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Climate Change trends in the Lake Chad Basin, its impacts on the water cycle and the subsequent consequences on Agriculture

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INTERNATIONAL NETWORK OF BASIN ORGANIZATIONS

IWMI International Water Management Institute

Outline

- Overview of the Lake Chad Basin,
- Climatic zones in the Basin,
- Precipitation and Temperature trends,
- Climate Change impacts,

Introduction

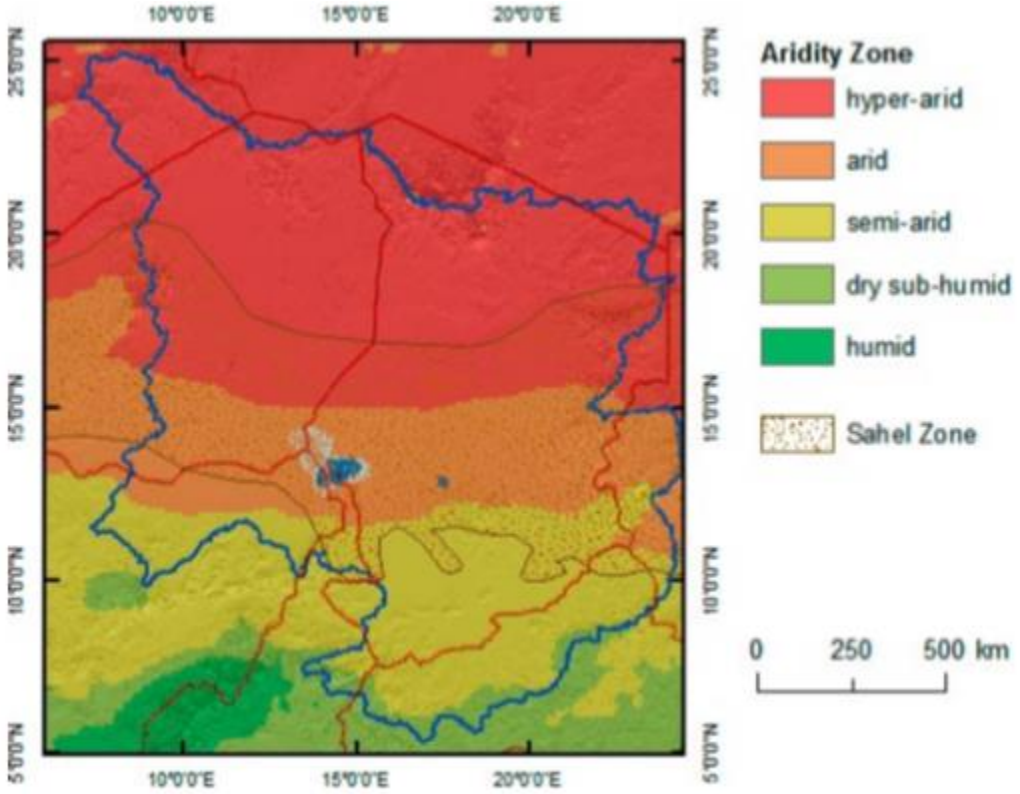
- Largest endorheic Basin in Africa,
- Covers about 2.5 million Km^2,
- Northern part of the basin is desert while to the South of the desert is the Sahel zone, dry savanna and thorny shrub savanna,….

The Lake Chad Basin (LCB)

Lake Chad Region Landscape: Photo retrieved from BBC website

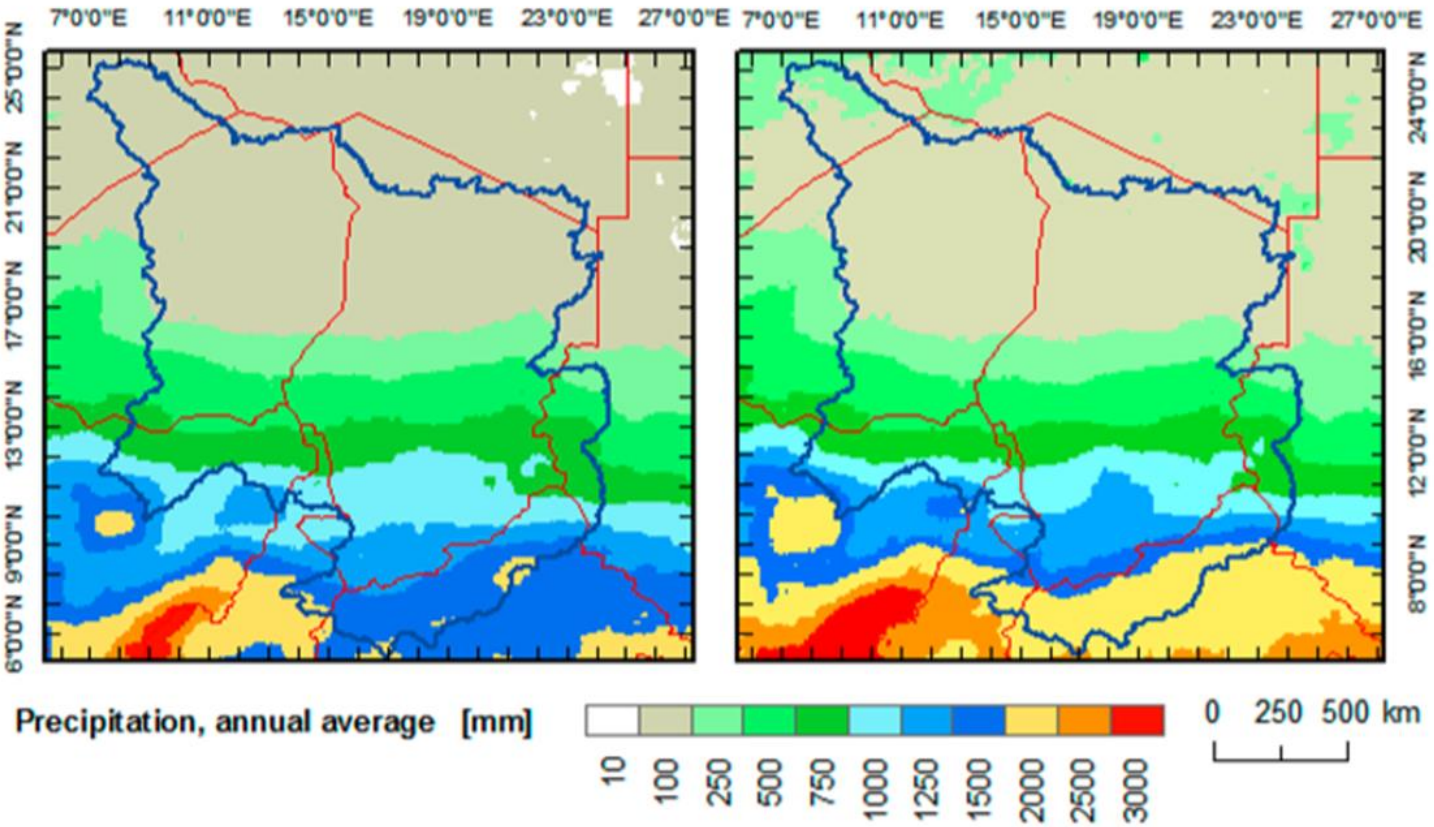
Socioeconomic activities and Biodiversity

Climatic Zones of the Lake Chad Basin



- These zones correspond to the bioclimatic zones in the Basin,
- Divided into six bioclimatic regions: the Saharan region (< 100 mm), the Sahara-Sahelian region (100 to 200 mm), the Sahelian region (200 to 600 mm), the Sudano-Sahel region (600 to 800 mm), the Sudanian region (800 to 1200 mm) and the sub-Guinean region (>1200 mm),

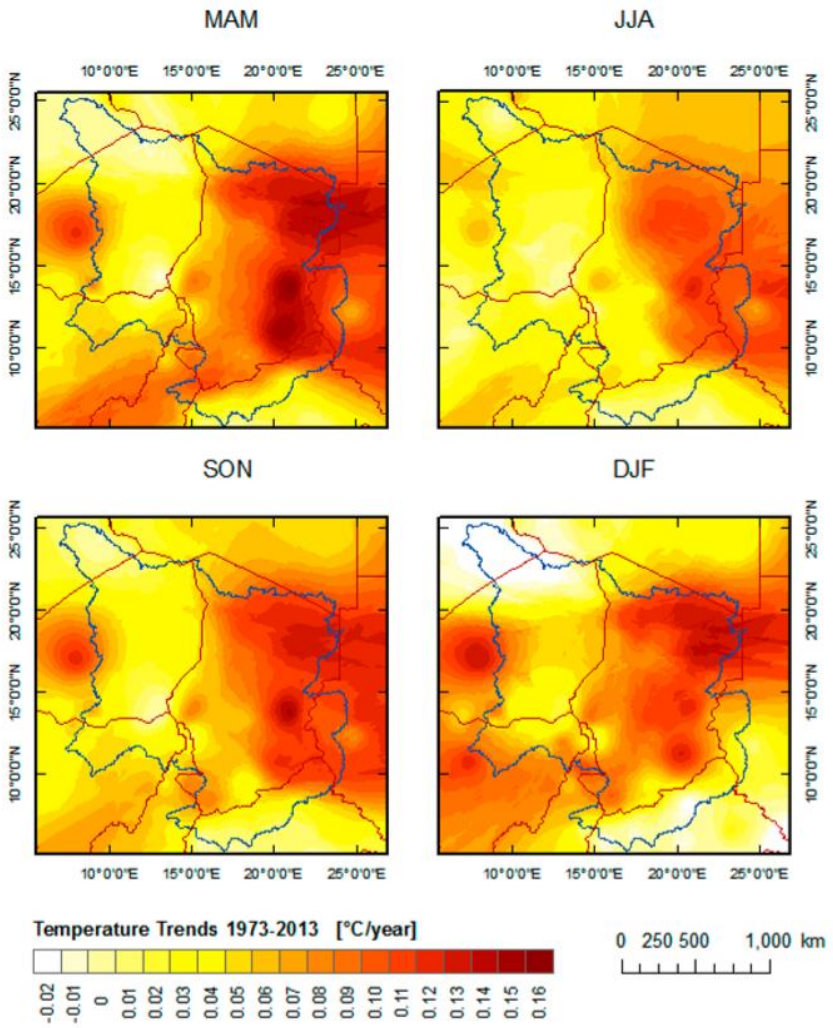
Spatial distribution of Precipitation in the Basin



GIZ, (2015)

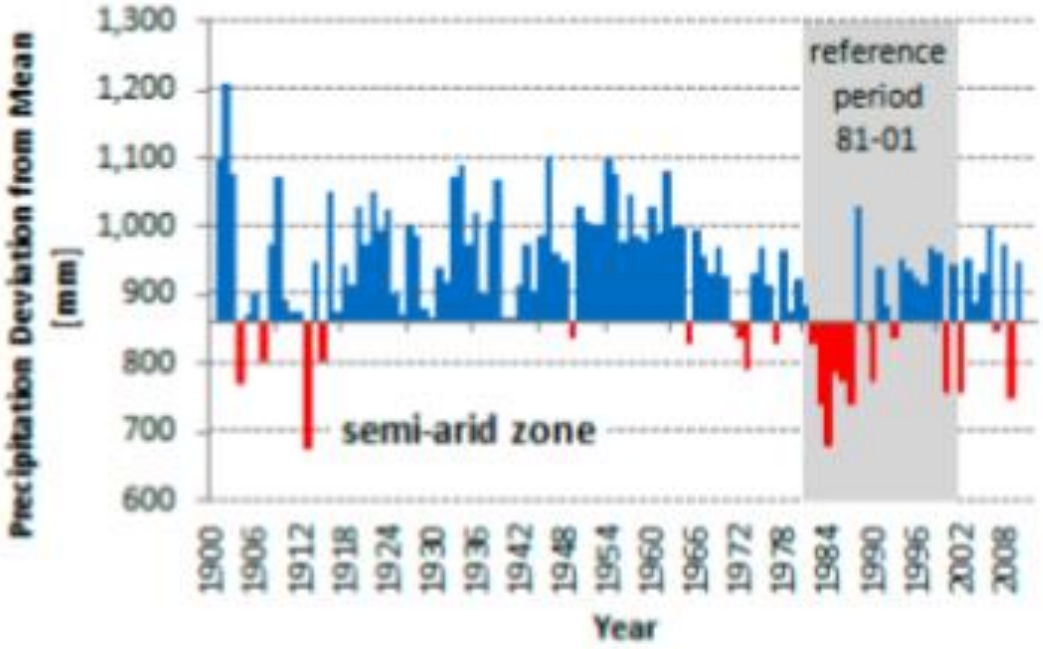
- Climate in the LCB region is strongly controlled by the seasonally varying position of Inter-Tropical Convergence Zone (ITCZ),
- Annual migration of the ITCZ causes a strong North-South precipitation gradient,
- *Observed mean precipitation from RFE data (left) and down-scaled precipitation (right) in LCB,*

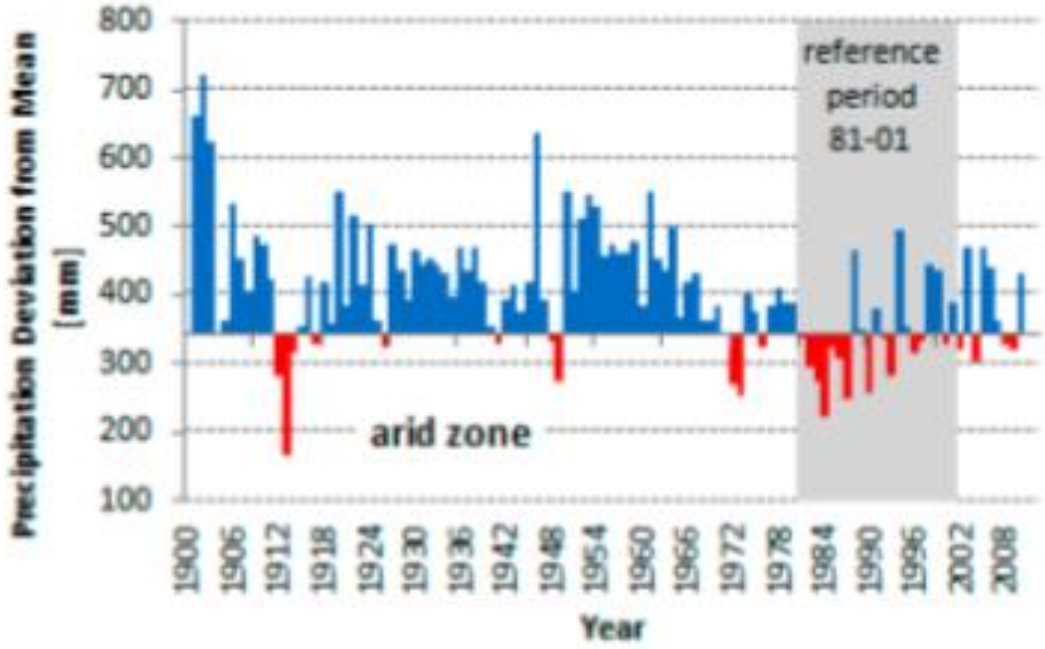
Long-term temperature trend in the Basin



- Strongest temperature increases occurred during the dry periods (up to 6 °C),
- There is a relatively cold period from December to February (11°C to 22°C) and a hot period from March to June (39°C to 45°C),
- Over the past 40 years, the eastern Chad experiences the highest temperature increase in the entire basin,
- An increase of 0.1°C is equivalent to a 3.1°C between 1973 and 2013,

Long-term precipitation development 1901 – 2010



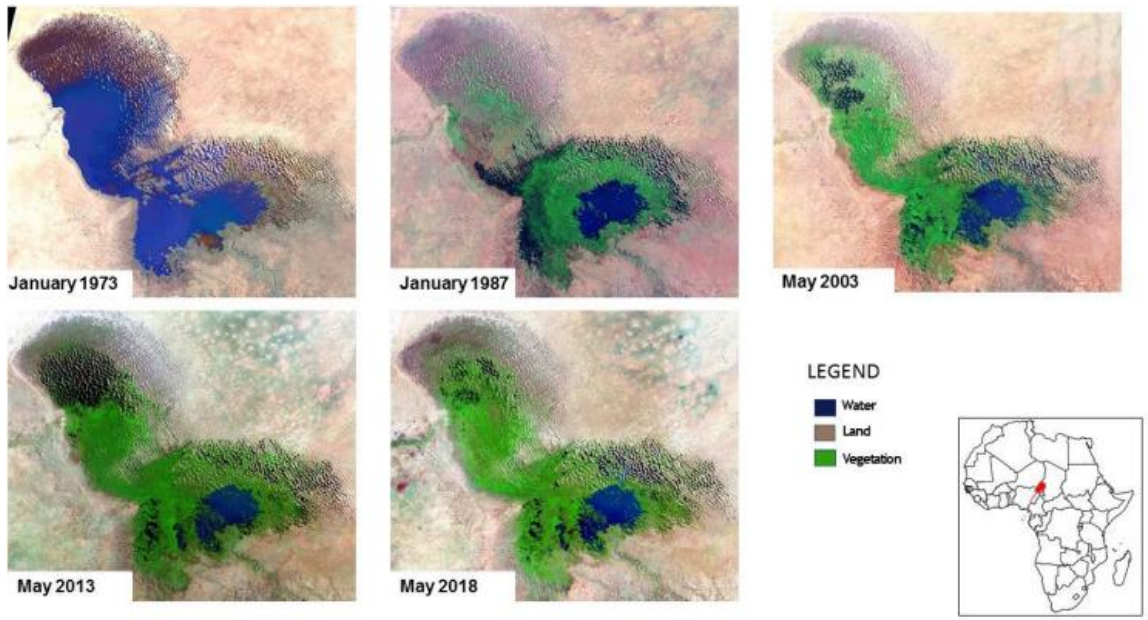


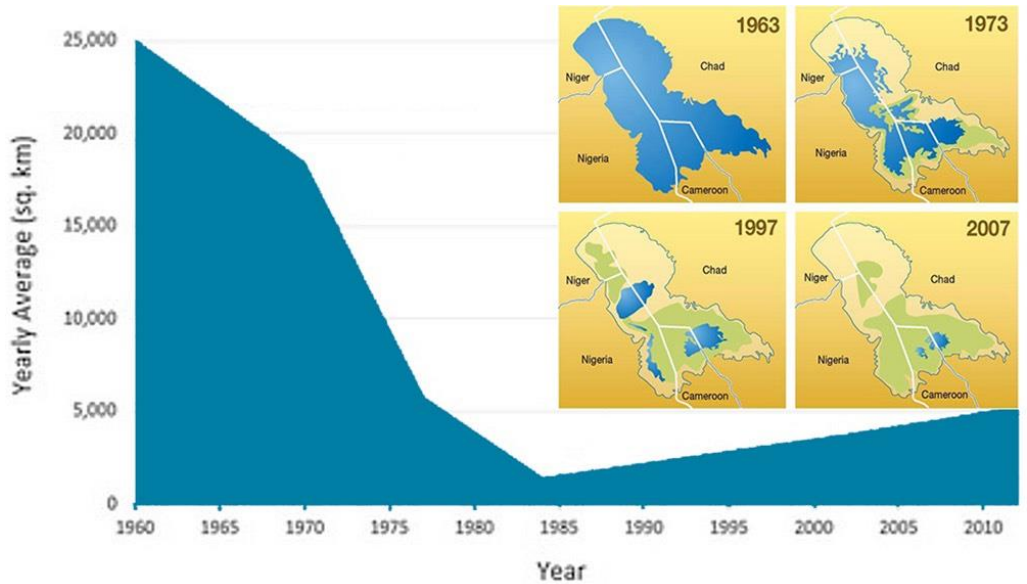
Climate Change Impacts

The following sectors are among others most affected by climate change:

- Water resources,
- Agriculture,
- Livestock,
- Fishery resources,
- Ecosystems and biodiversity,
- Human health and nutrition,

Climate Change Impacts: Water resources





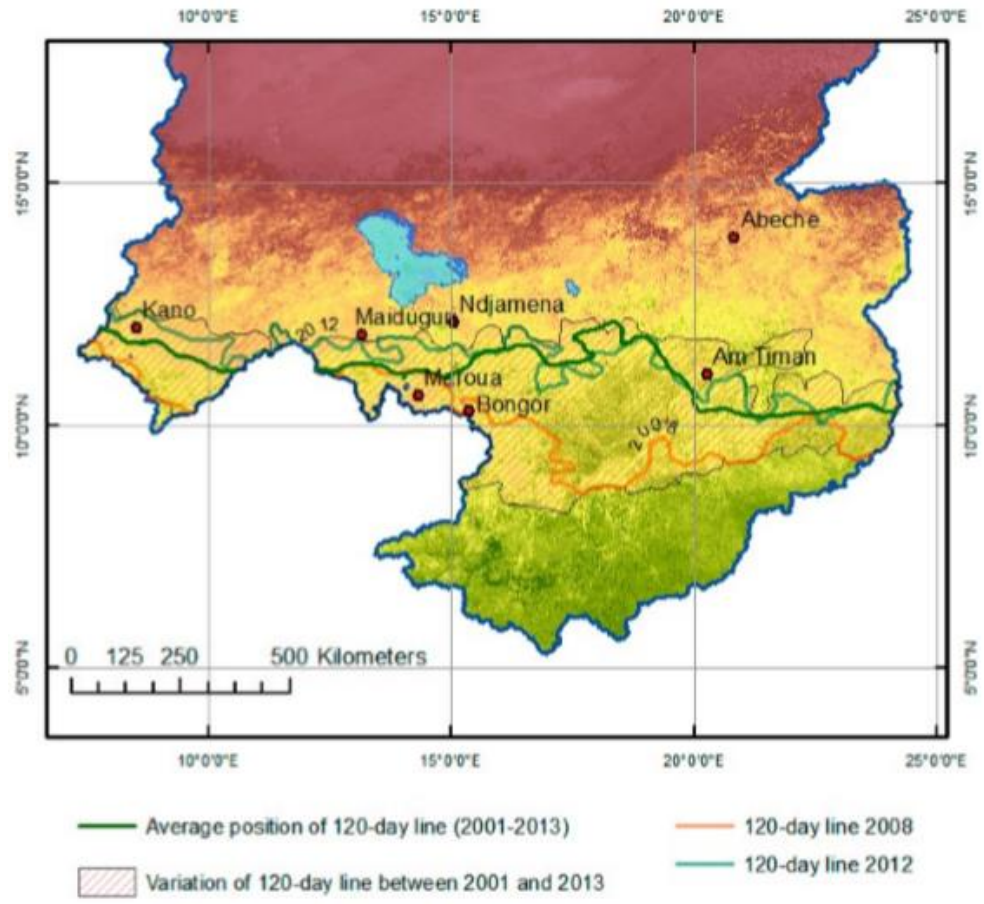
Climate Change Impacts: Agriculture

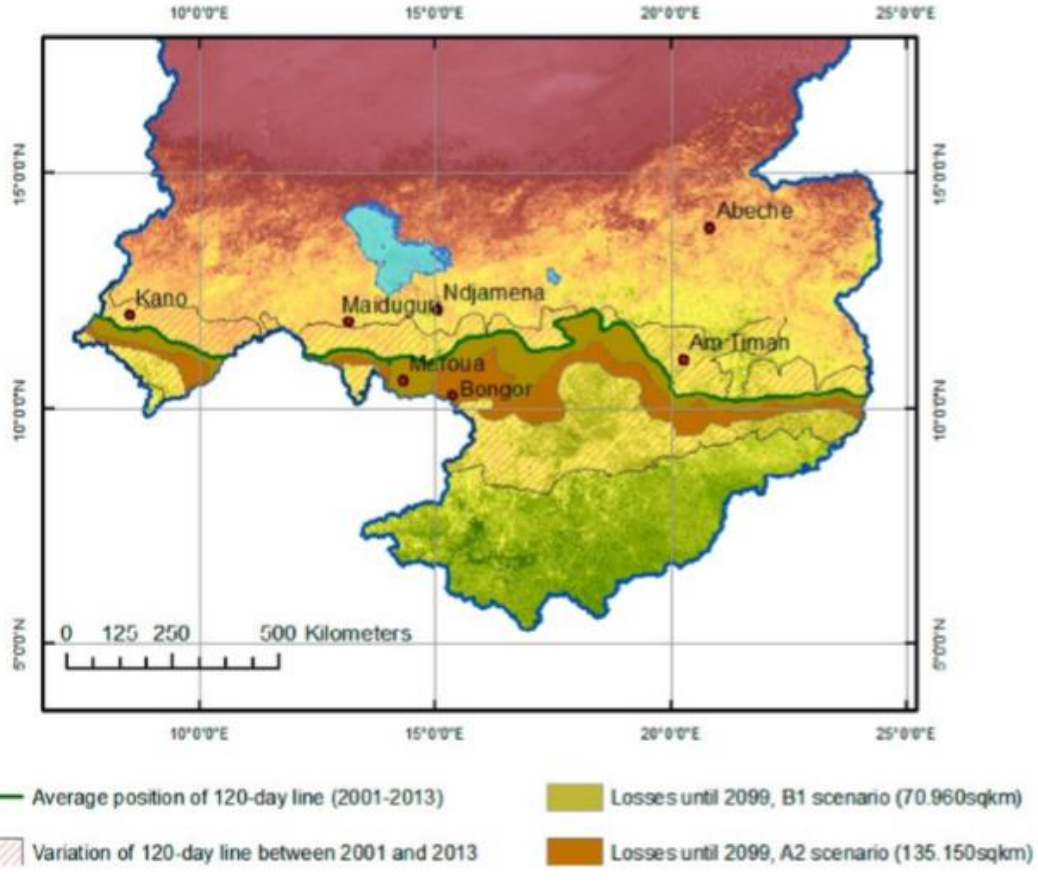
- Increased frequency of dry days during the agricultural season, resulting in significant drops (10–25 percent) in the yields and production of food crops (*Chad National Adaptation Plan, 2022*),
- Considering surface effects only (temperature and precipitation), the displacement of the 120-day line,

Class	Length of growing period	Typical crops
Hyper-arid	0	No crop, no pasture
Arid	1 – 59	No crops, marginal pasture
Semi-arid	60 – 119	Bulrush millet, sorghum, sesame
Dry sub-humid	120 – 179	Maize, bean, groundnut, peas, barley, wheat, teff (suitable for rainfed agriculture)

GIZ, (2015); LCBC (2012),

Climate Change Impacts: Agriculture





Climate Change Impacts: Modification of ecosystems

Climate Change Impacts: Loss of biodiversity

Kuri cattle breed (Endemic to Lake Chad)

Kuri cattle cross-breed with Zebu breed

References

- Lake Chad Basin Commission (2012), State of the Basin Ecosystems, https://cblt.org/download/state-of-the-basin-reports-of-the-lake-chad-basin/;
- GIZ (2015), Africa Supraregional – Adaptation to Climate Change in the Lake Chad Basin, https://cblt.org/download/adaptation-to-climate-change/,

Thank you

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