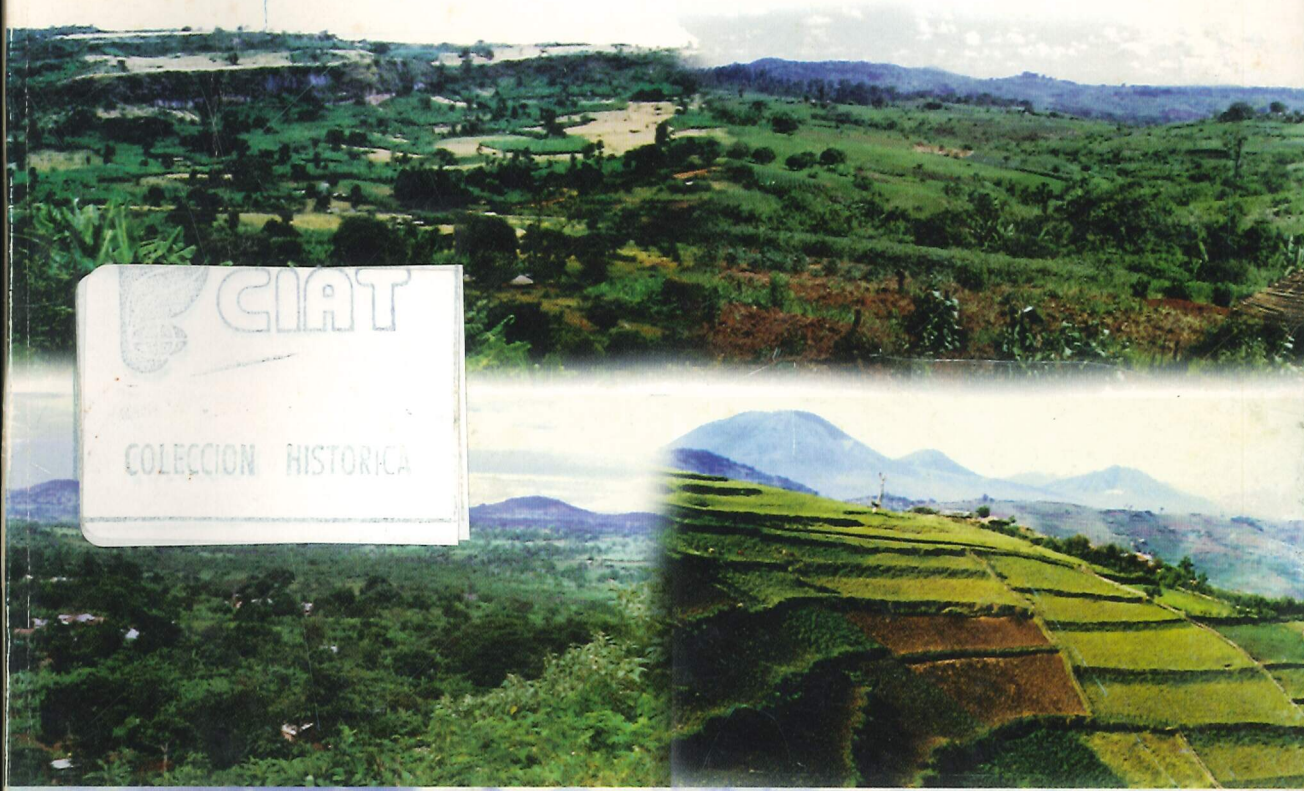
UGANDA'S AGROECOLOGICAL ZONES

A Guide for Planners and Policy makers



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PREFACE

Uganda is endowed with natural resources that have the potential to yield high agricultural productivity. The economy of the nation and the welfare of Uganda's people depend heavily on agriculture. The farming systems are mostly small-scale and generally biologically diverse, with much variation throughout the country.

Uganda's Agroecological Zones: A guide for planners and policy makers delineates and characterizes thirty-three agroecological zones for Uganda. It is a concise synthesis of information from numerous sources and is expected to be useful to a wide audience engaged in a range of activities including rural development planning, policy formulation, agricultural research and dissemination of information to farmers.

Reviewers of this document who work at the national level have suggested that this zonation is too detailed, while those engaged with district-level responsibilities requested a more detailed zonation. We offer an aggregation of agroecological zones at the end of the document for work at a less detailed level. Readers can also aggregate AEZs for their specific purposes based on the information given in the descriptions and tables, and in the maps provided at the end of the document. Unfortunately, the information currently available is inadequate to produce as detailed a zonation as may be desired for district- and county-level planning. The information provided here needs to be combined with local knowledge for a more detailed zonation of a district or a county.

Farming systems are dynamic and constantly evolving. The quality and quantity of information available is improving. Therefore, the delineation and characterization of zones presented in this document should not be treated as the final word but should be revised in the future. The data used for this zonation is freely available from CIAT. We encourage revision of the databases as systems change and as more and better data become available.

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GLOSSARY

Acacia: genus of leguminous trees

agroecological zone: an area characterized by specific environmental, land use and demographic factors whose interaction influences the productivity and sustainability of farming systems

available P: an indicator of phosphorus available to plants

bimodal rainfall pattern: annual rainfall has two distinct peaks

Butrospermum: genus of tree

Chloris: genus of grass

Combretum: genus of tree

Eragrostis: genus of grass

exchangeable nutrients: an indicator of nutrients available to plants

Heteropogon: genus of grass

Hyparrhenia dissoluta: species of grass

Imperata: genus of grass

Loudetia: genus of grass

m asl: meters above sea level

me/100g: milliequivalents per 100 grams (also known as cmol kg^{-1}, centimoles per kilogram)—a unit measure of concentration

nutrient supply: nutrients present in a form that plants can use

pH: acidity

ppm: parts per million (also known as mg kg^{-1}, milligrams per kilogram)—a unit measure of concentration

rainfall erosivity: potential of the rainfall to cause soil erosion

semi-arid: receives >800 mm/yr rainfall on average

Setaria: genus of grass

soil erodibility: susceptibility of soil to erosion

sub-humid: receives ~800-1500 mm/yr rainfall on average

Themeda: genus of grass

unimodal rainfall pattern: annual rainfall has one distinct peak

INTRODUCTION

Agriculture is central to Uganda, both economically and socially. The country's diverse agricultural systems have evolved out of the interaction of a number of factors governing land use. Understanding these factors, and the variation in agricultural systems that result from them, is crucial to efficient planning and implementation of rural development activities.

Climate, soil and terrain interact with farmers' traditions and preferences, resulting in varied agricultural systems and land use practices. In Uganda, the climate varies with the altitude, which ranges from 610 m asl in the Rift Valley to 4324 m asl on Mt. Elgon. Mean annual rainfall ranges from 510 mm in the northeast of the country to 2160 mm in the Ssese Islands. Soil productivity and land use are related to soil depth, texture, acidity and organic matter. This document presents information about each of these factors in order to describe Uganda's 33 "agroecological zones"—areas that share common natural features and agricultural characteristics—and to convey the similarities and differences between these zones.

A broad division of agricultural systems that categorizes them as short grass areas and tall grass areas has long been in general use. In the short grass areas, rainfall is lower and there is a pronounced dry season, and cropping systems are based on annual crops established from seed. In the tall grass areas, rainfall is higher, and perennial crops are important. Within this broad characterization, however, there is a good deal of variation, and research, development and policy efforts can benefit from more detailed, comprehensive delineation and definition of agroecological zones according to agricultural as well as climatic and soil characteristics.

This document is intended to assist planners in Uganda to achieve:

- efficient allocation of national and international financial and human resources
- more efficient research through better prioritization and better selection of sites for surveys and field research
- more effective technology dissemination through improved technology targeting
- improved rural development planning and policy formulation based on information about the agricultural, economic and demographic importance of agroecological zones, and of the activities, constraints and opportunities that operate in those zones.

Agroecological zones were delineated and defined for Uganda by considering 25 variables, including:

- three climatic variables (mean annual rainfall, temperature and proportion of annual rainfall that falls in July[1])
- six soil variables (percent sand, pH (acidity), organic matter, available P, exchangeable Ca and exchangeable K)
- two population variables (population density and male:female ratio)
- four land use types (farmland, woodland, grassland and wetland)
- ten food crops (banana, maize, cassava, sweet potato, Irish potato, finger millet, bean, groundnut, sorghum and rice).

A first approximation of the boundaries of agroecological zones was achieved through cluster analysis of the data. The delineation of the zones was refined after reference to additional information and in consultation with individuals knowledgeable about those parts of Uganda.

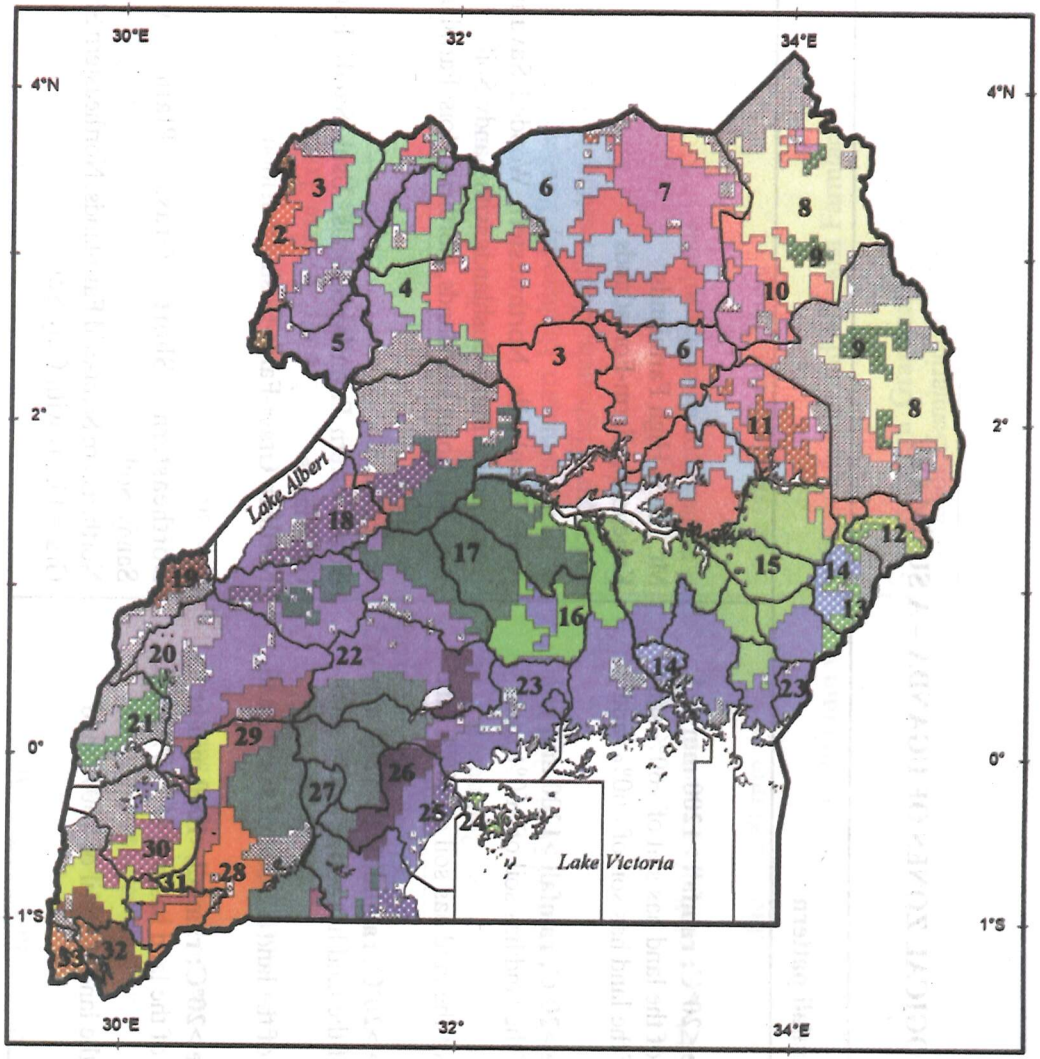
[1] The proportion of annual rainfall that falls in July is an indicator of the modality of rainfall in Uganda. A high proportion of rainfall in July indicates a single long season (unimodal rainfall), while a low proportion indicates two distinct seasons (bimodal rainfall).

LEGEND

1. West Nile Loam Farmlands
2. Arua Farmlands
3. Northern Moist Farmlands
4. Northwestern Wooded-Savanna
5. Northwestern Farmland - Wooded Savanna
6. Northcentral Farm-Bush Lands with Sandy Soils
7. Northern Grass-Farm-Bush Transition AEZ
8. Northeastern Short Grass Plains with Sandy Soils
9. Northeastern Semi-arid Farmlands
10. Northeastern Short Grass Plains with Clay Soils
11. Usuk Sandy Farm-Grasslands
12. Kapchorwa Farm-Forest AEZ
13. Mt. Elgon High Farmlands
14. Jinja and Mbale Farmlands
15. Southern and Eastern Lake Kyoga Basin
16. Central Buruli Farmlands
17. Central Wooded Savanna
18. Western Clay Loam Farmlands
19. Semliki Flats
20. Rwenzori Footslopes and Fort Portal
21. Kasese Transition Zone
22. Western Mid-Altitude Farmlands
23. Lake Victoria Crescent
24. Ssese Islands
25. Sango Plains
26. Western Masaka and Mityana Farmlands
27. Southwestern Grasslands
28. Southwestern Grass-Farm Lands
29. Semi-arid Grass-Famland Transition
30. Bushenyi-N.Rukungiri Farmlands
31. Southwestern Medium-High Farmlands
32. Kabale-Rukungiri Highlands
33. Kisoro-Kibale Highlands with Acid Soils

Gazetted (protected) areas

Agroecological zones of Uganda



AGROECOLOGICAL ZONES OF UGANDA – A SUMMARY

Unimodal rainfall pattern	
Temperature ≤20°C; rainfall >1200 mm yr^{-1}	
1. 30-70% of the land has soil of >60% sand	Mt. Elgon High Farmlands
2. <30% of the land has soil of >60% sand	Kapchorwa Farm-Forestlands
Temperature >20°C; rainfall >1200 mm yr^{-1}	
1. >70% of the land has soil of >60% sand	Arua Farmlands, Northwestern Wooded Savanna, Northcentral Farm-Bushlands with Sandy Soil
2. 30-70% of the land has soil of >60% sand	West Nile Loam Farmlands, Northern Moist Farmlands
Temperature >20°C; rainfall 1000-1200 mm yr^{-1}	
1. >70% of the land has soil of >60% sand	Northwestern Farm-Woodlands, Usuk Sandy Farm-Grasslands
2. 30-70% of the land has soil of >60% sand	Northern Grass-Farm-Bush Transition
Temperature >20°C; rainfall <1000 mm yr^{-1}	
1. 30-70% of the land has soil of >60% sand	Northeastern Short Grass Plains with Sandy Soil
2. <30% of the land has soil of >60% sand	Northeastern Semi-arid Farmlands, Northeastern Short Grass Plains with Clay Soil

Rainfall moderately reduced and unreliable during June-August	
Temperature ≤20°C; rainfall >1200 mm yr^{-1}	Rwenzori Footslopes and Fort Portal
Temperature >20°C; rainfall >1200 mm yr^{-1} 1. 30-70% of the land has soil of >60% sand	S.&E. Lake Kyoga Basin, Jinja and Mbale Farmlands, Lake Victoria Crescent
2. <30% of the land has soil of >60% sand	Western Clay Loam Farmlands
Temperature >20°C; rainfall 1000-1200 mm yr^{-1}	Central Buruli Farmlands, Central Wooded Savanna, Semliki Flats, Kasese Transition Zone, Western Mid-Altitude Farmlands
Bimodal rainfall with a distinct dry season during June-July	
Temperature ≤20°C; rainfall > 1200 mm yr^{-1}	Kisoro-Kabale Highlands with Acid Soils
Temperature ≤20°C; rainfall of 1000-1200 mm yr^{-1}	Kabale-Rukungiri Highlands, Bushenyi-Northern Rukungiri Highlands, Southwestern Medium-High Farmlands
Temperature ≤20°C; rainfall <1000 mm yr^{-1}	Southwestern Grass-Farmlands
Temperature >20°C; rainfall >1200 mm yr^{-1}	Ssese Islands, Sango Plains
Temperature >20°C; rainfall of 1000-1200 mm yr^{-1}	Western Masaka and Mityana Farmlands
Temperature >20°C; rainfall >1200 mm yr^{-1}	Southwestern Grasslands, Southwestern Grass-Farmlands, Semiarid Grass-Farmland Trans.

CHARACTERISTICS OF THIRTY-THREE AGROECOLOGICAL ZONES IN UGANDA

Thirty-three agroecological zones (AEZs) have been delineated and defined for Uganda (see map on preceding page and Tables 1-7). Some AEZs are economically more important than others due to differences in land area and intensity of land use. Mean values are presented for the AEZs, but population, altitude, and climatic, soil and crop characteristics vary widely within zones. This variation is not reflected in the mean values presented here.

1. **West Nile Loam Farmlands** (408 km^2; 1261 m asl; >20°C; >1200 mm per year; unimodal rainfall).

Landscape: The AEZ lies on a rolling plain divided by generally narrow valleys.

Soils: Sandy loam, acidic soils are common, but soils are less sandy than in the nearby Arua Farmlands. Organic matter is typically low and nutrients are generally deficient; many crops are likely to be very responsive to application of moderate amounts of N and P. Soil erodibility is low while rainfall erosivity is very high.

Population: Population density is moderate (126 persons per km^2).

Land use: Most of the land in this AEZ is farmed, although the northern part is largely woodland.

Climate: Rainfall is high and falls in one long season. Mean monthly rainfall exceeds 125 mm during April-October with a peak in August. This AEZ is cooler than the neighboring AEZs due to its higher altitude.

Cropping systems: Maize and cassava are the most important crops here. Banana, sorghum, finger millet, sweet potato, bean and groundnut are also important food crops. In the southern part of the zone, banana and cassava are relatively more important and finger millet and sorghum are less important. Tobacco and coffee are the main cash crops.

2. **The Arua Farmlands** (816 km^2; 1047 m asl; >20°C; >1200 mm per year; unimodal rainfall).

Landscape: The landscape consists of an undulating plain divided by narrow valleys.

Soils: Soils in the valleys are poorly developed, often shallow and of stony and sandy alluvium. The upland soils are generally deep, sandy and low in K, but with generally adequate supplies of N, P and Ca. Hard laterite layers are common, especially in the western part. Soil erodibility is low while rainfall erosivity is very high.

Population: This is the most densely populated part of Arua District (267 persons per km^2). The ratio of males to females is relatively low.

Land use: Nearly all land in this AEZ is arable.

Climate: Rainfall is high and falls in one long season. Mean monthly rainfall exceeds 110 mm during April-October.

Cropping systems: Bean and maize are the main food crops, but cassava, sorghum and finger millet are also important. Tobacco and coffee are important cash crops.

3. **Northern Moist Farmlands** (27,527 km^2; 1024 m asl; >20°C; >1200 mm per year; unimodal rainfall). This large area of farmland is very important for annual crop production.

Landscape: The West Nile part of the zone contains the West Nile Escarpment, but otherwise is gently rolling with narrow valleys. In Gulu, Lira, Apac and Kigumba, the landscape features gently rolling plains. In the southeast part of this AEZ (Soroti), the landscape is rolling with rock outcrops and wide valleys. In Kitgum, the landscape consists of rolling and undulating plains associated with the Pager and Agaga Rivers.

Soils: The soils are variable and often acidic and sandy, but they generally have moderately good nutrient supply. In the West Nile part of the zone, the soils are deep, sandy, acidic and often low in nutrient availability. The soils of Gulu, Lira and Apac are generally sandy and sandy clay soils with low organic matter and low nutrient availability, but loam soils are common near Gulu town. With loam upland soils and clay valley soils of moderate nutrient supply, the land of Kigumba is of medium productivity and is important for maize and cotton production. In the

southeast part, red loam soils are associated with the higher slopes, brown sandy soils are common on the lower slopes, and dark clay soils predominate in the valleys. The soils near the Pager and Agaga Rivers are high in clay but are often acidic and have low nutrient supply. Throughout this AEZ, maize, cotton and other crops are likely to be very responsive to application of moderate amounts of N and P. Soil erodibility is low, but rainfall erosivity ranges from moderate in the southeastern part of the zone to very high in the northwestern part.

Population: Population density is moderately low (65 persons per km^2).

Climate: The zone is sub-humid and relatively warm with rainfall well distributed from April to October, during which mean monthly rainfall exceeds 110 mm. The main dry season is December-March.

Land use: Most of the land is arable farmland with some grassland and bushland interspersed.

Cropping systems: Maize, finger millet and bean are important food crops but are not uniformly distributed. Sweet potato, cassava and sorghum are also important. Cotton, simsim and tobacco are major cash crops. This is the major AEZ for pigeon pea and cowpea production in Uganda. Rice is becoming important here as a commercial crop.

4. **Northwestern Wooded Savanna** (6505 km^2; 822 m asl; >20°C; >1200 mm per year; unimodal rainfall)

Landscape: In the West Nile part of this zone, the landscape consists of gently rolling foothills divided by narrow valleys; the vegetation is *Combretum* savanna. In Adjumani and Gulu, the terrain is rolling and occasionally rugged with narrow valleys.

Soils: The soils of this zone are sandy with moderately low nutrient supply. Shallow and stony soils are common in the western part of the zone, while the soils in Adjumani and Gulu districts are sandy, shallow and generally low in nutrient supply. Soil erodibility is very low to low; rainfall erosivity is moderate.

Population: This zone is one of the least densely populated zones (22 persons per km^2).

Land use: Woodland and bushland cover much of this zone, with only about 10% of the land used for crop production.

Climate: This sub-humid AEZ is one of the warmest zones in Uganda. Rainfall is well distributed from April to October, during which mean rainfall exceeds 115 mm per month.

Cropping systems: Maize and sweet potato are the main food crops. Cotton and tobacco are important cash crops.

5. **Northwestern Farmland-Wooded Savanna** (7449 km^2; 732 m asl; >20°C; 1000–1200 mm per year; unimodal rainfall)

Landscape: The landscape features of this AEZ are highly variable. The landscape consists of a plateau with wide valleys in West Nile and more rugged terrain with narrow valleys in parts of Nebbi. To the east of the Nile, in western Gulu, the landscape is rolling with narrow valleys.

Soils: The soils of this AEZ are often low in organic matter and mostly of moderate nutrient supply. West of the Nile, upland soils are sandy and soils of the main valleys are dark clays. East of the Nile, soils are generally shallow and sandy. Maize and cotton are likely to respond well to application of moderate amounts of N and P. Soil erodibility is generally low but is medium near the Nile River; rainfall erosivity is low or moderate.

Land use: Approximately 45% of the land is farmland. The sandy soils, combined with periods of inadequate rainfall and relatively high temperatures, result in frequent moisture deficits.

Population: Population density is moderately low (59 persons per km^2).

Climate: Rainfall is lower than in neighboring AEZs and temperatures are relatively high.

Cropping systems: Banana, maize and sweet potato are the main food crops, but crop distribution is uneven. Food crop production occurs primarily in Nebbi District, although sorghum is more evenly distributed. Cattle and small ruminants are important in this AEZ.

6. **Northcentral Farm-Bushlands with Sandy Soils** (10,791 km^2; 1023 m asl; >20°C; >1200 mm per year; unimodal rainfall). This AEZ is widely dispersed.

Landscape: The terrain consists of rolling or undulating plains.

Soils: The soils are sandy, often acidic, shallow, and low in nutrient supply. Soil erodibility is low and rainfall erosivity is moderate to very high.

Land use: Much of the land with less sandy soil is arable with a large proportion in fallow. Farmland is interspersed with bushland.

Population: Population density is low (37 persons per km^2).

Climate: The zone is warm and sub-humid. Mean rainfall exceeds 100 mm per month for April-October with the peak in August.

Cropping systems: Finger millet is the major crop, followed by sweet potato, maize and sorghum. Cotton, simsim and tobacco are important cash crops.

7. **Northern Grass-Farm-Bush Transition** (7755 km^2; 1075; >20°C; 1000-1200 mm per year; unimodal rainfall). This is a highly variable savanna zone with a north-south orientation. It differs from the grassland to the east where the soil is less sandy and more fertile.

Landscape: The northern part of the zone features plains associated with mountainous masses and prominent rock outcrops; *Butrospermum/Hyparrhenia dissoluta* are important in the vegetation complex. Also in the north is an area of alluvial plains. South of Kitgum and in the western and southern parts of the zone are undulating plains of dry *Combretum/Acacia* savanna.

Soils: Soils are often sandy, acidic and low in organic matter. Red soils with murram are common in the north. In the western part and south of Kitgum, shallow soils are interspersed with patches of deeper soils, which are preferred for crop production. In the southern part of the zone, shallow sandy clay soils are typical. Soil erodibility is low; rainfall erosivity is moderate.

Land use: Approximately one-third of the land is farmland, with much in fallow. The remaining land is either grassland or bushland.

Population: Population density is low (24 persons per km^2).

Climate: Rainfall is normally well distributed and exceeds 100 mm per month between April and September with the peak in July and August.

Cropping systems: Sorghum is the main food crop, followed by maize, finger millet and beans.

8. **Northeastern Short Grass Plains with Sandy Soils** (11,786 km^2; 1235 m asl; >20°C; <1000 mm per year; unimodal rainfall).

Landscape: This zone includes the northeastern mountains, but otherwise the landscape is generally flat to undulating, draining toward Lake Kyoga.

Soil: The soil is generally sandy loam with less sandy soils interspersed. Organic carbon is low, but nutrient supply is good. Soil erosivity is high, and rainfall erosivity is very low to low.

Land use: The land is primarily wooded-grassland of *Combretum* savanna.

Population: Population is low (15 persons per km^2) with a very low male:female ratio.

Climate: This is the driest AEZ of Uganda. Mean rainfall exceeds 100 mm per month for April, May, July and August.

Cropping systems: There is little crop production; sorghum is the principal food crop. This is the most important AEZ for cattle grazing in Uganda.

9. **Northeastern Semi-arid Farmlands** (1684 km^2; 1161 m asl; >20°C; <1000 mm per year; unimodal rainfall).

Landscape: The topography is flat to undulating.

Soils: Some crop production occurs on black vertic clay soils, but yellowish-red sandy clay loam soils are probably more commonly cultivated. Organic matter and nutrient supply of these soils is often low. Soil erodibility is low and rainfall erosivity is low.

Land use: Most land is arable with much in fallow. These farmlands are interspersed with the *Combretum* savanna grasslands of the Northeastern Short Grass Plains with Sandy Soils.

Population: Population density is moderately low (58 persons per km^2) with a very low male:female ratio.

Climate: This is a semi-arid zone with rains falling primarily from April to August and with peaks in May and July.

Cropping systems: Sorghum is the major crop, followed by maize. Cattle production is important.

10. **Northeastern Short Grass Plains with Clay Soils** (6608 km^2; 1093 m asl; >20°C; <1000 mm per year; unimodal rainfall).

Landscape: The landscape in the south is flat, sloping slightly toward Lake Kyoga, but in the north is more varied and undulating.

Soils: The soil is clay, often with vertic properties; calcareous soils are common on the very flat Sebei plain. This AEZ extends south to the lower steps, or terraces, of Mt. Elgon, where the clay loam soils are more often acidic. Nutrient supply is good. Soil erodibility is high while rainfall erosivity is moderate.

Land use: Most land is grassland with primarily *Acacia/Setaria* vegetation. The Pian-Upe Game Reserve and Bokora Corridor are located in this AEZ. About 10% of the land is farmland.

Population: Population density is low (20 persons per km^2) with a low male:female ratio.

Climate: The zone is semi-arid with one rainy season; April-August are the wettest months.

Cropping systems: There is little crop production. Sorghum and maize are the more important food crops, although bean and finger millet are important on the plains of Kapchorwa.

11. **Usuk Sandy Farm-Grasslands** (1403 km^2; 1070 m asl; >20°C; 1000-1200 mm per year; unimodal rainfall). Most of this AEZ lies in southern Katakwi District.

Landscape: The landscape consists of a flat plain of deep sandy soils derived from ancient lake deposits, divided by numerous drainage ways and flood plains.

Soils: The soils are deep and sandy. Soil erodibility is low and rainfall erosivity is very high. Nutrient supply is low; crops are likely to be very responsive to application of moderate amounts of N and P.

Land use: Most of the land is farmland (63%), much of which is in fallow.

Population: Population density is low (38 persons per km^2).

Climate: Rainfall is moderate with 100 mm or more per month for April-September, but water deficits frequently constrain crop growth because of the low water-holding capacity of the soil.

Cropping systems: Groundnut, sorghum and finger millet are important food crops.

12. **Kapchorwa Farm-Forest Lands** (612 km^2; 1455 m asl; ≤20°C; >1200 mm per year; unimodal rainfall).

Landscape: The zone is on the northern steps of Mt. Elgon.

Soils: The soils are generally highly productive. In the forest zone, soils are primarily reddish-brown loam over deep clay loam sub-soil. In the farmland areas, much of the soil is derived from volcanic parent material; clay and clay loam soils are common and often acidic, but are of good nutrient supply.

Land use: Much of this zone is forested; about 40% is used for crop production.

Population: Population density is moderate (206 persons per km^2) with a high male:female ratio.

Climate: This cool, sub-humid zone has a long wet season from April to October with a rainfall peak in April and May.

Cropping systems: Maize and bean are the main crops, with beans produced in association with other crops. Banana is also an important crop. This is the major AEZ for wheat production in Uganda.

13. **Mt. Elgon High Farmlands** (969 km^2; 1466 m asl; ≤20°C; >1200 mm per year; unimodal rainfall). This is a very productive area with fertile soils, high rainfall and moderately cool temperatures.

Landscape: The landscape is steeply sloped and divided by many valleys.

Soils: The soils of the northern part differ from those in the southern part of the AEZ. In the north, much of the soil is derived from volcanic parent material and the soils are typically red clay loam, well drained, highly leached, often acid (as indicated by the presence of bracken ferns), but of good nutrient supply. In the south, the surface soils more often have high sand content and lower nutrient supply. Soil erodibility is very low and rainfall erosivity is moderately high.

Land use: Most of the land is intensively cropped while about 20% is woodland.

Population: Population density is high (345 persons per km^2) with a high male:female ratio.

Climate: This AEZ is cool and wet. The southern part is warmer with less rain in July than in the north. Rainfall peaks in April and May but is generally more than 100 mm per month from March to November.

Cropping systems: Bean is the major food crop in terms of crop area, but banana is also very important. Maize and groundnuts are important crops. Arabica coffee is the major cash crop. While important throughout the AEZ, the production of banana, bean, and maize is more prevalent in the northern part.

14. **Jinja and Mbale Farmlands** (1505 km^2; 1213 m asl; >20°C; >1200 mm per year). This is a densely populated, intensively farmed zone with highly productive soils.

Landscape: The landscape of Jinja consists of flat-topped ridges, gently sloping hillsides, and narrow valleys that drain to the Nile River. The Mbale farmlands lie between Mt. Elgon and the plains to the west; the topography is varied but is generally sloping.

Soils: In the Jinja area, soils on the ridges are shallow, but soils on the gentle slopes are very deep and dark with high clay content. In the Mbale area, the soils are mainly red-brown loam and clay loam soils of good fertility. The soils are sandier and less fertile in the southern part where response to application of low rates of N and P is likely to be profitable. Soil erodibility is very low and rainfall erosivity is moderate.

Land use: Most of the land is used for crop production with little fallow.

Population: The population concentrations in the suburban areas of Mbale and Jinja make this the most densely populated (456 persons per km^2) of the 33 rural AEZs of Uganda.

Climate: The rain falls in two distinct but similar seasons with approximately 575 mm per season. July is relatively wetter near Mbale.

Cropping systems: Cropping systems are agronomically and biologically diverse. Banana, sweet potato and bean are the main food crops, but maize is also important. Coffee is the major cash crop.

15. **Southern and Eastern Lake Kyoga Basin** (10,154 km^2; 1075 m asl; >20°C; >1200 mm per year). This AEZ is environmentally similar to the Central Buruli Farmlands.

Landscape: This large AEZ has a gently rolling landscape with wide valleys draining to Lake Kyoga. Wetlands are common in Pallisa and Kumi.

Soils: The soils of the western part of this zone are generally loam on the ridges and upper slopes and sandy loam on the lower slopes. In the east and northwest, sandy soils derived from ancient lake deposits prevail. Soils are occasionally acidic and often have low organic matter and low nutrient supply. South and east of Kumi and near Bukedea, loam soils with good nutrient supply are common. Maize, cotton and other crops are likely to be very responsive to application of moderate amounts of N and P. Soil erodibility is low and rainfall erosivity is moderate. Crop production is often constrained by water and nutrient deficits.

Land use. Most land is farmland with much fallow, and there is much grassland as well. Some of the wetlands are cultivated.

Population: Population density is moderate (129 persons per km^2).

Climate: This sub-humid AEZ has two growing seasons with similar rainfall, 560 mm during March-June and 540 mm during July-November.

Cropping systems: Finger millet, banana and maize are major food crops, with more production in the southern part of the zone than in the north. Rice production in low-lying areas is important in Pallisa, northern Iganga and eastern Kamuli. Sorghum is relatively more important in Kumi and Pallisa. Cassava is a common food crop and is especially important in Kumi and parts of Pallisa. Cotton is a major cash crop.

16. **Central Buruli Farmlands** (4311 km^2; 1063 m asl; >20°C; 1000-1200 mm per year).

Landscape: The landscape is rolling with broad valleys in the southern part and undulating plains in the north.

Soils: The soils are variable; they are often sandy and acid. Nutrient and water deficits often constrain crop productivity; many crops are likely to respond to application of moderate amounts of N and small amounts of P. Soil erodibility is low and rainfall erosivity is moderate.

Land use: This AEZ is mostly farmland with grassland on the sandier soils. Relatively more of the land is grassland in the northern part, while the proportion of farmland is greater in the south. About 10% of the land is wetland.

Population: Population density is moderate and greater in the south (103 persons per km^2).

Climate: Rainfall is lower in the first cropping season than in the second, with 405 mm during March-May and 470 mm during August-November.

Cropping systems: The crops are diverse with banana occupying the most land, followed by bean, maize and sweet potato. Groundnuts and cassava are relatively more important in the eastern part of this AEZ. Banana and bean production are more important in the southern part, where the soils are less sandy and generally more fertile. Cotton and robusta coffee are cash crops.

17. **Central Wooded Savanna** (10,919 km^2; 1089 m asl; >20°C; 1000-1200 mm per year).

Landscape: The landscape consists of undulating plains with wide valleys.

Soil: The soil is sandy and often acidic with low nutrient supply. Soil structure is weak and the soil becomes hard upon drying; water infiltration with the early rains is poor and therefore crop productivity is generally low. Soil erodibility is low and rainfall erosivity is low to moderate.

Land use: The zone is primarily bush and grassland (*Combretum* and *Hyparrhenia-Loudetia* savanna), with less than 10% used as farmland.

Population: Population density is low (17 persons per km^2).

Climate: The second season is wetter than the first, with 385 mm in the March-May season and 500 mm in the August-November season.

Cropping systems: There is little crop and livestock production. Where crops are produced, banana is typically the most important food crop, followed by maize and beans. Cotton is the main cash crop.

18. **Western Clay Loam Farmlands** (2423 km^2; 1099 m asl; >20°C; >1200 mm per year)

Landscape: In Masindi the land is undulating, but in Hoima the slopes are steeper with wide valleys. Kibale's landscape is irregular.

Soils: The soils of this zone are generally acidic with low P and low base availability, but organic matter is adequate. In Masindi and Kibale, deep clay loam soils occur on the slopes. The soils are typically loam and deep on the valley slopes in Hoima but are often shallow on the upper slopes. Soil erodibility is low; rainfall erosivity is very high in the north but is otherwise moderate. Throughout this AEZ, maize, cotton and other crops are likely to be very responsive to application of moderate amounts of N, but less so to applied P.

Land use: The Masindi part of this AEZ is the most intensively farmed with more woodland and grassland in Hoima and Kibale.

Population: The population density is moderate (74 persons per km^2) with a relatively high male:female ratio.

Climate: Rainfall is adequate for good crop production and is higher in the August-November season.

Cropping systems: Cropping systems are diverse. The principal crops are banana and maize, followed by sweet potato and beans. Coffee and tobacco are important cash crops.

19. **Semliki Flats** (740 km^2; 684 m asl; >20°C; 1000-1200 mm per year).

Landscape: This AEZ is a flat alluvial plain that drains into Lake Albert.

Soils: Soils are dark gray clay developed from recent alluvium and lakeshore deposits. The water table is high and soils are frequently waterlogged. Soil erodibility is high but rainfall erosivity is low.

Land use: Grassland (*Themeda-Heteropogon-Imperata* savanna with *Borassus* palms) is prevalent.

Population: The AEZ is sparsely populated (30 persons per km^2) with a high male:female ratio.

Climate: The wettest months are April and May and August-November.

Cropping systems: There is little crop production in this AEZ; poor drainage is a constraint.

20. **Rwenzori Footslopes and Fort Portal** (2551 km^2; 1368 m asl; ≤20°C; >1200 mm per year)

Landscape: Volcanic craters are common in areas to the west and south of Fort Portal and slopes are often steep. In the northeast, the landscape is generally rolling with rounded hills.

Soils: The soils of volcanic origin are often sandy. Below the forest line of the mountains, the footslopes have sandy clay and clay loam soils, developed from non-volcanic parent material, which are of low to moderate productivity. In the northeastern part of this zone, soils are often clay loam of medium to high productivity. Soils erodibility is low and rainfall erosivity is moderate. Moderate acidity is common, but nutrient supply is generally good.

Land use: Land in this sub-humid area is primarily farmland interspersed with wooded areas.

Population: Population density is moderately high (214 persons per km^2).

Climate: The zone has cool temperatures and good rainfall with mean monthly precipitation exceeding 115 mm during March-May and August-November.

Cropping systems: Banana is the main food crop, although bean production is also very important. Maize is the principal crop in northern Kasese and southern Kabarole. Coffee and tea are important cash crops.

21. Kasese Transition Zone (1097 km^2; 1235 m asl; >20°C; 1000-1200 mm per year)

Landscape: This zone lies parallel to the Rwenzori Mountains. Footslopes in the west, and alluvial and lacustrine plains in the east and south, are important features.

Soils: Soil characteristics vary a good deal. Generally, soil erodibility is very low to low, and rainfall erosivity is low.

Land use: Farmland is the major land use type, although significant areas of woodland and grassland are found.

Population: Population density is moderate (260 persons per km^2).

Climate: Mean temperature and rainfall vary across the zone, with rainy seasons in March-May and August-November.

Cropping systems: Banana is the major food crop, followed by maize and beans. Cotton is an important cash crop.

22. Western Mid-Altitude Farmlands (15,307 km^2; 1198 m asl; >20°C; 1000-1200 mm per year). This is a large, widely dispersed and variable AEZ.

Landscape: In the northwestern part, the landscape is rolling to rugged; slopes of 10° are common. The terrain in the southwest is much more rugged. East of Lake Albert lies part of the Rift Valley Escarpment with steep slopes and shallow soils, and behind the escarpment is rugged terrain with steep slopes. The landscape of the farmlands of Mubende and Kiboga and parts of western Mpigi and Central Rakai vary but typically are rolling to rugged with narrow, rounded valleys. Central Mubende is gently rolling with flat-topped hills, broad valleys and coarse soils on the slopes. In northern Mubende and Kiboga, the terrain is more rugged. Western Mubende's landscape is rolling to rugged.

Soils: In the west, soils are often shallow, coarse-textured and acidic; patches of deeper soil are cultivated. Areas in Kibale have loam soils. In northern Mubende and Kiboga, the soils are shallow except on the lower slopes where brown loam, typically a meter deep, occurs. Shallow soils at the base of rock outcrops are often intensively cultivated. In western Mubende, more productive loam and clay loam soils occur on the mid-slopes; productivity is low to medium. Maize,

cotton and other crops are likely to be very responsive to application of moderate amounts of N. Soil erodibility is low and rainfall erosivity is low to moderate.

Land use: About 50% of the land is farmland with much fallow. Farmland is interspersed with wooded savanna in the western part of the zone, and with grassland in Mubende and Kiboga.

Population: Population density is moderately low (78 persons per km^2).

Climate: The first season is shorter with less rainfall (360 mm during March-May) than the second season (485 mm during August-November).

Cropping systems: The food crops are diverse with banana as most important, followed by maize, bean and sweet potato. Maize is more important in the eastern part of the AEZ while sweet potato, cassava and groundnuts are more important in Kabarole. Cattle grazing is important.

23. Lake Victoria Crescent (14,797 km^2; 1174 m asl; >20°C; >1200 mm per year). This is a large, extensive agricultural area that could be treated as three sub-zones: west of the Nile River, east of the Nile, and the eastern section that falls in Bugiri, Busia and Tororo Districts.

Landscape: West of the Nile River, the landscape is an old land surface marked by ridges or laterite-capped hills, long slopes and wide, often swampy valleys. East of the Nile, the landscape is rolling with wide valleys. The eastern part is relatively less rolling.

Soils: West of the Nile, the soils are variable but often have high clay content; sandy clay loam soils are common. The sub-soil has a clay loam texture in some places, which may interfere with rooting depth. Soils are often acidic and low in K, but with moderate levels of organic matter. Crop production takes place primarily on the slopes where the soil is generally deep. Murram may limit rooting depth in places on the lower slopes; ridge tops and land fringing swamps are generally not suitable for crop production. East of the Nile River, clay loam soils are typical on the hillslopes. In the east, soils are less fertile than in the west and are more typically sandy loam, and often acidic, especially in the southeast where K is often deficient. The profitability of response to applied N and P in this AEZ

varies and is lower than in some other AEZs. Soil erodibility is low and rainfall erosivity is moderate.

Land use: This is an important agricultural area where 82% of the land is farmed. Wetlands are important for plant products, environmental protection and rice cultivation in the east.

Population: Population density is moderately high (280 persons per km^2), as is the male:female ratio.

Cropping systems: The crops are diverse. Banana is important throughout much of the zone, but particularly in the west. Bean, sweet potato, cassava and maize are the main food crops. The cereal and grain legume crops are relatively more important east of the Nile. Rice production is important in parts of Tororo, Busia and northern Iganga districts. Robusta coffee is a major cash crop.

24. Ssese Islands (434 km^2; 1180 m asl; >20°C; >1200 mm per year; bimodal rainfall).

Landscape: The landscape of these islands of Lake Victoria consists of flat-topped ridges and plateau remnants, often with steeply sloping sides, and flat lands near the lakeshore.

Soils: The soils are sandy, acidic and generally of low nutrient supply. Soil erodibility is low and rainfall erosivity is moderately high to very high.

Land use: This area is primarily woodland and grassland (forest and *Loudetia-Eragrostis* grassland).

Population: Population density is moderately low (51 persons per km^2). The male:female ratio is unusually high (1.52:1), possibility due to the predominantly male fishing communities.

Climate: Rainfall is high, exceeding a mean of 1500 mm and peaking in April and May.

Cropping systems: Cassava and sweet potato are the main food crops.

25. **Sango Plains** (842 km^2; 1200 m asl; >20°C; >1200 mm per year; bimodal rainfall).

Landscape: The landscape consists of a coastal plain with remnants of old lake terraces; such remnants can be seen near Lake Nabugabo.

Soils: The soils are typically sandy, acidic and generally of low nutrient supply. Soil erodibility is very low and rainfall erosivity is moderate.

Land use: Land use is primarily grassland, with occasional patches of farmland found on the better soils, and areas of deciduous forest.

Population: Population density is low (43 persons per km^2) with a high male:female ratio.

Climate: Rainfall is moderately high in this zone. March-May is the wettest period.

Cropping systems: Banana and sweet potato are the major food crops; coffee is an important commercial crop.

26. **Western Masaka and Mityana Farmlands** (2755 km^2; 1235 m asl; >20°C; 1000-1200 mm per year; bimodal rainfall). This agricultural area is similar to the adjoining farmlands of the western part of the Lake Victoria Crescent, but rainfall is lower and the soils are less productive.

Landscape: The terrain consists of gently rolling hills with rounded summits separated by narrow rounded valleys.

Soils: The soils are variable but are typically deep, acidic sandy loam with generally adequate base supply and moderate organic matter levels. Maize, cotton and other crops are likely to respond to N and P applied at low to moderate levels. Water deficits frequently constrain productivity on the sandier soils. Soil erodibility is low and rainfall erosivity is low.

Land use: The land is primarily farmland on the hill slopes.

Population: Population density is moderately high (194 persons per km^2).

Climate: Rainfall distribution is bimodal with pronounced dry periods in January and February and June-August. Monthly rainfall is higher during the first cropping season, but the second season is of longer duration.

Cropping systems: The crops are diverse with banana occupying the most land, followed by bean, sweet potato and maize.

27. Southwestern Grasslands (11,659 km^2; 1220 m asl; >20°C; <1000 mm per year; bimodal rainfall).

Landscape: In the wetter eastern part, the landscape is varied but is generally rolling with narrow, short valleys. High, narrow ridges dominate the landscape in the west, with steep slopes giving way to more gentle footslopes and valleys. Parts of the south and north of the AEZ are gently rolling.

Soils: The soil in the east is generally clay loam, often moderately acidic, and usually with a good nutrient supply; soil is shallow on ridges. Soils in the west are sandy but generally enjoy good nutrient supply. Soil erodibility is generally low, and while rainfall erosivity is low, soil loss is often great at the onset of the rains due to extensive burning of grasslands. Water deficits constrain land productivity, especially where soils are shallow.

Land use: This AEZ is a semi-arid grassland area (*Themeda-Chloris* and *Themeda-Loudetia* short grass savanna). Most of the crop production takes place in the eastern part.

Population: Population density is moderately low (64 persons per km^2) with a high male:female ratio.

Climate: Rainfall distribution is bimodal with dry periods from December-February and June-August. Precipitation exceeds 100 mm per month in April and November only. Daytime temperatures are hottest in January and February.

Cropping systems: Banana is the major crop, followed by bean. Sweet potato, maize and cassava are also important food crops. Crop production takes place primarily on gentle slopes of drainage ways and on footslopes. There is some cultivation of floodplains. This is a major cattle-grazing area.

28. Southwestern Grass-Farm Lands (2882 km^2; 1477 m asl; <20°C; <1000 mm per year; bimodal rainfall).

Landscape: High, narrow ridges dominate the landscape, with steep slopes giving way to more gentle footslopes and valleys.

Soils: The soil is often moderately acidic clay loam and nutrient supply is generally good; soil is generally shallow on ridges. Soil erodibility is generally low and

rainfall erosivity is low. Water deficits constrain land productivity, especially where soils are shallow.

Land use: This semi-arid area has roughly equal proportions of grassland (*Themeda-Chloris* grass savanna) and farmland.

Population: Population density is moderate (150 persons per km^2).

Climate: Rainfall distribution is bimodal with dry periods from December-February and June-August. Precipitation exceeds 100 mm per month in April and November only.

Cropping systems: Banana is the major crop. This AEZ is a major cattle-grazing area.

29. **Semi-arid Grass-Farmland Transition** (3342 km^2; 1212 m asl; >20°C; <1000 mm per year; bimodal rainfall).

Landscape: The landscape throughout much of this zone consists of gently rolling hills with rounded summits.

Soils: Soils are generally sandy, often with much gravel. Acidic soils low in Ca are common, but otherwise nutrient supply is generally good. Soil erodibility and rainfall erosivity are low.

Land use: Grassland is the major land use type (49%) followed by farmland (30%) in this narrow zone of transition from semi-arid to sub-humid areas.

Population: Population density is moderately low (75 persons per km^2).

Climate: Rainfall is bimodal. Water deficits are common during the first season, but monthly precipitation is greater during the second season, which is of longer duration.

Cropping systems: Banana is the major crop, followed by bean and sweet potato.

30. **Bushenyi-N.Rukungiri Farmlands** (1505 km^2; 1593 m asl; ≤20°C; 1000-1200 mm per year; bimodal rainfall).

Landscape: The terrain is undulating with broad ridge tops and generally small valleys around Bushenyi, but is more steeply sloping in the southern and northern parts of the zone.

Soils: The soil is typically dark, deep and often acidic, but nutrient supply is generally good. Soil erodibility is generally very low to low and rainfall erosivity is moderate.

Land use: This sub-humid highland area is intensively farmed, with some woodland, and less grassland, interspersed.

Population: Population density is moderately high (248 persons per km^2).

Climate: Temperatures are lower than in the mid-altitude areas of Uganda. Rainfall distribution is bimodal and June and July are the driest and coolest months. Rainfall is most reliable during the second season.

Cropping systems: Banana is the major food and market crop. Tea and coffee are important cash crops. Cattle and goat numbers are high.

31. Southwestern Medium-High Farmlands (3546 km^2; 1428 m asl; ≤20°C; 1000-1200 mm per year; bimodal rainfall).

Landscape: Much of the zone consists of low, broad and rounded hills with narrow, flat, swampy valleys. Some parts, however, are steeply sloped.

Soils: The soils are commonly sandy loam in the southwest and loam in the northeast and are often acidic.

Land use: This AEZ is a sub-humid area with similar proportions of woodland and farmland. Soil erodibility is low; rainfall erosivity is low to moderate.

Population: Population density is moderate (202 persons per km^2).

Climate: Rainfall distribution is bimodal and June and July are the driest and coolest months. Rainfall is sufficient for good crop productivity and is most reliable during the second season.

Cropping systems: Banana is the major crop and is commercially important. Other important food crops are bean, maize and sweet potato. Cattle and goat production are major activities.

32. Kabale-Rukungiri Highlands (1607 km^2; 2123 m asl; ≤20°C; 1000-1200 mm per year; bimodal rainfall).

Landscape: The landscape is hilly with long ridges. The slopes are steep to very steep in Kabale, but less steep in Rukungiri. Nearly flat, wide valleys constitute an agriculturally important feature of the landscape; they are often intensively cultivated or grazed.

Soils: Much of the soil is acid loam but nutrient supply is generally good and productivity is medium to high. Waterlogged valley soils are often high in sulfur, which leads

them to become acidified upon aeration following drainage. Erodibility of the upland soils is very low, and while the rainfall erosivity is moderate, erosion potential is high due to the long, steep slopes.

Land use: This highland area is intensively farmed and interspersed with small areas of woodland and grassland.

Population: Population density is moderately high (244 persons per km^2), with a low male:female ratio, probably due to significant out-migration of males.

Climate: The zone has two cropping systems with a major dry season in June and a minor dry season in January. Although sorghum is sown in December and January, other crops are sown mainly in March for the first season. The second season last from September through December. Rainfall peaks in April and November.

Cropping systems: The main crops are banana and bean, followed by maize, sweet potato and sorghum. This AEZ is important for Uganda's production of Irish potatoes.

33. **Kisoro-Kabale Highlands with Acid Soils** (892 km^2; 2169 m asl; ≤20°C; >1200 mm per year; bimodal rainfall).

Topography: The landscape is dominated by a lava plain with ridges, cones and alluvial fans in the south. Slopes are steep in the northern part of the zone.

Soils: The soils are dark brown, often acid and low in base, and are derived from basalt, lava, ash and, in places, phyllite. In the south, the humose brown loam soils are typically of moderate to high productivity. In the north, soils are acidic with low base supply and low productivity. Soil erodibility is very low, and while rainfall erosivity is moderate, the potential for erosion is high due to long, steep slopes.

Land use: Most land is farmland (75%) interspersed with woodland.

Population: Population density is high (309 persons per km^2). The male:female ratio is low (0.90:1), possibly due to out-migration of males.

Climate: This AEZ has high rainfall and cool temperatures. A major dry season occurs during June-August. Rainfall peaks in April and November.

Cropping systems: The principal crops are banana and bean, followed by maize, finger millet and Irish potato. This AEZ is one of Uganda's most important production areas for Irish potatoes.

Table 1. Soil and climate characteristics of agroecological zones of Uganda. Soil characteristics[1] are expressed as percent land area above or below a critical level.

Agroecological zone	Sand %	OC %	pH %	P %	Ca %	Mg %	K %	Rain mm/yr	July : Annual rain %[2]	Temp ^{0}C
1. West Nile Loam FL[3]	43	58	77	58	37	19	63	1345	10.7	22
2. Arua FL	87	39	34	18	21	11	46	1325	10.8	24
3. N Moist FL	58	37	51	40	19	16	24	1261	10.1	24
4. NW WL	84	53	40	35	44	26	53	1228	11.0	25
5. NW F-WL	75	51	33	32	31	31	44	1118	10.1	25
6. NC Sandy F-WL	84	51	47	33	39	36	32	1212	11.8	24
7. N G-F-WL Transition	58	43	50	25	22	33	21	1034	14.3	23
8. NE Sandy Short GL	49	54	37	20	18	21	19	714	15.7	23
9. NE Semi-arid FL	23	55	33	24	13	11	8	744	15.3	23
10. NE Clay Short GL	20	49	32	17	14	19	10	948	14.0	23
11. Usuk Sandy F-GL	85	68	43	76	81	64	70	1082	11.8	24
12. Kapchorwa F-WL	5	27	39	14	10	09	7	1185	12.0	20
13. Mt. Elgon High FL	38	38	46	33	16	17	33	1432	9.1	20
14. Jinja and Mbale FL	31	34	36	24	16	17	25	1282	7.9	22
15. S&E Lake Kyoga Basin	69	47	40	32	29	26	34	1238	7.7	23
16. C Buruli FL	54	27	46	24	22	10	23	1175	5.9	23
17. C WL	66	31	48	35	23	11	30	1170	6.4	23
18. W Clay-Loam FL	10	16	70	42	47	12	69	1236	6.6	22
19. Semliki Flats	32	12	34	14	14	09	12	1067	8.0	24
20. Rwenzori/Fort Portal	39	22	41	20	16	09	19	1310	4.6	20
21. Kasese Transition	50	36	42	34	27	09	34	1168	4.0	21

22. W. Mid-Altitude FL	50	26	53	31	33	18	27	1093	4.9	22
23. L. Victoria Crescent	35	28	54	22	20	17	43	1255	4.9	22
24. Ssese Islands	85	41	78	41	84	70	71	1584	3.4	21
25. Sango Plains	81	51	65	16	73	73	78	1318	2.6	21
26. W Masaka Mityana	68	30	44	20	24	17	35	1015	3.1	21
27. SW GL	65	30	43	22	23	13	40	832	2.6	21
28. SW G-FL	44	15	32	14	20	9	16	832	1.4	20
29. Semi-arid G-FL Trans	53	20	46	20	29	14	16	939	3.1	21
30. Bushenyi-N Rukungiri	41	21	67	25	14	n/a	18	1137	2.8	19
31. SW Medium-High FL	51	21	45	22	20	21	25	1035	2.8	20
32. Kabale-Rukungiri FL	24	14	66	33	19	16	25	1144	1.8	17
33. Kisoro-Kabale FL	29	14	77	37	52	49	59	1237	1.7	16

[1]Critical levels applied to soil properties are: >60% sand, 1.74% OC (organic carbon), <5.5 pH (acidity), <10 ppm P (phosphorus), <1.75 me Ca (calcium) per 100 g of soil, <0.80 me Mg (magnesium) per 100 g, <0.30 me K (potassium) per 100 g.

[2]Rainfall distribution is unimodal in the northern part of the country and the southern districts, but is bimodal in the other AEZs (AEZ 14 - 31).

[3]FL, GL, WL, G-FL, etc. refer to farmland, grassland, woodland (including wooded or bush savanna), grass-farm land, etc.

Table 2. Population and land use characteristics for agroecological zones of Uganda.

Agroecological zone	Pop'n density	Male:female ratio	Area km^2	Grass-land %	Farm-land %	Wood-land %	Wet-land %
1. West Nile Loam FL	126	0.95	408	3	60	36	0
2. Arua FL	267	0.92	816	0	99	1	0
3. N Moist FL	65	0.96	27527	12	71	17	1
4. NW WL	22	0.96	6505	14	8	77	1
5. NW F-WL	59	0.93	7449	27	47	25	1
6. NC Sandy F-WL	37	0.95	10791	16	46	37	1
7. N G-F-WL Transition	24	0.97	7756	30	33	36	0
8. NE Sandy Short GL	15	0.86	11786	85	4	11	0
9. NE Semi-arid FL	58	0.78	1684	31	67	2	0
10. NE Clay Short GL	20	0.93	6608	70	10	18	1
11. Usuk Sandy F-GL	38	0.98	1403	33	64	3	0
12. Kapchorwa F-WL	206	1.02	612	16	39	44	0
13. Mt. Elgon High FL	345	1.00	969	7	73	19	0
14. Jinja and Mbale FL	456	0.99	1505	6	84	9	0
15. S&E Lake Kyoga Basin	129	0.95	10154	11	76	2	10
16. C Buruli FL	103	1.00	4311	20	56	14	10
17. C WL	17	1.02	10919	30	5	62	3
18. W Clay-Loam FL	74	1.03	2424	12	58	31	0
19. Semliki Flats	30	1.07	740	66	2	22	10
20. Rwenzori/Fort Portal	214	0.98	2551	7	63	29	1
21. Kasese Transition	260	0.97	1097	12	51	37	0

22. W. Mid-Altitude FL	78	1.00	15307	16	53	29	2
23. L. Victoria Crescent	280	0.98	14797	8	82	8	3
24. Ssese Islands	51	1.52	434	22	28	50	0
25. Sango Plains	43	0.99	842	63	12	20	5
26. W Masaka Mityana	194	1.00	2755	11	84	4	1
27. SW GL	64	1.02	11659	61	28	8	3
28. SW G-FL	150	0.95	2883	51	47	0	2
29. Semi-arid G-FL Trans	75	0.98	3342	45	31	15	9
30. Bushenyi-N Rukungiri	248	0.93	1505	6	79	14	0
31. SW Medium-High FL	202	0.93	3546	15	78	7	0
32. Kabale-Rukungiri FL	244	0.91	1607	7	83	10	0
33. Kisoro-Kabale FL	309	0.87	893	0	82	18	0

FL, GL, WL, G-FL, etc. refer to farmland, grassland, woodland (including wooded or bush savanna), grass-farm land, etc.

Table 3. Percent unprotected land occupied by 10 food crops for agroecological zones of Uganda.

Agroecological zone	Maize	Sor-ghum	Cas-sava	Sweet Potato	Irish Potato	Finger Millet	Banana	Bean	G'nut	Rice
1. West Nile Loam FL	8.7	4.8	6.1	4.3	0.2	4.7	4.9	4.3	4.2	0.0
2. Arua FL	9.3	4.9	6.1	3.9	0.0	4.5	2.1	11.4	2.7	0.0
3. N Moist FL	4.8	2.8	2.9	3.6	0.3	4.2	1.7	5.0	2.8	0.3
4. NW WL	0.5	0.5	0.6	0.6	0.0	0.4	0.1	0.4	0.3	0.0
5. NW F-WL	2.1	2.2	2.0	1.6	0.1	1.9	1.5	1.1	1.7	0.1
6. NC Sandy F-WL	1.7	1.5	1.6	1.8	0.1	2.1	0.0	1.5	1.2	0.1
7. N G-F-WL Trans.	1.5	1.9	0.9	1.2	0.0	1.4	0.0	1.6	1.3	0.0
8. NE Sandy Short GL	0.3	0.9	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0
9. NE Semi-arid FL	3.7	10.8	0.1	0.3	0.0	0.6	0.0	0.6	0.4	0.0
10. NE Clay Short GL	1.6	1.0	0.6	1.0	0.0	0.9	0.4	1.5	1.2	0.0
11. Usuk Sandy F-GL	0.7	1.8	0.5	1.2	0.0	1.9	0.0	1.0	2.2	0.1
12. Kapchorwa F-WL	28.7	1.7	8.1	5.7	1.9	7.5	16.4	37.5	10.1	0.2
13. Mt. Elgon High FL	17.1	2.7	9.3	15.2	1.2	11.2	30.0	23.8	16.1	2.2
14. Jinja and Mbale FL	15.7	0.6	6.7	19.5	1.2	6.5	44.4	22.1	8.3	0.5
15. S&E Lake Kyoga Basin	4.9	2.0	5.0	5.6	0.2	6.6	3.9	4.6	3.6	2.9
16. C Buruli FL	1.5	0.4	1.1	1.3	0.0	0.5	5.2	1.8	2.1	0.0
17. C WL	0.4	0.0	0.1	0.3	0.0	0.2	0.5	0.3	0.3	0.0
18. W Clay-Loam FL	7.2	0.9	1.0	7.5	0.2	4.5	12.2	6.5	3.7	0.3
19. Semliki Flats	0.1	0.0	0.2	0.1	0.1	0.0	3.3	0.5	0.1	0.1
20. Rwenzori/Fort Portal	3.5	0.6	2.1	2.4	0.4	0.5	31.2	5.7	0.5	0.4

21. Kasese Transition	6.0	0.3	1.7	1.7	0.7	0.1	33.4	4.9	0.2	0.1
22. W. Mid-Altitude FL	2.4	0.6	1.1	2.4	0.1	1.1	7.1	2.5	0.9	0.1
23. L. Victoria Crescent	6.1	1.1	3.6	4.4	0.3	2.9	12.9	4.6	1.8	1.1
24. Ssese Islands	0.8	0.1	12.8	20.0	0.0	0.0	1.0	.4	0.3	0.0
25. Sango Plains	0.9	0.3	0.5	2.1	0.0	0.0	4.2	1.1	0.2	0.0
26. W Masaka Mityana	1.5	0.6	0.7	2.6	0.3	0.1	25.9	2.6	0.5	0.0
27. SW GL	1.1	0.3	0.6	1.4	0.1	0.3	7.1	1.7	0.4	0.0
28. SW G-FL	2.9	2.8	1.0	3.1	0.7	2.3	29.9	5.1	1.2	0.0
29. Semi-arid G-FL Trans	0.9	0.8	0.9	1.3	0.1	1.0	10.3	1.5	0.7	0.0
30. Bushenyi-N Rukungiri	2.5	1.2	0.7	2.7	0.0	2.3	59.9	3.0	1.3	0.0
31. SW Medium-High FL	3.9	3.0	0.8	3.6	0.8	2.6	48.3	5.2	1.3	0.0
32. Kabale-Rukungiri FL	12.0	6.4	1.4	8.2	3.7	5.0	19.8	12.6	0.3	0.0
33. Kisoro-Kabale FL	10.8	7.7	0.1	3.8	10.5	11.0	3.0	10.7	0.2	0.0

FL, GL, WL, G-FL, etc. refer to farmland, grassland, woodland (including wooded or bush savanna), grass-farm land, etc.

Crop production estimates indicate the relative importance of a crop, but are probably inaccurate in many cases.

Table 4. Annual areas (ha) of crop production in agroecological zones of Uganda.

Agroecological zone	Maize	Sorghum	Cassava	Sweet Potato	Irish Potato	Finger Millet	Banana	Bean	G'nut	Rice
1. West Nile Loam FL	3551	1942	2480	1774	93	1936	2003	1771	1701	19
2. Arua FL	7596	4038	4949	3221	26	3669	1721	9332	2244	35
3. N Moist FL	131099	76780	78710	97963	9308	116815	47087	138048	75876	7060
4. NW WL	3447	3023	3723	4079	3	2375	714	2745	2003	217
5. NW F-WL	15311	16289	14639	11698	529	14080	11131	8256	12951	519
6. NC Sandy F-WL	18573	16583	16830	19734	540	22811	379	16517	13411	646
7. N G-F-WL Transition	11344	14740	7147	9307	147	11091	41	12500	10268	273
8. NE Sandy Short GL	3208	10141	256	390	1	620	3	738	628	1
9. NE Semi-arid FL	6253	18123	145	536	0	954	2	1052	619	0
10. NE Clay Short GL	10431	6316	4017	6331	314	6256	2852	9797	8131	48
11. Usuk Sandy F-GL	915	2564	750	1644	15	2653	24	1387	3145	81
12. Kapchorwa F-WL	17564	1040	4957	3488	1163	4590	10037	22950	6181	122
13. Mt. Elgon High FL	16570	2616	9012	14729	1163	10835	29070	23031	15584	2132
14. Jinja and Mbale FL	23628	903	10083	29340	1806	9782	66822	33264	12486	753
15. S&E Lake Kyoga Basin	49496	20207	50986	56930	2238	66528	39791	47111	36420	29654
16. C Buruli FL	6603	1853	4551	5710	77	2171	22559	7778	8882	103
17. C WL	3873	436	1072	3441	82	1658	5151	3760	3129	38
18. W Clay-Loam FL	17368	2187	2485	18121	527	11011	29522	15839	8981	668
19. Semliki Flats	98	28	168	63	46	2	2447	354	41	100
20. Rwenzori/Fort Portal	8904	1560	5245	6178	1125	1243	79644	14529	1202	1040
21. Kasese Transition	6599	334	1857	1913	723	131	36647	5404	202	72

22. W. Mid-Altitude FL	36869	9081	17359	36638	2206	17065	108343	38781	13792	1428
23. L. Victoria Crescent	90338	16686	52790	65326	4447	43051	191032	68425	27129	16767
24. Ssese Islands	348	54	5556	8680	0	0	420	172	138	0
25. Sango Plains	799	228	388	1809	39	34	3548	896	210	0
26. W Masaka Mityana	4036	1711	1962	7047	701	243	71270	7060	1360	0
27. SW GL	13164	3525	6529	16841	1272	3092	83327	19585	4848	0
28. SW G-FL	8501	8000	2879	8866	1955	6516	86118	14568	3325	0
29. Semi-arid G-FL Trans	2876	2645	3171	4278	329	3191	34268	5112	2377	0
30. Bushenyi-N Rukungiri	3720	1744	1100	4073	64	3411	90123	4513	1988	0
31. SW Medium-High FL	13688	10811	2996	12624	2720	9196	171350	18471	4725	0
32. Kabale-Rukungiri FL	19268	10362	2328	13104	5933	8080	31793	20231	468	0
33. Kisoro-Kabale FL	9656	6841	115	3353	9347	9778	2696	9560	146	0

FL, GL, WL, G-FL, etc. refer to farmland, grassland, woodland (including wooded or bush savanna), grass-farm land, etc.

Crop production estimates indicate the relative importance of a crop, but are probably inaccurate in many cases.

Table 5. Median values for mean monthly rainfall (mm) for agroecological zones of Uganda.

Agroecological zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. West Nile Loam FL	17	32	84	135	135	130	157	197	180	169	92	31
2. Arua FL	16	32	85	134	127	118	144	192	173	173	97	34
3. N Moist FL	16	30	79	154	163	112	127	179	147	140	83	35
4. NW WL	11	23	72	135	142	118	136	175	151	149	87	28
5. NW F-WL	13	22	71	126	114	91	112	155	141	143	94	27
6. NC Sandy F-WL	11	26	69	139	157	125	152	182	134	115	67	33
7. N G-F-WL Transition	10	22	61	122	137	108	147	160	103	82	48	27
8. NE Sandy Short GL	8	16	48	102	99	70	113	103	56	45	31	19
9. NE Semi-arid FL	9	16	52	107	112	71	114	105	57	44	38	20
10. NE Clay Short GL	14	24	58	119	129	95	131	133	83	70	48	28
11. Usuk Sandy F-GL	17	31	67	150	161	103	126	145	100	85	57	31
12. Kapchorwa F-WL	26	43	79	152	170	112	142	149	97	102	75	39
13. Mt. Elgon High FL	42	65	114	196	201	123	135	154	117	132	112	59
14. Jinja and Mbale FL	39	58	107	178	175	114	112	133	107	116	100	58
15. S&E Lake Kyoga Basin	27	51	101	194	173	91	92	133	110	112	93	55
16. C Buruli FL	36	54	104	166	136	71	68	110	114	131	115	67
17. C WL	29	47	95	158	132	70	75	122	125	141	114	54
18. W Clay-Loam FL	30	47	99	167	133	79	85	133	140	152	122	51
19. Semliki Flats	27	40	90	141	120	76	85	126	94	102	93	54
20. Rwenzori/Fort Portal	44	60	122	170	122	68	58	116	147	166	144	80
21. Kasese Transition	45	58	110	153	115	60	49	99	131	147	134	79
22. W. Mid-Altitude FL	35	46	96	151	109	51	51	103	120	140	122	60
23. L. Victoria Crescent	56	69	126	196	151	72	65	90	98	121	131	88

24. Ssese Islands	84	96	176	277	256	90	55	75	84	104	153	134
25. Sango Plains	72	83	149	228	198	58	36	58	82	102	132	113
26. W Masaka Mityana	52	59	109	150	115	42	29	53	86	101	115	80
27. SW GL	38	45	84	115	77	23	21	53	88	99	104	59
28. SW G-FL	46	63	94	119	79	15	11	41	77	95	111	74
29. Semi-arid G-FL Trans	35	44	89	127	87	33	33	75	101	116	118	59
30. Bushenyi-N Rukungiri	63	77	112	138	99	39	32	81	117	132	144	99
31. SW Medium-High FL	55	68	100	134	95	37	29	74	103	119	132	90
32. Kabale-Rukungiri FL	73	95	126	166	106	33	18	57	107	119	134	100
33. Kisoro-Kabale FL	81	103	134	178	115	39	21	65	116	129	142	104

Median monthly values for rainfall were estimated from data presented in *Africa: A Topographic and Climatic Database* (1995).

Table 6. Median values for mean monthly minimum temperature (C°) for agroecological zones of Uganda.

Agroecological zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. West Nile Loam FL	18.0	19.1	19.7	19.7	19.4	18.7	18.3	18.4	18.6	18.6	18.6	17.8
2. Arua FL	17.4	18.8	19.4	19.3	19.0	18.4	18.0	17.9	18.2	18.1	18.1	17.2
3. N Moist FL	17.2	18.0	18.6	18.5	18.0	17.5	17.1	16.9	16.9	17.1	17.1	16.9
4. NW WL	17.8	19.0	19.6	19.5	19.1	18.5	18.0	17.8	17.9	17.9	17.8	17.4
5. NW F-WL	18.3	19.5	20.1	20.0	19.6	19.0	18.6	18.5	18.6	18.7	18.6	18.0
6. NC Sandy F-WL	16.9	17.7	18.3	18.1	17.6	17.1	16.7	16.6	16.6	16.8	16.7	16.5
7. N G-F-WL Transition	17.2	18.0	18.5	18.2	17.7	17.1	16.9	16.7	16.8	17.1	17.1	16.9
8. NE Sandy Short GL	18.2	18.9	19.5	19.1	18.6	17.9	17.8	17.8	18.1	18.5	18.4	18.2
9. NE Semi-arid FL	18.1	18.8	19.3	19.0	18.4	17.8	17.7	17.6	17.7	18.4	18.2	18.0
10. NE Clay Short GL	16.4	17.1	17.6	17.5	16.9	16.2	16.1	16.0	16.0	16.6	16.6	16.4
11. Usuk Sandy F-GL	16.6	17.2	17.7	17.7	17.0	16.4	16.3	16.2	16.1	16.8	16.8	16.6
12. Kapchorwa F-WL	15.3	15.7	16.4	16.6	16.0	15.0	15.1	15.1	15.1	15.8	15.7	15.5
13. Mt. Elgon High FL	8.7	8.9	9.5	10.2	10.5	9.2	9.3	9.2	8.7	9.0	9.0	8.9
14. Jinja and Mbale FL	15.3	15.7	16.3	16.5	16.1	15.3	15.3	15.2	15.1	15.6	15.6	15.4
15. S&E Lake Kyoga Basin	16.8	17.4	17.8	17.9	17.3	16.8	16.6	16.5	16.5	17.0	17.0	16.8
16. C Buruli FL	17.1	17.6	18.1	18.1	17.8	17.2	16.8	16.7	16.8	17.2	17.2	17.0
17. C WL	17.4	17.9	18.3	18.4	18.0	17.5	17.0	17.0	17.0	17.4	17.4	17.2
18. W Clay-Loam FL	17.1	17.8	18.1	18.1	17.9	17.4	16.9	17.0	16.9	17.3	17.3	16.9
19. Semliki Flats	18.6	19.4	19.8	19.9	19.5	18.9	18.4	18.9	18.8	19.2	19.2	18.5
20. Rwenzori/Fort Portal	15.7	16.2	16.6	16.9	16.6	15.8	15.5	16.0	15.9	16.2	16.3	15.7
21. Kasese Transition	14.7	15.3	15.6	16.0	15.6	14.7	14.3	15.2	15.0	15.1	15.4	14.7
22. W. Mid-Altitude FL	16.7	17.0	17.3	17.4	17.1	16.6	16.1	16.3	16.3	16.7	16.8	16.5
23. L. Victoria Crescent	16.2	16.6	17.0	17.2	17.0	16.3	15.8	15.9	15.9	16.4	16.4	16.2

24. Ssese Islands	15.8	16.0	16.4	16.7	16.4	15.5	14.9	15.1	15.4	16.0	16.1	15.7
25. Sango Plains	15.7	15.9	16.3	16.7	16.2	15.2	14.6	15.0	15.3	16.0	16.1	15.6
26. W Masaka Mityana	15.7	15.9	16.3	16.6	16.3	15.4	14.8	15.0	15.2	15.8	16.0	15.5
27. SW GL	15.5	15.8	16.1	16.3	15.9	15.1	14.6	14.9	15.2	15.6	15.8	15.4
28. SW G-FL	13.1	13.4	13.9	14.3	13.6	12.1	11.9	12.8	13.2	13.4	14.0	13.4
29. Semi-arid G-FL Trans	15.2	15.6	15.9	16.1	15.7	15.0	14.6	15.1	15.2	15.4	15.7	15.2
30. Bushenyi-N Rukungiri	12.7	13.0	13.5	14.0	13.3	12.0	11.7	12.9	13.0	13.0	13.4	12.9
31. SW Medium-High FL	13.3	13.8	14.2	14.7	14.0	12.7	12.4	13.4	13.7	13.7	14.1	13.6
32. Kabale-Rukungiri FL	12.5	12.8	13.2	13.7	13.2	11.7	11.4	12.7	12.9	12.8	13.1	12.8
33. Kisoro-Kabale FL	11.1	11.4	11.7	12.2	11.9	10.5	10.1	11.3	11.4	11.4	11.5	11.4

Median values for mean monthly minimum temperature were estimated from data presented in *Africa: A Topographic and Climatic Database* (1995).

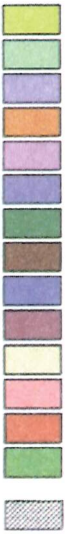
Table 7. Median values for mean monthly maximum temperature (C°) for agroecological zones of Uganda.

Agroecological zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. West Nile Loam FL	33.9	34.4	33.3	28.8	31.0	29.8	28.7	28.8	29.9	30.5	31.5	32.5
2. Arua FL	33.6	34.0	33.0	28.7	30.8	29.7	28.4	28.7	29.8	30.5	31.3	32.2
3. N Moist FL	32.5	32.8	31.8	28.0	28.9	28.5	27.7	28.0	29.2	30.1	30.6	31.0
4. NW WL	34.2	34.6	33.5	28.8	30.6	29.7	28.6	28.8	30.1	31.0	32.0	32.5
5. NW F-WL	33.6	33.9	32.9	29.0	30.8	30.0	28.9	29.0	30.1	30.8	31.5	32.3
6. NC Sandy F-WL	32.1	32.4	31.4	27.5	28.6	28.1	27.3	27.5	28.8	29.7	30.2	30.6
7. N G-F-WL Transition	31.9	32.3	31.3	27.6	28.7	28.2	27.3	27.6	29.0	29.7	30.2	30.4
8. NE Sandy Short GL	32.3	32.8	32.1	28.7	29.8	29.3	28.5	28.7	30.1	30.6	30.8	31.1
9. NE Semi-arid FL	32.4	32.9	32.2	28.8	29.8	29.4	28.5	28.8	30.3	30.6	30.9	31.0
10. NE Clay Short GL	31.2	31.5	30.8	27.5	28.3	28.0	27.2	27.5	28.9	29.3	29.5	29.9
11. Usuk Sandy F-GL	31.6	31.9	31.1	27.7	28.4	28.3	27.5	27.7	29.1	29.6	29.9	30.3
12. Kapchorwa F-WL	30.9	31.3	30.8	27.9	28.5	28.2	27.4	27.9	29.0	29.4	29.1	29.9
13. Mt. Elgon High FL	23.9	24.3	24.2	20.1	21.3	20.8	19.7	20.1	21.1	21.7	21.8	22.4
14. Jinja and Mbale FL	30.5	30.5	29.9	27.3	27.6	27.4	26.9	27.3	28.1	28.8	28.7	29.3
15. S&E Lake Kyoga Basin	31.8	31.8	31.0	27.8	28.3	28.1	27.4	27.8	28.7	29.5	29.8	30.3
16. C Buruli FL	31.3	31.3	30.7	27.5	28.1	27.8	27.2	27.5	28.4	29.2	29.7	30.0
17. C WL	31.2	31.3	30.6	27.3	28.1	27.9	27.1	27.3	28.2	28.9	29.5	29.8
18. W Clay-Loam FL	30.0	30.2	29.5	26.7	27.7	27.5	26.7	26.7	27.5	27.9	28.3	28.6
19. Semliki Flats	31.4	31.7	31.0	29.1	29.8	29.7	29.1	29.1	29.8	29.7	29.8	30.3
20. Rwenzori/Fort Portal	29.1	29.3	28.6	27.8	27.6	27.6	27.5	27.8	27.9	27.6	27.4	27.9
21. Kasese Transition	28.6	28.9	28.1	27.8	27.1	27.3	27.5	27.8	27.7	27.2	27.0	27.4
22. W. Mid-Altitude FL	29.2	29.3	28.8	26.7	27.1	27.1	26.6	26.7	27.2	27.4	27.6	27.9

23. L. Victoria Crescent	29.8	29.7	29.2	26.9	27.2	27.0	26.5	26.9	27.6	28.2	28.3	28.6
24. Ssese Islands	27.1	27.0	26.4	25.3	25.1	25.0	24.8	25.3	26.2	26.6	26.3	26.2
25. Sango Plains	27.2	27.2	26.7	26.0	25.7	25.8	25.5	26.0	26.6	26.6	26.3	26.3
26. W Masaka Mityana	28.0	27.9	27.6	26.3	26.4	26.3	25.9	26.3	26.6	26.7	26.7	26.9
27. SW GL	28.1	28.2	27.7	26.4	26.3	26.4	26.1	26.4	26.7	26.6	26.6	26.8
28. SW G-FL	27.0	27.2	27.0	27.4	26.4	26.9	27.2	27.4	26.9	26.5	26.0	26.2
29. Semi-arid G-FL Trans	28.3	28.5	27.9	26.8	26.3	26.5	26.6	26.8	26.8	26.6	26.6	26.9
30. Bushenyi-N Rukungiri	27.0	27.2	26.8	27.0	26.0	26.4	26.8	27.0	26.7	26.2	25.8	26.1
31. SW Medium-High FL	27.6	27.8	27.5	27.6	26.8	27.1	27.4	27.6	27.4	26.9	26.5	26.8
32. Kabale-Rukungiri FL	26.4	26.6	26.4	26.7	25.6	26.0	26.4	26.7	26.6	26.0	25.5	25.7
33. Kisoro-Kabale FL	24.1	24.3	23.9	23.8	22.7	23.0	23.6	23.8	24.0	23.6	23.2	23.4

Median values for mean monthly maximum temperature were estimated from data presented in *Africa: A Topographic and Climatic Database* (1995).

LEGEND



1. West Nile Farmlands
2. Northwestern Farmlands-Wooded Savanna
3. Northern Moist Farmlands
4. Northeastern-centrel Grass-Bush-Farmlands
5. Northeastern Semi-arid Short Grass Plains
6. Western Mid-Altitude Farmlands and the Semliki Flats
7. Central Wooded Savanna
8. Southern and Eastern Lake Kyoga Basin
9. Mt. Elgon Farmlands
10. Western Medium-High Farmlands
11. Southwestern Grass-Farmlands
12. Lake Victoria Crescent and Mbale Farmlands
13. Ssese Islands and Sango Plains
14. Southwestern Highlands

Gazetted (protected) areas

An Aggregation of Agroecological zones of Uganda

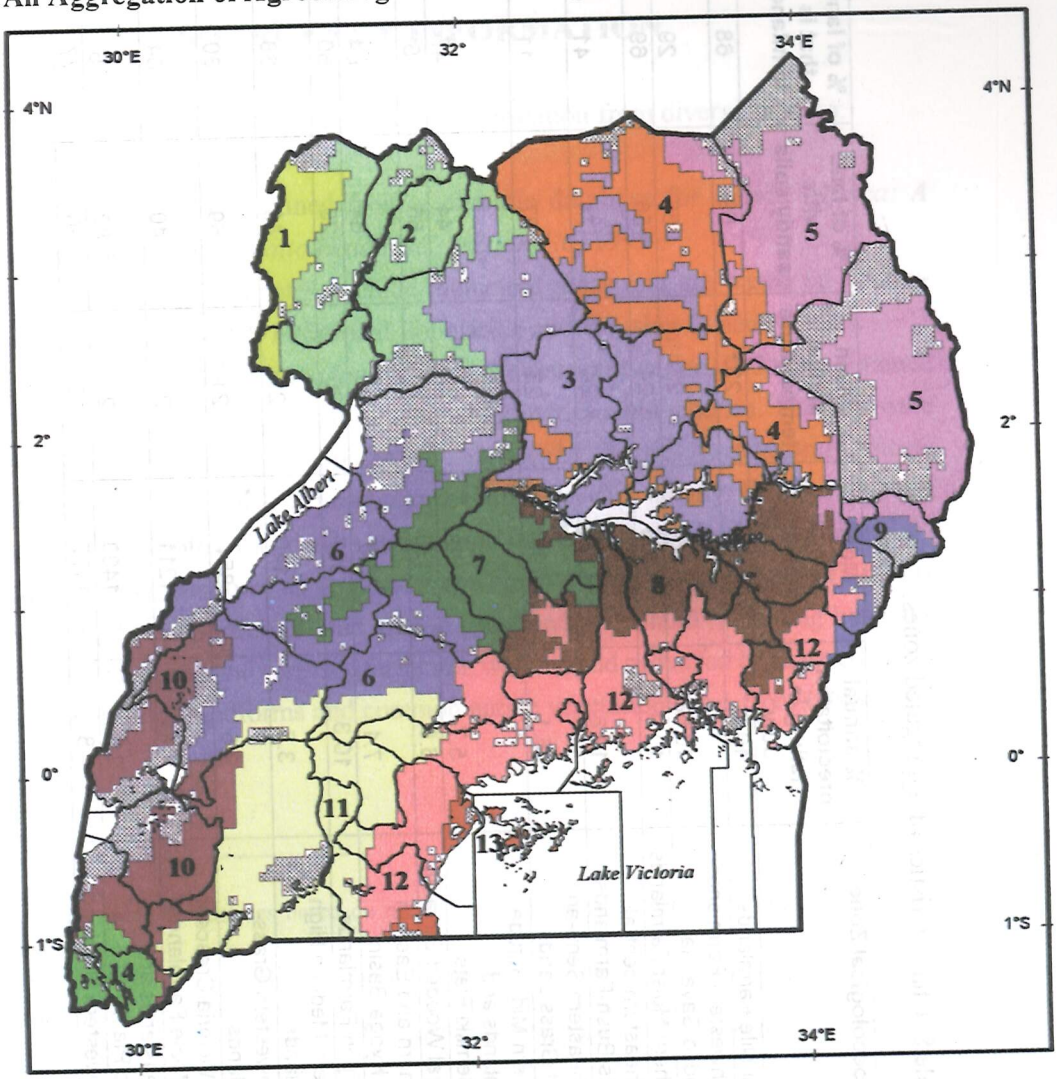


Table 8. Characteristics of aggregated zones.

Agroecological Zone	% annual precipitation falling in July	Mean annual precipitation	Mean annual temperature	% of land with sandy soils	% of land that is farmland
West Nile Farmlands	10.8	1304	23	69	68
Northwestern Farmlands-Wooded Savanna	10.6	1174	25	80	29
Northern Moist Farmlands	10.0	1258	24	56	69
Northeastern-central Grass-Bush-Farmlands	12.8	1134	24	74	41
Northeastern Semi-arid Short Grass Lands	15.1	795	23	37	11
Western Mid-Altitude Farmlands and the Semliki Flats	5.7	1123	22	44	47
Central Wooded Savanna	6.5	1170	23	66	5
Southern and Eastern Lake Kyoga Basin	7.1	220	23	64	64
Mt. Elgon Farmlands	10.3	1337	20	25	60
Western Medium High Farmlands	3.5	1140	20	46	68
Southwestern Grass-Farmlands	2.5	851	21	59	30
Lake Victoria Crescent and Mbale Farmlands	4.7	1211	22	40	64
Ssese Islands and Sango Plains	2.9	1400	21	82	5
Southwestern Highlands	1.8	1177	16	26	77

SOURCES OF INFORMATION

The AEZs for Uganda were determined using information from diverse sources:

1. Climate data were obtained from a climatic database for Africa (*Africa: A Topographic and Climatic Database. Version 1.0,* 1995).
2. Rural population estimates exclude municipal areas and are based on county-level data from the 1991 National Population and Housing Census (1992).
3. Crop production data for ten food crops at the district level for 1995 were obtained from the Ministry of Agriculture, Animal Industries and Fisheries. The data were extended to the county level based on estimates by District Agricultural Officers of the proportion of district production occurring in each county. These production estimates were often found to be highly improbable and were adjusted accordingly[2] .
4. Land use information was obtained from The National Biomass Study (1996) to estimate the proportion of land area in grassland, woodland (including bush and wooded savannas and forests), farmland, wetland and protected or gazetted areas.
5. Information on landforms and common native vegetation came from Ollier *et al.* (1965).

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[2] When crop production estimates based on official statistics were judged to be highly improbable, adjustments were made:

- Estimates of banana production were judged to be extremely high in several districts relative to area planted to other crops. These were revised to equal the total of the nine other food crops considered for Kiboga (75,641 to 12,984), Luwero (38,167 to 26,772), Mpigi (61,759 to 40,000), and Mubende (50,426 to 20,000). Banana production was also adjusted for Rakai (118,027 to 70,000) and Masaka (153,975 to 100,000).
- Areas planted to crops were reduced by 35, 18, 11, 47 (banana, only) and 65% for the Kapchorwa Farm-Woodland, Mt. Elgon High Farmland, Jinja and Mbale Farmlands, Southwest Grass-Farmlands, and Ssese Islands AEZs, respectively, as the estimates received were improbably high.
- Other doubtful estimates which were not adjusted include: the high intensity of banana production in the Southwestern Medium-High Farmlands; the low intensity of bean production in Kisoro; the low intensity of sorghum production in Kabale; the high level of bean production in the Southern and Eastern Lake Kyoga Basin; and the low level of crop production in the Central Buruli Farmlands, in the Lake Victoria Crescent and in the Western Mid-Altitude Farmlands.

6. Information on soil erodibility and rainfall erosivity[3] (by Modified Fournier Index, FAO, 1977) was taken from Yost and Eswaran (1990).
7. Soil data were derived from the Memoirs of the Research Division: Kawanda Research Station, Department of Agriculture, Uganda. These memoirs report the results of a soil reconnaissance survey. This information was used to estimate the proportion of land area with values above or below a critical level: sand >60%; pH <5.5; available P <10 ppm; organic carbon <1.74%; and exchangeable Ca, Mg and K less than 1.75, 0.80, and 0.30 me/100g, respectively. Soil profile information and the results of fertilizer response trials (Foster, 1976) were used in describing the soils of the AEZs.
8. Further details on the information and methods used to determine the AEZs of Uganda are presented in a working document (Wortmann and Eledu, unpublished).

[3] Rainfall erosivity (C_1) equals $\sum p_i^2/P$ (i = 1-12), where p_i is the rainfall in month I and P is the annual rainfall. Very low, low, moderate, high and very high erosivity corresponds to C_1 values of ≤100, 200, 300, 400 and ≥500, respectively.

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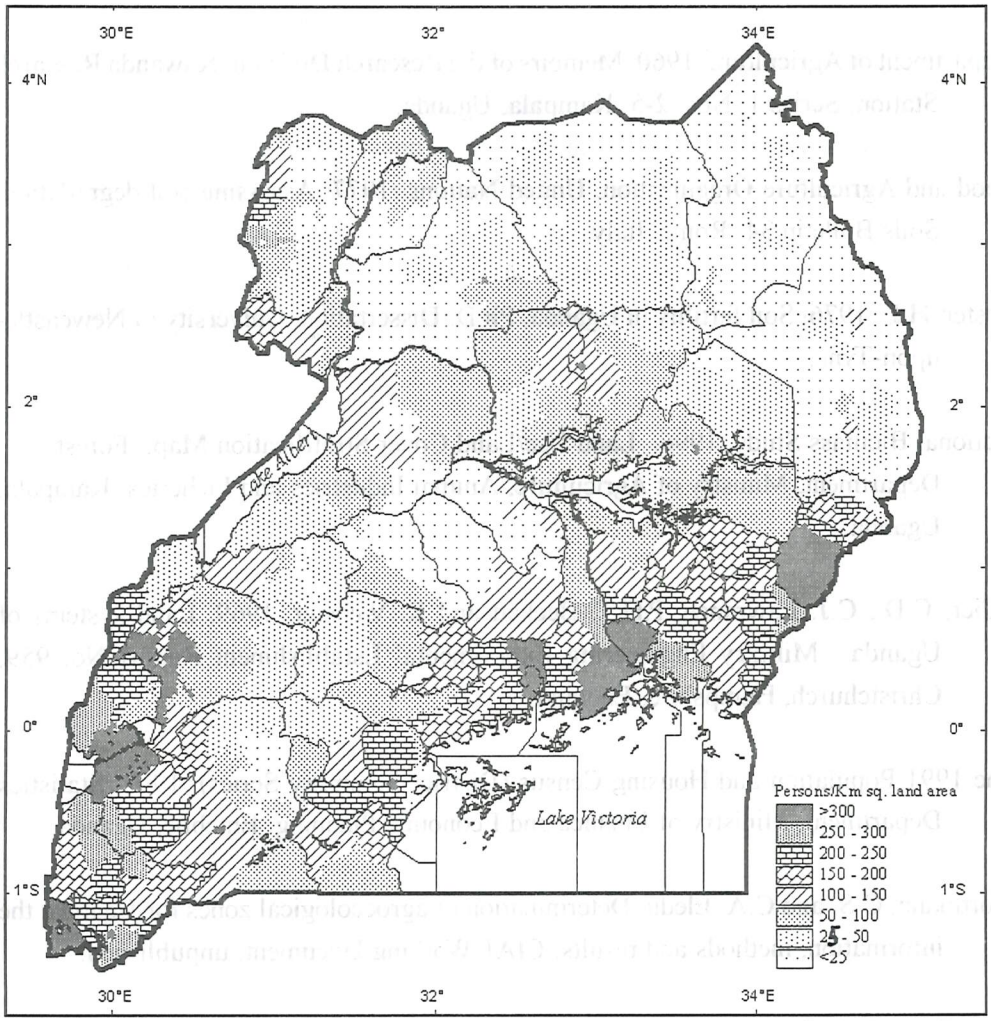
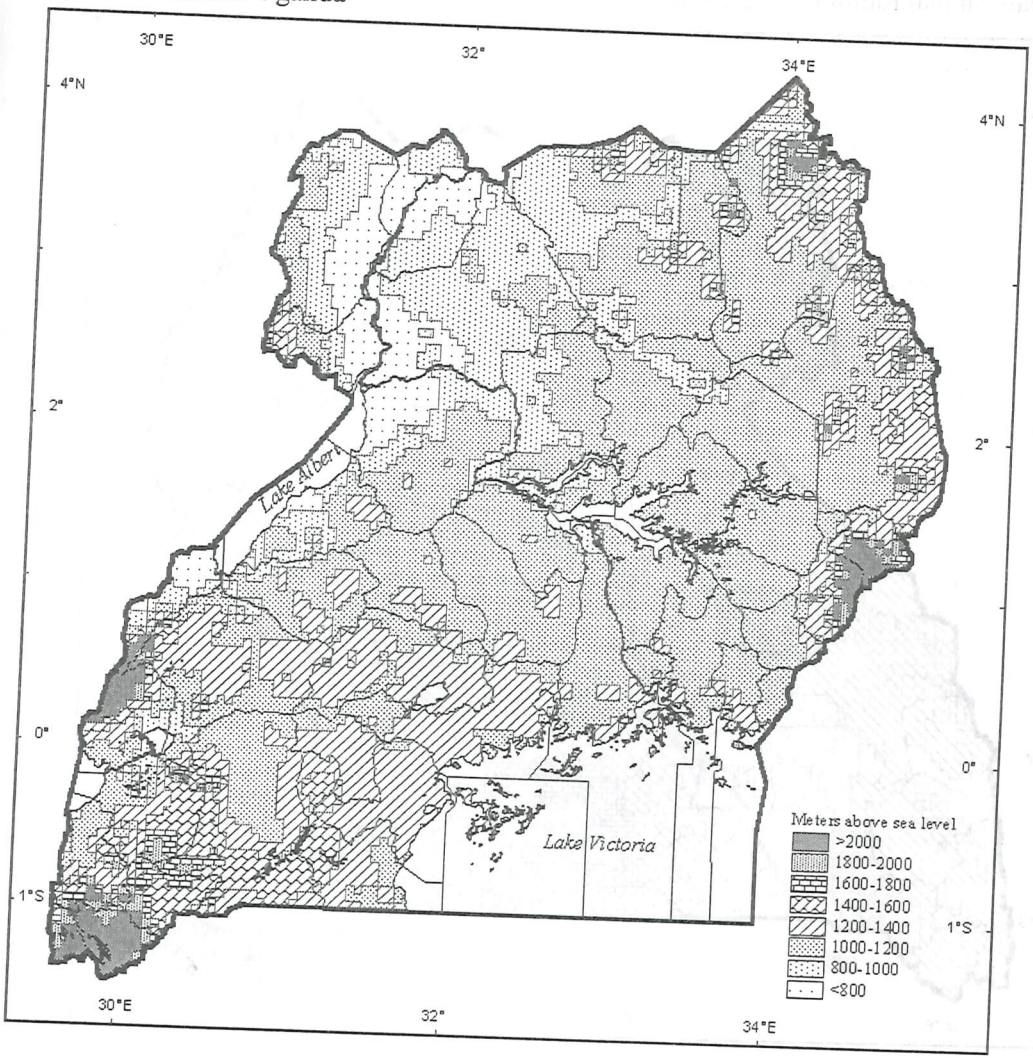
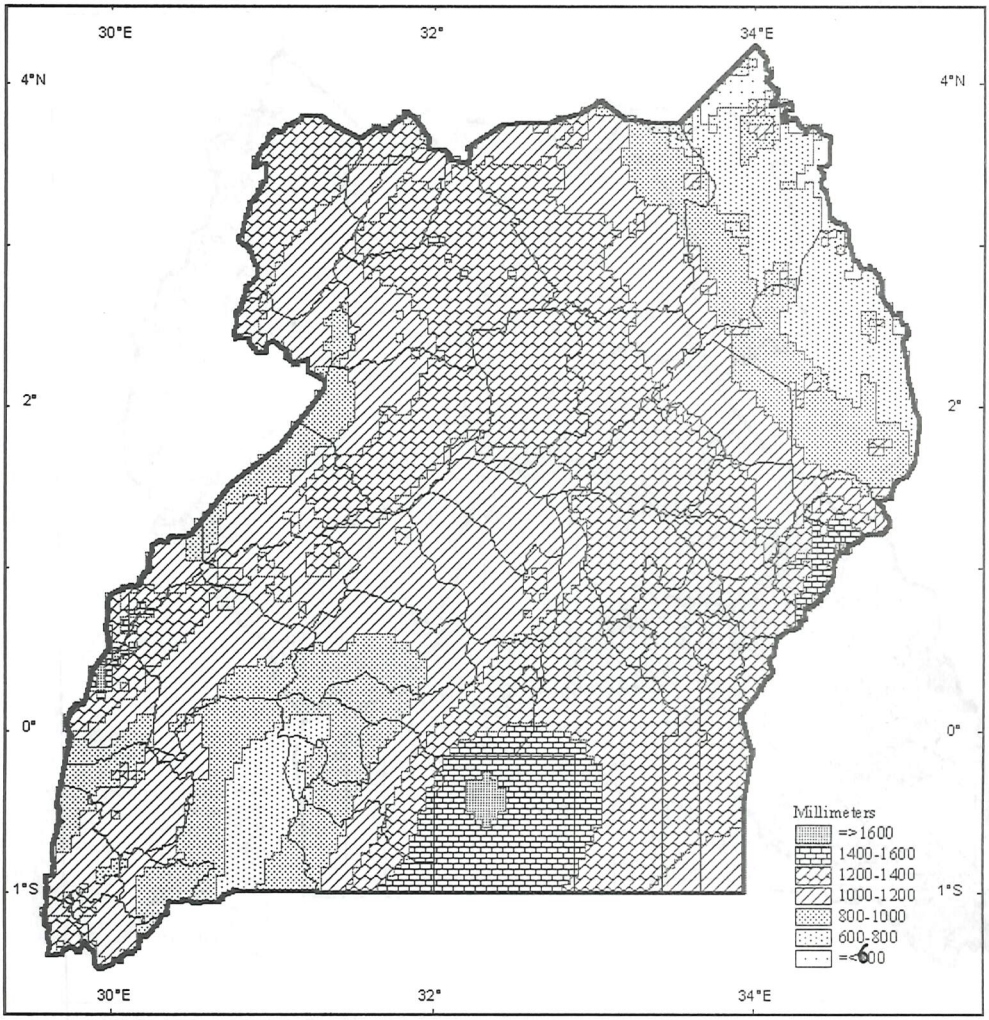
Population density for rural Uganda



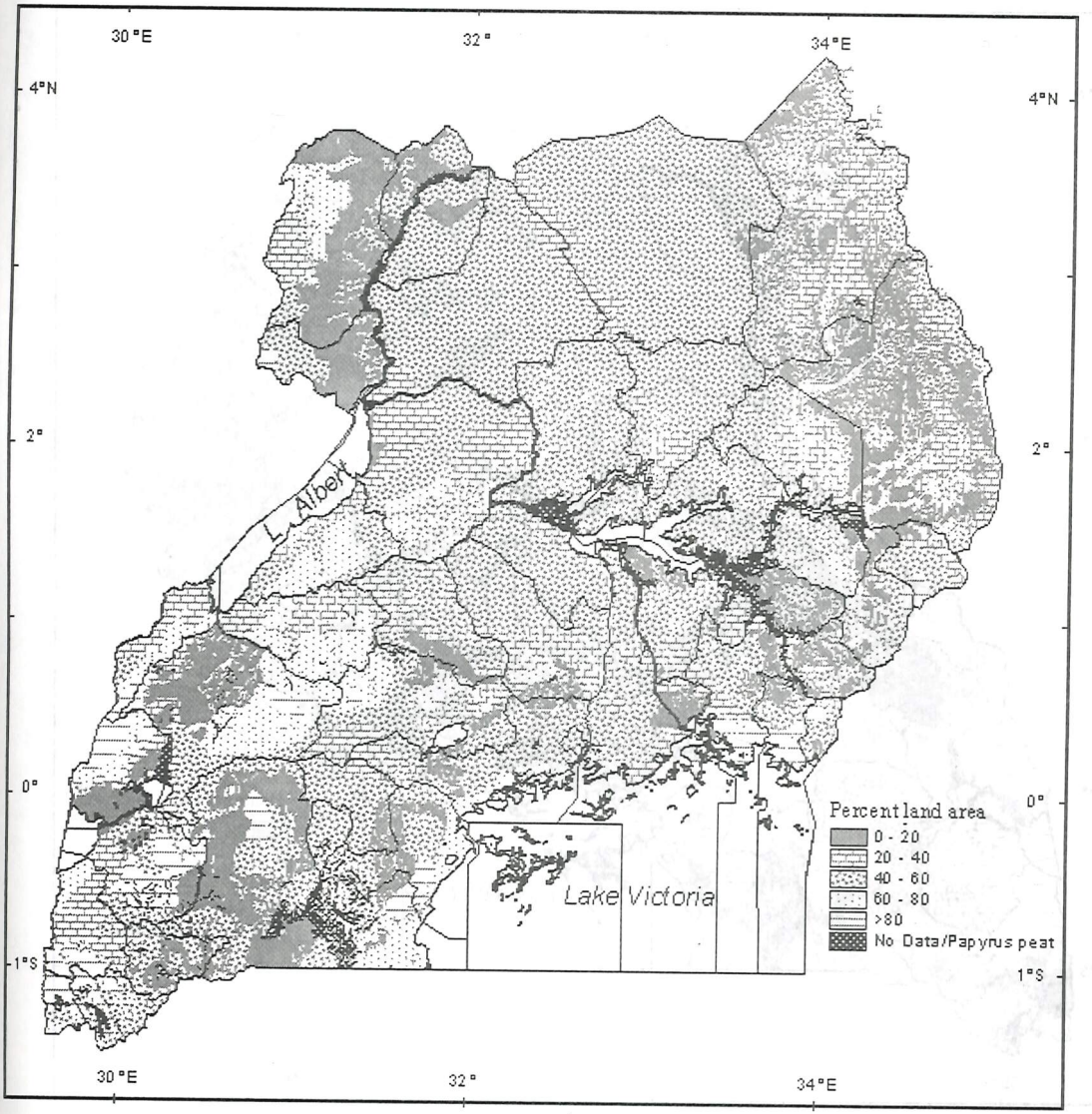
Elevation for Uganda



Mean Annual Rainfall for Uganda



Proportion of land area with acid soils (pH <5.5)



Proportion of land area with sandy soils (sand >60%)