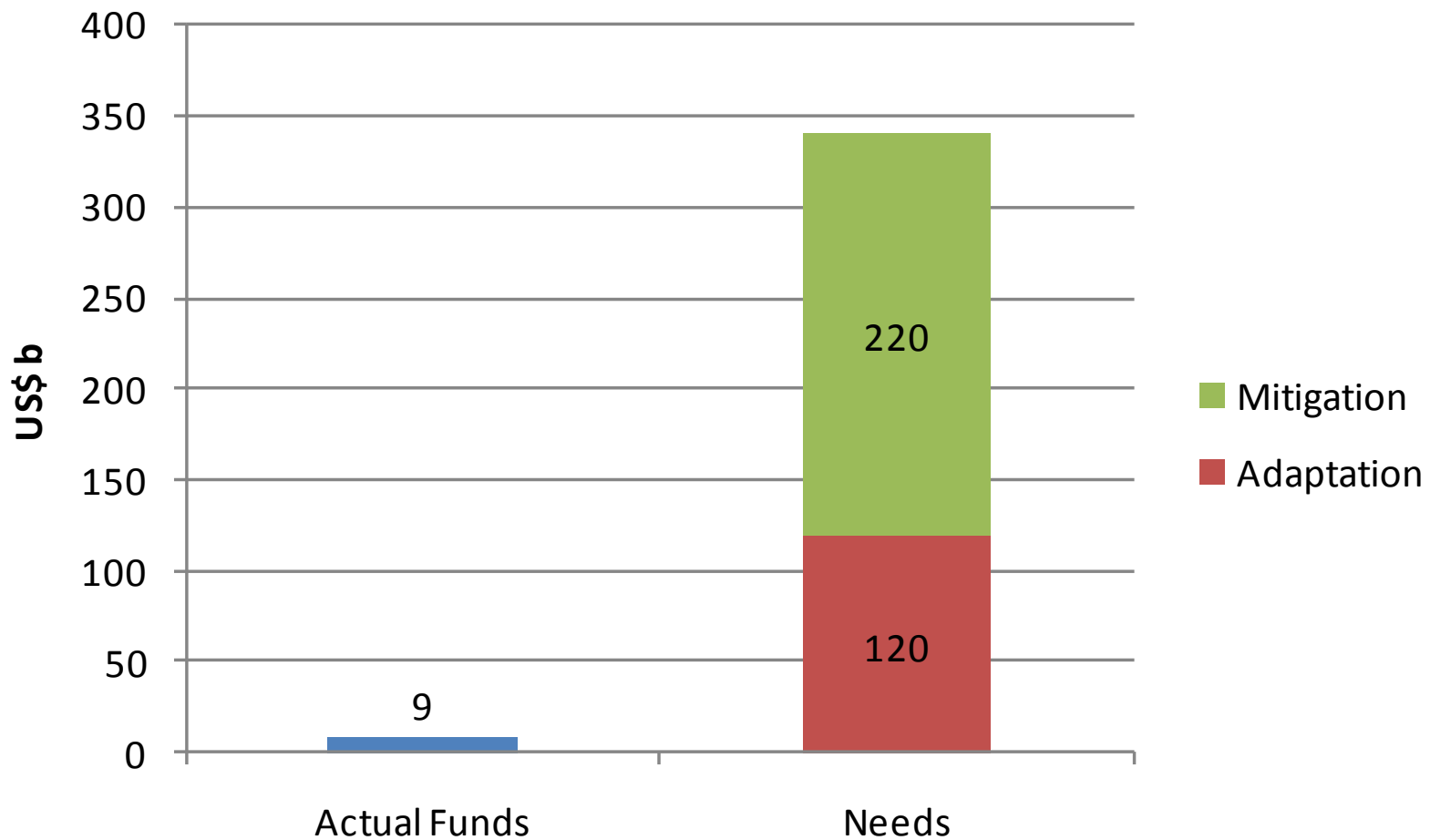
Southern Africa



East Africa

Source:

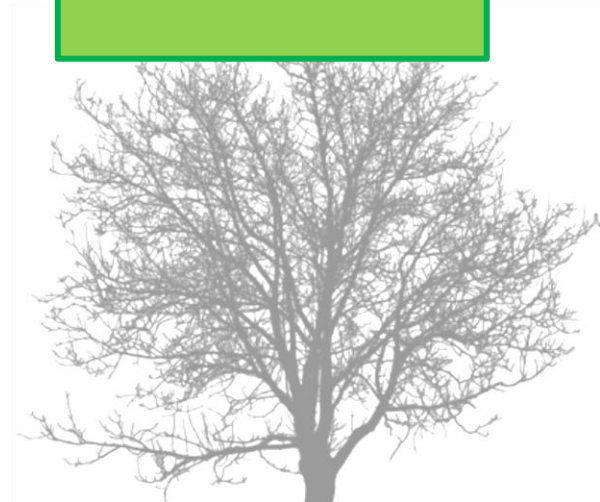
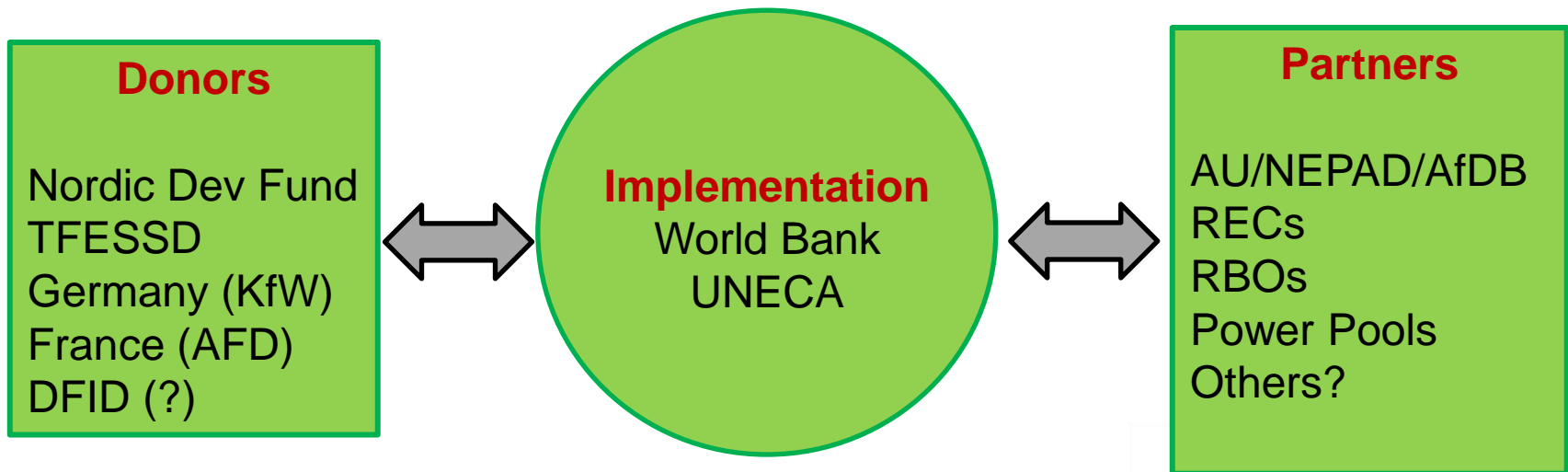
Positioning Africa on climate finance discussions (with figures and plans)



Estimated annual incremental climate costs required for 2°C trajectory

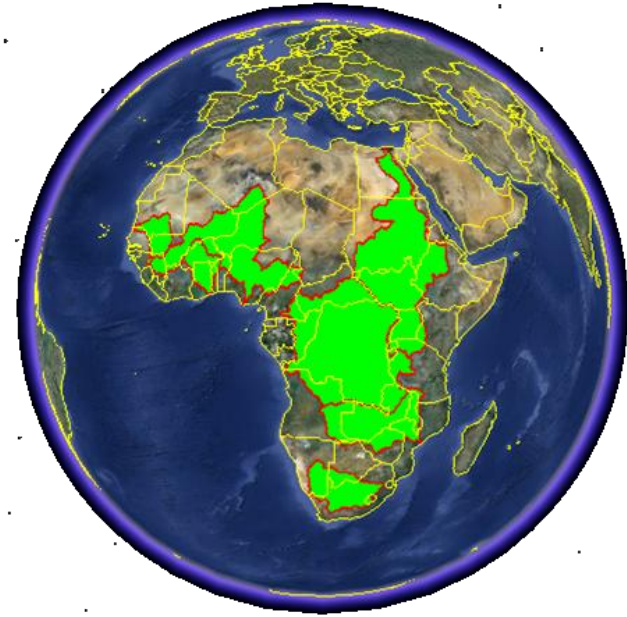
Africa Climate and Infrastructure Diagnostic

A partnership to support investments in Africa's infrastructure under a future uncertain climate

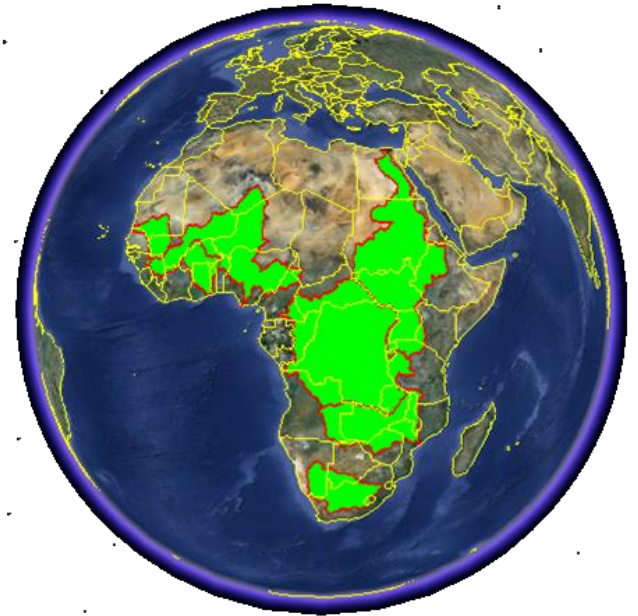


Conclusion

- Substantial investments in infrastructure are critical for Africa's development
- Many of these investments (esp. in Water, Power, and Transport) are climate sensitive
- New approaches are required to help analyze climate change additionality on investment designs and costs
- The Africa Infrastructure and Climate Diagnostic is trying to address this gap



Thank you!



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