Nyando / Katuk Odeyo
Kenya

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)
Correct citation:

Titles in this series aim to disseminate interim climate change, agriculture and food security research and practices and stimulate feedback from the scientific community.

This document is published by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) which is a strategic partnership between CGIAR and Future Earth. CCAFS is supported by the CGIAR Fund, the Danish International Development Agency (DANIDA), the Australian Government Overseas Aid Program (AusAid), Irish Aid, Environment Canada, the Ministry of Foreign Affairs for the Netherlands, the Swiss Agency for Development and Cooperation (SDC), Instituto de Investigação Científica Tropical (IICT), UK Aid, the Government of Russia, and the European Union (EU). The Program is carried out with technical support from the International Fund for Agricultural Development (IFAD)

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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 Nyando / Katuk Odeyo in Kenya, 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)
Topography Nyando

CCAFS Site KE01, Nyando / Katuk Odeyo, Kenya

Coordinates of the CCAFS Baseline
Sampling frame
35.068E  0.269S
35.068E  0.361S
34.978E  0.361S
34.978E  0.269S

Sampling frame size: 10km x 10km

Citation: GeoMapa (2013b)
Annual Rainfall

Rainfall data of current interpolations of observed data, representative of 1950 - 2000

Citation: Hijmans et al (2005)

Rainfall (mm)

- <= 250
- 250 - 750
- 750 - 1,250
- 1,250 - 1,750
- >= 1,750

Katuk Odeyo Mean Monthly Rainfall Distribution

Citation: Jones et al (2002)

Lake Victoria

SOUTH SUDAN

ETHIOPIA

UGANDA

KENYA

TANZANIA

SOMALIA

INDIAN OCEAN
**Annual Temperature**

*Lake Victoria*

- **Citation:** Hijmans et al (2005)
- **Citation:** Jones et al (2002)

**Annual Temperature** represents annual temperature data of current interpolations of observed data, averaged for 1950 - 2000.

- Temperature (ºC)
  - <= 15
  - 15 - 20
  - 20 - 25
  - 25 - 30
  - > = 30

**Katuk Odeyo Mean Monthly Temperature Distribution**

- **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.
Landforms

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

Legend corresponds to left map

- Red: Piedmont plains
- Purple: Plateaux and high-level structural plains
- Green: Swamps
- Blue: Upland/high-level plain transitional lands
- Light blue: Upper middle-level uplands
- Light brown: Upper-level uplands
- Orange: Volcanic footridges
- Fuchsia: Undifferentiated or various rocks
- Gray: Urban area

Citation: FAO Africover (2002)
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.

Citation: FAO et al (2009)
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:
- High Altitude Derived Savanna
- Mid Altitude Derived Savanna
- High Altitude Humid Forest
- Mid Altitude Humid Forest

* Legend corresponds to left map

Citation: FAO (2008)
Landcover shows the observed (bio)physical cover of the earth’s surface, i.e. dominant vegetation, land use and man-made features.
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:
- Forest protected
- Forest with agricultural activities
- Forest with moderate or higher livestock density
- Shrubs unmanaged
- Shrubs protected
- Shrubs moderate livestock density
- Shrubs high livestock density
- Rainfed crops (Subsistence/Commercial)
- Crops and moderate intensive livestock density
- Crops and high livestock density
- Agriculture protected
- Urban area

Corresponds to the map on the left

1 cm = 7.5 km

1:750,000 Scale

Citation: Natchtergaele 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.

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

Livestock Density is measured in numbers of livestock, including cattle, goats and sheep, per km².

<table>
<thead>
<tr>
<th>Number per km²</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 5</td>
<td>No Observations</td>
</tr>
<tr>
<td>5 - 10</td>
<td></td>
</tr>
<tr>
<td>10 - 15</td>
<td></td>
</tr>
<tr>
<td>15 - 20</td>
<td></td>
</tr>
<tr>
<td>&gt;= 20</td>
<td></td>
</tr>
</tbody>
</table>

Citation: Wint et al (2007)
Livelihoods are complex and shaped by a variety of factors. These livelihood zone maps delineate geographic areas within which people broadly share the same livelihood patterns including access to food, income, and markets.
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).
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.

Citation: CIESIN (2005)
Conservation Areas

Conservation Areas represent protected areas that, according to IUCN, are clearly defined geographic spaces, recognized, dedicated and 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. Projection: Geographic, Lat/Long, WGS84

**Satellite Image**
RapidEye Satellite Image, 5 meter ground resolution, Image acquisition, 17-01-2011

**Annual Rainfall**

**Annual Rainfall Graph**

**Annual Temperature**

**Annual Temperature Graph**

**Aridity Index**

**Altitude**

**Soil Type**

**Agro-Ecological Zones**

**Landuse**

**Landcover**

**Length of Growing Period 2000**
Length of Growing Period 2030

Crop Suitability

Livestock Production Systems

Livestock Density
FAO, 131 pp.

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