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Africa, sustainable development and climate change

Prospects of Paris and beyond

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Impact of increasing global temperature on Ghana's climate

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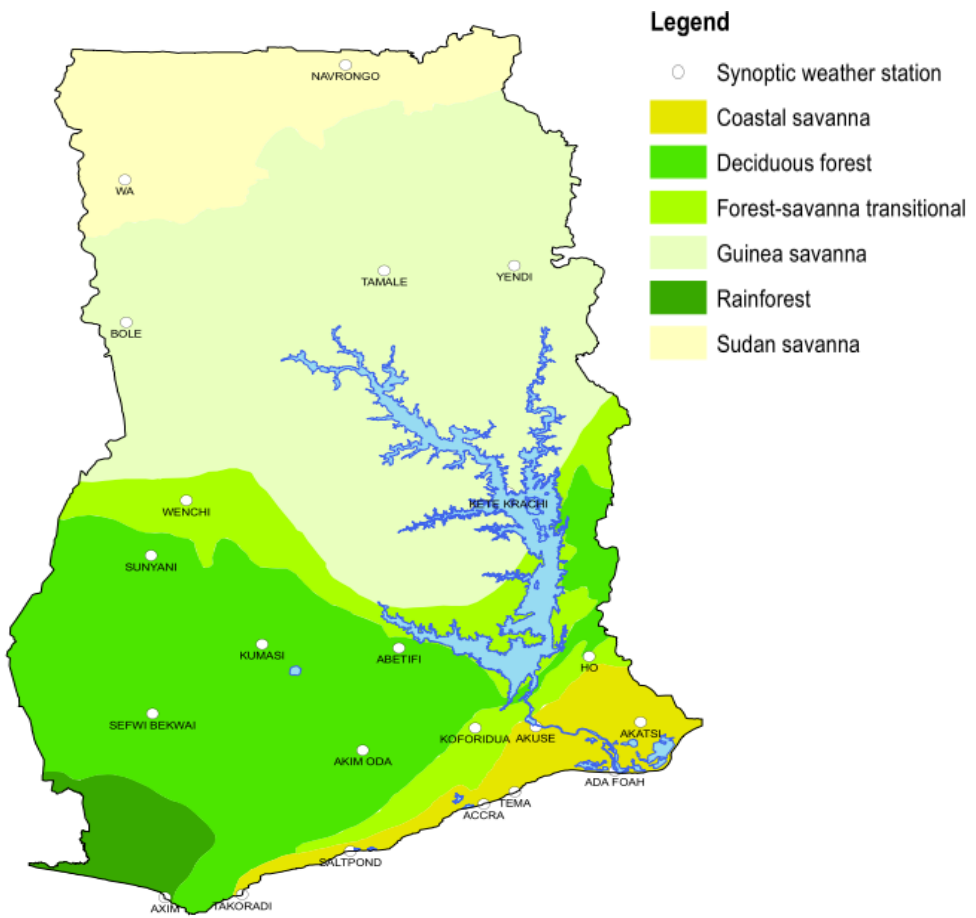
Problem statement

- Ghana's emissions are low compare to other countries.
- Increase in temperature is mounting concerns because the impact will be more devastating on water security, food security, health and society in general.
- The impacts of the increasing global temperature on Ghana is evident.
- Many studies reported the rising trend in average annual temperatures in almost all the agro-ecological zones of Ghana over a 40-year period.

Methods

- A projection of Ghana's climate over the past climate trends for the 1981 to 2010 period is reviewed.
- Historical rainfall and temperature data obtained from the Ghana Meteorological Agency for its active 22 synoptic weather stations across Ghana were used.
- Nine GCM/RCMs combinations from the AMMA-ENSEMBLES experiments were extracted for each of the 22 stations.
- The RCMs were driven by global climate models outputs simulated under the SRES A1B.
- Downscaled with quantile-quantile transformation.



Spatial distribution of the 22 synoptic stations grouped into six agro-ecological zones in Ghana.

Key Findings – Observed changes

Part of Ghana	Zone	Minimum Temperature change	Maximum Temperature change	Change in Rainfall
Southern part	Rainforest and Coastal agro-ecological zones	2%	3.6%	333%
Middle part	Deciduous and Transition Zone	2%	2.7%	112%
Northern part	Guinea and Sudan Savannah Zones	3.7%	6.1%	431%

Key findings – projected changes

Part of Ghana	Zone	Minimum Temperature Increase (°C)			Maximum Temperature increase (°C)			Change in Rainfall %		
		2040	2060	2080	2040	2060	2080	2040	2060	2080
Southern part	Rainforest	1.4	2.5	3	1.0	1.9	2.5	- 5	+ 6.6	-1.0
	Coastal	1.1	1.9	2.5	1.2	2.1	2.9	- 4.4	+ 9.2	+ 2.9
Middle part	Deciduous	1.1	2	2..5	4.2	2.5	3.2	-5.8	+ 2.4	- 4.7
	Transition	1.6	2.8	3.5	1.6	2.9	3.6	< -10	< -10	< -10
Northern part	Guinea Savannah	1.6	2.8	3.5	1.7	3.1	3.9	- 3.5	- 0.9	- 3.1
	Sudan Savannah	3.3	3.3	4	2.6	3.4	4.1	- 3.2	+ 0.8	- 23

Key Findings

Over Ghana

- Rainfall is projected to decrease by 2.9% in the near future, a slight increase of 1.1% in mid future and then a decrease in the far future by 1.7%.
- The climate of Ghana is projected to be hotter, with a slow increase in the average minimum and maximum temperature in all agro-ecological zones of the country by the year 2080. Mean temperatures are projected to increase between 1°C and 7°C by 2080.
- The spread of change is more intense towards northern Ghana than the south for both temperature and rainfall.

Conclusions

- The mean annual rainfall in all agro-ecological zones is projected to reduce by about 10%.
- Rainfall in the major rainfall seasons are also likely to see a decrease of more than 10% in all agro-ecological zones but will increase in the other months by less than 10%.
- The observed impacts of these changes coupled with frequent floods and prolonged droughts and a host of other threats, is likely leading to reductions in crop yields increasing the concerns of food security in Ghana.
- Negative impacts of the warming caused in the past will continue to be felt in Ghana and other developing countries because of low adaptive capacity.