



CCAFS site atlas

Kaffrine Senegal

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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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 Kaffrine in Senegal, in West Africa Region.

CCAFS Sites: West Africa



- Burkina Faso: Yatenga (BF01)
- Ghana: Lawra-Jirapa (GH01)
- Mali: Segou (MA01)
- Niger: Kollo (NI01)
- Senegal: Kaffrine (SE01)

CCAFS Country Sites

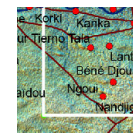
Topography Kaffrine

CCAFS Site SE01, Kaffrine, Senegal



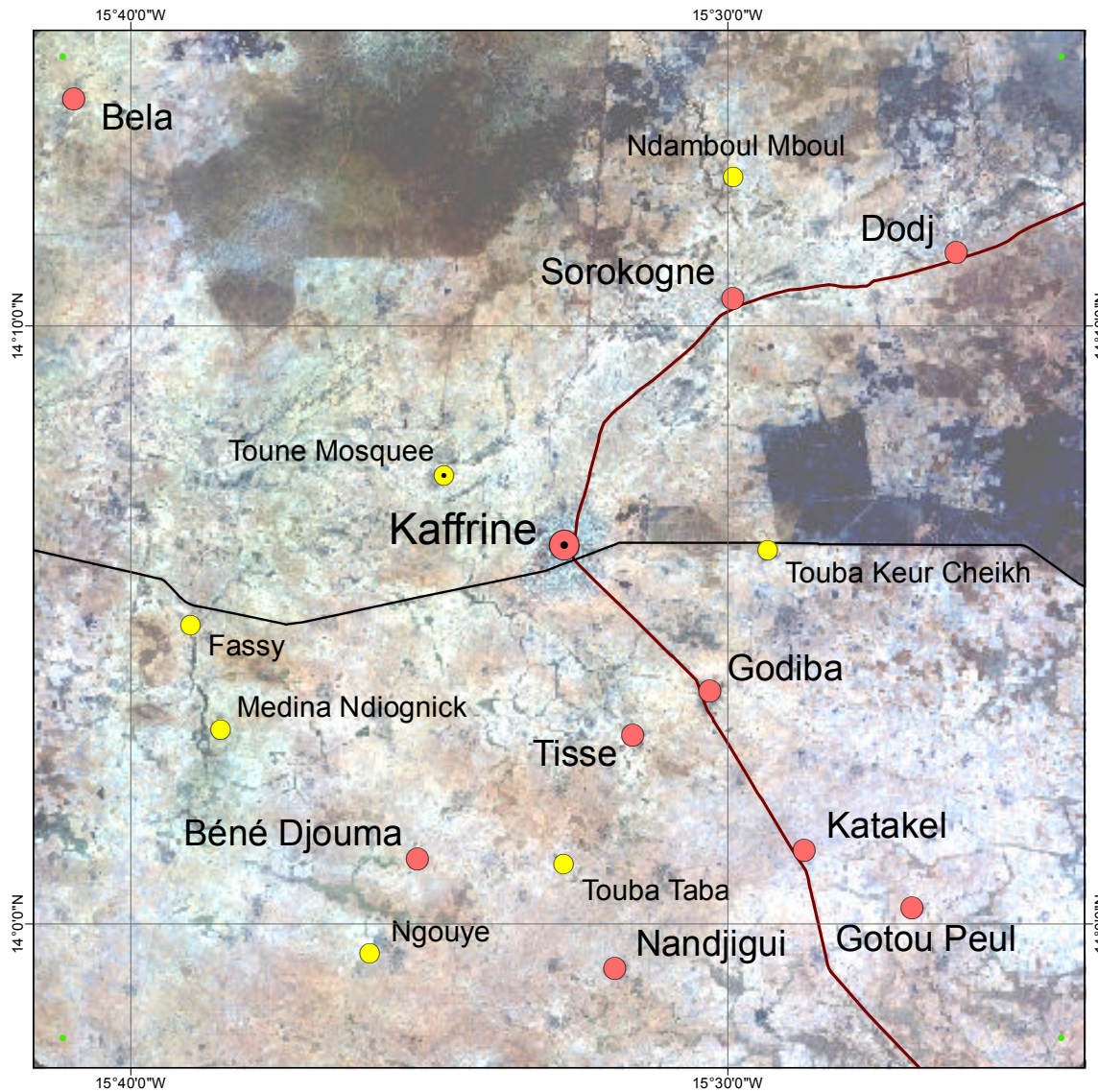
Coordinates of the CCAFS Baseline Sampling frame

15.407W 13.968N
 15.407W 14.242N
 15.686W 14.242N
 15.686W 13.968N



Sampling frame size: 30km x 30km

Satellite Image Kaffrine

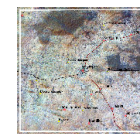


RapidEye imagery from 21-04-2011
at 5m ground resolution

HBS= Household Baseline
Survey

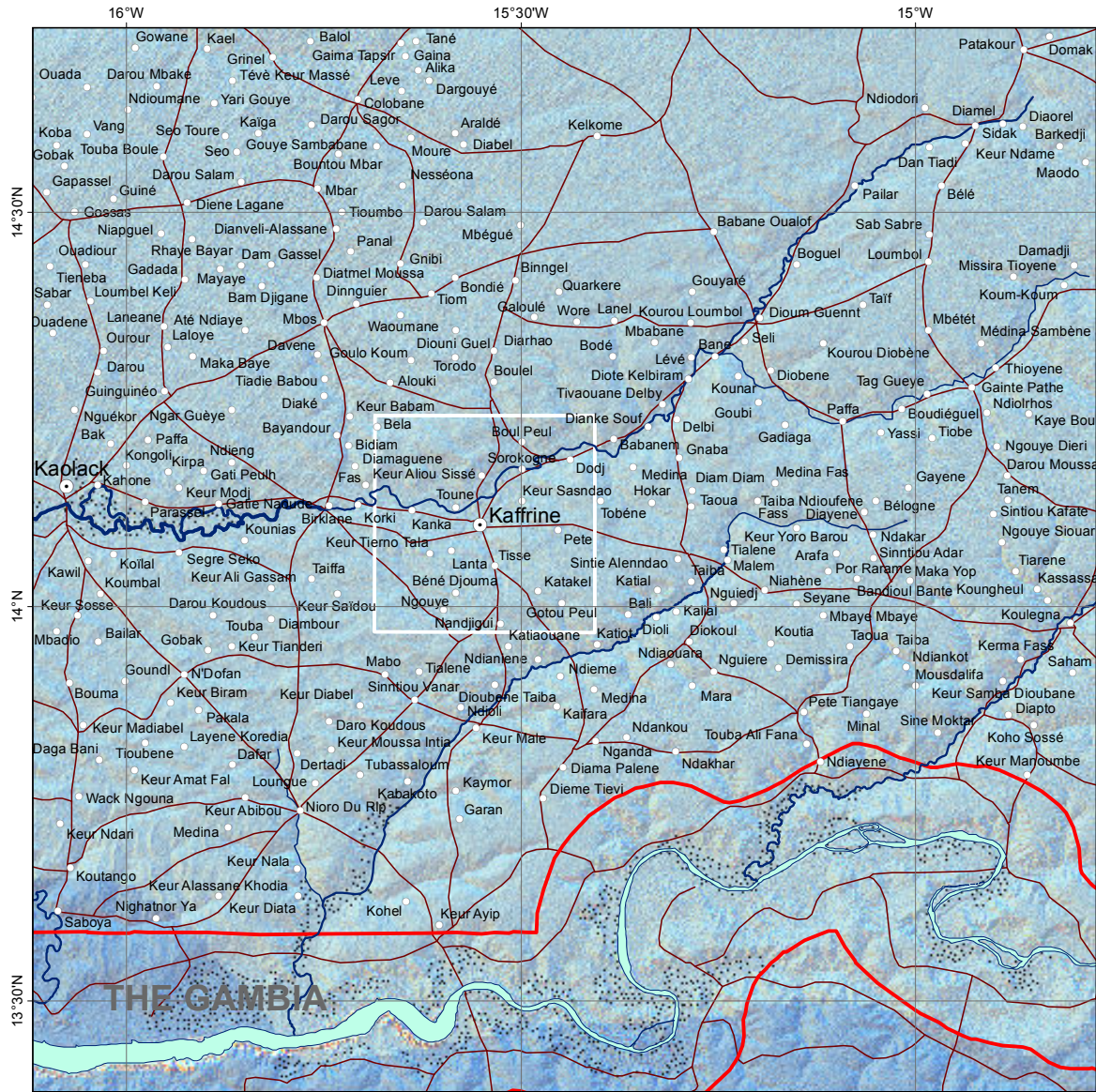
VBS= Village Baseline
Survey

OBS= Organizational Baseline
Survey



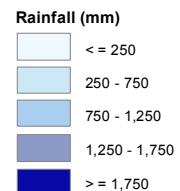
CCAFS Baseline
Sampling Frame

Annual Rainfall

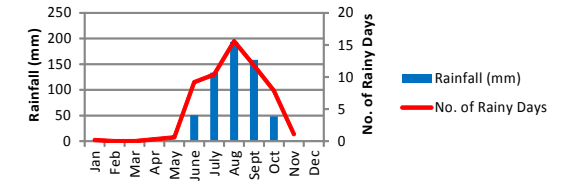


— International boundary
 Scale 1:12,500,000
 0 125 250 500 Kilometers

Corresponds to the map on the left



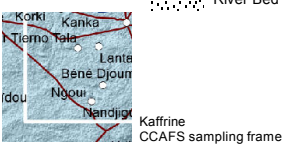
Kaffrine Mean Monthly Rainfall Distribution



Citation: Jones et al (2002)

● Town
 ○ Settlement
 — International Boundary
 — Road
 — River
 ••• River Bed

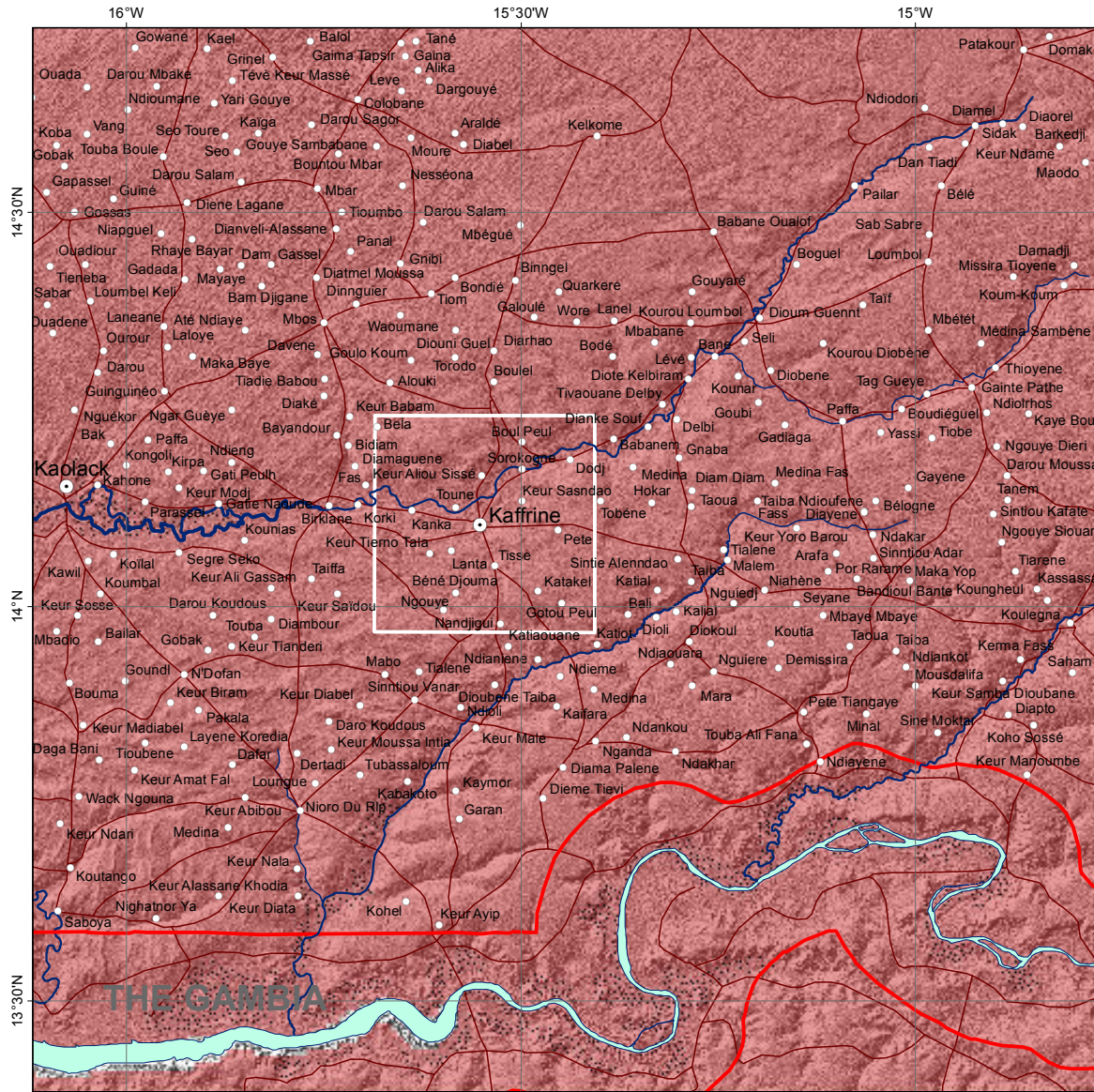
Scale 1:1,000,000
 0 5 10 20 30 40 50 Kilometers
 1 cm = 10 km



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

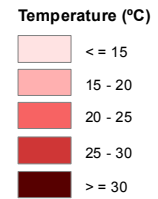
Citation: Hijmans et al (2005)

Annual Temperature

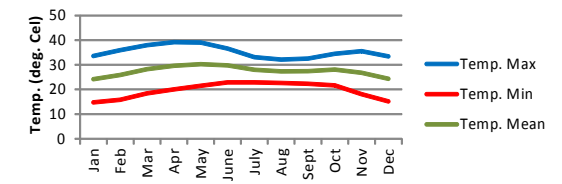


International boundary

Corresponds to the map on the left



Kaffrine Mean Monthly Temperature Distribution

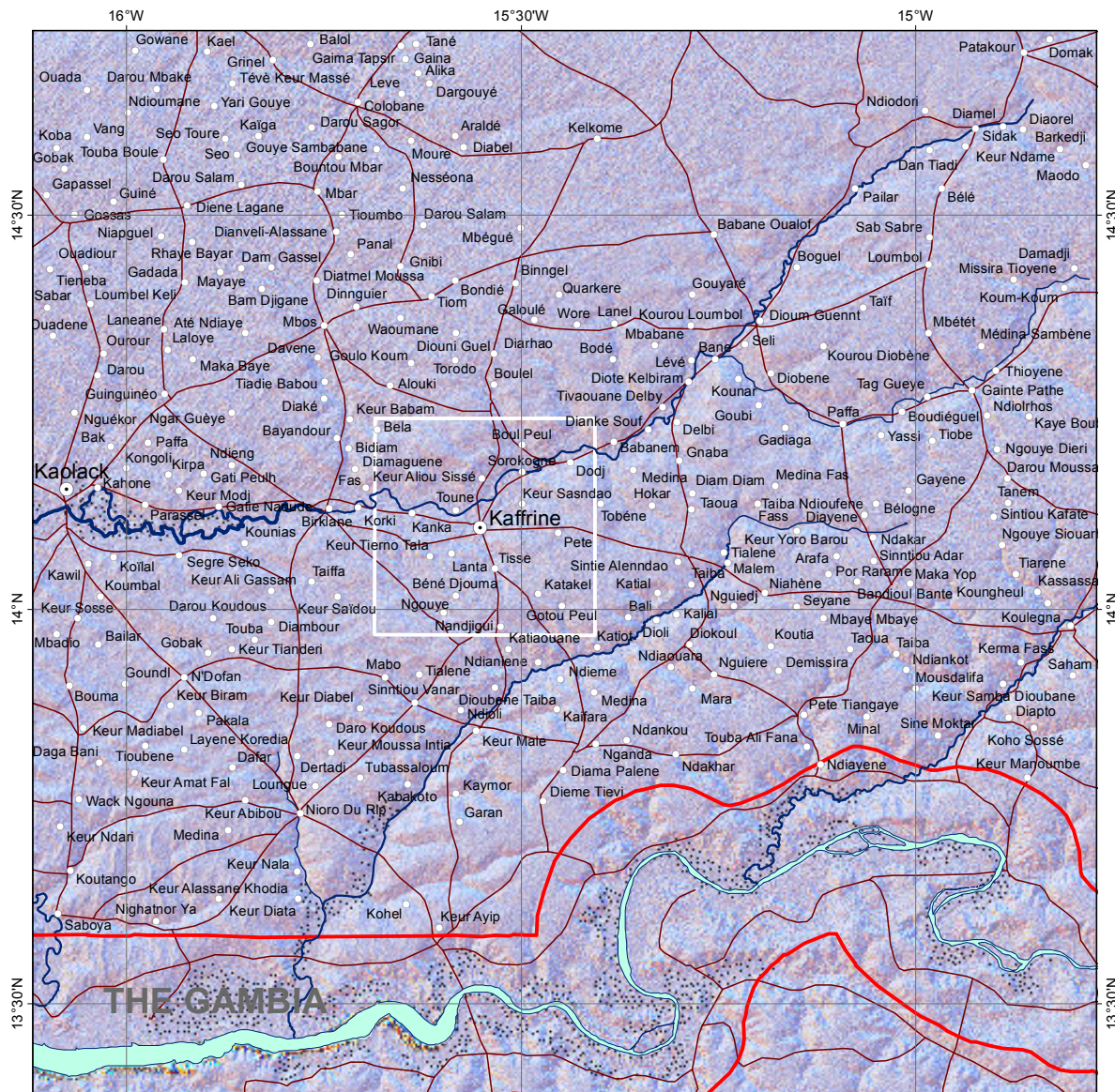


Citation: Jones et al (2002)

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

Citation: Hijmans et al (2005)

Aridity Index



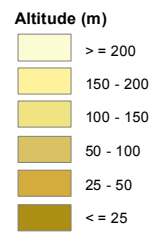
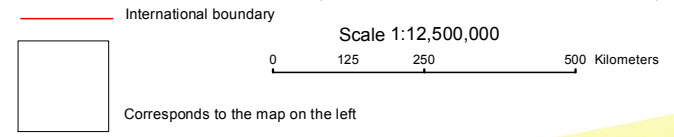
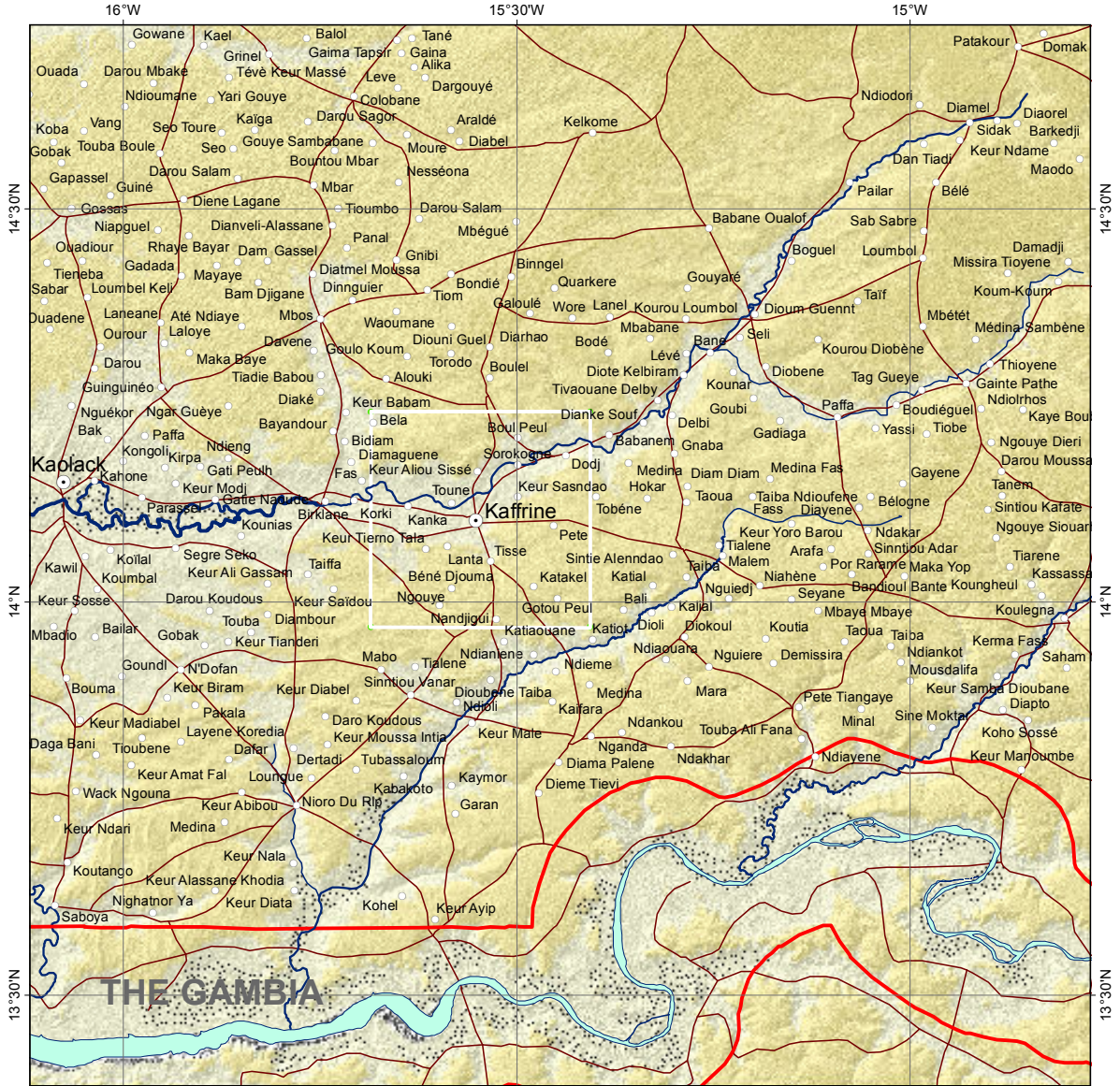
— International boundary
 Scale 1:12,500,000
 0 125 250 500 Kilometers
 Corresponds to the map on the left

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

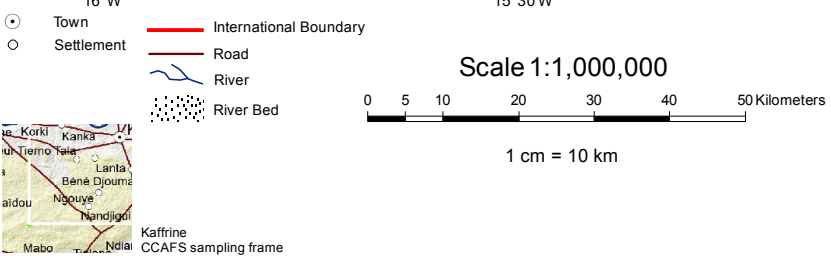
Aridity Index indicates the level of dryness, taking evapotranspiration into account, at a given location of known rainfall

○ Town
 ○ Settlement
 — International Boundary
 — Road
 — River
 ●●●● River Bed
 Scale 1:1,000,000
 0 5 10 20 30 40 50 Kilometers
 1 cm = 10 km
 Kaffrine CCAFS sampling frame

Altitude



Altitude indicates the height above sea level in meters



Citation: Jarvis et al (2008)

Soil Type



— International boundary
 Scale 1:12,500,000
 0 125 250 500 Kilometers
 Corresponds to the map on the left

- Soil Type ***
- Acrisols
 - Arenosols
 - Fluvisols
 - Gleysols
 - Leptosols
 - Lixisols
 - Regosols
 - Solonchaks
- * Legend corresponds to left map

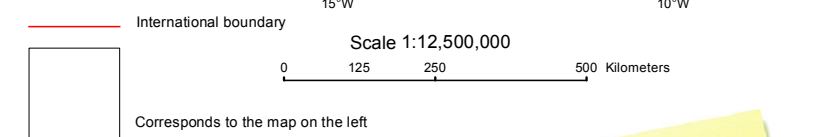
● Town
 ○ Settlement
 — International Boundary
 — Road
 — River
 ●●●● River Bed

Scale 1:1,000,000
 0 5 10 20 30 40 50 Kilometers
 1 cm = 10 km

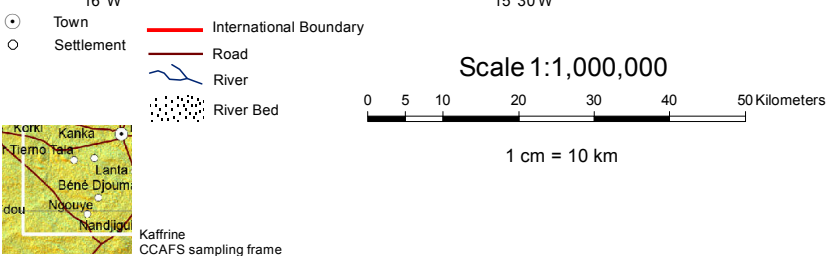
Kaffrine CCAFS sampling frame

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 texture (sand, silt and clay content), as well as organic matter content.

Agro-Ecological Zones



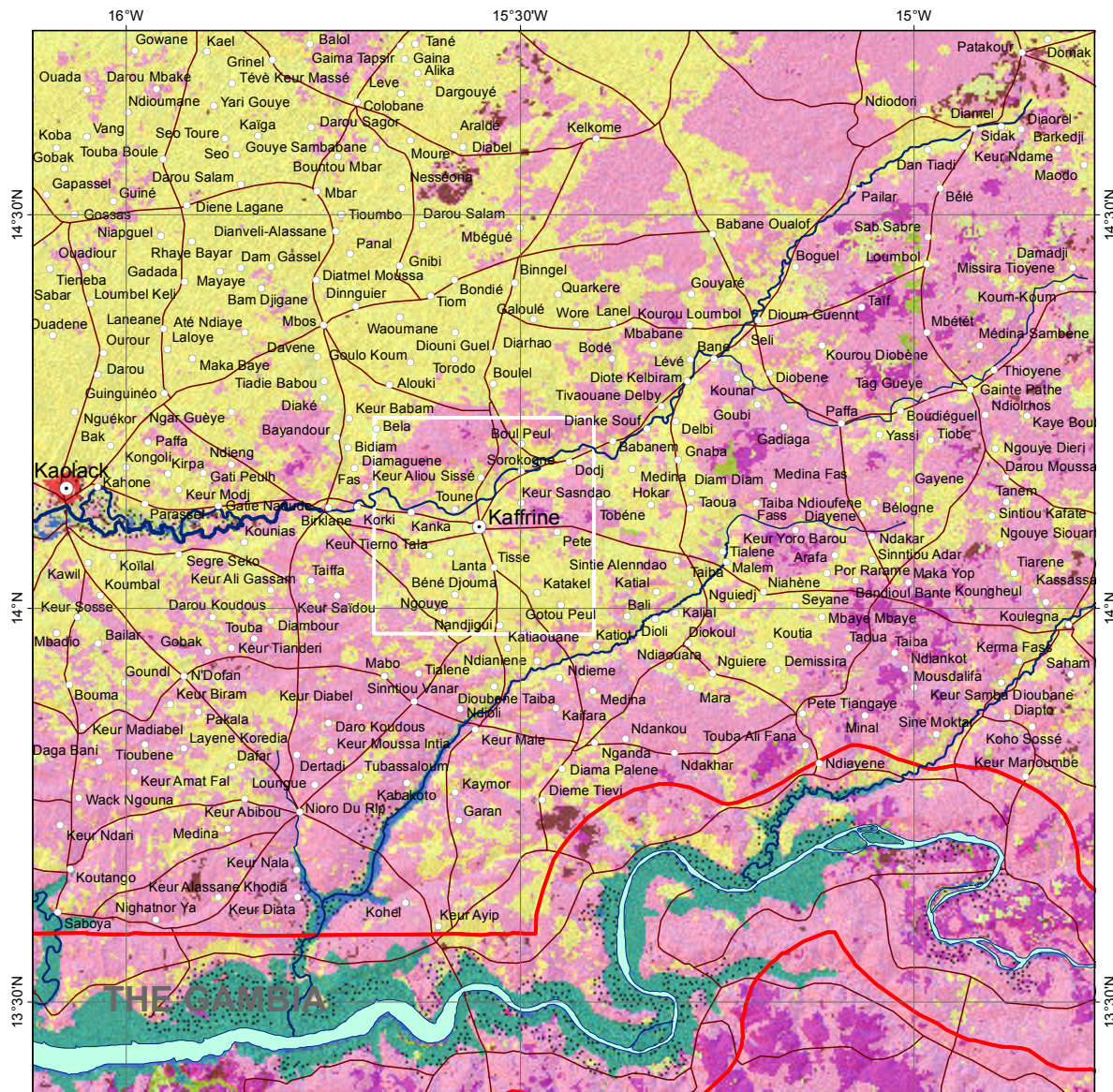
- Agro-Ecological Zones ***
- Semi-arid/Sudan Savanna
 - Northern Guinea Savanna
 - Southern Guinea Savanna
- * Legend corresponds to left map



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

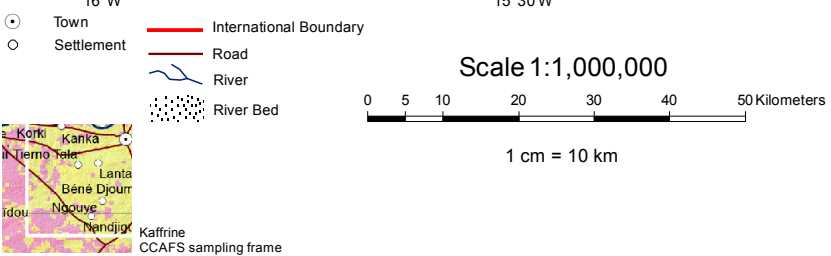


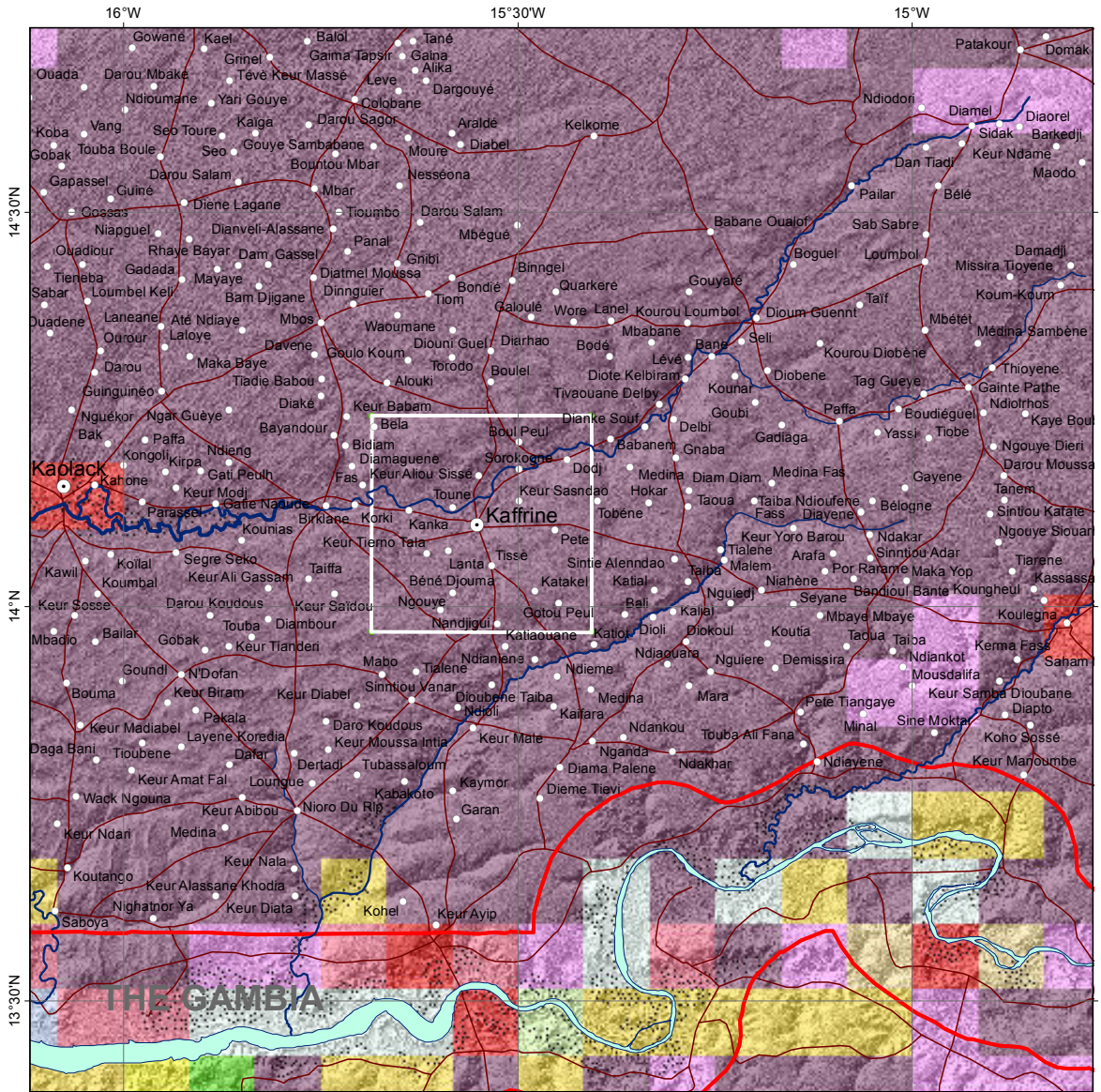
— International boundary
 Scale 1:12,500,000
 0 125 250 500 Kilometers
 □ Corresponds to the map on the left

- Landcover***
- Rainfed croplands
 - Mosaic Croplands/Vegetation
 - Mosaic Vegetation/Croplands
 - Open broadleaved deciduous forest
 - Mosaic Forest-Shrubland/Grassland
 - Closed to open shrubland
 - Bare areas
 - Urban area
 - Closed to open broadleaved forest regularly flooded (fresh-brackish water)

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

* Legend corresponds to left map





— International boundary
 Scale 1:12,500,000
 0 125 250 500 Kilometers
 Corresponds to the map on the left

- Landuse ***
- Forest protected
 - Shrubs unmanaged
 - Shrubs moderate livestock density
 - Shrubs high livestock density
 - Agriculture protected
 - Crops and high livestock density
 - Crops and moderate intensive livestock density
 - Urban area
 - Wetlands mangrove
 - Open water inland Fisheries

* Legend corresponds to left map

Citation: Natchtergalee et al (2010)

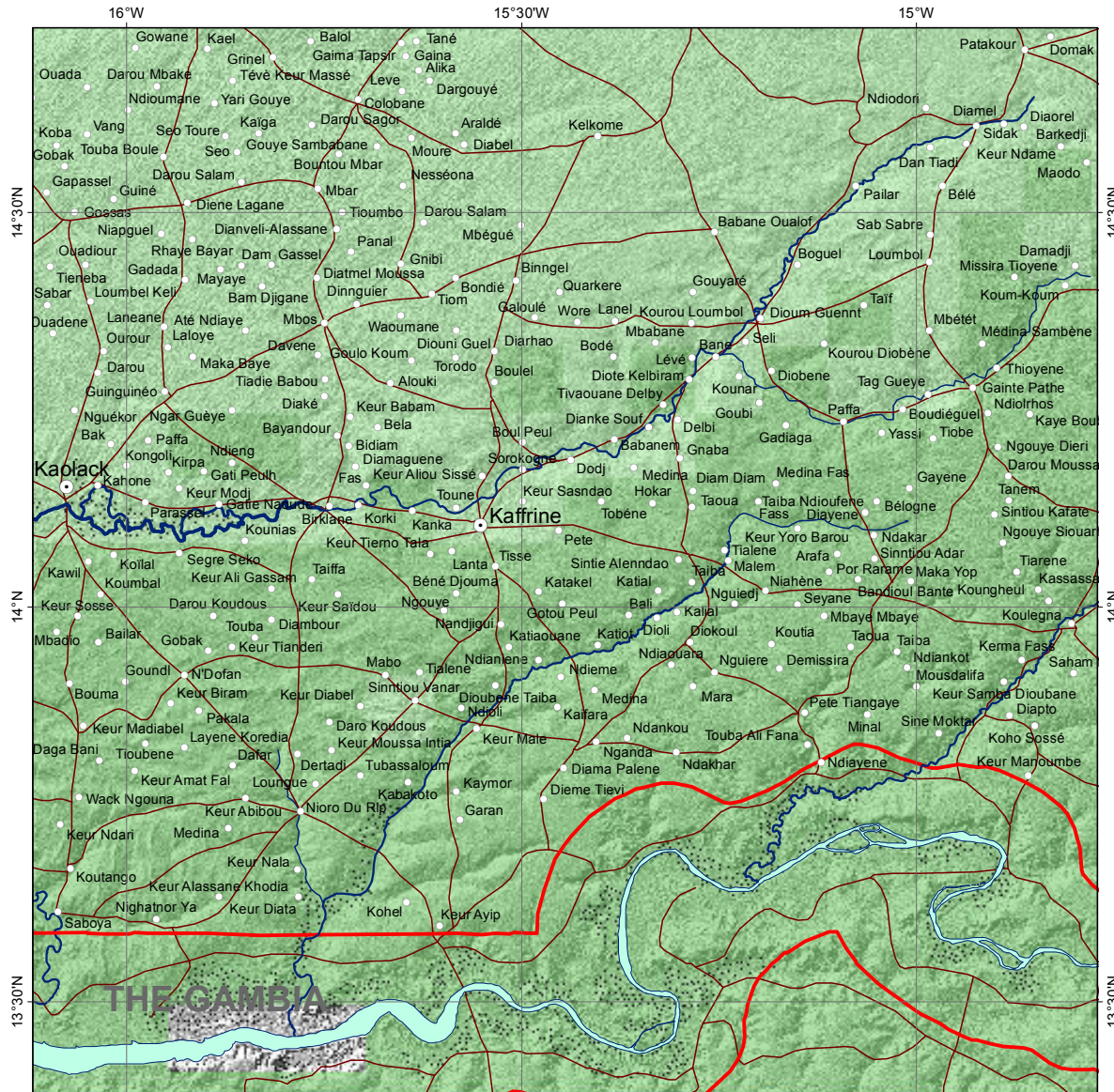
● Town
 ○ Settlement
 — International Boundary
 — Road
 — River
 — River Bed

Scale 1:1,000,000
 0 5 10 20 30 40 50 Kilometers
 1 cm = 10 km

Kaffrine CCAFS sampling frame

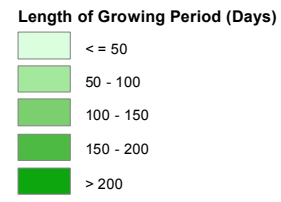
Landuse is a description of how people utilize the land. It involves socio-economic activity, i.e. the management and modification of the natural environment into built environment, such as agricultural fields and settlements. At any place, there may be multiple land uses, the dominant one is presented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

Length of Growing Period 2000

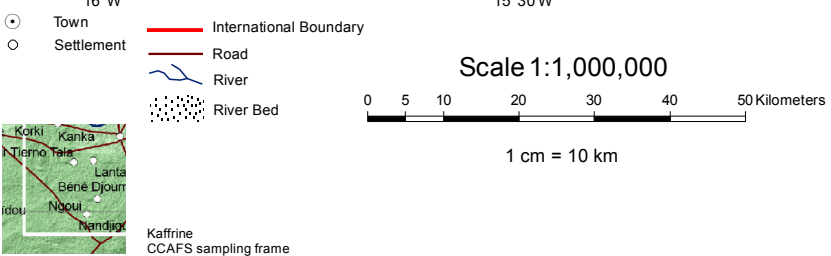


— International boundary
 Scale 1:12,500,000
 0 125 250 500 Kilometers

Corresponds to the map on the left

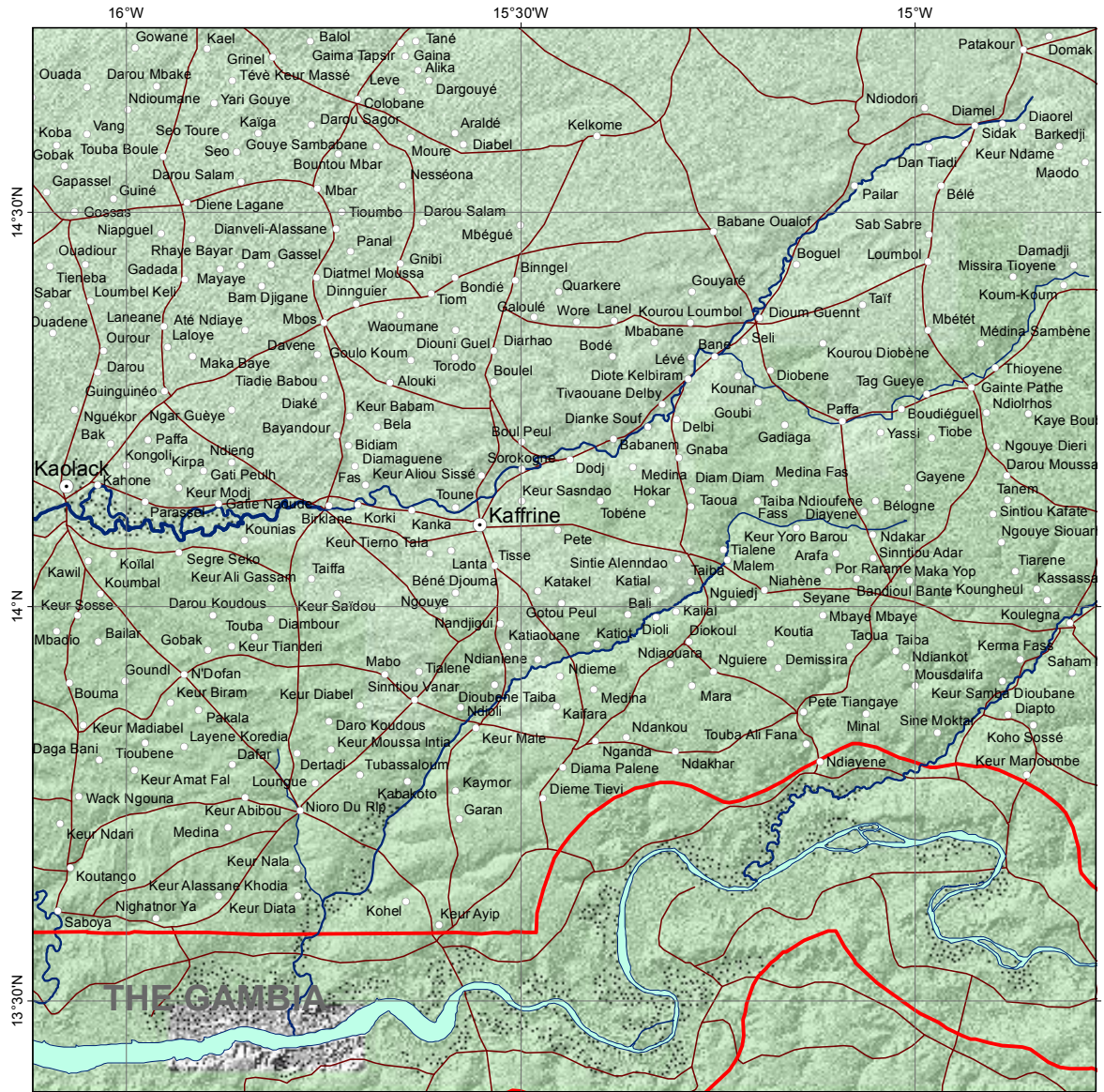


The Length of Growing Period (LGP) is defined as the number of days in a year during which there is available rainfed soil moisture supply for plant growth.

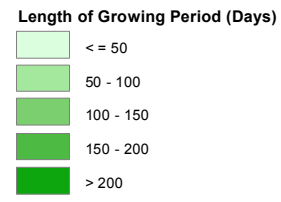


Citation: Thornton et.al (2006)

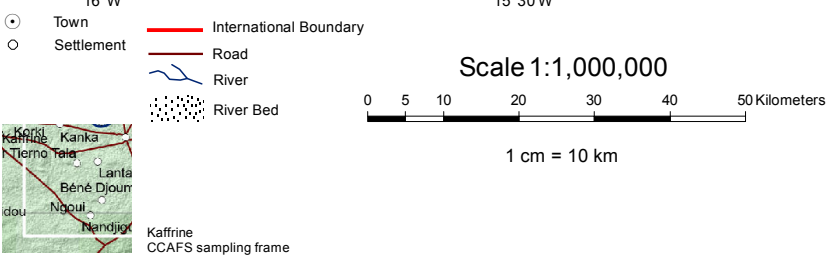
Length of Growing Period 2030



International boundary
 Scale 1:12,500,000
 0 125 250 500 Kilometers
 Corresponds to the map on the left

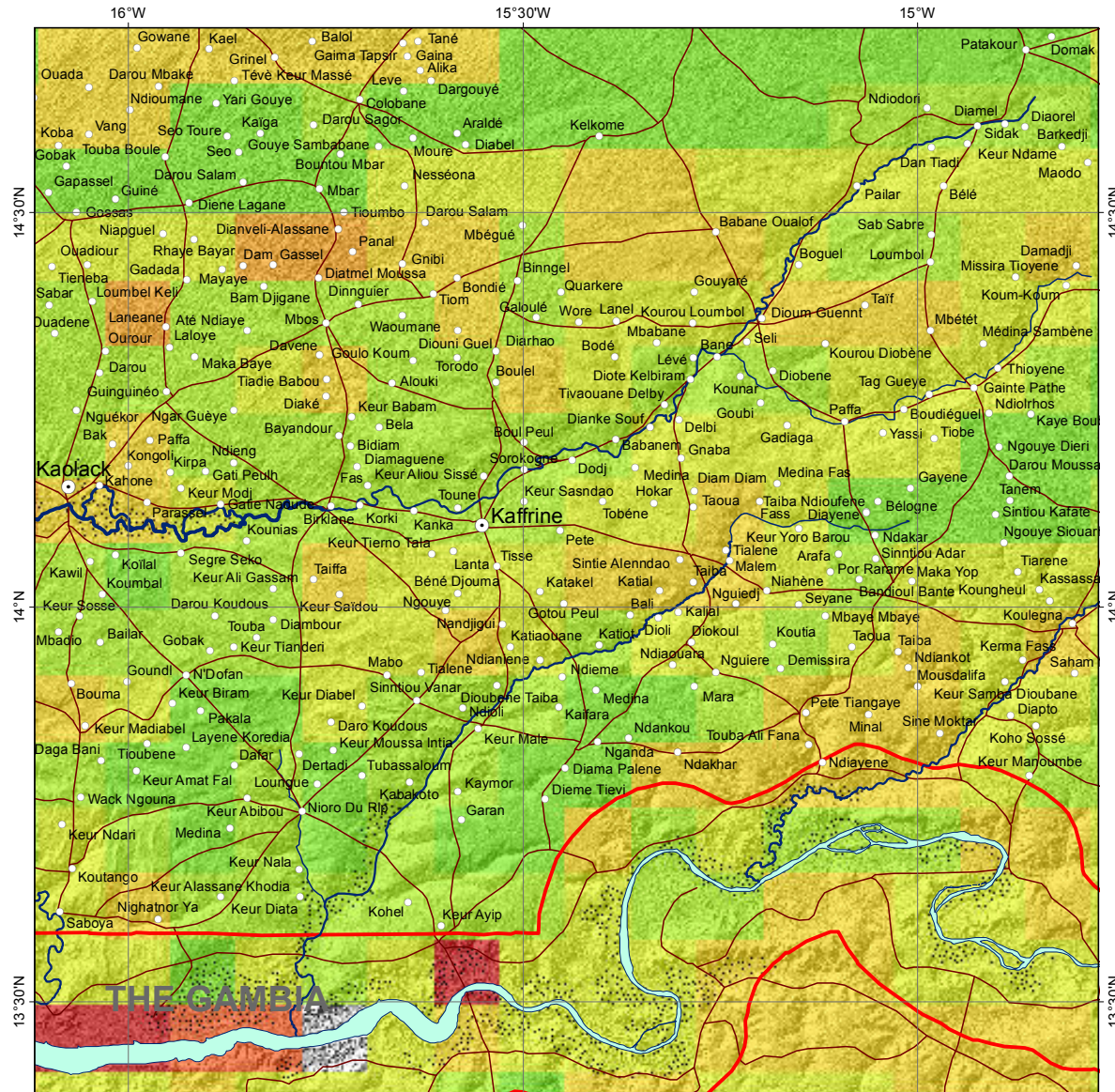


The Length of Growing Period (LGP) is defined as the number of days in a year during which there is available rainfed soil moisture supply for plant growth; here modeled for 2030.



Citation: Thornton et al (2006)

Crop Suitability



International boundary

Scale 1:12,500,000

0 125 250 500 Kilometers

Corresponds to the map on the left

- 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.

● Town
 ○ Settlement
 — International Boundary
 — Road
 — River
 ■ River Bed

Scale 1:1,000,000

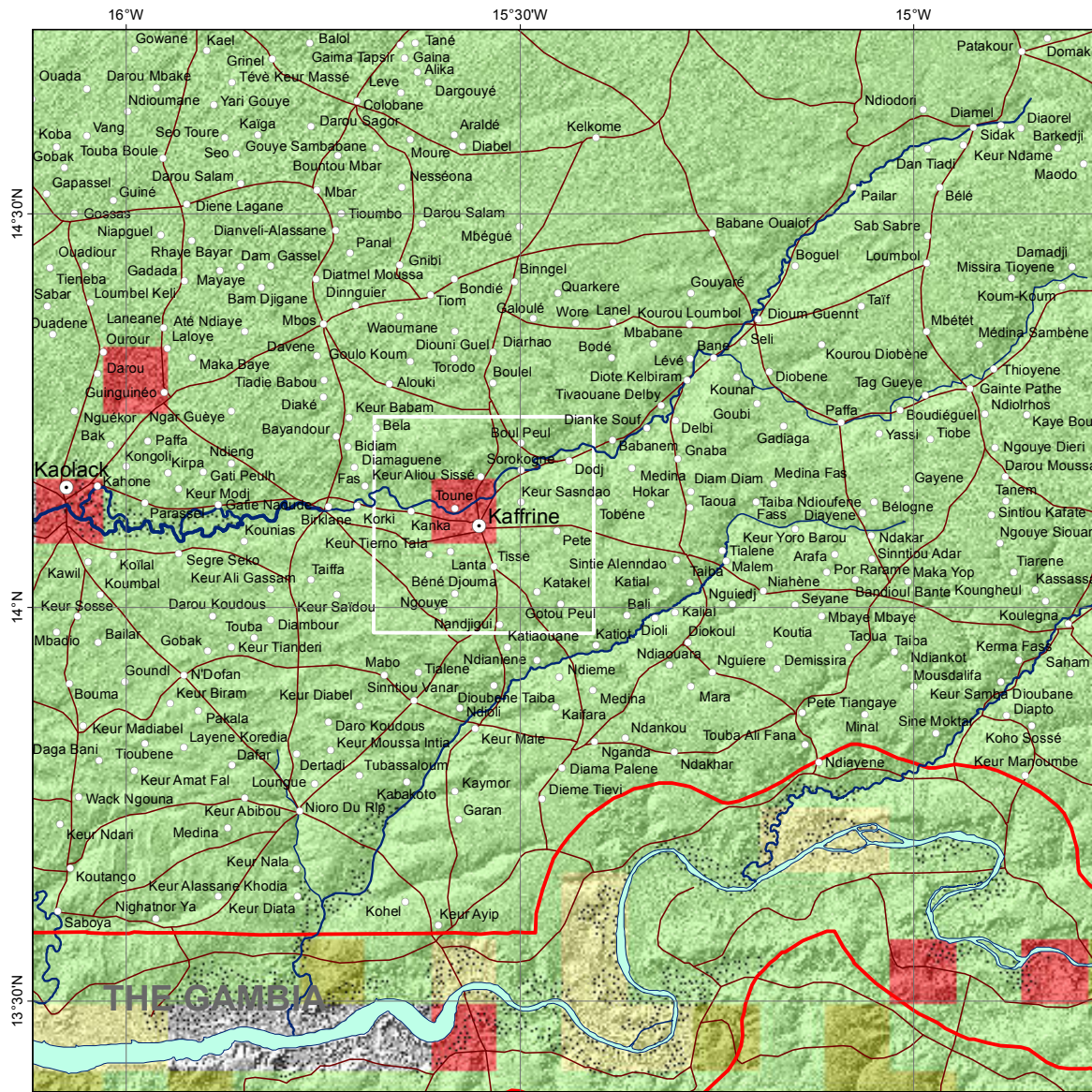
0 5 10 20 30 40 50 Kilometers

1 cm = 10 km

Kaffrine
CCAFS sampling frame

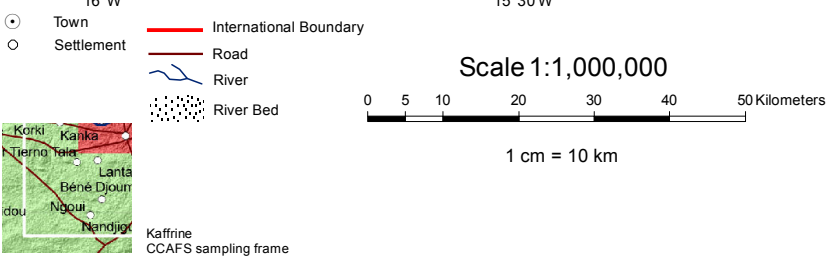
Citation: FAO and IIASA (2007)

Livestock Production Systems



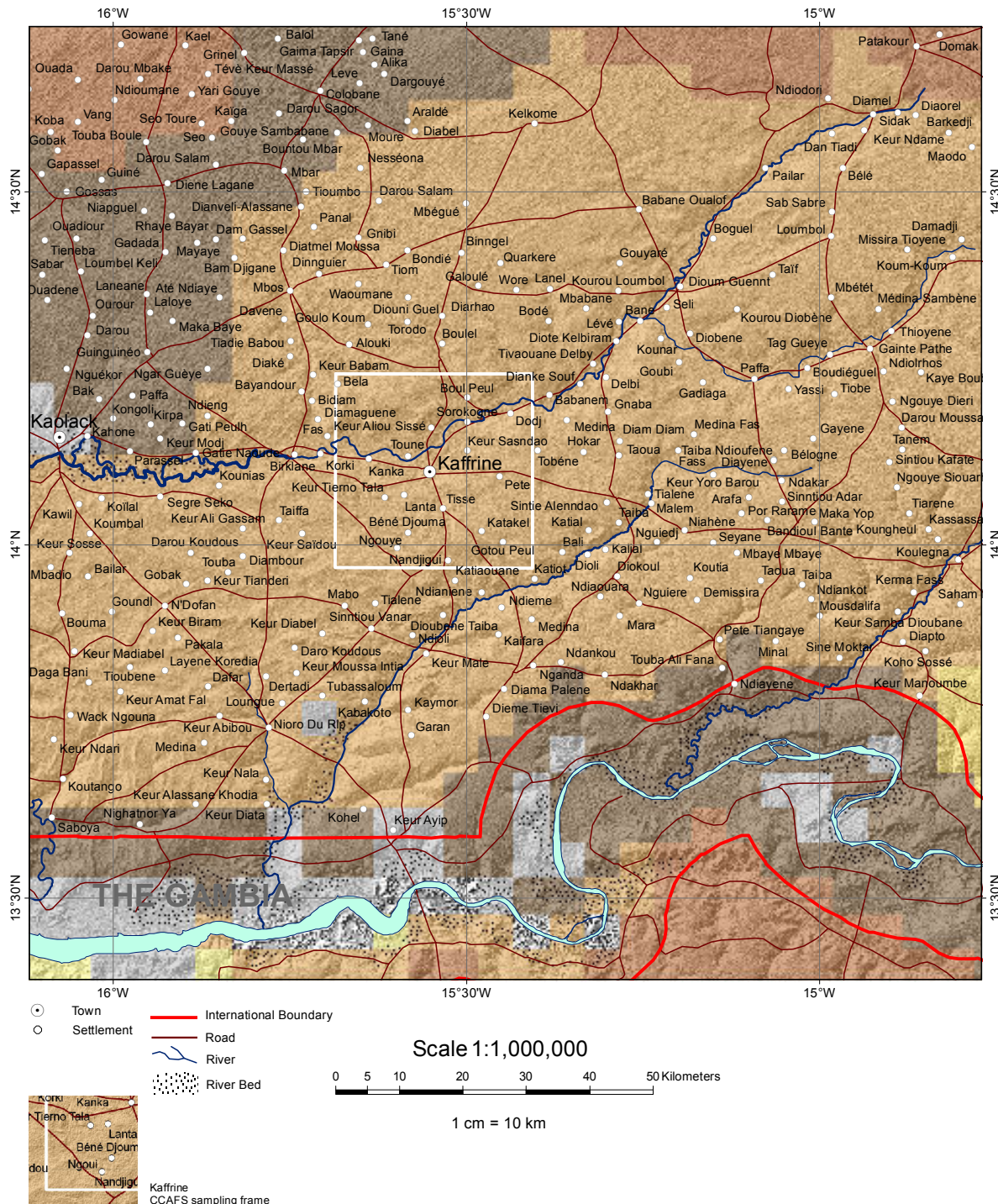
International boundary
Scale 1:12,500,000
0 125 250 500 Kilometers

- Corresponds to the map on the left
- | | |
|---|---|
| Mixed Rainfed | Livestock only |
| Arid / Semi-arid | Arid/semi-arid |
| Humid / sub-humid | Temperate / highland |
| Temperate / highland | Closed to open shrubland |
| Mixed Irrigated | Urban area |
| Arid / semi-arid | Other |
| Humid / sub-humid | |
| Temperate / highland | |



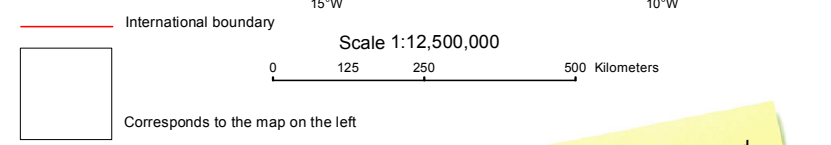
Livestock Production Systems as part of agricultural systems take agro-climatic conditions into account and are classified in terms of feed and livestock resources; livestock commodities produced; production technology; product use and livestock functions; area covered; geographic locations; and human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

Livestock Density

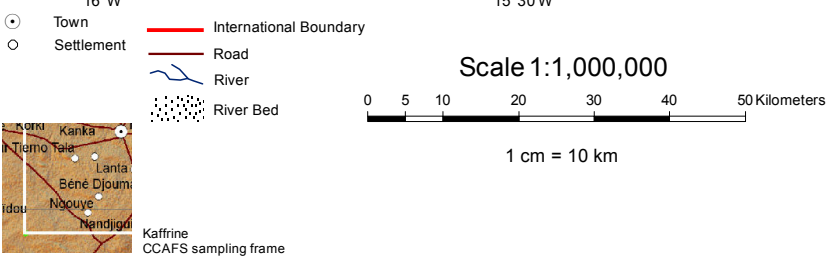


Livestock Density is measured in numbers of livestock, including cattle, goats and sheep, per km²

Livelihood Zones

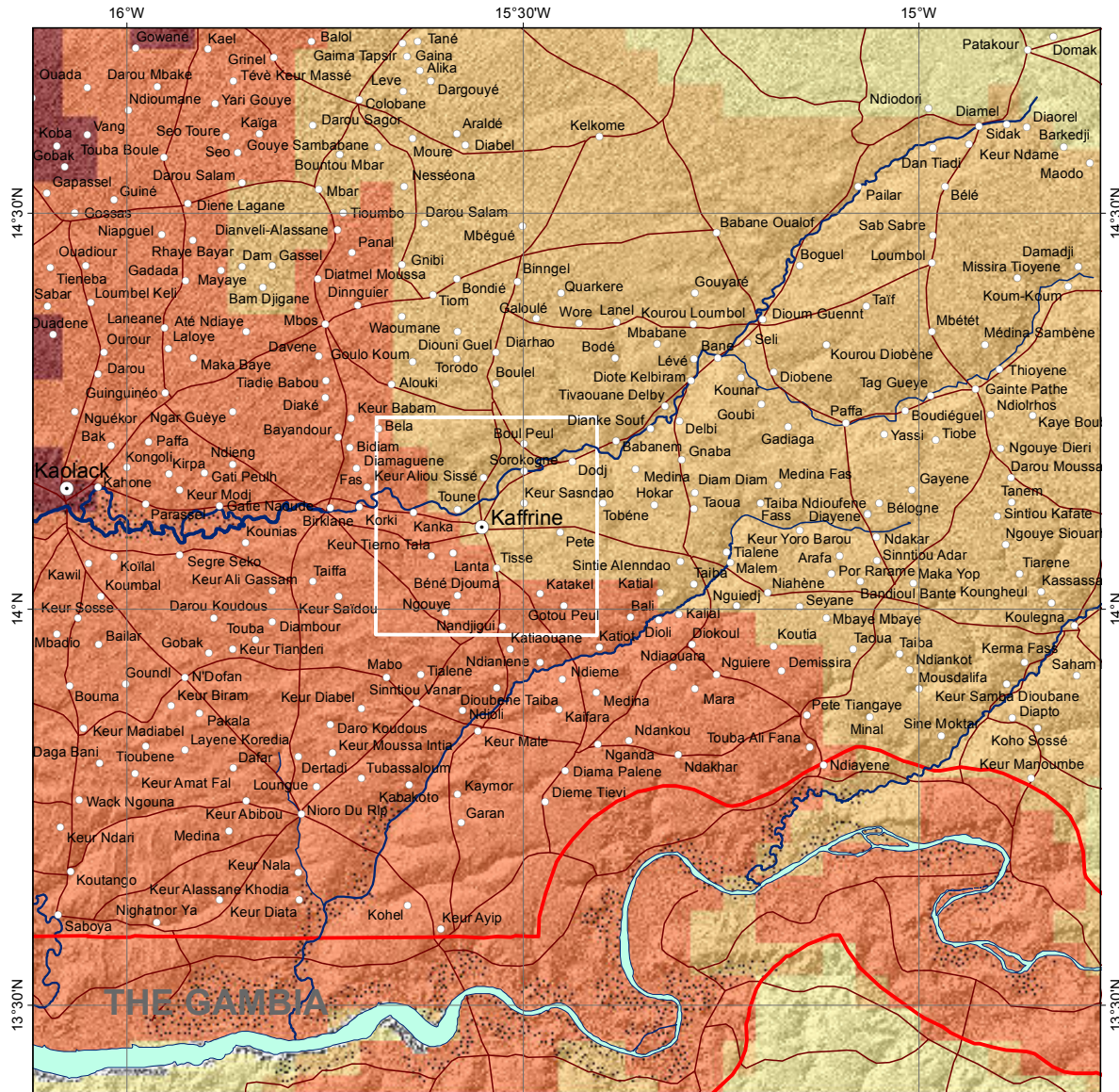


- Livelihood Zones ***
- Agriculture Zone
 - Agropastoral: Peanut Zone
 - Sylvo-pastoral
 - Petite-Cote: Fishing, Tourism and Arboriculture Zone
- * Legend corresponds to left map



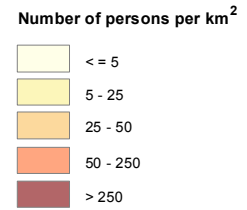
Livelihoods are complex and shaped by a variety of factors. These livelihood zone maps delineate geographic areas within which people broadly share the same livelihood patterns including access to food, income, and markets.

Human Population Density

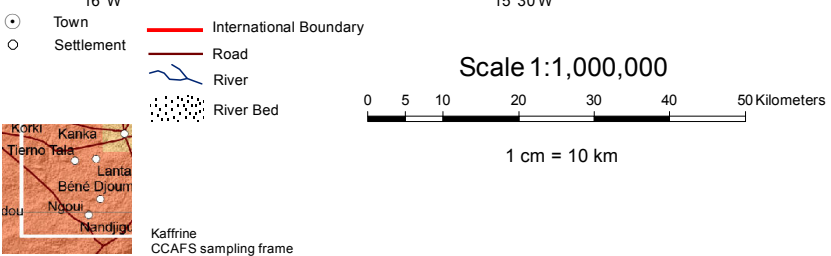


— International boundary
 Scale 1:12,500,000
 0 125 250 500 Kilometers

Corresponds to the map on the left

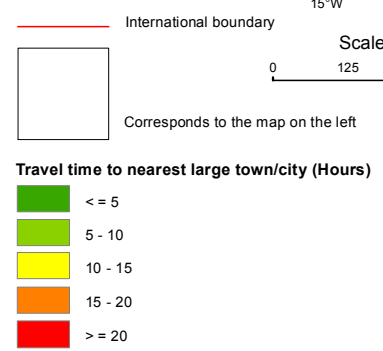
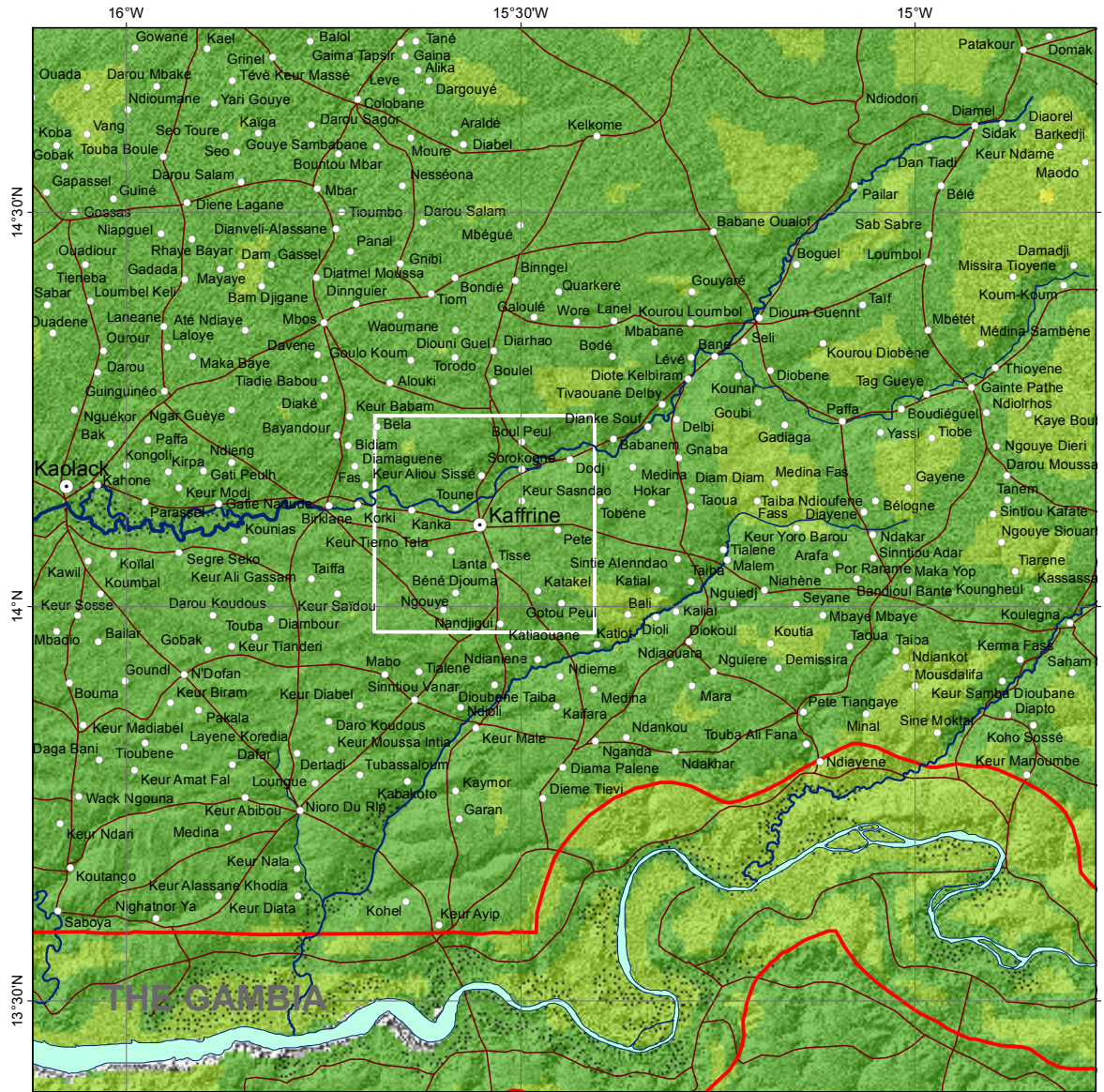


Human Population Density is the gridded number of persons per km² in 2005.



Citation: CIESIN (2005)

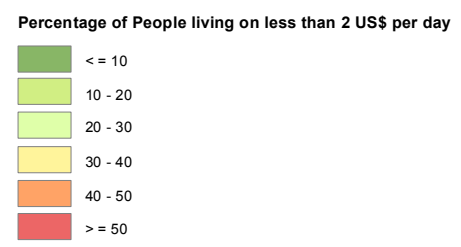
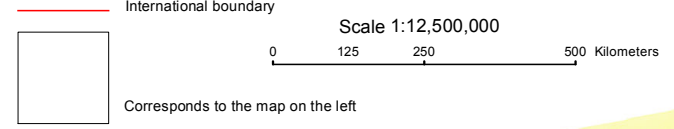
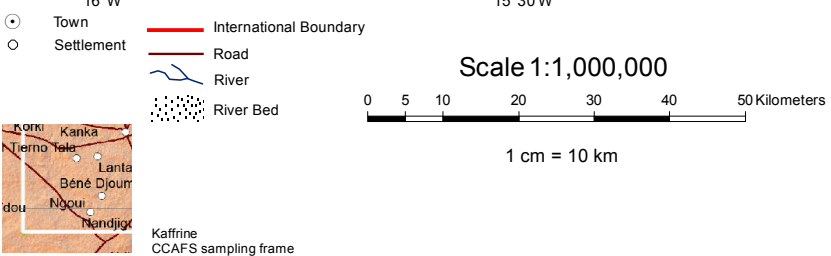
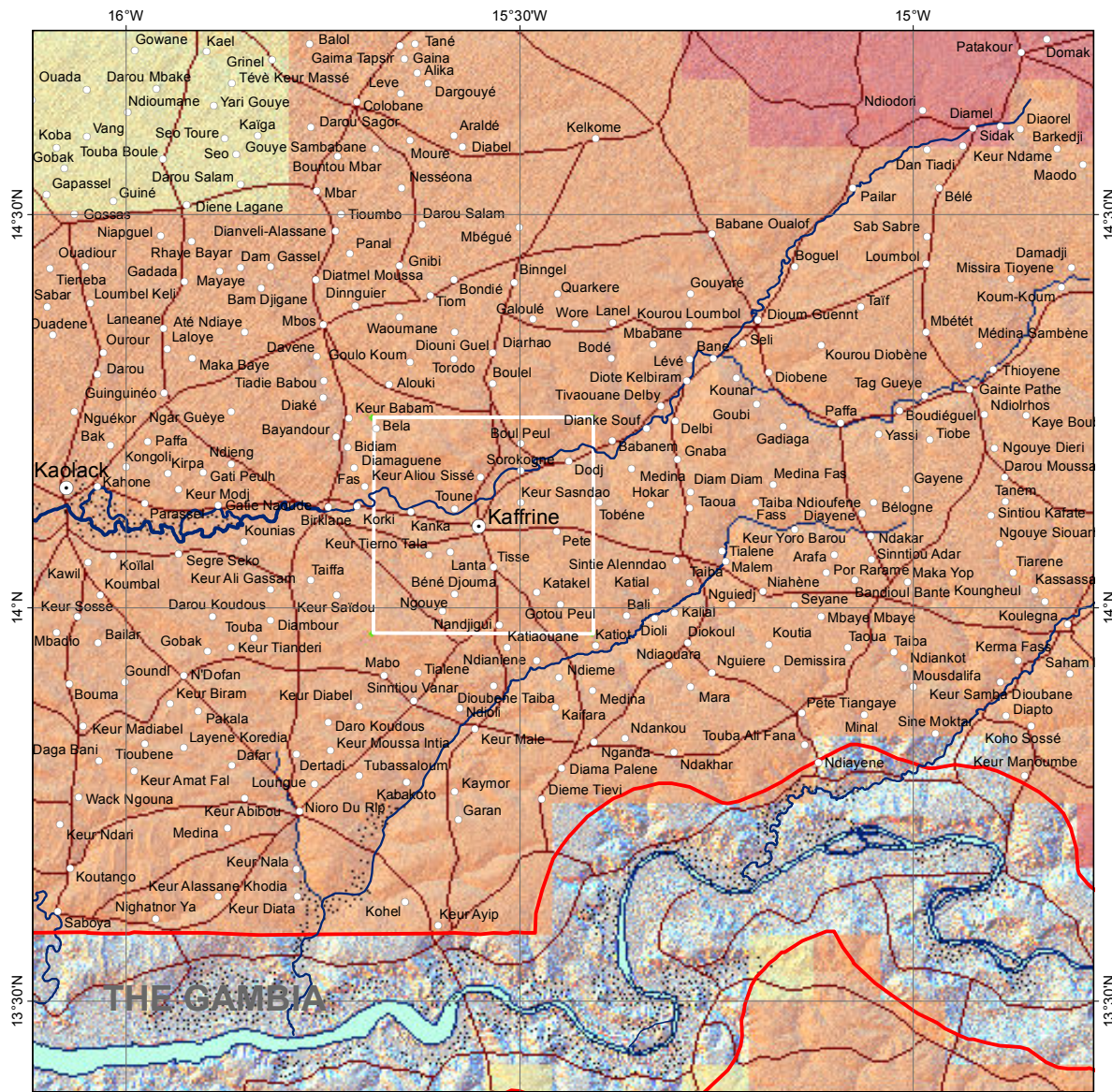
Market Access



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)

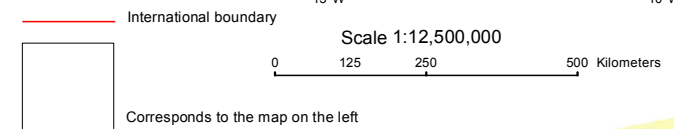
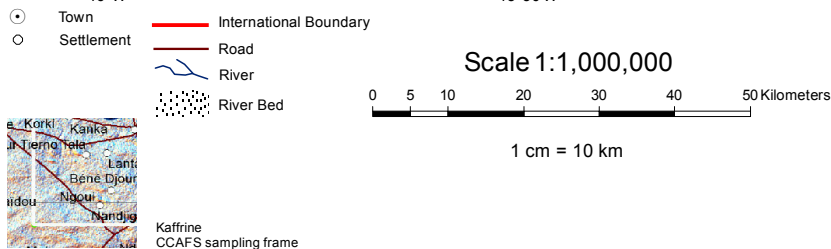
Poverty



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**
-  Natural Park
 -  National Park
 -  Hunting Reserve

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.

References and Data Sources

Regional Map

Sijmons K. 2013a. Digital Satellite Image based on, MODIS (Moderate Resolution Imaging Spectroradiometer) NASA, 2009, Ground resolution : 1 Kilometer. GTOPO30, (DEM) Global Digital Elevation Model U.S Geological Survey, Ground resolution: 1 Kilometer. Topographic Features derived from: Global GIS, U.S. Geological Survey and Google Earth. Projection: Geographic, Lat/Long, WGS84

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

Hijmans, R.J., S.E. Cameron, J.L. Parra, P.G. Jones and A. Jarvis, 2005. Very high resolution interpolated climate surfaces for global land areas. *International Journal of Climatology* 25: 1965-1978.

Annual Rainfall Graph

Jones P G, Thornton P K, Diaz W and Wilkens P W. 2002. MarkSim, a computer tool that generates simulated weather data for crop modeling and risk assessment. Version 1, 2002. CD-ROM and Users Manual. CIAT, AA6713, Cali, Colombia, 87 pp.

Annual Temperature

Hijmans, R.J., S.E. Cameron, J.L. Parra, P.G. Jones and A. Jarvis, 2005. Very high resolution interpolated climate surfaces for global land areas. *International Journal of Climatology* 25: 1965-1978.

Annual Temperature Graph

Jones P G, Thornton P K, Diaz W and Wilkens P W. 2002. MarkSim, a computer tool that generates simulated weather data for crop modeling and risk

assessment. Version 1, 2002. CD-ROM and User's Manual. CIAT, AA6713, Cali, Colombia, 87 pp.

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.csi.cgiar.org/>

Altitude

Jarvis, A., H.I. Reuter, A. Nelson, E. Guevara, 2008, Hole-filled SRTM for the globe Version 4, available from the CGIAR-CSI SRTM 90m Database. Available at <http://srtm.csi.cgiar.org>

Soil Type

FAO/IIASA/ISRIC/ISS-CAS/JRC. 2009. Harmonized World Soil Database (version 1.1). FAO, Rome, Italy and IIASA, Laxenburg, Austria.

Agro-Ecological Zones

Fischer, G., F. Nachtergaele, S. Prieler, H.T. van Velthuisen, L. Verelst, D. Wiberg, 2008. Global Agro-ecological Zones Assessment for Agriculture (GAEZ 2008). IIASA, Laxenburg, Austria and FAO, Rome, Italy

Landcover

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Landuse

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