Usambara / Lushoto
Tanzania

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)
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Introduction

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) seeks to promote a food-secure world through the provision of science-based efforts that support sustainable agriculture and enhance livelihoods while adapting to climate change and conserving natural resources and environmental services.

Climate change is an unprecedented threat to the food security of hundreds of millions of people who depend on small-scale agriculture for their livelihoods. Climate change affects agriculture and food security, and likewise, agriculture and natural resource management affect the climate system.

CCAFS has initially focused on three regions; East Africa (EA), West Africa (WA) and South Asia (SA) to carry out its research. The 15 CCAFS sites in these areas represent areas that are becoming both drier and wetter, and are focal locations that will generate results that can be applied and adapted to other regions worldwide. In this year, 2013, CCAFS is expanding its portfolio to additional sites in Latin America and South-East Asia.

These sites serve as the initial focus of CCAFS partnership-building and long-term research activities falling within the following CCAFS Research Themes; Adaptation to Progressive Climate Change, Adaptation through Managing Climate Risk, Pro-Poor Climate Change Mitigation and Integration for Decision Making. At all 15 CCAFS sites, baseline surveys have been conducted, including three levels of data collection and analysis at household, village and organizational levels (see: http://ccafs.cgiar.org/resources/baseline-surveys).

More information on CCAFS work in all the three regions can be accessed at www.ccafs.cgiar.org

To better understand the CCAFS sites’ characteristics, a list of geospatial indicators for climate variability, bio-physical characteristics and socio-economic variables have been mapped into site atlases.

This Atlas was developed for the CCAFS site at Usambara / Lushoto in Tanzania, in East Africa Region.
CCAFS Sites: East Africa

Ethiopia: Borana (ET01)
Kenya: Nyando (KE01)
Kenya: Makueni (KE02)
Uganda: Albertine Rift (UG01)
Uganda: Kagera Basin (UG02)
Tanzania: Usambara (TZ01)

Citation: GeoMapa (2013a)
Annual Temperature

Citation: Hijmans et al (2005)
Aridity Index

Aridity Index indicates the level of dryness, taking evapotranspiration into account, at a given location of known rainfall.

Citation: Trabucco et al (2009)
Altitude indicates the height above sea level in meters.

Citation: Jarvis et al (2008)
Landforms

Landforms comprise the geomorphological units that make up the Earth’s surface, largely defined by its surface form and location in the landscape.
Soil Type

Soil Type refers to the soil group as per the FAO classification. Soil groups are defined by their parent material and morphogenetic characteristics in terms of structural properties and texture (sand, silt and clay content), as well as organic matter content.

*Legend corresponds to left map*

- Chromic Luvisols
- Eutric Leptosols
- Eutric Pianosols
- Eutric Vertisols
- Haplic Acrisols
- Haplic Luvisols
- Rhodic Ferralsols
- Sodic Solonchaks
- Umbrie Acrisols

Soil Type *
Agro-Ecological Zones

Agro-Ecological Zones indicate the division of land areas that have similar characteristics related to land suitability, potential agricultural production and environmental impact.

* Legend corresponds to left map

Citation: FAO (2008)
Landuse

Landuse is a description of how people utilize the land. It involves socio-economic activity, i.e. the management and modification of the natural environment into built environment, such as agricultural fields and settlements. At any place, there may be multiple land uses, the dominant one is presented here.

Legend corresponds to left map

- Bare Soil
- Bushland
- Cultivated Land
- Grassland
- Natural Forest
- Plantation Forest
- Urban Area
- Woodland

* Legend corresponds to left map

Citation: Netherton et al (2010)
The Length of Growing Period (LGP) is defined as the number of days in a year during which there is available rainfed soil moisture supply for plant growth.

Length of Growing Period (Days)

- < 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200

Citation: Thornton et al (2006)
The Length of Growing Period (LGP) is defined as the number of days in a year during which there is available rainfed soil moisture supply for plant growth; here modeled for 2030.

### Length of Growing Period (Days)

- **< 50**
- **50 - 100**
- **100 - 150**
- **150 - 200**
- **> 200**

**Citation:** Thornton et al (2006)
Crop Suitability

Crop Suitability refers to the land resource assessment that considers agricultural land use options with relevant agro-ecological condition to estimate expected cropping activities.

Citation: FAO and IIASA (2007)
Livestock Production Systems

Livestock Production Systems as part of agricultural systems take agro-climatic conditions into account and are classified in terms of feed and livestock resources; livestock commodities produced; production technology; product use and livestock functions; area covered; geographic locations; and human populations supported.

Citation: FAO (2007)
Livestock Density is measured in numbers of livestock, including cattle, goats and sheep, per km².

Citation: Wint et al (2007)
Livelihood Zones

Livelihoods are complex and shaped by a variety of factors. Livelihood zones maps delineate geographic areas within which people broadly share the same livelihood patterns including access to food, income, and markets.

Citation: USAID (2011)

Legend corresponds to left map

* Legend corresponds to left map

Livelihood zones *
- **Tanga Maize and Cattle**
- **Tanga Maize, Orange and Jackfruit Midlands**
- **Tanga Maize and Sisal Employment**
- **River Pangani Paddy and Maize Basin**
- **Southern Maasai Pastoralist**
- **Usambara-Pare Highland**
Market Access

Travel time to nearest large town/city (Hours)

- Travel time is a measure of accessibility determined in the time (hours) taken to the nearest urban centre, town or city of a population of 50,000 people or more (taking different means of transportation into account).

Citation: Nelson (2008)
CIESIN constructed global data sets of poverty that are based on estimates of subnational infant mortality and child malnutrition data, recognizing that both are proxies for poverty and welfare rather than direct measures.
Conservation Areas

Represent protected areas that, according to IUCN, are clearly defined geographic spaces, recognized, dedicated spaces, managed through legal or other effective means, to achieve long-term conservation of nature with associated ecosystem services and cultural value.

Citation: UNEP and WCMC (2012)
References and Data Sources

Regional Map

Topographic Map
Sijmons K. 2013b. Relief representation derived from Digital Elevation Model (DEM) of SRTM (Shuttle Radar Topographic Mission) 2000, Ground resolution 90 meter and ASTER GDEM, Ground resolution 30 meter, NASA. Topographic Features digitized from Google Earth Proection: Geographic, Lat/Long, WGS84

Satellite Image

Annual Rainfall

Annual Rainfall Graph

Annual Temperature

Annual Temperature Graph

Aridity Index
Trabucco, A., and Zomer, R.J. 2009. Global Aridity Index (Global-Aridity) and Global Potential Evapo-Transpiration (Global-PET) Geospatial Database. CGIAR Consortium for Spatial Information. Published online, available from the CGIAR-CSI GeoPortal at: http://www.cgiar.org/

Altitude

Soil Type

Agro-Ecological Zones

Landcover

Length of Growing Period 2000
Length of Growing Period 2030

Crop Suitability

Livestock Production Systems

Livestock Density

Livelihood Zones

Human Population Density

Market Access

Poverty

Conservation Areas
UNEP-WCMC (2012). Data Standards for the World Database on Protected Areas. UNEP-WCMC: Cambridge, UK.
The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) brings together the world's best researchers in agricultural science, development research, climate science and Earth System science, to identify and address the most important interactions, synergies and tradeoffs between climate change, agriculture and food security. CCAFS is a strategic partnership of CGIAR and Future Earth, led by the International Center for Tropical Agriculture (CIAT).

For more information, visit www.ccafs.cgiar.org and www.geomapa.nl