L.Cramer/CCAFS

CCAFS site atlas

Usambara / Lushoto Tanzania

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

Site Atlas

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

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Contents

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

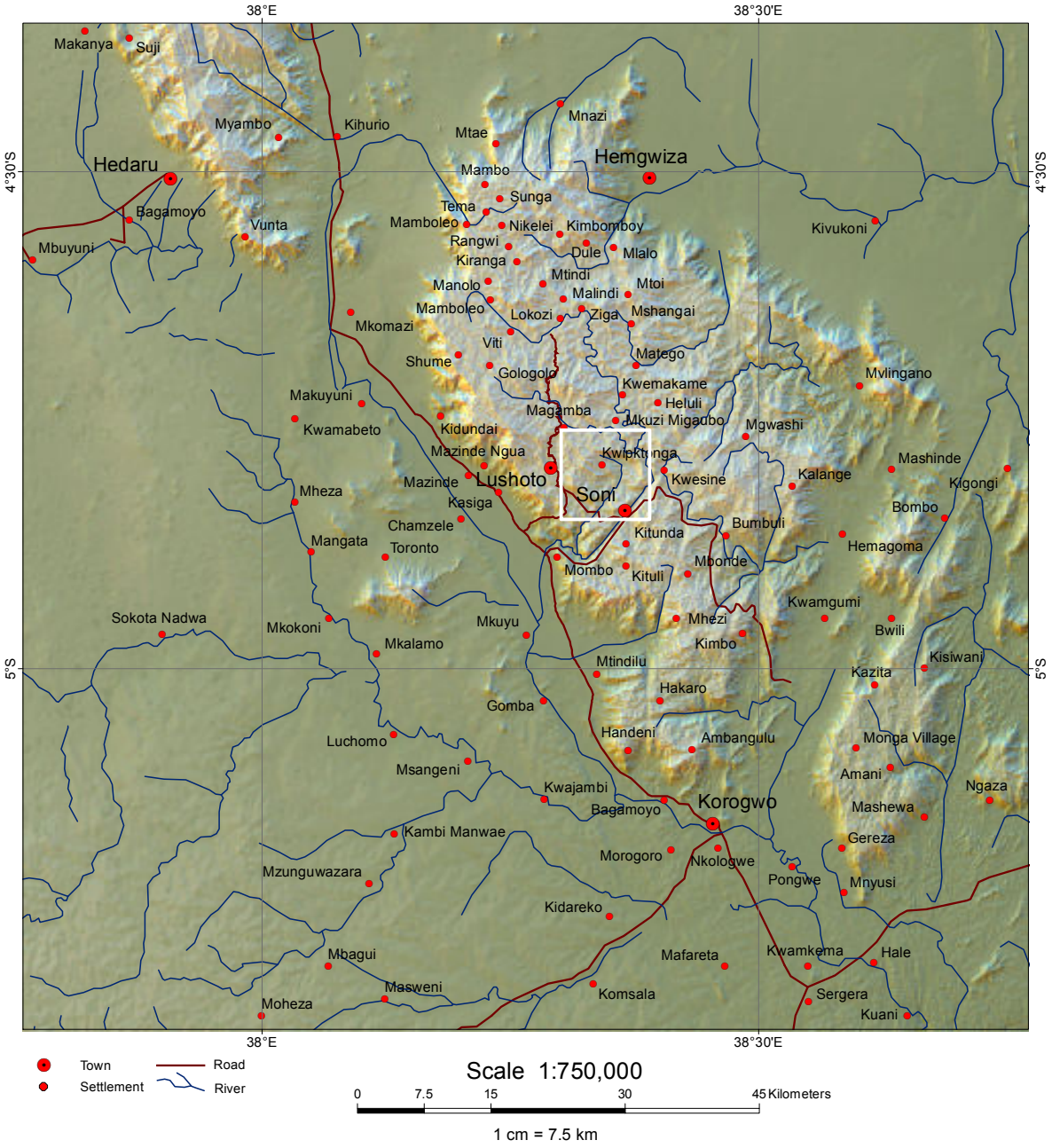
Ethiopia: Borana (ET01)
Kenya: Nyando (KE01)
Kenya: Makueni (KE02)
Uganda: Albertine Rift (UG01)
Uganda: Kagera Basin (UG02)
Tanzania: Usambara (TZ01)

CCAFS Country Sites

Citation: GeoMapa (2013a)

Topography Usambara

CCAFS Site TZ01, Lushoto / Usambara, Tanzania



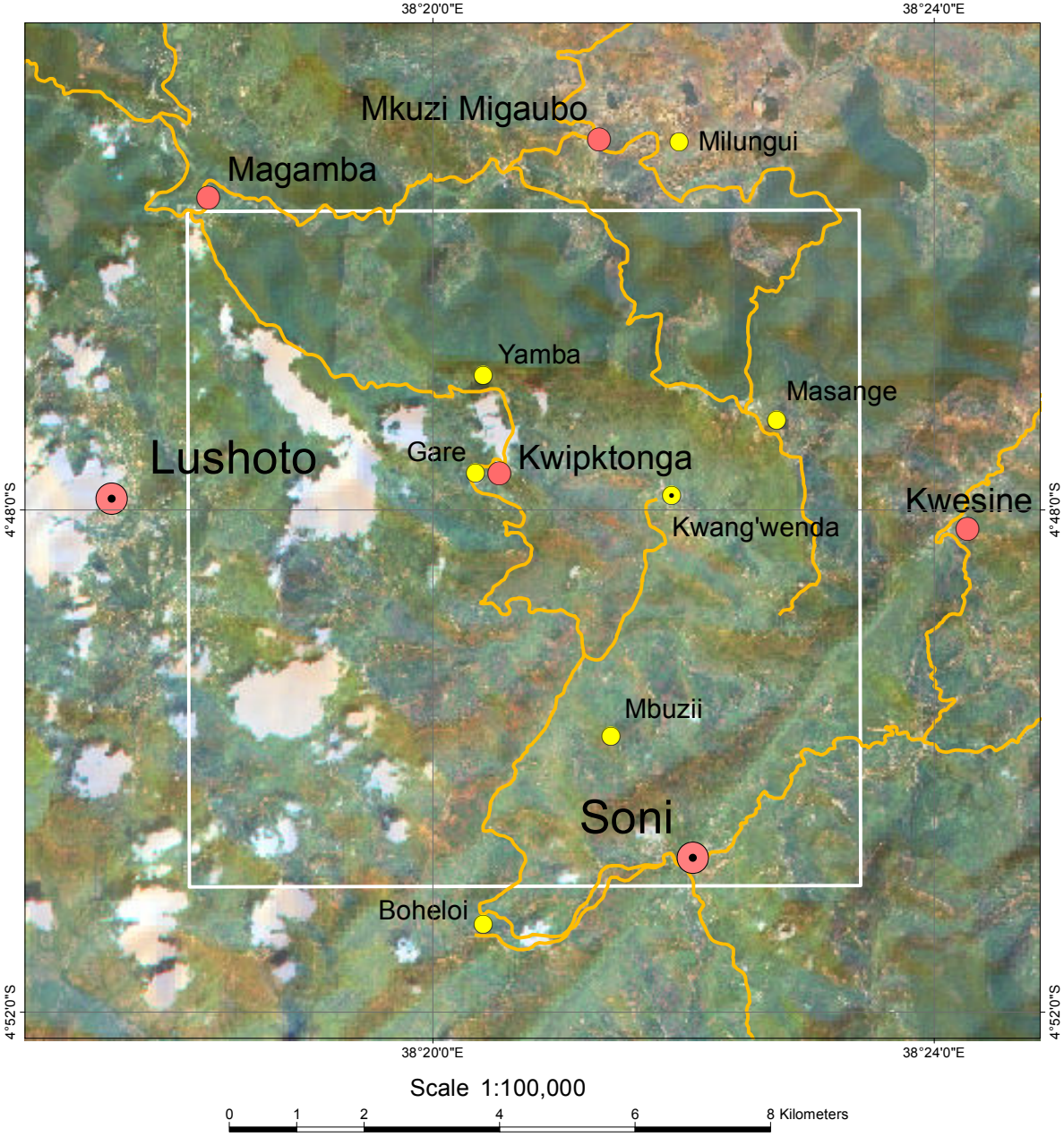
Coordinates of the CCAFS Baseline Sampling frame

38.417E 4.790S
38.417E 4.850S
38.301E 4.850S
38.301E 4.790S

Sampling frame size: 10km x 10km

Citation: GeoMapa (2013b)

Satellite Image Lushoto



RapidEye imagery from 17-01-2011 at 5m ground resolution

HBS= Household Baseline Survey

VBS= Village Baseline Survey

OBS= Organizational Baseline Survey

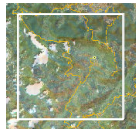
Road

Town

Settlement

CCAFS VBS/OBS village

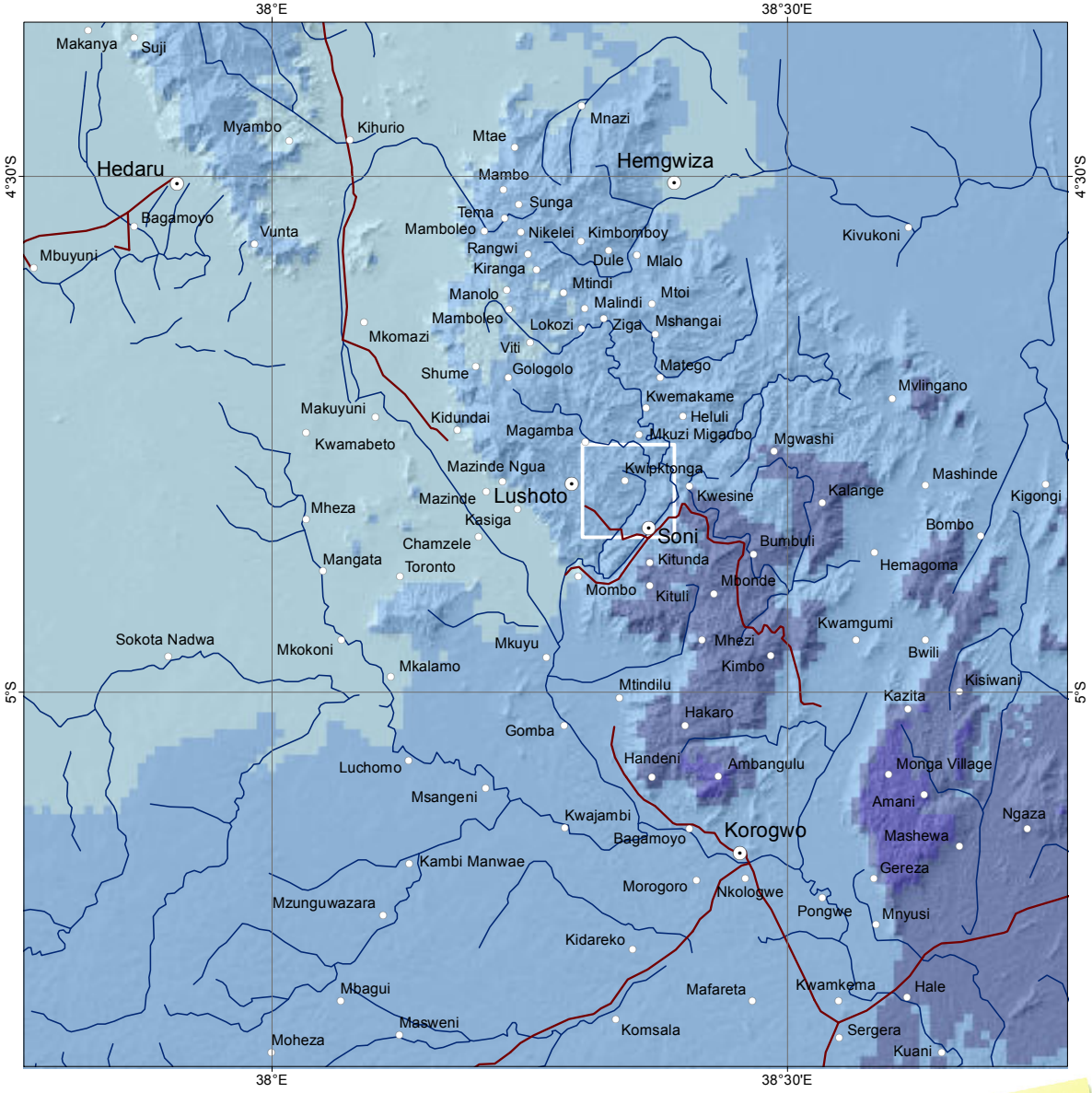
CCAFS HBS village

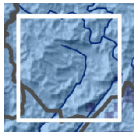


CCAFS Baseline Sampling Frame

Citation: RapidEye (2011)

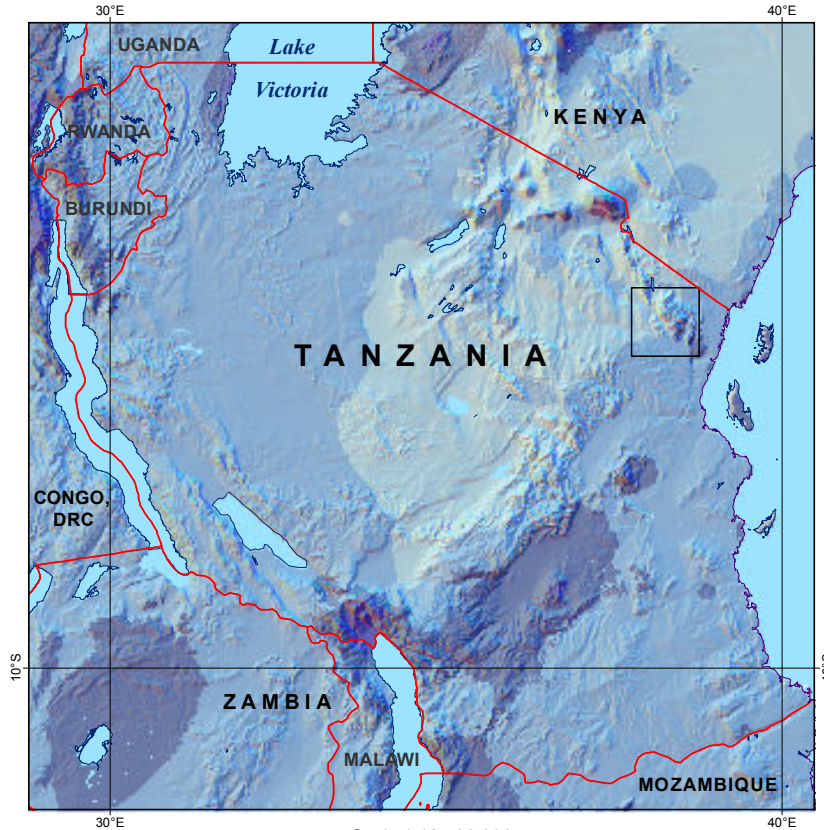
Annual Rainfall





Lushoto
CCAFS sampling frame

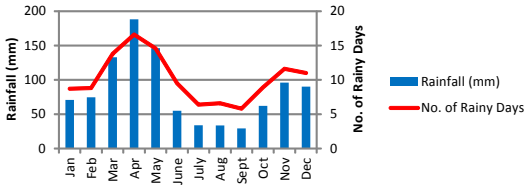
Annual Rainfall data of current interpolations of observed data, representative of 1950 - 2000



Rainfall (mm)

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

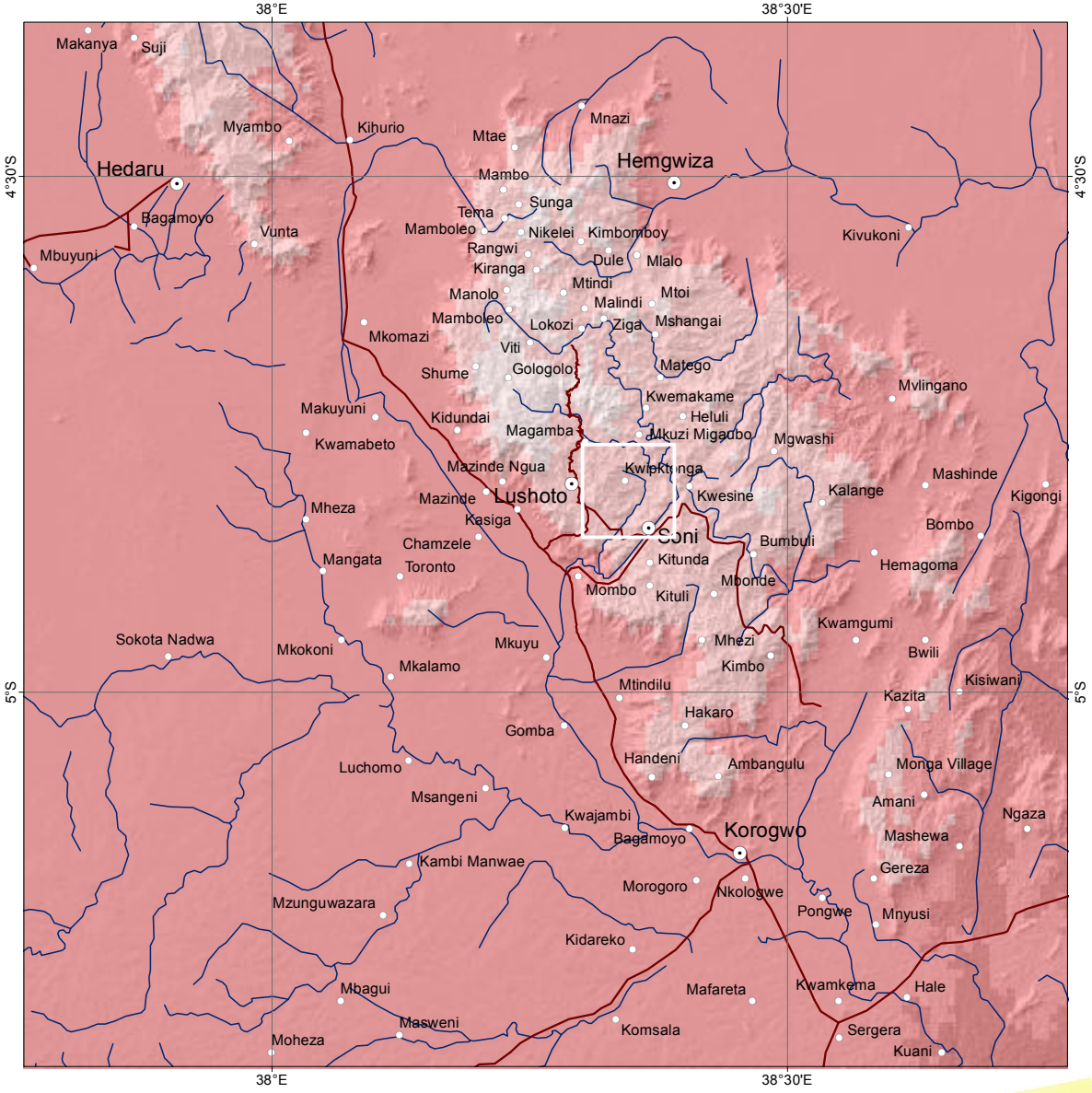
Lushoto Mean Monthly Rainfall Distribution



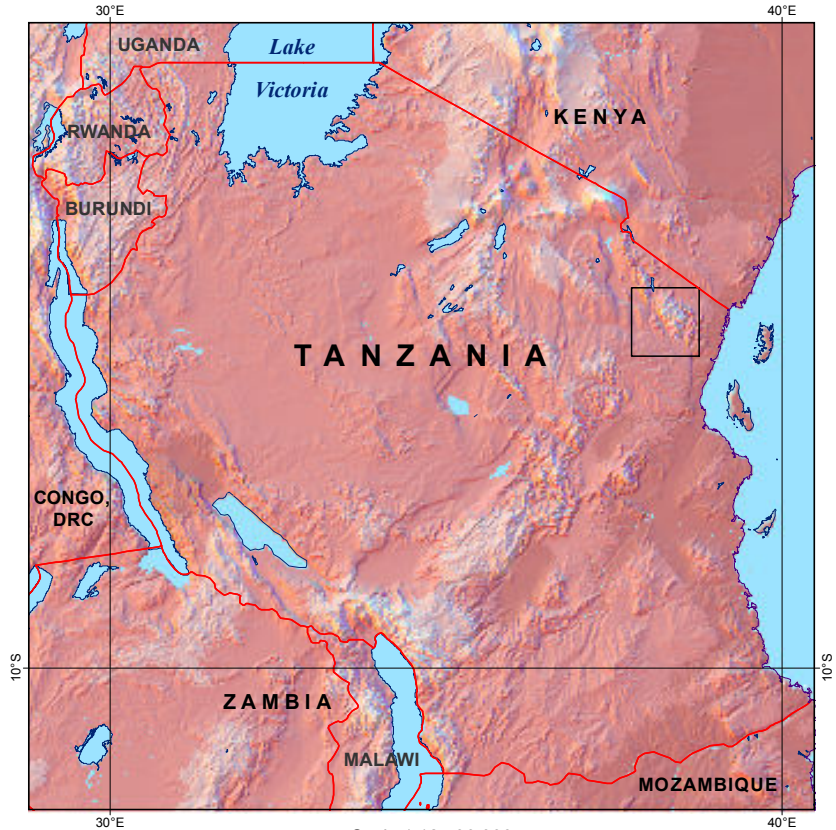
Citation: Jones et al (2002)

Citation: Hijmans et al (2005)

Annual Temperature



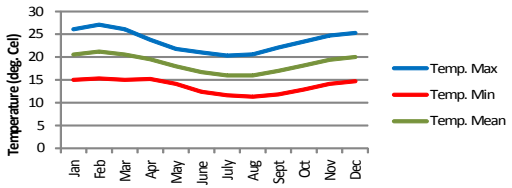
Lushoto
CCAFS sampling frame



Temperature (°C)

- < = 15
- 15 - 20
- 20 - 25
- 25 - 30
- > = 30

Lushoto Mean Monthly Temperature Distribution

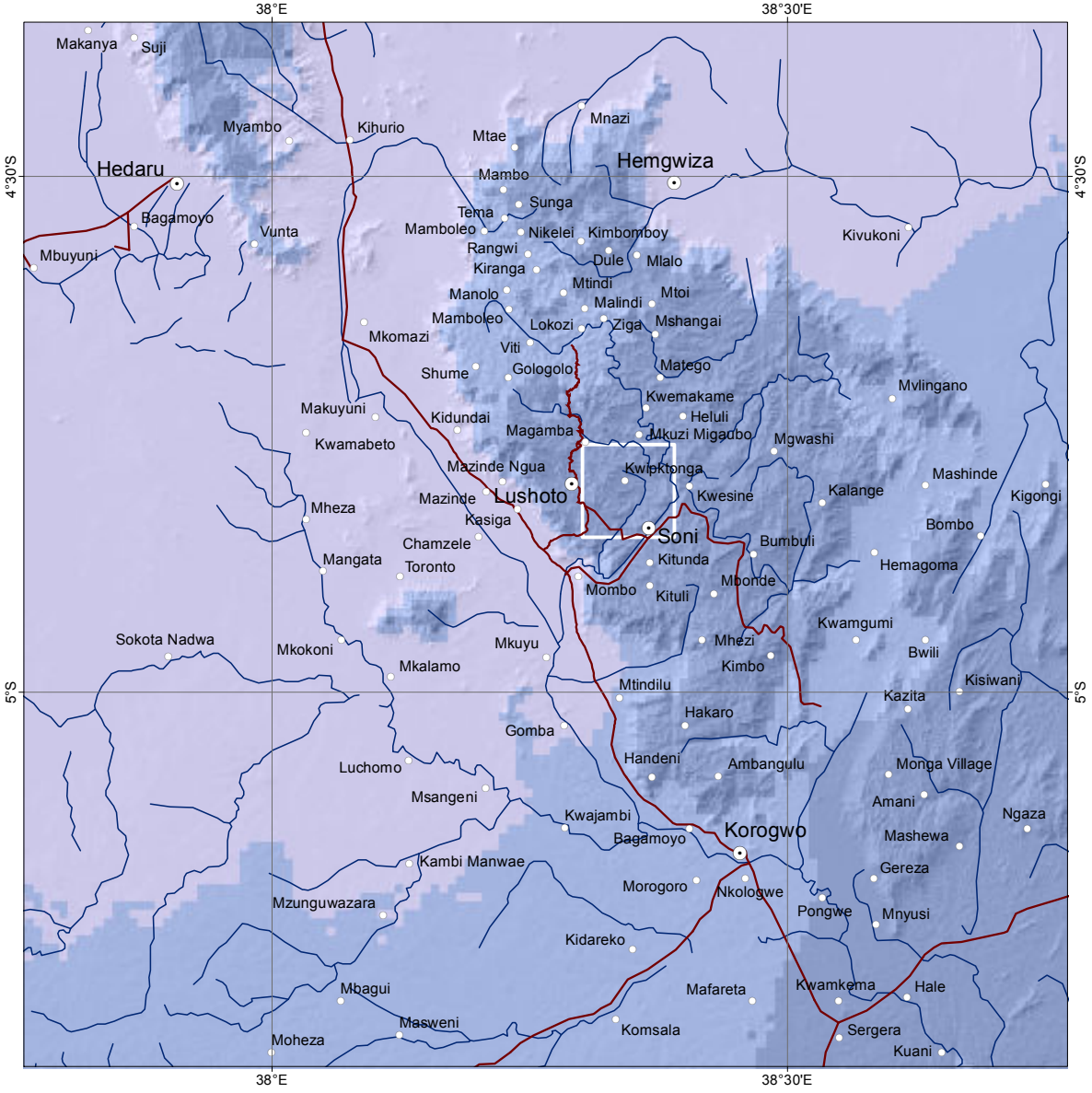


Citation: Jones et al (2002)

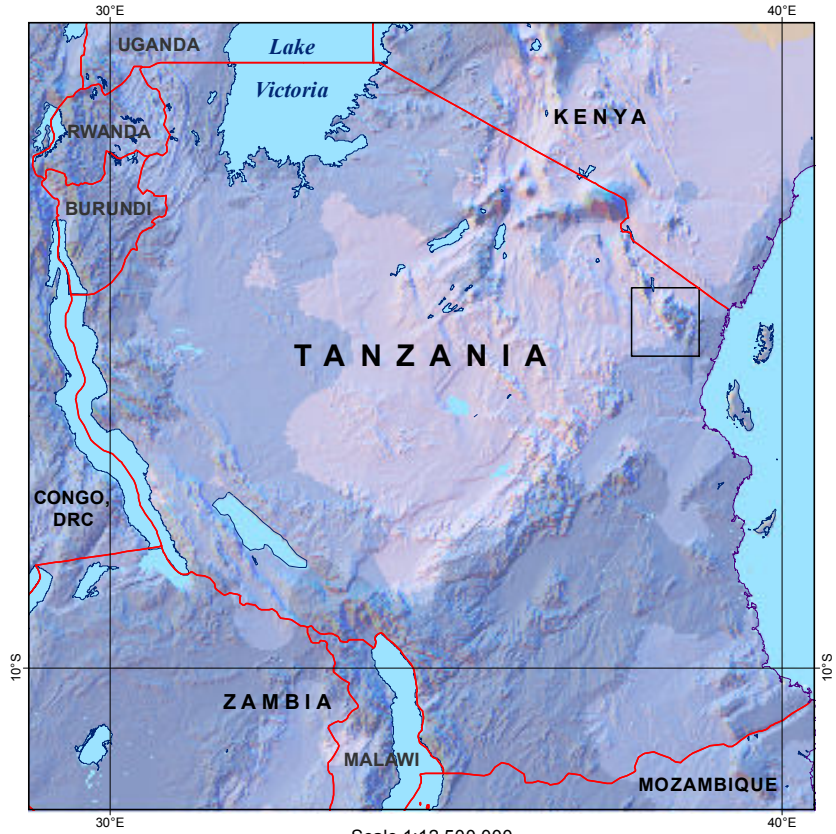
Annual Temperature represents annual temperature data of current interpolations of observed data, averaged for 1950 - 2000

Citation: Hijmans et al (2005)

Aridity Index



Lushoto
CCAFS sampling frame



Aridity Index

- Hyper Arid
- Arid
- Semi Arid
- Dry sub-humid
- Humid

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

Citation: Trabucco et al (2009)

Altitude

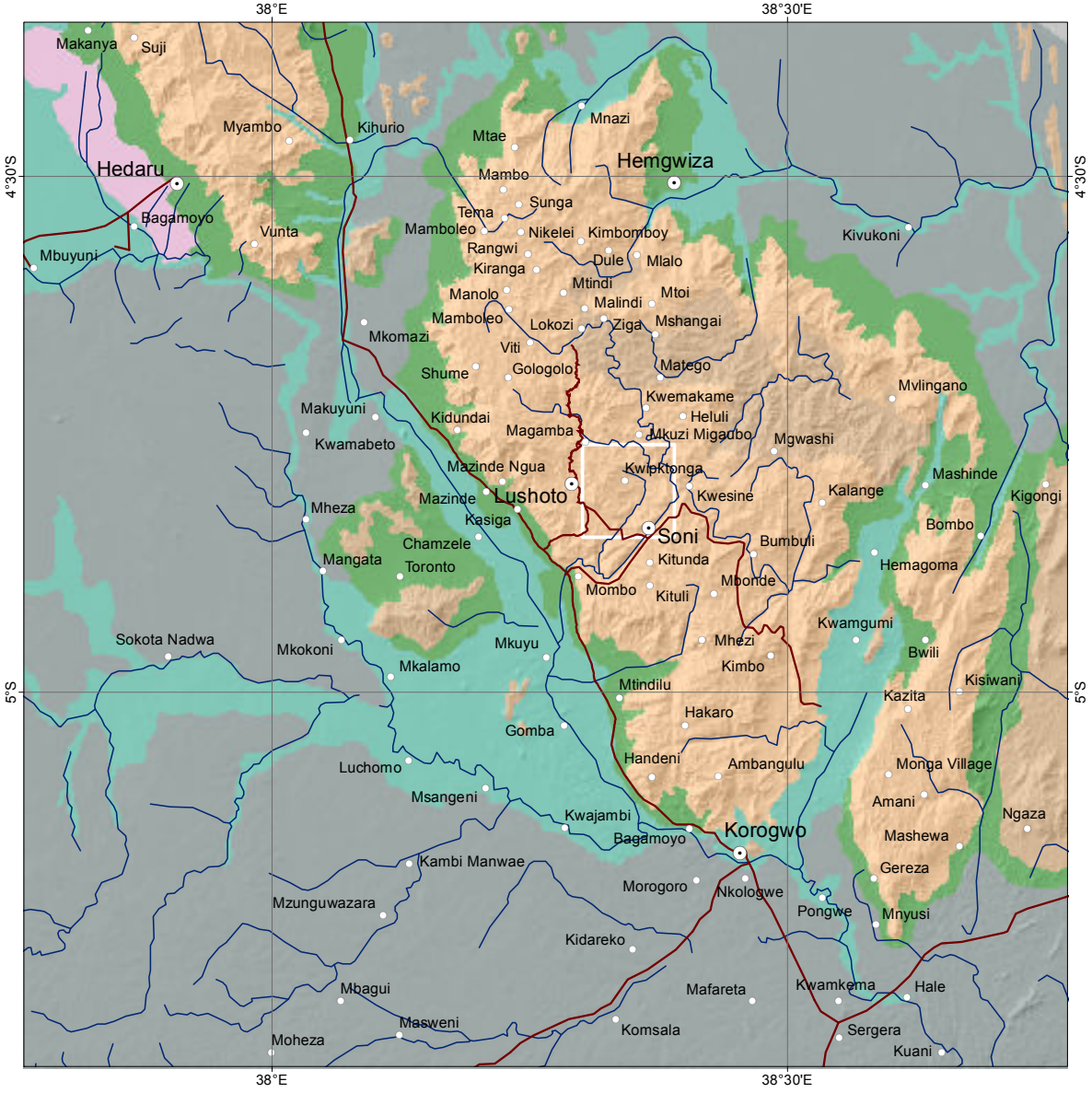
Altitude (m)

- > = 2,500
- 2,000 - 2,500
- 1,500 - 2,000
- 1,000 - 1,500
- 500 - 1,000
- < = 500

Altitude indicates the height above sea level in meters

Citation: Jarvis et al (2008)

Landforms



Lushoto
CCAFS sampling frame

International boundary

Scale 1:12,500,000

0 125 250 500 Kilometers

Corresponds to the map on the left

Landforms *

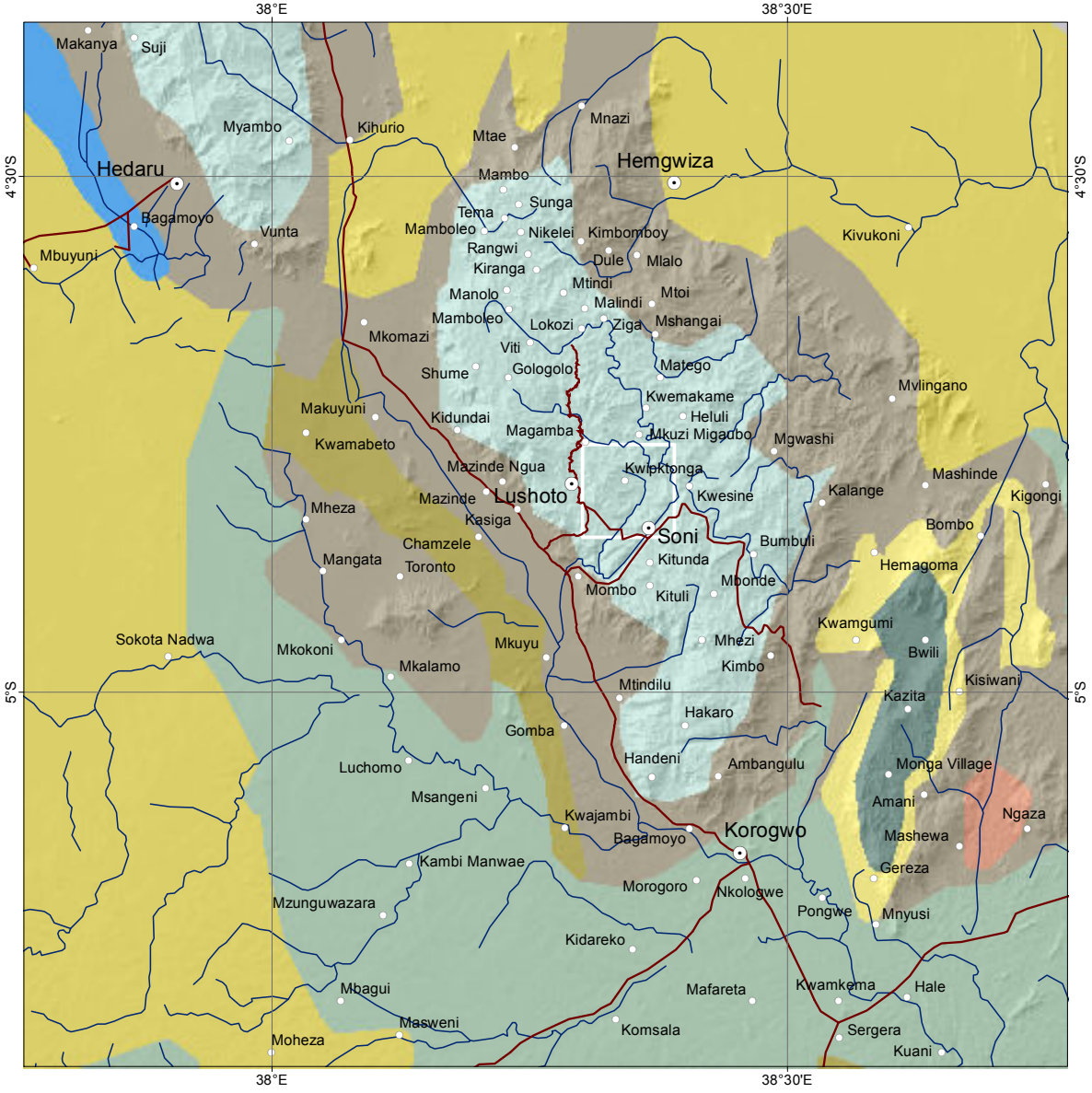
- Footslope
- Plain
- Alluvial plain
- Hills and mountain footridges
- Mountains
- Fan

* Legend corresponds to left map

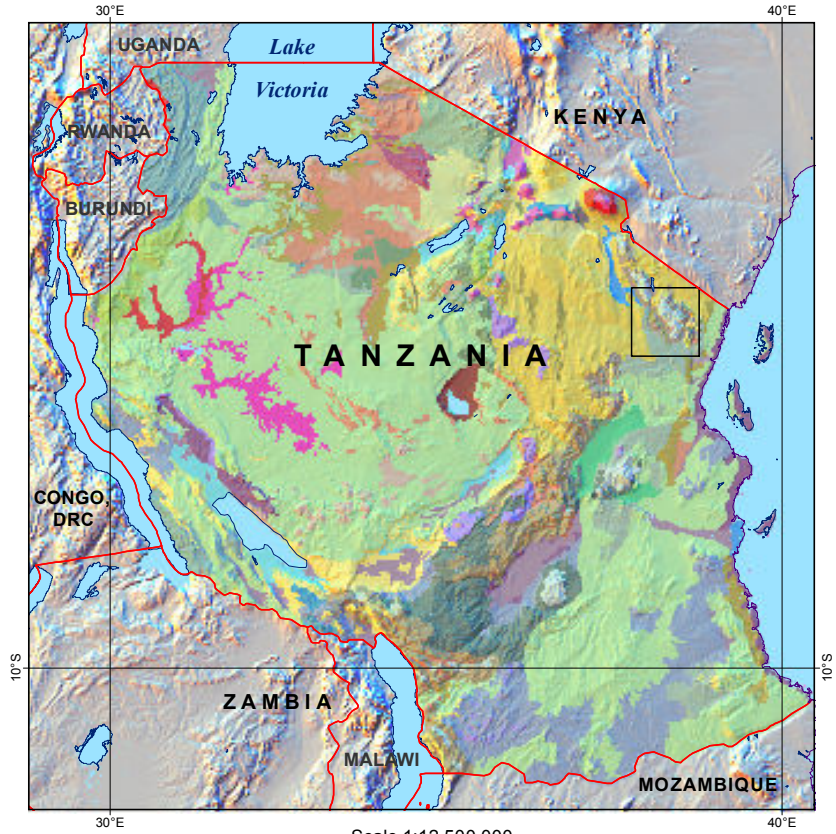
Landforms comprise the geomorphological units that make up the Earth's surface, largely defined by its surface form and location in the landscape

Citation: FAO Africover (2002)

Soil Type



Lushoto
CCAFS sampling frame



International boundary

Scale 1:12,500,000

0 125 250 500 Kilometers

Corresponds to the map on the left

Soil Type *

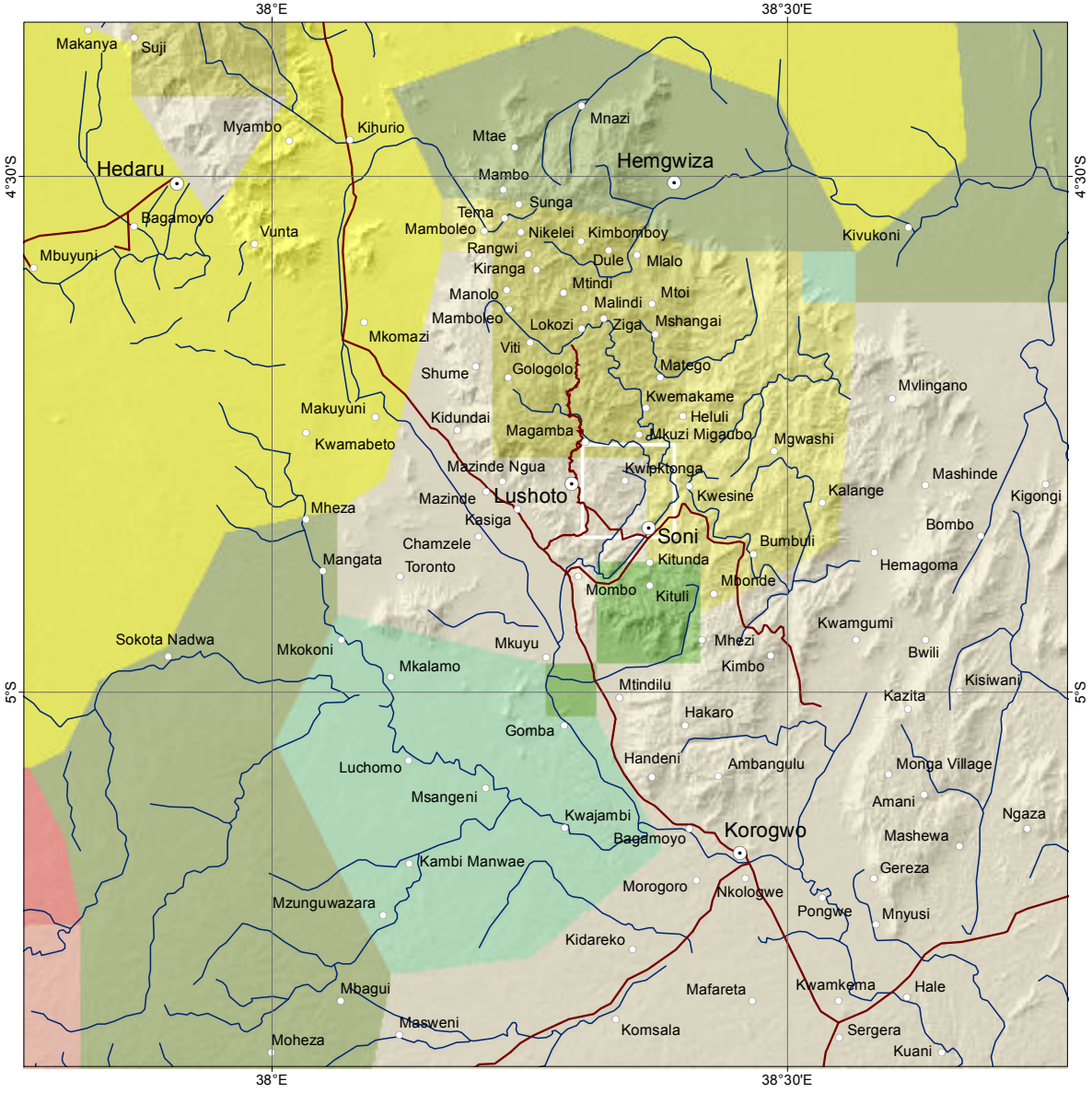
- Chromic Luvisols
- Eutric Leptosols
- Eutric Planosols
- Eutric Vertisols
- Haplic Acrisols
- Haplic Luvisols
- Rhodic Ferrasols
- Sodic Solonochak
- Umbric Acrisols

* Legend corresponds to left map

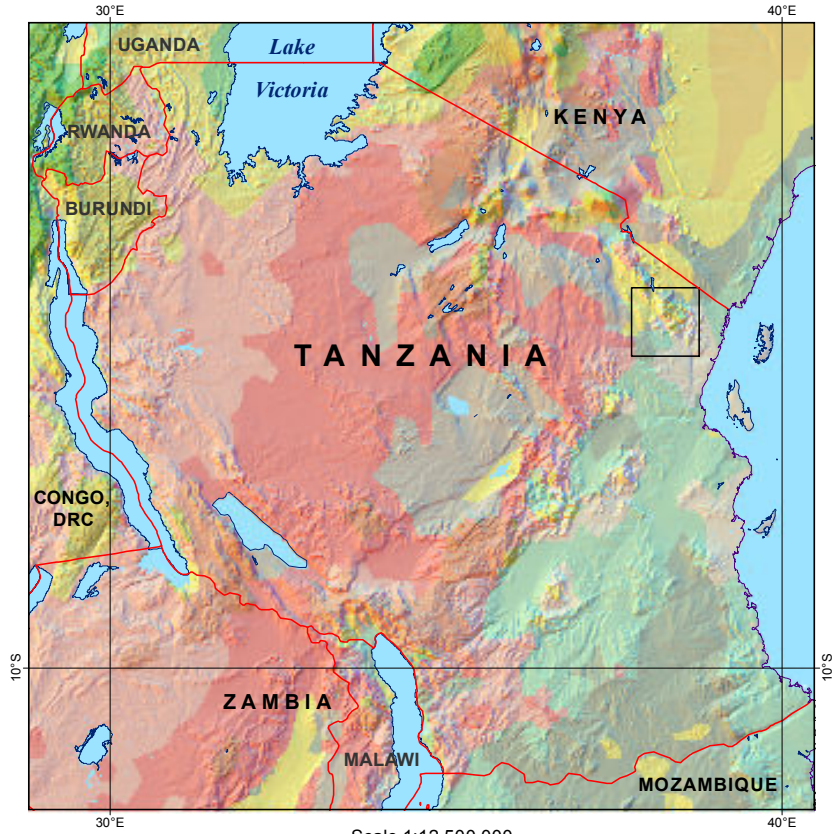
Soil Type refers to the soil group as per the FAO classification. Soil groups are defined by their parent material and morphogenetic characteristics in terms of structural properties and texture (sand, silt and clay content), as well as organic matter content.

Citation: FAO/IIASA/ISRIC/ISS-CAS/JRC (2009)

Agro-Ecological Zones



Lushoto
CCAFS sampling frame



International boundary

Scale 1:12,500,000

0 125 250 500 Kilometers

Corresponds to the map on the left

Agro-Ecological Zones *

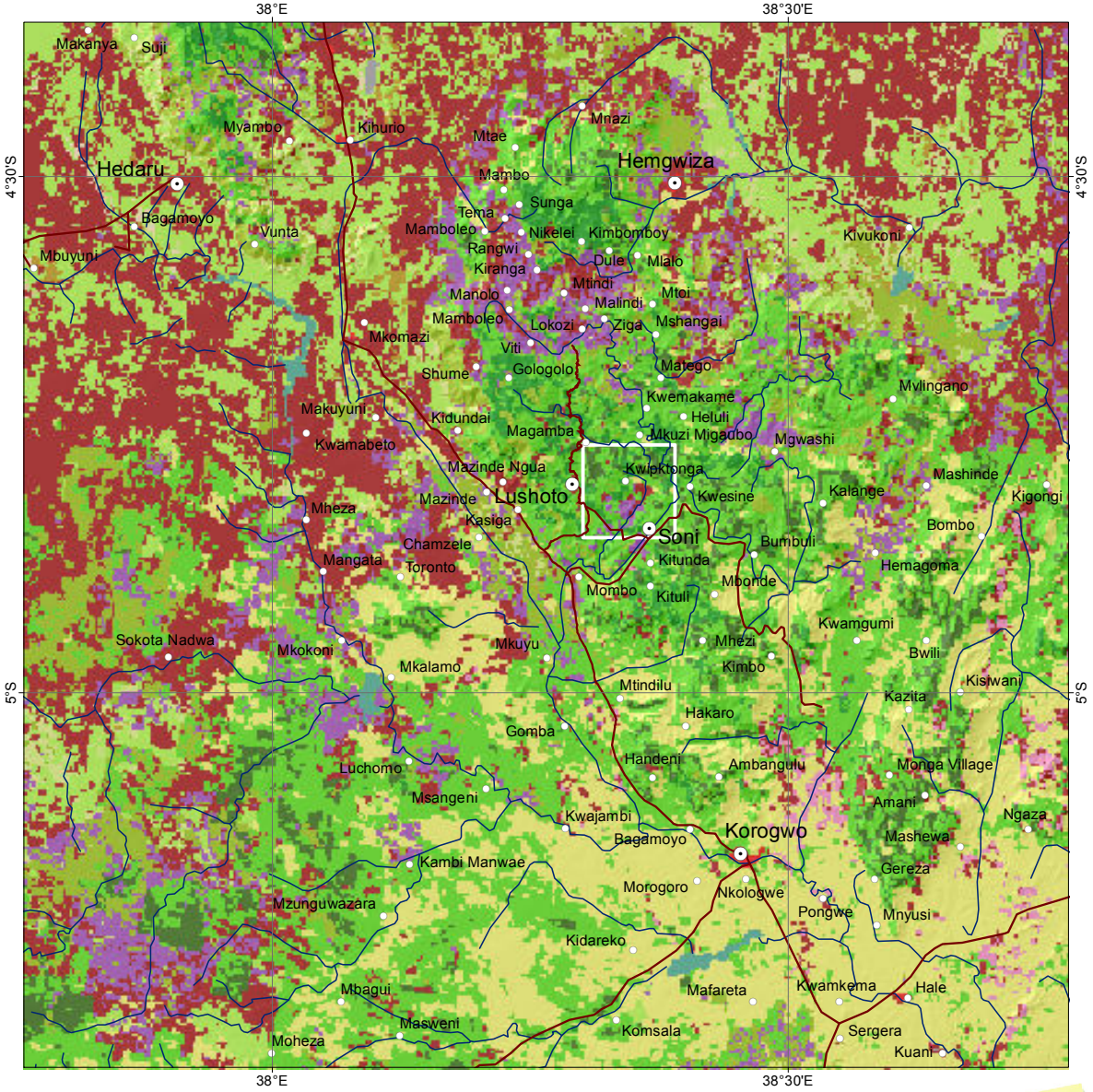
- Semi-arid/Sudan Savanna
- Northern Guinea Savanna
- Southern Guinea Savanna
- High Altitude Derived Savanna
- Mid Altitude Derived Savanna
- Mid Altitude Northern Guinea Savanna
- Mid Altitude Southern Guinea Savanna
- Derived Savanna
- Humid Forest

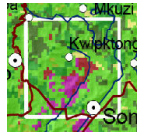
* Legend corresponds to left map

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

Citation: FAO (2008)

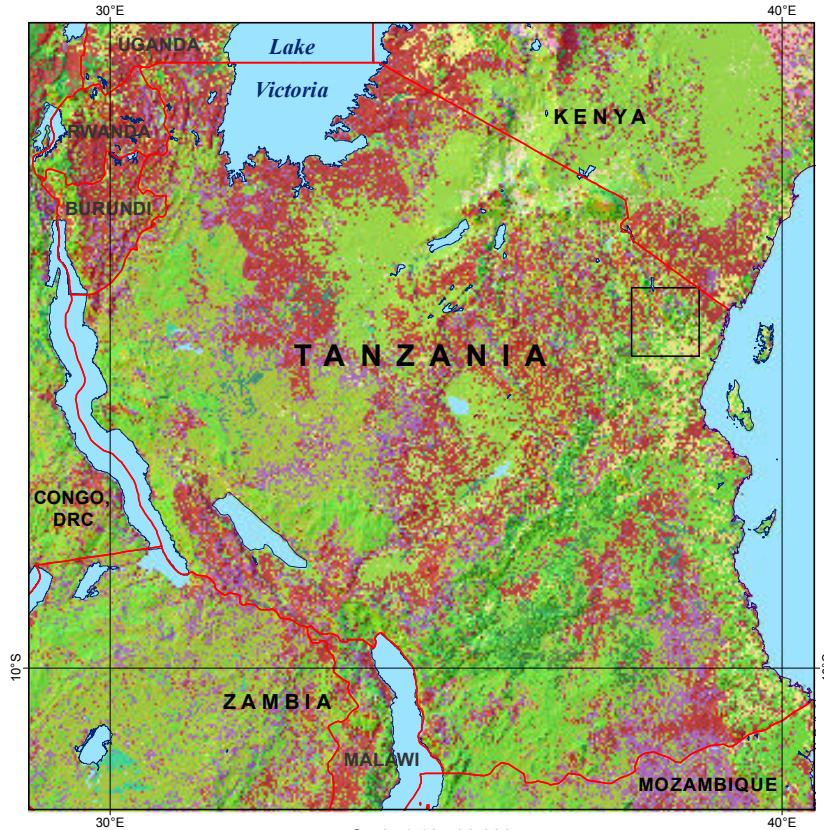
Landcover





Lushoto
CCAFS sampling frame

Landcover shows the observed (bio)physical cover of the earth's surface, i.e. dominant vegetation, land use and man-made features.



International boundary

Scale 1:12,500,000

0 125 250 500 Kilometers

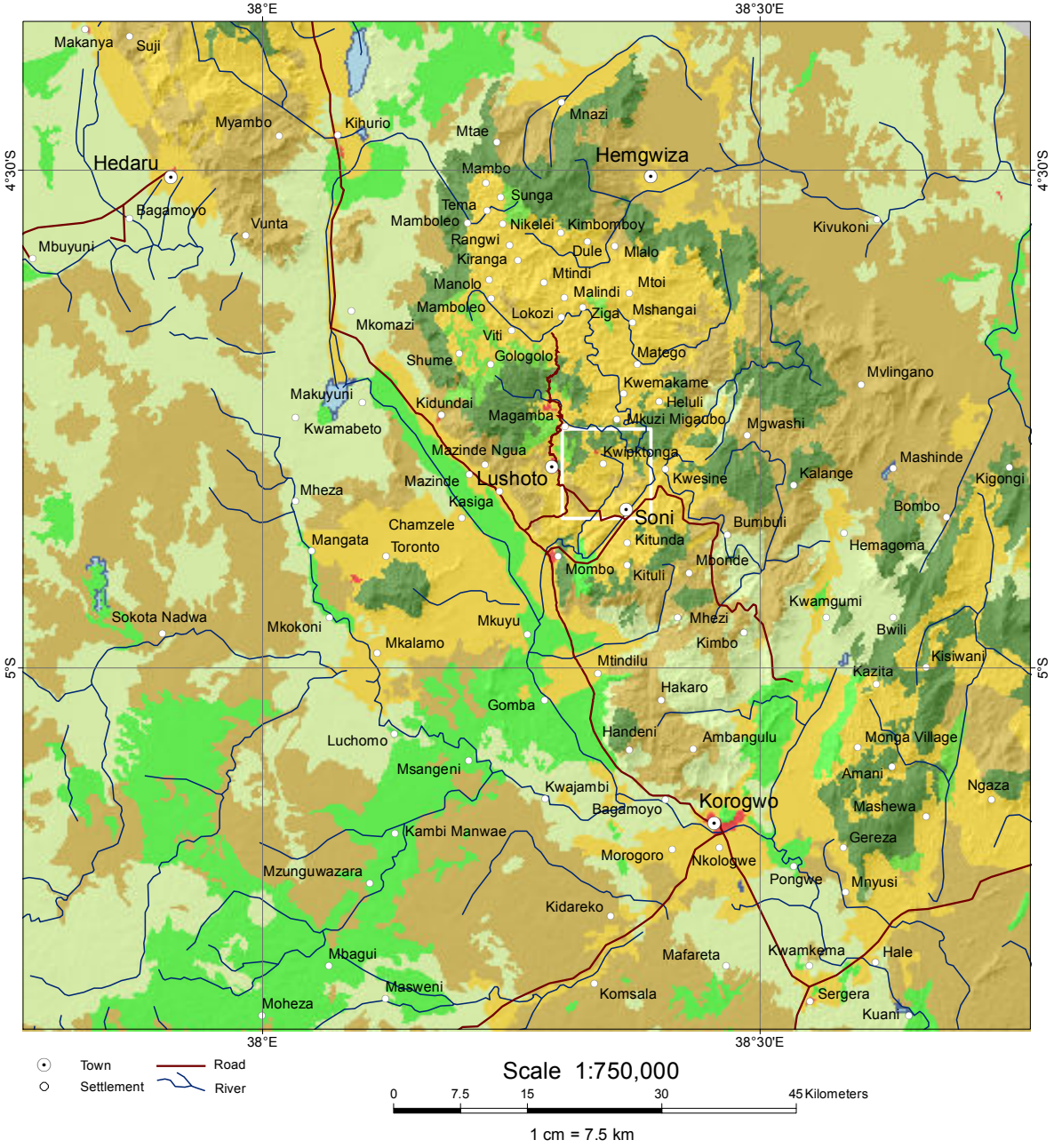
Corresponds to the map on the left

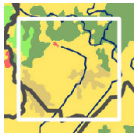
Landcover

- Rainfed croplands
- Mosaic Croplands/Vegetation
- Mosaic Vegetation/Croplands
- Closed broadleaved deciduous forest
- Open broadleaved deciduous forest
- Open needleleaved deciduous or evergreen forest
- Mosaic Forest-Shrubland/Grassland
- Urban area
- Closed to open broadleaved evergreen or semi-deciduous forest
- Closed to open mixed broadleaved, needleleaved forest
- Mosaic Grassland/Forest-Shrubland
- Closed to open shrubland
- Closed to open grassland
- Sparse vegetation
- Closed to open vegetation regularly flooded
- Irrigated croplands
- Bare areas
- Closed to open broadleaved forest regularly flooded (fresh-brackish water)

Citation: Arino et al (2009)

Landuse





Landuse *

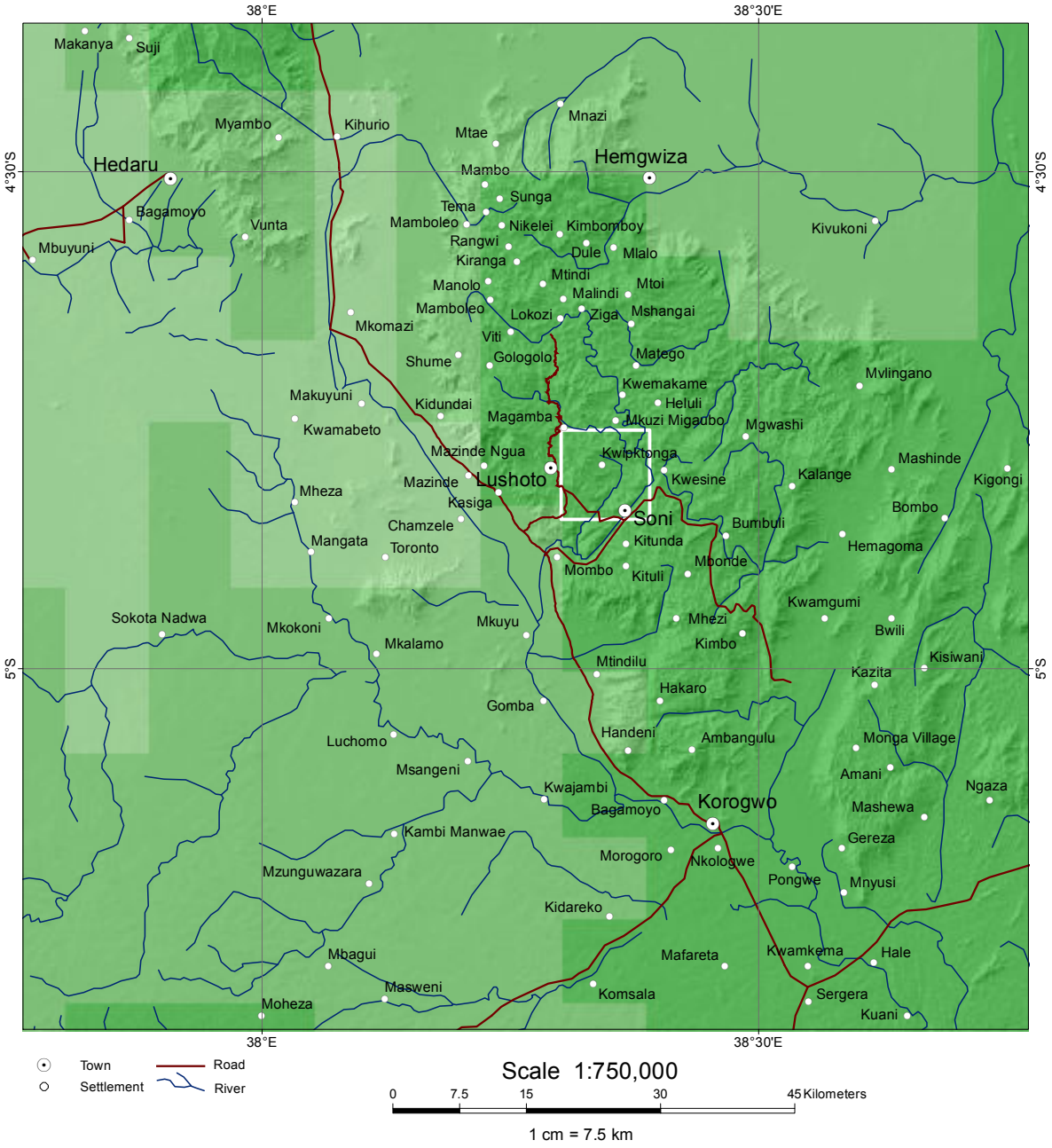
- Bare Soil
- Bushland
- Cultivated Land
- Grassland
- Natural Forest
- Plantation Forest
- Urban Area
- Woodland

* Legend corresponds to left map

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.

Citation: Natchtergaele et al (2010)

Length of Growing Period 2000



Lushoto
CCAFS sampling frame

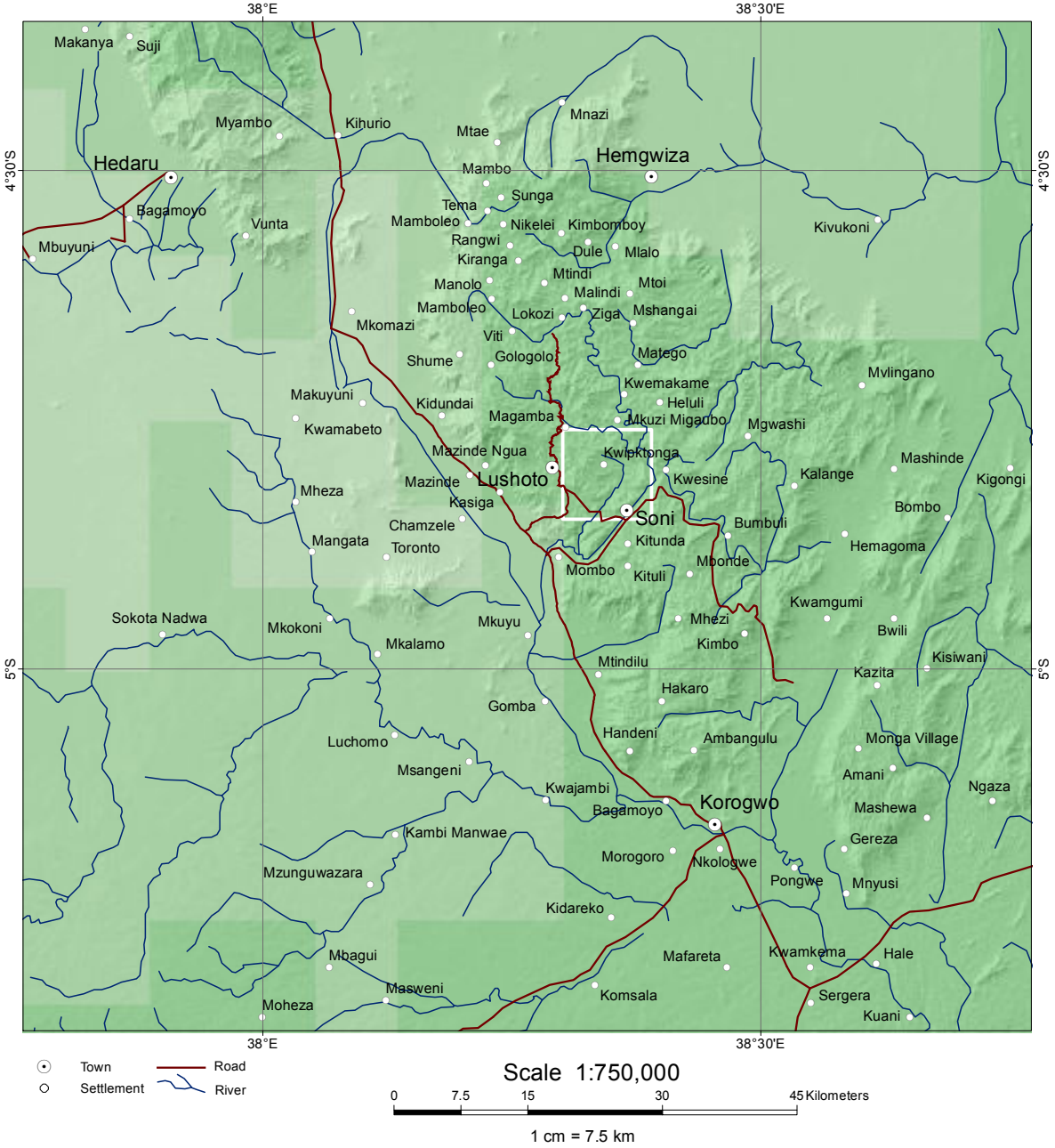
Length of Growing Period (Days)

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

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)

Length of Growing Period 2030



Length of Growing Period (Days)

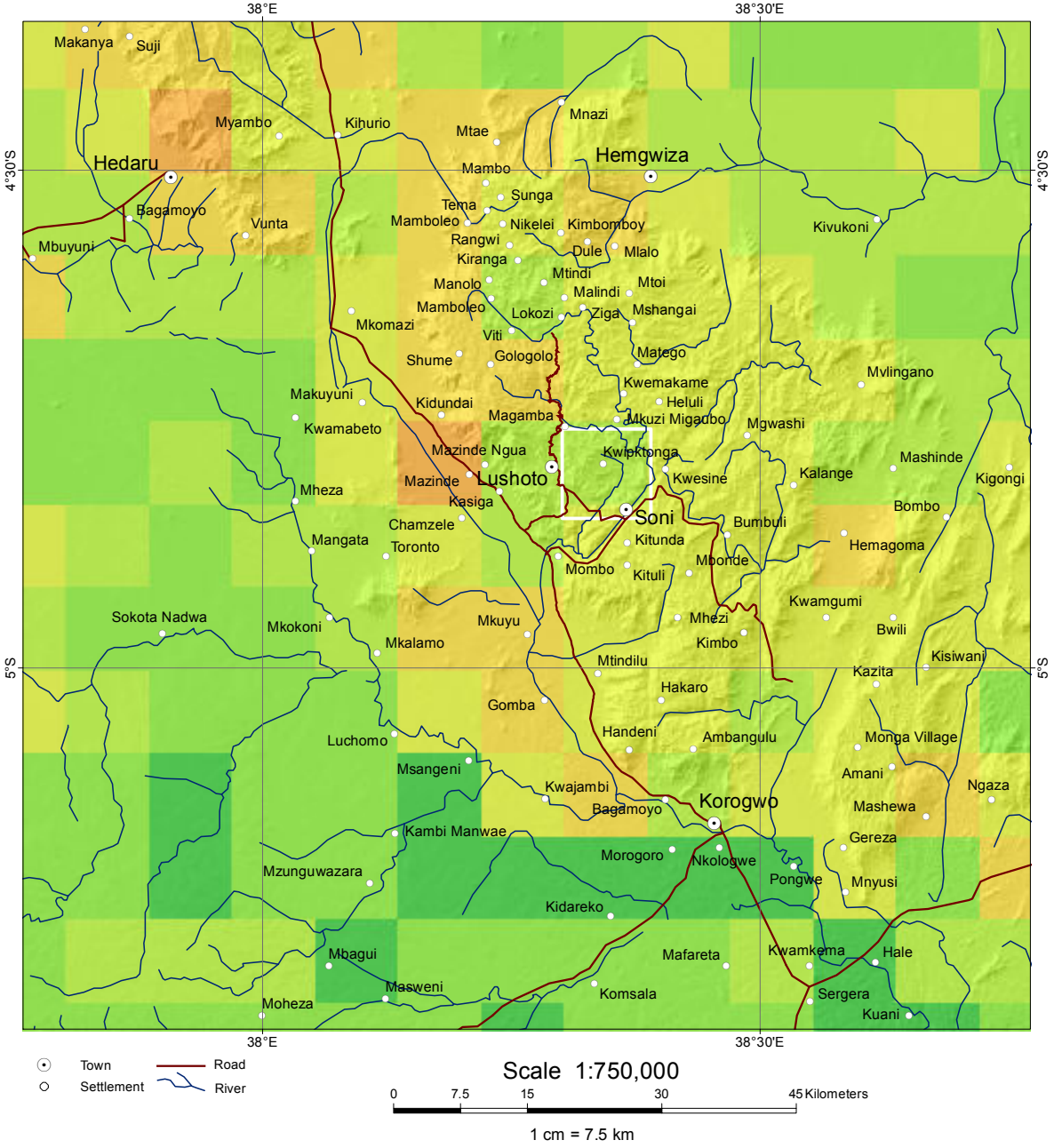
- < = 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200

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.

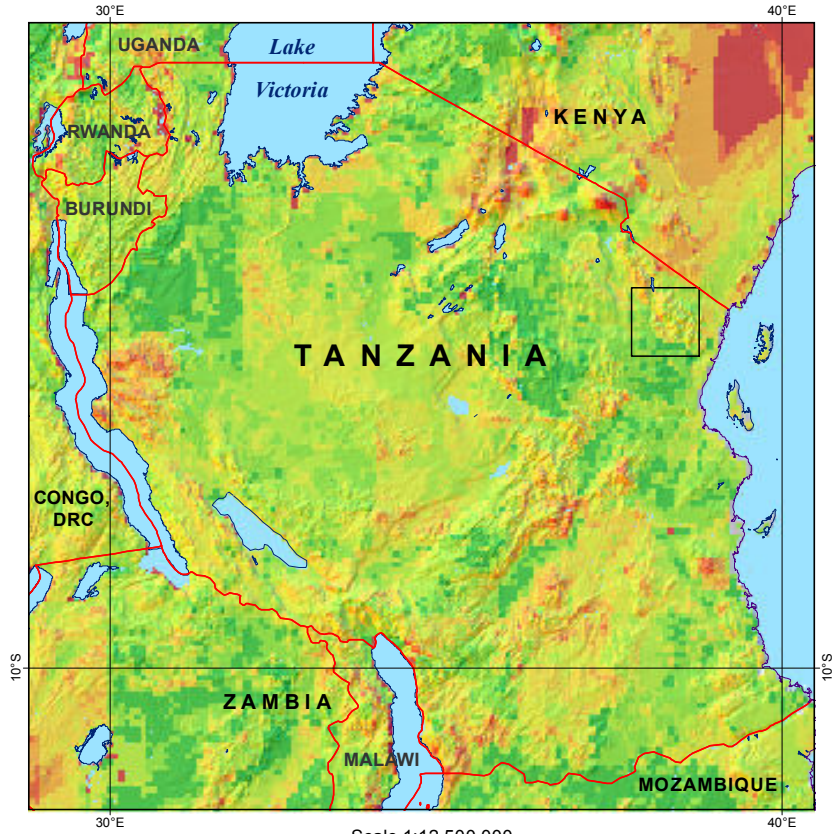
Lushoto
CCAFS sampling frame

Citation: Thornton et al (2006)

Crop Suitability



Lushoto
CCAFS sampling frame



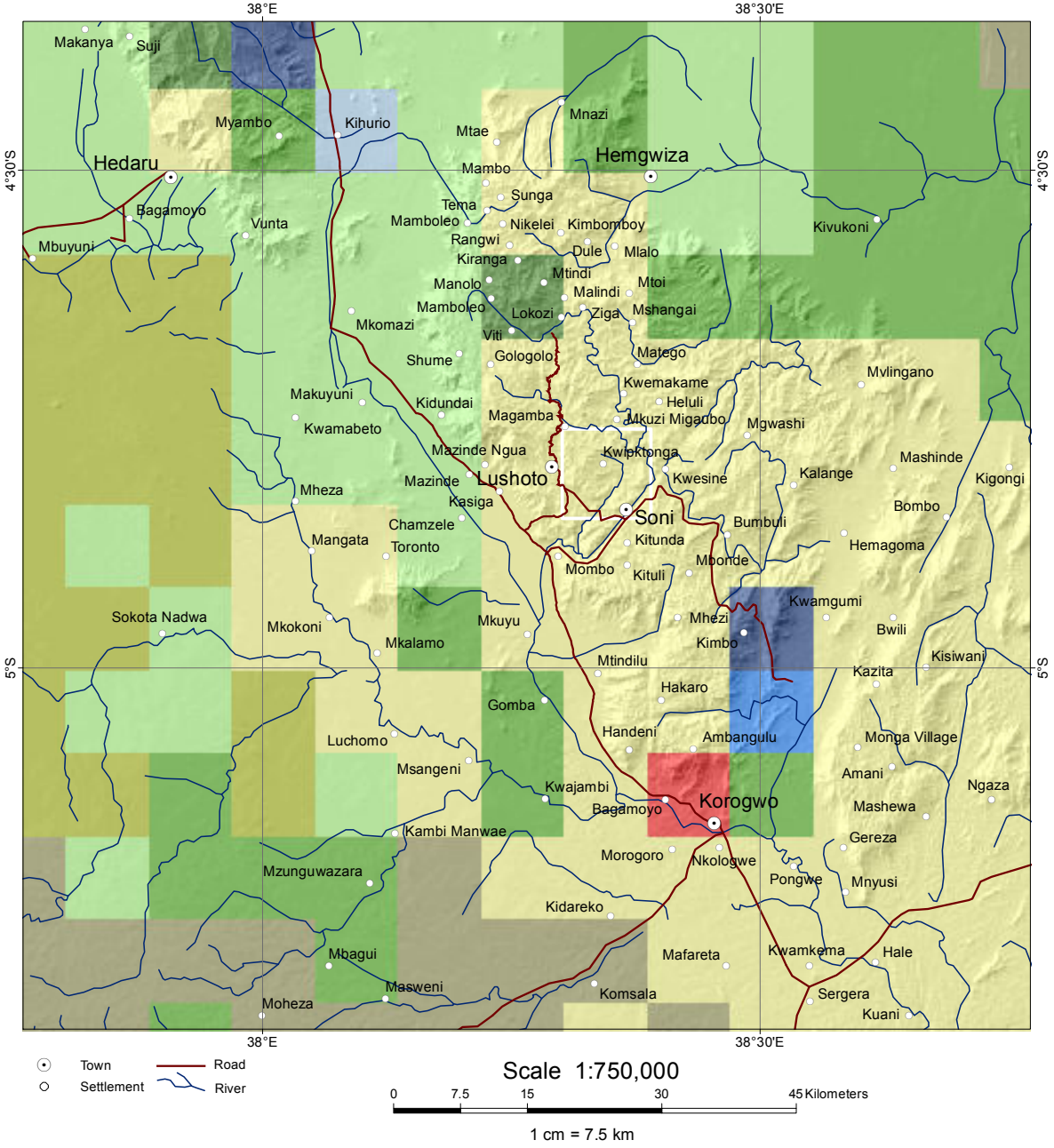
Crop Suitability

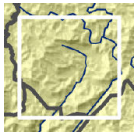
- Not suitable
- Very low
- Low
- Medium low
- Medium
- Medium high
- High
- Very high

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





Lushoto
CCAFS sampling frame

Mixed Rainfed
- Arid / Semi-arid
- Humid / sub-humid
- Temperate / highland

Mixed Irrigated
- Arid / semi-arid
- Humid / sub-humid
- Temperate / highland

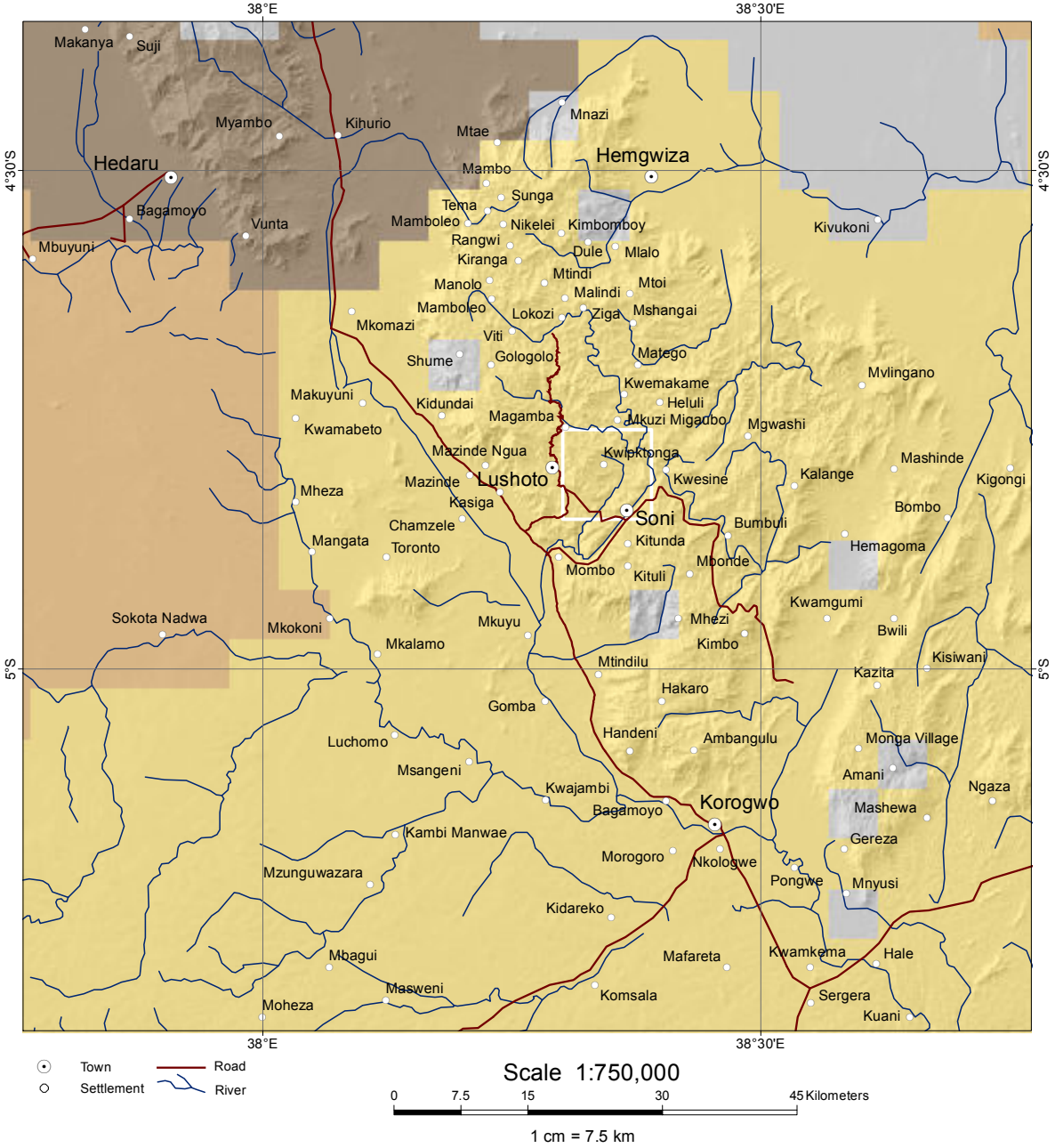
Livestock only
- Arid /semi-arid
- Temperate / highland
- Closed to open shrubland

- Other
- Urban area

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



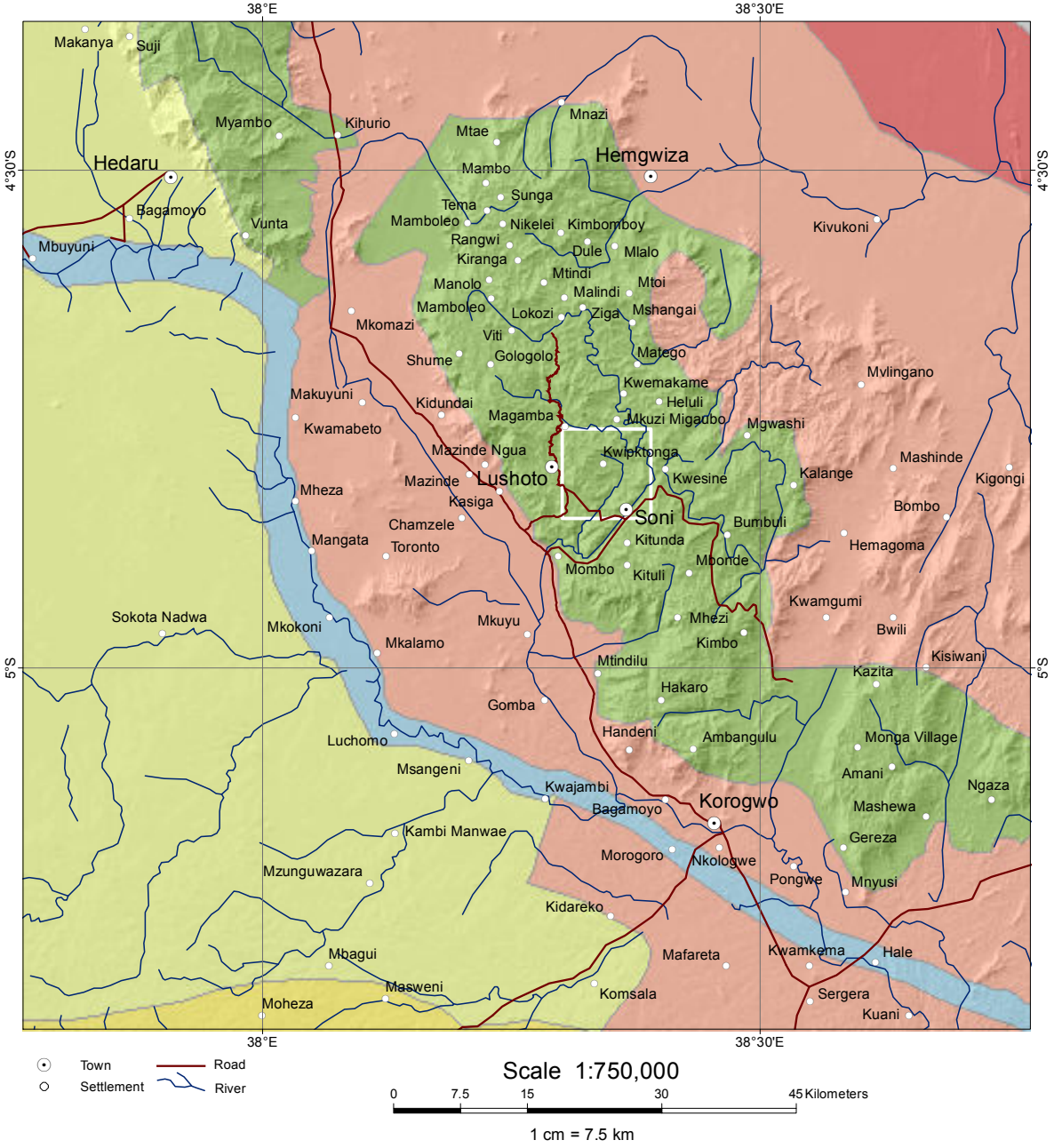
Number per km²

- No Observations
- < = 5
- 5 - 10
- 10 - 15
- 15 - 20
- > = 20

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

Citation: Wint et al (2007)

Livelihood Zones



Livelihood zones *

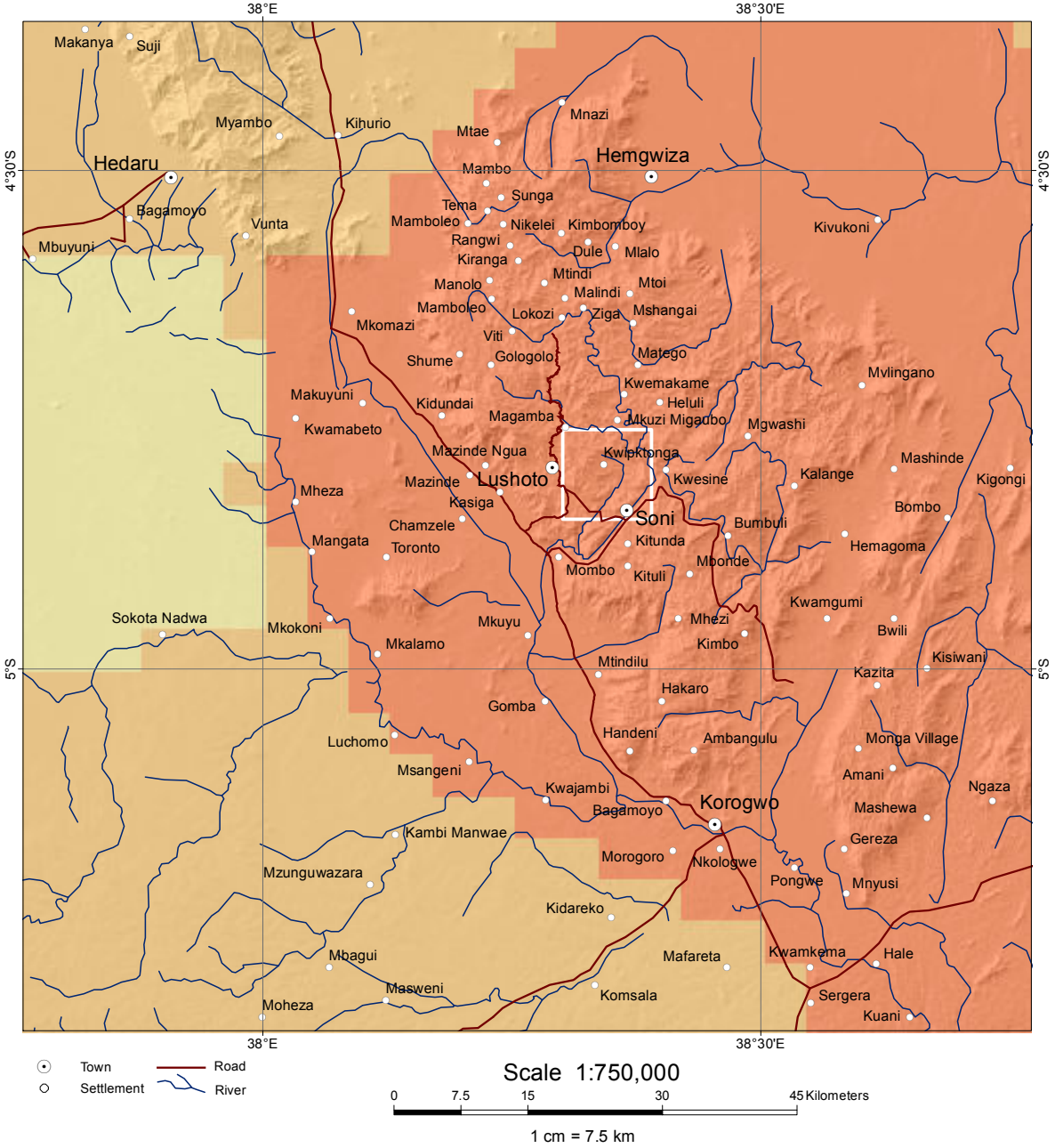
- Tanga Maize and Cattle
- Tanga Maize, Orange and Jackfruit Midlands
- Tanga Maize and Sisal Employment
- River Pangani Paddy and Maize Basin
- Southern Maasai Pastoralist
- Usambara-Pare Highland

* Legend corresponds to left map

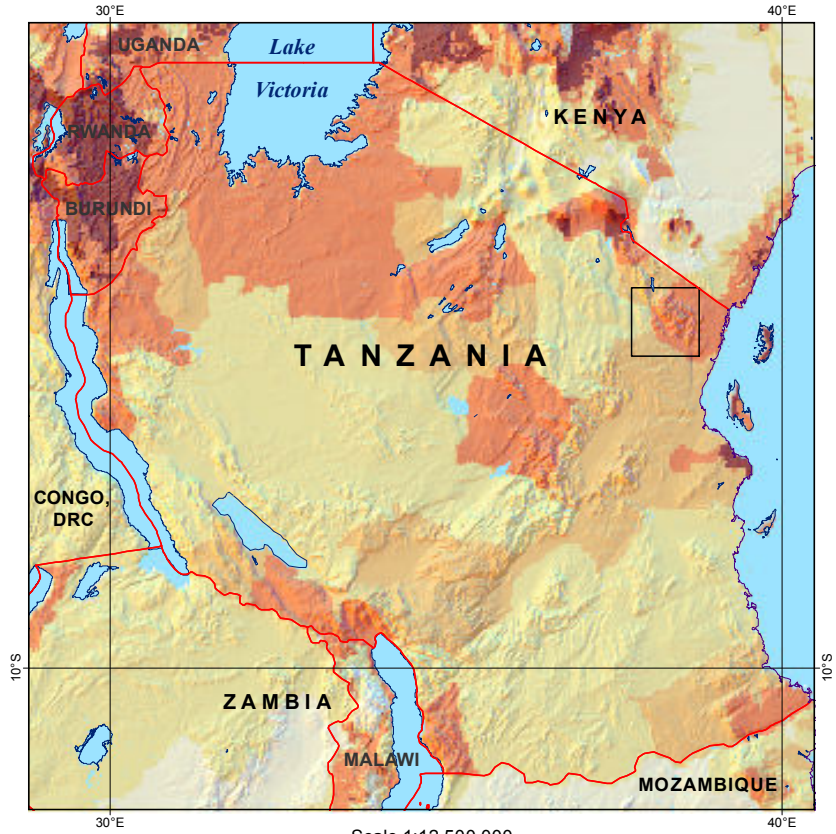
Livelihoods are complex and shaped by a variety of factors. Livelihoods zone maps delineate geographic areas within which people broadly share the same livelihood patterns including access to food, income, and markets.

Citation: USAID (2011)

Human Population Density



Lushoto
CCAFS sampling frame



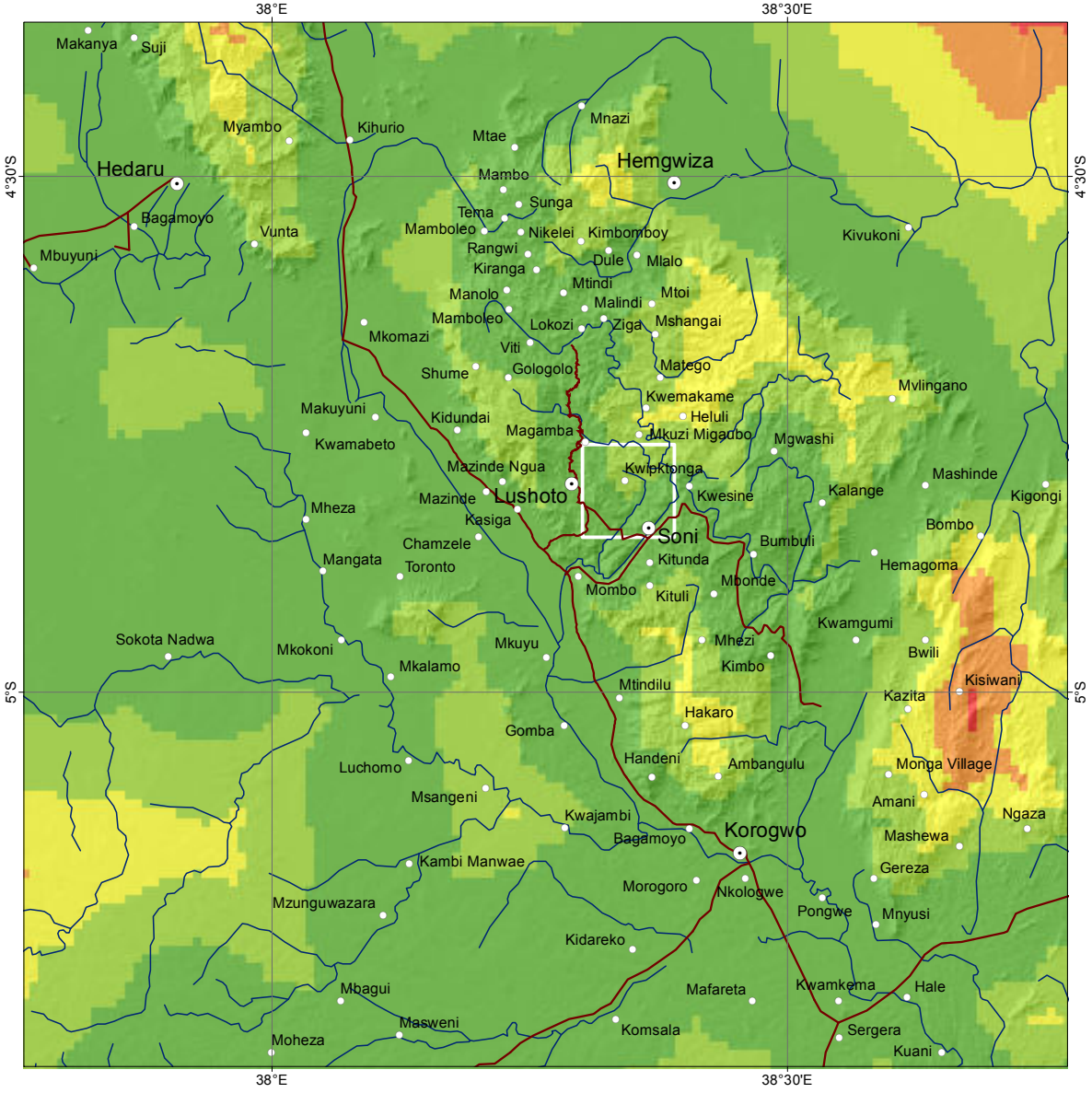
Number of persons per km^2

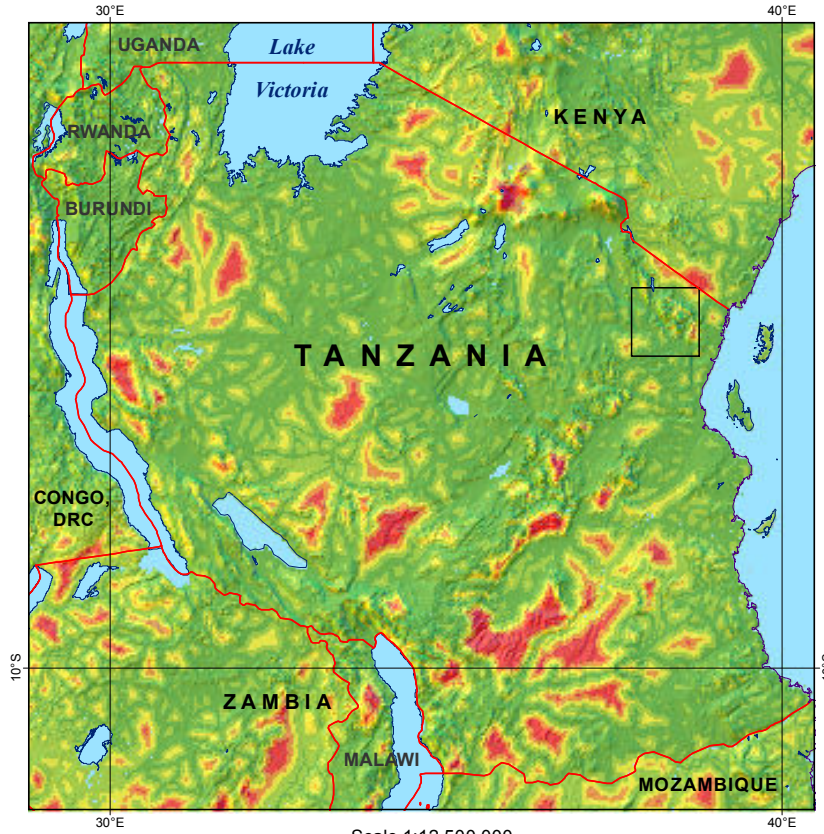
- < = 5
- 5 - 25
- 25 - 50
- 50 - 250
- > 250

Human Population Density is the gridded number of persons per km^2 in 2005

Citation: CIESIN (2005)

Market Access





Travel time to nearest large town/city (Hours)

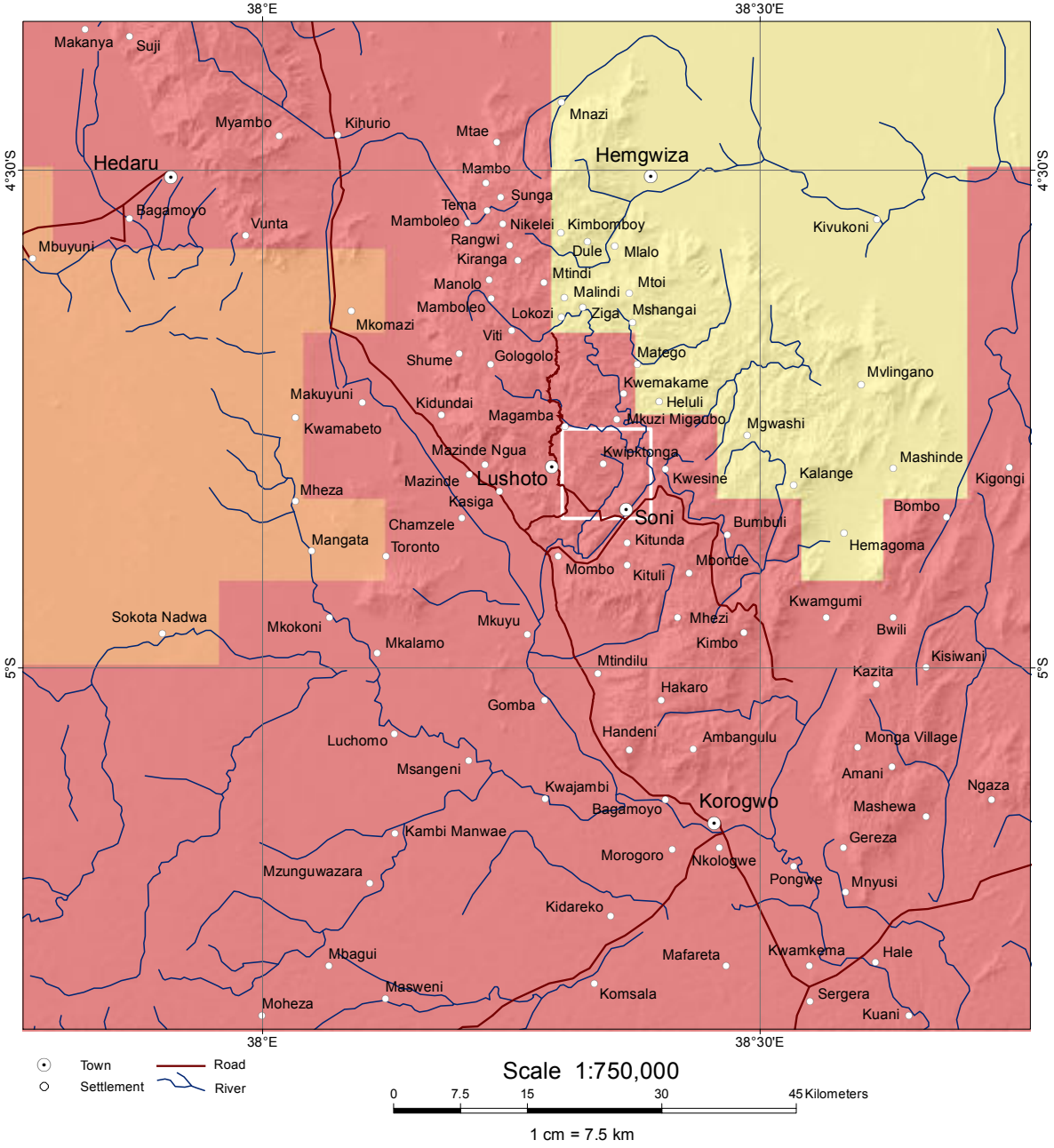
- < = 5
- 5 - 10
- 10 - 15
- 15 - 20
- > = 20

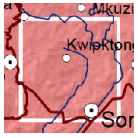
Travel time is a measure of accessibility determined in the time (hours) taken to the nearest urban centre, town or city of a population of 50,000 people or more (taking different means of transportation into account)

Lushoto
CCAFS sampling frame

Citation: Nelson (2008)

Poverty





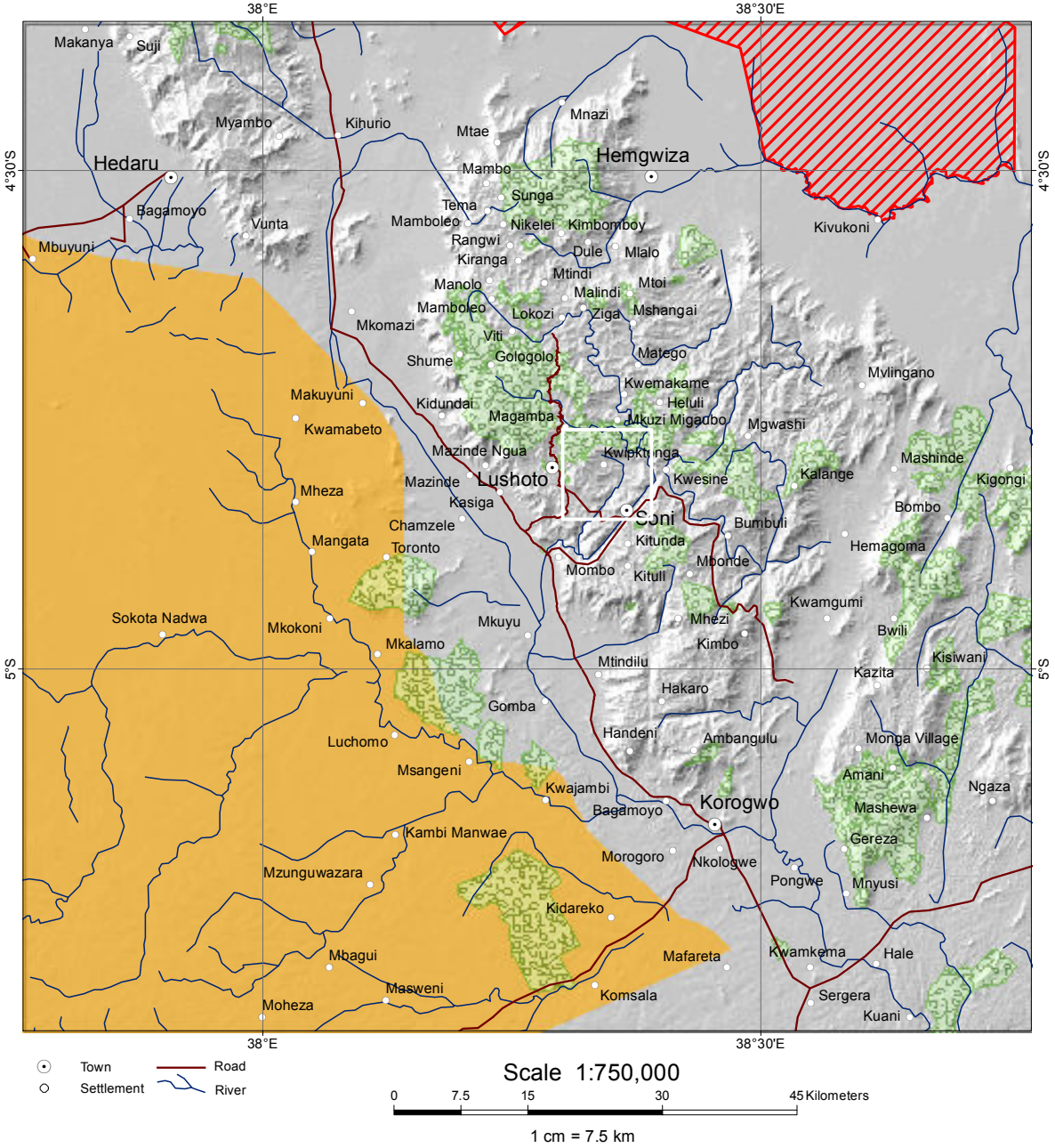
Percentage of People living on less than 2 US$ per day

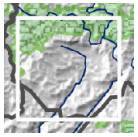
- 0 or missing
- 0 - 20
- 20 - 40
- 40 - 60
- 60 - 80
- 80 -100

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 forpoverty and welfare rather than direct measures.

Citation: CIESIN (2005)

Conservation Areas





Lushoto
CCAFS sampling frame

Conservation Areas

- Game reserves
- National parks
- Forest reserves
- Controlled game
- 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)

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Projection: Geographic, Lat/Long, WGS84

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GeoMapa GIS/Cartography

J.Recha/CCAFS