Climate Change Impact Assessment and Adaptation Options in Vulnerable Agro-Landscapes in East-Africa

Tscherning K¹, Sieber S¹, Wenkel K¹, Kersebaum K¹, Manful D¹, Dietrich O¹, Gomani M¹, Lisched G¹, Ojoyi M¹, Baur H², Dietz J², Kitalyi A², Kindt R², Gerstengarbe F-W³, Böhm U³ & Büchner M³

¹ Leibniz-Centre for Agricultural Landscape Research (ZALF) e.V., Müncheberg, Germany
² World Agroforestry Centre (ICRAF), Nairobi, Kenya
³ Potsdam Institute of Climate Change Research (PIK), Potsdam, Germany

Background
- Climate change is recognized risk to peoples’ livelihoods in Tanzania.
- Projected impacts include: variability in temperature, rainfall, LGP, flooding and drought.
- This affects different sectors namely agriculture, water resources & ecosystem services among others. Final effects are being felt in reduced agricultural production, diminishing river flow & possibly ground water.
- This will be coupled with increasing demand for food due to increase in human pressure.
- Rain-fed mixed crop livestock systems of north, east and central Tanzania are likely to be most severely affected by these changes.

Objectives
- Assess the regional impacts of climate change on agro-landscapes and environment.
- Design adaptation strategies and practices for small-scale agriculture.

Study Area
- The region’s agricultural sector composed of >80% peasant farmers of its total population depend on agriculture for their livelihood.
- The study area is among most food insecure regions.
- The region will be impacted by climate change which is likely to aggravate food security.

Methodological framework
- Regional climate change modeling using non-hydrostatic models (PNI)
- Hydrologic modeling using water balance models (ZALF-Institute of Landscape Hydrology)
- Agro-ecosystem modeling using SWAT models (ZALF-Institute of Landscape System Analysis)
- Agroforestry experiments (ICRAF)

Implementation framework
- Climate change and other external drivers
  - Data driven model based scenarios
  - Sustainability impact assessment
  - Stakeholder led qualitative data and scenarios
  - Scenarios of viable resilient sustainable agro-landscapes
  - Sets of climate change adapted good practices for farmers

Expected outputs
- Downscaled climate change scenarios for different IPCC emission scenarios.
- Model based estimations of climate change impacts on hydrological cycle and assessment of land use options.
- Scenarios of sustainable livelihoods and resilient agro-landscapes under climate change.
- Assessment of adaptive practices and criteria for best adaptation practices.

Fig. 1: Map of Tanzania showing river basins and study site near Mpwapwa and Morogoro