

**ZONATION AND INTEGRATED PLANT NUTRIENT MANAGEMENT  
STRATEGIES AND OPTIONS IN TANZANIA**

Volume III. Farming systems in relation to agro-ecological zones,  
geology, soil types

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## 1. INTRODUCTION

After the farming system workshop in April 2000 at Mlingano a tentative list of possible farming systems to be distinguished at national level has been used to indicate the likely land use of each of the mapping units. Both farming systems and farming system groups have been used. The farming system groups are formed by one or more farming systems appearing on a toposequence (e.g. from high to low topographical position) or in a climosequence (toposequences appearing in different climatic zones). These farming systems groups are related to the soil groups.

In this report, firstly the farming system groups are presented. In the second part the farming systems are given.

Table 1 gives an overview of the upper level of farming systems and its relation to altitude, temperature and rainfall

Table 1. Overview of the farming systems

Main crops	Altitude	Temp. regime	Rain-fall	Farming system group(s)	Farming system
<b>High altitude, cool temperature, high rainfall systems</b>					
Maize, potato	1500-2900	1	A	1a1, 2a2	MP1a
	1500-2500	1	B	2c1	MP1b
<b>Intermediate to high altitude, cool temperature, high rainfall systems</b>					
Coffee, banana	900-2000	1	A	2a2, 2c1	CB1
	1500-2000	1	A-B	2a1, 2c2	CB2
Coffee, maize, bean	1500-1700	1	A-B	1a2, 2b2, 2d1	CMB2
	1300-1600	1	A	2c2	CMB3a
Maize, bean	2000+	1	B	2c1	MB1b
<b>Low to very high altitude, intermediate to cool temperature, high rainfall systems</b>					
Maize, bean (+ tea)	500-2500	1-2	A-B	2b3, 2c2	MB2
	1000-1500	1	B	1d1	MB3
Coffee, banana (+ tea)	1100-1800	2	A-B	2b1, 2b2	CB3
Coffee, maize, bean	1200-1800	1	B	1d2	CMB1
Maize, potato (+ tea, wattle)	900-2200	1-2	A-B	2c2	MP2
Maize, fingermillet	1000-2300	1-2	B	1e1	MFmla
Maize, forestry	700-2800	1-2	A(-B)	2c2, 2i1	MFola
Maize, cassava, cotton, rice	1000-1300	2	A-B	2g1, 2l1	MCCR
Cassava, rice	500-1000	1-2	A-B	1b1, 2b1	CR

**Low to high altitude, intermediate temperature, reliable rainfall systems**

Maize, bean	900-2000	2-3	B	2c1	MB1a
Maize, livestock (+ sugarcane)	1000-1500	2	B	2h1	ML1a-b
Banana	1200-1600	2	B	2b1, 2b2	B
Maize, groundnut, tobacco, pastoralism	1000-1300	2	B	2g1	MGTP
Cassava, rice, oilpalm	800-1800	2	B	1f2, 1f3	CRO
Coffee, maize, bean	750-1500	2	B	2f1	CMB3b
Maize, sorghum	1000-1200	2	B	2b3	MS2b
Rice, livestock	1200-1300	2	B	2l2	RL
Rice, sweet potato	900-1200	2	B	1f1	RSp
Cotton, maize	1000-1300	2	B	2h2	CM1a
Maize, fingermillet	1000-1800	2	B-C	2d2	MFm1b
Tobacco, pastoralism	850-1800	2	B-C	2b1, 2g1	TPl1a

**Very low to low altitude, intermediate to warm temperature, high rainfall systems**

Rice, cocoa	500	3	A	1c1	RC
Cashew	<1000	2-3	(A-)B	2c2, 2i1, 2j1, 2n1	C1
Cassava, trees	< 200	3	A	2e1, 2j1	CT

**Very low to intermediate altitude, intermediate to warm temperature, medium rainfall systems**

Rice, maize, sweet potato	500-1000	3	B-C	1h1, 1j1	RMSp
Rice, coconut, cassava (+ sisal)	800-1000	3	B-C	2e1, 2j1	RCC
Maize, sorghum (+ sisal, ranching)	150-1000	3	B-C	2j1, 2m1, 2n1	MS2a
Rice, maize, cassava, cotton (+sugarcane)	<600	3	B	1g2, 1h1, 1h3	RMC
Cotton, maize	250-1000	2-3	B-C	2m1	CM1b
Coconut, cassava, cashew	<200	3	B	1g1, 2n1	CCC
Maize, sesame	<600	3	B-C	2m1	MSel1a
	400-600	2	C	2i1	MSel1b
Sorghum, fingermillet	1000-1800	2	(C)	2c2	SF1
Maize, sorghum, pastoralism	750-1800	2	B-C	2f1, 2m1	MSP1
(+ citrus, ranching)	200	3	B-C	1h2, 2h2	MSP2
Sorghum, millet, legumes (bambara groundnut)	400-500	3	B	2m1	SML1a

**Intermediate to very altitude, cool temperature, low rainfall systems**

Maize, bean, sunflower	1200-2100	1	C-D	2c2	MB4a
Maize, bean	1200-1900	1	C	2a2	MB4c
	1500-2500	1	D	2c2	MB5a
Maize, sorghum	1500-1800	1	C	1i1	MS1
Maize, fingermillet	1200-1700	1	D	2d2	MFm2
Maize, forestry	>1500	1	C	2a1	MFo1b
Wheat, barley, maize, bean, pigeon pea	1500-2500	1-2	D	2c1, 2c2, 2f1	WBMBP

**Low to intermediate altitude, intermediate temperature, low rainfall systems**

Maize, bean, tobacco	500-1500	2	C-D	2c2	MB4b
(+ sisal)	1000-1500	2	D	2f1, 2m1	MB5b
Rice, sorghum, millet	900	2	D	1j2	RSM
Sorghum	1100-1300	2	D	2h2	S
Maize, sorghum, tobacco, pastoralism (+ ranching)	1000-1500	2	D	2f1, 2g1	MSP3
Maize, livestock	1000-1500	2	D	2h1	ML1c
(+ ranching)	1000-1500	1-2	D	2d1	ML1d
Maize, bean, pastoralism (some fingermillet) (+ sugarcane, wheat, ranching)	500-1700	2	D	2c1, 2f1	MBP
Cotton, sorghum, pastoralism	600-800	2	D	2g1, 2l1, 2l2	CSP
Tobacco, pastoralism	800-1200	2	C	2o1	TP1b
Pastoralism	900-100	1-2	C-D	2k1	P1a

**Very low to intermediate altitude, warm temperature, low rainfall systems**

Cashew	200-1100	2-3	C-D	2i1	C2
Maize, sorghum, pastoralism	200-1200	2-3	D	2m1	MSP4
Sorghum, millet, (non-bean) legumes (+ ranching)	300-400	3	D	2m1	SML1b
Game park	200-500	3	D	2i1	Park1b

**Intermediate altitude, intermediate temperature, low to very low rainfall systems**

Cotton, sorghum	1000-1100	2	D-E	2l2	CS
Millet, groundnut, livestock	1100-1400	2	D-E	1k2, 2g1, 2h2	MGL
Pastoralism	1000-1500	2	D-E	2f1, 2l2	P2b
Game park	1000	1-2	D-E	2k1	Park1a

**Low to intermediate altitude, intermediate temperature, very low rainfall systems**

Maize, sorghum, sunflower, pastoralism	700-1500	2	E	1k1, 1k2, 2o1	MSP5
Rice, pastoralism	750-1500	2	E	1k1, 2o1	RP1
	1100-1200	2	D-E	2l1	RP2
Pastoralism	1500	2	E	2k1	P1b
	1100-1300	2	E	1k2, 2o1	P2a
Game park	1200	2	E	2f1	Park1c

Temperature regimes: 1, maximum 16-25 C, minimum 5-15 C; 2: maximum 27-30 C, minimum 15-18 C; 3: maximum 29-31 C, minimum 19-23 C.

Rainfall pattern	Mono-modal		Transitional			Bimodal	
Drought risk (%)	Low (18-24)	Low (20-24)	Medium (24-30)	High (30-40)	Low (16-24)	Medium (24-30)	High to very high (30->40)
A	>1000	>1100	>1300	>1500	>1200	>1350	>1500
B	800-1000	900-1100	1050-1300	1200-1500	1000-1200	1100-1350	1200-1500
C	600- 800	700- 900	850-1050	1000-1200	800-1000	900-1100	1000-1200
D	500- 600	550- 700	650- 850	800-1000	550/600- 800	700- 900	800-1000
E	< 500	< 550	< 650	< 800	< 550/600	< 700	< 800

## 2. FARMING SYSTEMS GROUPS AND RELATIONS TO AGRO-ECOLOGICAL ZONES AND SOIL GROUPS

In annex 1 the list of farming system groups is given together with information on the relation with the agro-ecological zone, the soil group(s), farming system and the mapping units.

### LIST OF FARMING SYSTEMS GROUPS

#### Topo-sequences

A total of 18 topo-sequences are being listed. The topo-sequences represent a sequence of soil types in a particular set of climate (rainfall, temperature) and geology. The overview of these topo-sequences is given in Table 2.

Table 2. Overview of the different topo-sequences

Rainfall	Temp. regime	Geology	Topo-sequence	Main crops
High	Cool	Volcanic ash	1a1	Maize, potato
		Sandstone, limestone	1a2	Coffee, maize, bean (2)
	Intermediate	Schist, granite, gneiss	1b1	Cassava, rice
	Warm	Lacustrine	1c1	Rice, cocoa
Medium	Cool	Basalt, limestone, sandstone	1d1	Maize, bean (3)
		Granite, gneiss, volc. ash	1d2	Coffee, maize, bean (1)
	Cool to intermediate	Schist, granite, gneiss	1e1	Maize, fingermillet
	Intermediate	Lake and stream	1f1	Rice, sweet potato
		Limestone, basalt	1f2	Cassava, rice, oilpalm
		Sandstone, shale	1f3	Cassava, rice
	Warm	Sandstone, limestone, shale	1g1	Coconut, cassava, cashew
		Stream	1g2	Rice, maize, cassava, cotton, sugarcane
Low to medium	Warm	Stream	1h1	Rice, maize, sweet potato, cassava, sisal
		Coastal sand over limestone, shale, marl	1h2	Maize, sorghum, citrus, pastoralism
		Stream	1h3	Rice, maize, cassava, cotton?
Low, variable	Cool	Volcanic phonolites	1i1	Maize, cassava, sorghum
Low	Intermediate	Stream	1j1	Rice, maize, sweet potato
			1j2	Rice, sorghum, millet
Very low	Intermediate	Granite, gneiss, wash	1k1	maize, rice, sorghum, sunflower, pastoralism
			1k2	Pastoralism



**FS group 1a1, Maize-Potato (1a) in high rainfall zones with cool temperatures on volcanic ash**

- Southern Highlands volcanic ash areas, Rungwe highlands, west Njombe plateau
- Associated farming system group: 2a2
- Altitude (m): 1600-2900
- Temperature regime: 1
- Annual rainfall (mm): 1000-1600
- Rainfall pattern: monomodal
- Length of growing season: >6
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Plio-Pleistocene (7v)
- Physiographic units: HP1,HP3,HP4,HU2
- CMU: D5v
- Mapping units: A1a1-2, A1c, A1g1-2
- Landform: undulating plains and plateaux, some steeply dissected, with some steep hills and footslopes
- Soil group: 1a
- Soil types:
  - Dominant: 133, 261 (b), 265, 473
  - Inclusions: 105, 111, 272, 275, 364, 501
- Climate related constraints: radiation, temperature
- Soil related constraints: leaching, fertility, erosion, landslides, soil depth (drought stress), capping/sealing
- Farming system: MPl1a
- Land use: maize, potato, bean, coffee, livestock, wheat, pyrethrum, sunflower, pea, barley, dairy, fruit, vegetables, tea, wattle
- Proportion of cultivated land: very high
- Carrying capacity: high
- Agro-ecological zone: Vo-1a

**FS group 1a2, Coffee-Maize-Bean (2) in high rainfall zone with cool temperatures on sandstone and limestone**

- Kigoma highlands
- Associated farming system groups: 1d1, 2b2
- Altitude (m): 1500-1700
- Temperature regime: 1
- Annual rainfall (mm): 1000-1500
- Rainfall pattern: monomodal to transitional
- Length of growing season: 6-8
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Bukoba (2) sandstone and limestone
- Physiographic units: W2, RT
- CMU: D1
- Mapping unit: A1e
- Landform: dissected hilly plateaux with tablelands, scarps and steep valleys
- Soil group: 7a
- Soil types:
  - Dominant: 367, 479
  - Inclusions: 106, 114, 276
- Soil related constraints: fertility, acidity, erosion, capping

- Farming system: CMB2
- Land use: maize, bean, coffee, livestock, cassava, banana
- Proportion of cultivated land: high
- Carrying capacity: medium
- Agro-ecological zone: Ka-1

**FS group 1b1, Cassava-Rice in high rainfall zone with intermediate temperatures on schist, granite and gneiss**

- Lake Tanganyika and Nyasa shores
- Associated farming system groups: 1e1, 1f2, 2b3, 2d2, 2g1
- Altitude (m): 500-1000
- Temperature regime: (1-)2
- Annual rainfall (mm): 1000-1500
- Rainfall pattern: monomodal
- Length of growing season: >5
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Karagwe/Ankolean (1) schist and granite and possibly Mocambique gneiss
- Physiographic units: HM3?, U2
- CMU: G5, D4?
- Mapping units: A2d4(?), A2e
- Landform: very gently undulating plains and hills
- Soil group: 25b
- Soil types:
  - Dominant: 475
  - Inclusions: 106
- Climate related constraints: radiation, temperature
- Soil related constraints: fertility, soil depth (drought stress), acidity, capping/sealing, erosion?
- Farming system: CR
- Land use: cassava, rice, maize, fishing, sweet potato, groundnut, coconut, fruit, livestock
- Proportion of cultivated land: high to very high
- Carrying capacity: medium to high
- Agro-ecological zone: Me-2a

**FS group 1c1, Rice-Cocoa in high rainfall zone with warm temperatures on lacustrine sediments**

- Kyela plain
- Altitude (m): 500
- Temperature regime: 3
- Annual rainfall (mm): 1000-2600
- Rainfall pattern: monomodal
- Length of growing season: >8
- Drought risk: low
- Dependency on soil moisture availability: low
- Geology: Recent (2) deposits
- Physiographic units: HL
- CMU: F1
- Mapping unit: A3a
- Landform: flat lacustrine plain
- Soil group: 9
- Soil types:
  - Dominant: 647

- Associated: 206
- Climate related constraints: excess rainfall, humidity
- Soil related constraints: flooding, fertility, erosion?
- Farming system: RC
- Land use: rice, maize, banana, cocoa, bean, cassava, oilpalm, fruit, cashew, livestock, groundnut, fishing, dairy
- Proportion of cultivated land: very high
- Carrying capacity: high
- Agro-ecological zone: Me-2c

**FS group 1d1, Maize-Bean (3) in medium rainfall zone with cool temperatures on basalt, limestone, sandstone**

- Kasuli-Kibombo medium altitude plains
- Associated farming system groups: 1a2, 2b2
- Altitude (m): 1000-1500
- Temperature regime: 1
- Annual rainfall (mm): 800-1400
- Rainfall pattern: monomodal to transitional
- Length of growing season: 6.5-8
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Bukoba (1) basalt, limestone and argillaceous sandstone
- Physiographic units: W1
- CMU: C1h
- Mapping unit: B1e
- Landform: dissected highlands
- Soil group: 7b
- Soil types:
  - Associated: 276, 367
  - Inclusions: 113, 687
- Climate related constraints: radiation, temperature, drought (length of season)
- Soil related constraints: erosion, fertility
- Farming system: MB3
- Land use: maize, bean
- Proportion of cultivated land: high
- Carrying capacity: medium
- Agro-ecological zone: Ka-3a

**FS group 1d2, Coffee-Maize-Bean (1) and coffee estates in medium rainfall zone with cool temperatures on granite and gneiss with volcanic ash cover**

- Mbozi plateau
- Altitude (m): 1200-1800
- Temperature regime: 1
- Annual rainfall (mm): 800-1200
- Rainfall pattern: monomodal
- Length of growing season: 6-9
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Plio-Pleistocene (8v) cover over Ubendian granite and gneiss
- Physiographic units: HP5
- CMU: D6v
- Mapping unit: B1d

- Landform: undulating to rolling plains and plateaux with rift benches, steep hills and footslopes
- Soil group: 2
- Soil types:
  - Dominant: 264
  - Inclusions: 275, 478, 681
- Climate related constraints: radiation, temperature
- Soil related constraints: erosion, fertility, capping/sealing
- Farming system: CMB1
- Land use: maize, coffee, bean, cassava, sweet potato, groundnut, banana, livestock, fingermillet, vegetables, dairy
- Proportion of cultivated land: very high
- Carrying capacity: high
- Agro-ecological zone: Vo-2

**FS group 1e1, Maize-Finger millet (1a) in medium rainfall zone with cool to intermediate temperatures on schist, granite and gneiss**

- Kate-Mwazyze hills, Nkungwe mountain, Yambamrizi range, Ipumba hills (Rukwa)
- Associated farming system groups: 1b1, 1f2, 2b3, 2d2, 2g1
- Altitude (m): 1000-2300
- Temperature regime: 1-2
- Annual rainfall (mm): 850-1400
- Rainfall pattern: monomodal
- Length of growing season: 5-9
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Karagwe/Ankolean (1), Ubendian gneiss
- Physiographic units: U3, U5, U6
- CMU: D3a, D6
- Mapping units: B1c, B2a1, B2a2
- Landform: flat to rolling plains, sometimes steeply dissected
- Soil group: 25a
- Soil types:
  - Dominant: 339, 473, 475, 504
  - Associated: 111, 210, 421, 422, 651
  - Inclusions: 115, 501, 685
- Climate related constraints: radiation, temperature
- Soil related constraints: erosion, soil depth (drought stress), fertility, acidity, low organic matter, capping/sealing
- Farming system: MFmla
- Land use: maize, fingermillet, wheat, potato, pyrethrum, coffee, bean, livestock, dairy, sunflower, groundnut, sweet potato, tea, fruit
- Proportion of cultivated land: high
- Carrying capacity: medium
- Agro-ecological zones: Me-3, 4a

**FS group 1f1, Rice-Sweet potato in medium rainfall zone with intermediate temperatures on lake and stream deposits**

- Western swamps
- Altitude (m): 900-1200
- Temperature regime: 2
- Annual rainfall (mm): 800-1000
- Rainfall pattern: monomodal

- Length of growing season: 5-6, flooding
- Drought risk: low to moderate
- Dependency on soil moisture availability: low
- Geology: Recent (2)
- Physiographic units: Pp1, Pp2, Pp3
- CMU: G1
- Mapping unit: B2o
- Landform: flat, seasonally inundated lowland plains and swamps
- Soil group: 13
- Soil types:
  - Dominant: 671, 737
  - Associated: 701, 783
- Soil related constraints: flooding, drainage, (fertility, acidity?)
- Farming system: RSp
- Land use: rice, sweet potato, groundnut, pigeon pea
- Proportion of cultivated land: very low
- Carrying capacity: medium
- Agro-ecological zone: Lw-1b

**FS group 1f2, Cassava-Rice-Oilpalm in medium rainfall zone with intermediate temperatures on limestone and basalt**

- Kigoma lakeshore (G3)
- Altitude (m): 800-1800 ?
- Temperature regime: 2
- Annual rainfall (mm): 800-1300 ?
- Rainfall pattern: monomodal
- Length of growing season: 6-7.5
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Bukoba (1) limestone and basalt
- Physiographic units: PPw5
- CMU: G3
- Mapping unit: B2s
- Landform: undulating plains and plateaux
- Soil group: 20
- Soil types:
  - Dominant: 337, 474
  - Inclusions: 113, 505, 687
- Climate related constraints: radiation, humidity
- Soil related constraints: fertility, capping/sealing, acidity?
- Farming system: CRO
- Land use: cassava, rice, oilpalm
- Proportion of cultivated land: very low
- Carrying capacity: low
- Agro-ecological zone: Lw-1a

**FS group 1f3, Cassava-Rice-(oilpalm, coffee, banana, maize, bean, tobacco) in medium rainfall zone with intermediate temperatures on sandstone and shale**

- Kigoma lakeshore (G4h)
- Associated farming system group: 2b1
- Altitude (m): 800-1800
- Temperature regime: 2
- Annual rainfall (mm): 800-1300

- Rainfall pattern: monomodal
- Length of growing season: 6-7.5
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Bukoba (2) sandstone and shale, possibly some Ubendian gneiss
- Physiographic units: PC1, PC3?
- CMU: G4h
- Mapping unit: B2t
- Landform: undulating plains and plateaux
- Soil group: 29b
- Soil types:
  - Dominant: 341, 473
  - Associated: 106, 364, 421, 477
  - Inclusions: 210, 651, 686
- Climate related constraints: radiation, humidity
- Soil related constraints: fertility, erosion, capping/sealing
- Farming system: CRO
- Land use: cassava, rice, maize, sweet potato, groundnut, sorghum, livestock
- Proportion of cultivated land: very low
- Carrying capacity: low
- Agro-ecological zone: Ka-4c

**FS group 1g1, Coconut-Cassava-Cashew in medium rainfall zone with warm temperatures on sandstone, limestone, shale**

- Southern and Eastern hinterland sedimentary plains (A5)
- Associated farming system group: 2n1
- Altitude (m): <100-200
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: variable
- Length of growing season: 3-4.5, 1-2
- Drought risk: low to high
- Dependency on soil moisture availability: moderate
- Geology: Jurassic-Paleogene limestone, cretaceous clays, shale, sandstone and marl
- Physiographic units: CD2, CD3, CH2
- CMU: A5, A5d
- Mapping units: B3g2, B3g3
- Landform: undulating to rolling, steeply dissected
- Soil group: 15a
- Soil types:
  - Dominant: 541
  - Associated: 107, 236, 674, 722
- Soil related constraints: salinity, fertility, workability, drainage, compaction, low organic matter, soil depth (drought stress), acidity?
- Farming system: CCC
- Land use: rice, coconut, cassava, maize, sorghum, sisal, cashew
- Proportion of cultivated land: medium to very high
- Carrying capacity: low
- Agro-ecological zone: Sa-2b

**FS group 1g2, Rice-Maize-Cassava-Cotton and sugarcane estates in medium rainfall zone with warm temperatures on stream deposits**

- Kilombero valley
- Altitude (m): 400-600
- Temperature regime: 3
- Annual rainfall (mm): 900-1200
- Rainfall pattern: transitional
- Length of growing season: 5.5-8, flooding
- Drought risk: moderate
- Dependency on soil moisture availability: high
- Geology: Pleistocene (1) stream deposits (terraces)
- Physiographic units: EA2a, EA2b
- CMU: B2
- Mapping unit: B3a
- Landform: floodplain and alluvial complexes
- Soil group: 12
- Soil types:
  - Dominant: 205, 611
  - Associated: 633, 648
- Soil related constraints: flooding, fertility, (acidity, low organic matter)
- Farming system: RMC
- Land use: rice, maize, sugarcane
- Proportion of cultivated land: high
- Carrying capacity: very high
- Agro-ecological zone: Sa-2c

**FS group 1h1, Rice-Maize-Sweet potato-Cassava-Cotton and sisal estates in low to medium rainfall zone with warm temperatures on stream deposits**

- Eastern alluvial plains
- Altitude (m): 400-500
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: transitional
- Length of growing season: <3-6.5 ?
- Drought risk: moderate
- Dependency on soil moisture availability: moderate to high
- Geology: Sub-recent (1) stream deposits
- Physiographic units: EA1, CH3, CT
- CMU: A2, B1
- Mapping units: B3j1, B3j2, C3h
- Landform: flat older alluvial plain (non-flooded)
- Soil group: 23
- Soil types:
  - Dominant: 632
  - Associated: 332, 521, 723, 724, 781
  - Inclusions: 601, 677
- Soil related constraints: fertility, flooding, acidity?
- Farming systems: RMC, RMSp
- Land use: cassava, maize, cotton, rice, sorghum, sweet potato
- Proportion of cultivated land: low to high
- Carrying capacity: medium
- Agro-ecological zone: Me-5d

**FS group 1h2, Maize-Sorghum-Pastoralism (2) and citrus plantations in low to medium rainfall zone with warm temperatures on coastal sand cover over limestone, shale and marl**

- Eastern and Southern hinterland plains with coastal sand cover (A4)
- Altitude (m): 200
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: nd
- Length of growing season: <3-4.5
- Drought risk: nd
- Dependency on soil moisture availability: moderate
- Geology: Plio-Pleistocene (2) coastal sand and clay over Neogene sandy clay, Jurassic sandstone and shale, Paleogene limestone
- Physiographic units: CD1, CD2
- CMU: A4d
- Mapping units: B3k, C3e
- Landform: nd
- Soil group: 24
- Soil types:
  - Dominant: 471
  - Inclusions: 524, 644
- Climate related constraint: drought
- Soil related constraints: fertility, acidity, capping/sealing
- Farming system: MSP2
- Land use: Maize, sorghum, pastoralism
- Proportion of cultivated land: very high
- Carrying capacity: low
- Agro-ecological zone: Co-3a

**FS group 1h3, Rice-Maize-Cassava-(Cotton?) in low to medium rainfall zone with warm temperatures on stream deposits**

- Rufiji valley, coastal floodplains and deltas
- Altitude (m): < 200
- Temperature regime: 3
- Annual rainfall (mm): 800-1200
- Rainfall pattern: transitional to bimodal
- Length of growing season: <3-4.5, flooding
- Drought risk: low to moderate
- Dependency on soil moisture availability: moderate
- Geology: Recent (1) stream deposits
- Physiographic units: CF1, CF2
- CMU: A1
- Mapping units: B3b, B3i, C3i
- Landform: coastal floodplains, deltas
- Soil group: 28
- Soil types:
  - Associated: 201, 641, 751, 761
  - Inclusions: 621
- Climate related constraint: length of season
- Soil related constraints: flooding, fertility, acidity?, low organic matter, salinity?
- Farming system: RMC
- Land use: rice, maize, cassava, cotton
- Proportion of cultivated land: high



- Carrying capacity: low
- Agro-ecological zones: Me-5b, 5d

**FS group 1i1, Maize-Cassava-Sorghum-(banana, bean, horticulture) (1) in low but variable rainfall zone, with cool temperatures on volcanic phonolites**

- Tarime highlands
- Altitude (m): 1500-1800
- Temperature regime: 1
- Annual rainfall (mm): 800-> 1200
- Rainfall pattern: bimodal
- Length of growing season: 6-10
- Drought risk: low to high
- Dependency on soil moisture availability: low
- Geology: Miocene volcanic ash and granite
- Physiographic units: NP4
- CMU: E6
- Mapping unit: C1a
- Landform: undulating to rolling plateaux and plains
- Soil group: 6
- Soil types:
  - Associated: 273, 361, 411
  - Inclusions: 104, 209, 648
- Climate related constraints: radiation, temperature, drought
- Soil related constraints: fertility, erosion, acidity, low organic matter, soil degradation (gully erosion)
- Farming system: MS1
- Land use: maize, sorghum, cassava, bean, banana, coffee
- Proportion of cultivated land: very high
- Carrying capacity: high
- Agro-ecological zone: Vo-4b

**FS group 1j1, Rice-Maize-Sweet potato in low rainfall zone with drought risk with intermediate temperatures on stream deposits, possibly with some volcanic influence**

- Pangani river valley
- Altitude (m): nd
- Temperature regime: 2
- Annual rainfall (mm): 500-600
- Rainfall pattern: nd
- Length of growing season: <2, flooding
- Drought risk: moderate
- Dependency on soil moisture availability: low
- Geology: Sub-recent (1), stream deposits
- Physiographic units: EA3a
- CMU: H2
- Mapping unit: D2p2
- Landform: alluvial plain
- Soil group: 16
- Soil types:
  - Dominant: 762
  - Associated: 724
  - Inclusions: 461
- Climate related constraint: drought (length of season, total rainfall, drought hazard)

- Soil related constraints: salinity, sodicity, workability, flooding/drainage, soil degradation (gully erosion), (capping/sealing)
- Farming system: RMsP
- Land use: rice, maize, sweet potato
- Proportion of cultivated land: very low
- Carrying capacity: very low
- Agro-ecological zone: Vo-5c

**FS group 1j2, Rice-Sorghum-Millet in low rainfall zone with drought risk with intermediate temperatures on stream deposits**

- Central irrigated and flooded area
- Associated farming system group: 211
- Altitude (m): 900
- Temperature regime: 2
- Annual rainfall (mm): 500-700
- Rainfall pattern: monomodal to transitional
- Length of growing season: 3-3.5, flooding
- Drought risk: low to high
- Dependency on soil moisture availability: low
- Geology: Sub-recent (2) deposits
- Physiographic units: PSa, PSb
- CMU: H2
- Mapping unit: D2s
- Landform: flats, swamps, waterlogged plains
- Soil group: 22a
- Soil types:
  - Dominant: 604, 764
  - Inclusions: 508, 726
- Climate related constraint: drought (length of season)
- Soil related constraints: fertility, flooding, workability, salinity, sodicity
- Farming system: RSM
- Land use: rice, sorghum, millet
- Proportion of cultivated land: high
- Carrying capacity: very low
- Agro-ecological zone: Se-2

**FS group 1k1, Maize-Rice-Sorghum-Sunflower-(Agro-)Pastoralism in very low rainfall zone with intermediate temperatures on granite and gneiss with older wash deposits**

- Ruaha lowland and valley
- Associated farming system group: 1k2
- Altitude (m): 1100-1300 ?
- Temperature regime: 2
- Annual rainfall (mm): 400-600 ?
- Rainfall pattern: monomodal ?
- Length of growing season: 3-3.5 ?
- Drought risk: low-moderate ?
- Dependency on soil moisture availability: low ?
- Geology: Plio-Pleistocene (6) wash deposits over Dodoma gneiss and granite
- Physiographic units: PH1, PPw1, RA2, RP2, RT
- CMU: C6, C6h, G8
- Mapping units: Eb3, Eb4, (Ec1)

- Landform: lacustrine plains and gently undulating plains
- Soil group: 21b
- Soil types:
  - Dominant: 111, 335b, 421, 735, 766
  - Associated: 343, 455, 507, 679
  - Inclusions: 131, 501, 691
- Climate related constraint: drought (total rainfall, length of season)
- Soil related constraints: fertility, workability, flooding, soil degradation (gully erosion), acidity, soil depth (drought stress), salinity/sodicity, (capping/sealing)
- Farming system: MSP5, RP1
- Land use: rice, sorghum, millet, maize, groundnut
- Proportion of cultivated land: low
- Carrying capacity: very low
- Agro-ecological zone: Se-3b

**FS group 1k2, Pastoralism (2a) in very low rainfall zone with intermediate temperatures on granite and gneiss and lake and stream deposits with saline soils**

- North-western and south-western lake Eyasi, southern Dodoma, western Iringa, western Mbulu, northern Irambu, lake Manjara shore
- Associated farming system group: 1k1
- Altitude (m): 1100-1300
- Temperature regime: 2
- Annual rainfall (mm): 400-600
- Rainfall pattern: monomodal ?
- Length of growing season: 3-3.5
- Drought risk: low to moderate
- Dependency on soil moisture availability: nd
- Geology: Sub-recent (2) and recent (2) deposits and Dodoma granite and gneiss
- Physiographic units: NR1, PH1, Pp2, Ppw1, RP3
- CMU: C6, C6h, G2, H2
- Mapping units: Ea2, Ec1, Ed2, (Ee1), Eg1
- Landform: gently undulating piedmont plains and hills
- Soil group: 2a1
- Soil types:
  - Dominant: 335b, 343, 421, 735, 738, 772
  - Associated: 425, 509, 605
  - Inclusions: 111, 131, 501, 604, 691, 734
- Climate related constraint: drought (total rainfall, length of season)
- Soil related constraints: soil depth (drought stress), salinity/sodicity, flooding, capping/sealing
- Farming systems: P2a, MGL, MSP5
- Land use: nd
- Proportion of cultivated land: nd
- Carrying capacity: nd
- Agro-ecological zone: Se-3b

### Climo-sequences

In total 22 climo-sequences are described. Each climo-sequence represents several topo-sequences in different climatic settings, forming a sequence. Table 3 gives an overview of the climo-sequences.

Table 3. Overview of the different climo-sequences

Rainfall	Temp. regime	Geology	Climo-sequence	Main crops
Low to high	Cool	Gneiss	2a1	Coffee, banana, maize
		Basalt, volcanic ash	2a2	Maize, potato, coffee, banana, bean
Medium to high	Intermediate to cool	Sandstone, shale	2b1	Coffee, banana, tea, cassava, rice, tobacco, pastoralism
		Phyllite and quartzite	2b2	Coffee, maize, bean, banana
		Gneiss	2b3	Maize, bean, sorghum
Low to high	Intermediate to cool	Volcanic ash	2c1	Coffee, banana, maize, bean, potato, wheat, pigeon pea, sugarcane pastoralism, ranching
	Intermediate to warm	Gneiss, granite	2c2	Coffee, maize, bean, potato, tea, wattle, horticulture, sorghum, fingermillet
Low to medium	Intermediate to cool	Schist, granite	2d1	Coffee, maize, bean, livestock/dairy, ranching
		Gneiss	2d2	Maize, fingermillet
Medium to high	Warm	Limestone, marl, clay	2e1	Cassava, trees, maize, sorghum, rice, coconut, sisal
Very low to medium	Intermediate	Gneiss, granite	2f1	Coffee, maize, bean, sorghum, wheat, pigeon pea, sisal, pastoralism
Low to high	Intermediate	Gneiss, granite	2g1	Maize, cassava, cotton, rice, groundnut, tobacco, sorghum, pastoralism
Low to medium	Intermediate	Stream	2h1	Maize, livestock
		Granite, gneiss	2h2	Cotton, maize, sorghum, groundnut, pastoralism
Low to high	Intermediate to warm	Sandstone, shale	2i1	Cashew, maize, sesame, bean, park
	Warm	Coastal sand and clay	2j1	Cassava, trees, maize, sorghum, rice, coconut, cashew
Low to very low	Intermediate to cool	Volcanic ash	2k1	Pastoralism, park
Very low to medium	Intermediate	Lake and stream	2l1	Maize, cassava, cotton, rice, sorghum, pastoralism
		Wash, lake, stream	2l2	Rice, livestock, cotton, sorghum, pastoralism
Low to medium	Intermediate to warm	Gneiss	2m1	Maize, sorghum, millet, grain legumes, cotton, sesame, sisal, pastoralism, ranching
	Warm	Sandstone, limestone, shale	2n1	Cashew, maize, cassava, coconut, sorghum, sisal
Very low to low	Intermediate	Lake and stream	2o1	Tobacco, maize, sorghum, rice, pastoralism

**FS group 2a1, Coffee-Banana-Maize-Forest sequence in low to high rainfall zones with cool temperatures on gneiss**

Coffee-Banana (2) on deeper soils in higher rainfall areas, but forest land with little cropping (Maize-Forest (1b)) in drier areas or on shallow soils in rocky terrains.

- Rungwe highlands, northern Mbeya and Mbozi rocky terrain
- Altitude (m): nd
- Temperature regime: 1
- Annual rainfall (mm): 800+ ?
- Rainfall pattern: nd
- Length of growing season: nd
- Drought risk: nd
- Dependency on soil moisture availability: nd
- Geology: Ubendian gneiss
- Physiographic units: Hp6, HU2, RT
- CMU: D6d
- Mapping units: Alh3, Clb
- Landform: steep hills and footslopes
- Soil group: 3
- Soil types:
  - Dominant: 111, 275, 364, 473
  - Associated: 682
- Climate related constraints: radiation, temperature
- Soil related constraints: erosion, fertility, acidity, soil degradation (gully erosion), low organic matter, soil depth (drought stress), capping/sealing
- Farming systems: CB2, MFolb
- Land use: nd
- Proportion of cultivated land: nd
- Carrying capacity: nd
- Agro-ecological zones: GN-1a,5a

**FS group 2a2, Maize-Potato-Coffee-Banana-Bean sequence in low to high rainfall zones with cool temperatures on basalt and other volcanic materials**

Maize-Potato (1a) or Coffee-Banana (1) in high rainfall zones with Maize-bean (4c) in lower rainfall zones in Southern highlands.

- Volcanic Southern Highlands (Mbeya, Rungwe), Mbeya stepped plain
- Associated farming system group: 1a1
- Altitude (m): 600-2600
- Temperature regime: 1
- Annual rainfall (mm): 600-2000
- Rainfall pattern: monomodal
- Length of growing season: >6
- Drought risk: low
- Dependency on soil moisture availability: variable
- Geology: Pleistocene (4v) volcanic materials
- Physiographic units: Hp2, HU2, HV1, HV2, RT
- CMU: E3, E3h
- Mapping units: Alb, Alc, Alh1, Alh2, Clc
- Landform: undulating to rolling plains and plateaux, sometimes steeply dissected, some steep hills and footslopes
- Soil group: 1b
- Soil types:

- Dominant: 133, 261b, 265
- Associated: 275, 364
- Inclusions: 103, 111, 272
- Climate related constraints: radiation, temperature
- Soil related constraints: leaching, fertility, erosion, landslides, soil depth (drought stress)
- Farming systems: MP1a, CB1, MB4c
- Land use: maize, wheat, bean, pea, sunflower, banana, coffee, rice, livestock, cassava, sweet potato, bambara nuts, horticulture, fingermillet, dairy, (potato?)
- Proportion of cultivated land: very high
- Carrying capacity: high
- Agro-ecological zones: Vo-1a, 1b, 4

**FS group 2b1, Coffee-Banana-Cassava-Rice-Tobacco-(Agro-)Pastoralism with tea estates sequence in medium to high rainfall zones with intermediate to cool temperatures on sandstone and shale**

Coffee-Banana (3) in medium to high rainfall zones changing with lower rainfall to cassava-Rice, Banana towards Tobacco-(Agro-)Pastoralism systems

- Bukoba high rainfall area, Nkansi-kasanga plain, Katumba plateau, Central Bihramulo, Busando hills, south-western Kagera
- Associated farming system: 1f3
- Altitude (m): 1000-1700
- Temperature regime: 1-2
- Annual rainfall (mm): 800-1200
- Rainfall pattern: variable
- Length of growing season: 4-9
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Bukoba (2) sandstone and shale
- Physiographic units: PC4, PPw5, U2, U4, W4, W6, W7
- CMU: C2, C2h, D2, G4h
- Mapping units: A2a1, A2a2, B1f, B2f1, B2f2, B2f3, B2f4
- Landform: gently undulating to rolling plains and plateaux, outwash plains, sometimes steeply dissected with parallel ridges and narrow valleys
- Soil group: 29a
- Soil types:
  - Dominant: 341, 368, 391, 477, 506
  - Associated: 424, 686, 704, 784
  - Inclusions: 106, 108
- Climate related constraints: radiation, temperature, humidity
- Soil related constraints: fertility, acidity, drainage, leaching, soil depth (drought stress), erosion, capping/sealing
- Farming systems: CB3, CR, B, TP1a
- Land use: coffee, banana, maize, bean, cassava, tobacco, groundnut, bean, sunflower, fingermillet, sweet potato, tea, fruit, livestock
- Proportion of cultivated land: variable from low to very high
- Carrying capacity: low to medium
- Agro-ecological zones: Ka-2, 3b, 4c

**FS group 2b2, Coffee-Maize-Bean-Banana sequence in medium to high rainfall zones with intermediate to cool temperatures on phyllite and quartzite**

Coffee-Maize-Bean (2) in high rainfall zones and Coffee-Banana (3) or Banana in medium rainfall zones

- Kigoma highlands, Karagwe plains and hills
- Associated farming system groups: 1a2, 1d1
- Altitude (m): 1300-1800
- Temperature regime: 1-2
- Annual rainfall (mm): 800-1000
- Rainfall pattern: bimodal to transitional
- Length of growing season: 7-9
- Drought risk: low
- Dependency on soil moisture availability: low ?
- Geology: Karagwe/Ankolean (2) phyllite, conglomerates and quartzite
- Physiographic units: W2, W3
- CMU: D3, D3d
- Mapping units: Alf, B2g1, B2g2
- Landform: undulating to rolling hills, sometimes strongly dissected, and valleys and swamps, near Kigoma dissected hilly plateaux with tablelands, scarps and steep valleys
- Soil group: 7c
- Soil types:
  - Dominant: 365
  - Associated: 106, 108, 116, 276, 367, 479
  - Inclusions: 684-7, 786
- Climate related constraints: radiation, temperature
- Soil related constraints: fertility, soil depth (drought stress), erosion, leaching, capping/sealing
- Farming systems: CMB2, CB3, B
- Land use: coffee, banana, cassava, bean, potato, maize
- Proportion of cultivated land: high
- Carrying capacity: medium
- Agro-ecological zones: Ka-1, 4a

**FS group 2b3, Maize-Bean-Sorghum sequence in medium to high rainfall zones with intermediate to cool temperatures on gneiss**

Maize-Bean (2) in higher rainfall zones and changing to Maize-Sorghum (2b) towards drier areas.

NB The Maize-Sorghum system (Inyonga plain) may change to another main crop label when more data are available.

- Mwese-Mpande range, Karema depression, Western plateau, Inyonga/Kipembawe plains
- Associated farming system groups: 1b1, 1e1, 1f2, 2d2, 2g1
- Altitude (m): 1000-2500
- Temperature regime: 1-2
- Annual rainfall (mm): 900-1300
- Rainfall pattern: monomodal
- Length of growing season: 5-9
- Drought risk: low (to moderate)
- Dependency on soil moisture availability: low to high
- Geology: Ubendian gneiss
- Physiographic units: PC2, PM1, PPw3, RP1

- CMU: G6, G6h
- Mapping units: A1i, A2c, B2d3, B2d4
- Landform: variable and complex: cuestas, hills, sloping to piedmonts and interfluvial floodplains, but also lacustrine plains with floodplains, gently undulating to rolling outwash plains, sometimes strongly dissected
- Soil group: 25c
- Soil types:
  - Dominant: 335a, 473, 506?
  - Associated: 364
  - Inclusions: 111, 210, 501, 651, 691, 735
- Climate related constraints: radiation, temperature
- Soil related constraints: fertility, erosion, salinity, sodicity, flooding, acidity, soil depth (drought stress), low organic matter, capping/sealing
- Farming systems: MB2, MS2
- Land use: maize, bean, livestock, sorghum, groundnut, banana, tobacco, cassava, coffee, finger millet, fruit, rice, sweet potato, Miombo woodland, cowpea
- Proportion of cultivated land: low
- Carrying capacity: low to moderate
- Agro-ecological zones: Me-1, 2a, 4a

**FS group 2c1, Coffee-Banana-Maize-Bean-Potato-Wheat-Barley-Pigeon pea-(Agro-)Pastoralism sequence with bean, wheat/barley, sugarcane estates and ranches) (Northern zone) in low to high rainfall zones with intermediate to cool temperatures on volcanic ash deposits**

Coffee-Banana (1) in high rainfall areas (higher altitudes), Maize-Bean (1a) or Maize-Potato (Karatu) in medium rainfall zones, and Wheat-Barley-Maize-Bean-Pigeon pea-Pastoralism in the low rainfall areas.

- Meru/Kilimanjaro footslopes and plains, Karatu plateau, Northern lowlands, Hanang, Babati
- Associated farming system group: 2k1
- Altitude (m): ranging from 500 to 2500
- Temperature regime: 1-2
- Annual rainfall (mm): ranging from 500 to 2000
- Rainfall pattern: bimodal to transitional
- Length of growing season: ranging from 2 to 11
- Drought risk: ranging from low to high
- Dependency on soil moisture availability: variable
- Geology: Sub-recent (3v)(Meru) and Plio-Pleistocene (8v) (Karatu, Kilimanjaro) volcanic materials
- Physiographic units: NA6, NA7, NA9, NC2, NP3, NV3a, NV3b
- CMU: E2, E4, E4h, H2v, H4v, possible C4
- Mapping units: A1k1, A1k2, B1a1, B1a2, B2b1, B2b2, D2h2, D2k1, D2k3, (D2k4), D2l
- Landform: steep and more gently sloping volcanic footslopes, rolling to hilly, dissected plateaux, undulating to rolling plains and poorly drained flats
- Soil group: 4a
- Soil types
  - Dominant: 231, 262, 271, 321
  - Associated: 102, 132, 142, 734, 782
  - Inclusions: 111, 363?, 501, 543



- Climate related constraints: radiation, temperature, drought (length of season)
- Soil related constraints: erosion, drought, acidity, low organic matter, soil degradation (gully erosion), salinity, soil depth (drought stress), sodicity, fertility, wind erosion
- Farming systems: CB1, MP1b, MB1a, MBP, WBMBP
- Land use: coffee, banana, maize, bean, potato, horticulture, dairy, wheat, pigeon pea, rice, sorghum
- Proportion of cultivated land: medium to very high
- Carrying capacity: generally low, but very high in high rainfall area on volcano slopes
- Agro-ecological zones: Vo-1c, 3, 5b

**FS group 2c2, Coffee-Maize-Bean-Potato-Forest-Sorghum-Fingermillet sequence with tea and wattle estates in low to high rainfall zones with intermediate to high temperatures on gneiss or granite**

This FS group is found widespread. Coffee-Maize-Bean (3a), Maize-Potato (2) or Maize-Forest (1a) occur in the high rainfall areas, Maize-bean (2) in the medium rainfall areas, Sorghum-Fingermillet (1) in the low but variable rainfall areas, while in the driest areas again Maize-Bean (4a and 5a) is found.

- Mufindi plateau, Kidugala plateau, East Njombe plateau, Pare mountains, Mpwapwa plateau, Eastern Ubena plateau, Northern Ubena plateau, Upper Lukosi valley, Usanga flat border, Iringa plain, Eastern Mbulu, Southern highlands on gneiss, Eastern Iringa highlands, Mahenge highlands, Usambara highlands, Morogoro highlands, Matengo highlands, Ludewa plateau, Mbinga area, Lupembe-Niave hills, Songea plateau, Ruhuhu escarpment
- Associated farming system group: 2f1
- Altitude (m): ranging from 500 to 2500
- Temperature regime: 1-2
- Annual rainfall (mm): ranging from 500 to 1600
- Rainfall pattern: mainly monomodal, sometimes transitional
- Length of growing season: ranging from 3 to 10 months
- Drought risk: low to moderate
- Dependency on soil moisture availability: usually moderate to high
- Geology: Mocambique and Ubendian gneiss
- Physiographic units: EF, EI2, EM2, EM4, EM5, EPh6, HM1, HM2, HM3, HM4, HM5, HP1, HP2, HP4, HU1, NP1, NP2, RT
- CMU: B5h, D4, D5, D5d
- Mapping units: Ald1, Ald2, Ald3, Ald4, Ald5, Ald6, Ald7, Alj1, Alj2, Alj3, A2d1, A2d2, A2d3, A2d5, A2d6, A2d7, B1b1, B1b2, B1b3, B1b4, B1b5, B1b6, B2c, B2i, C1d1, C1d2, C1d3, D1b1, D1b2, D1d1
- Landforms: mountaineous, strongly dissected plateaux and valleys, dissected rolling to hilly mountain slopes and plateaux, strongly dissected hilly plateaux with rocky hills and escarpments, undulating to rolling plains and plateaux with hills ranges and footslopes, flat to rolling plains
- Soil group: 5a
- Soil types:
  - Dominant: 146, 272, 362, 412, 473
  - Associated: 111, 237, 338, 421, 461
  - Inclusions: 208, 332, 335b, 501, 649
- Climate related constraints: radiation, temperature
- Soil related constraints: fertility, workability, erosion, acidity, soil depth (drought stress), landslides, soil degradation

- (gully erosion), leaching, low organic matter, salinity?, capping/sealing
- Farming systems: MF01a, MP2, MB2, CMB3a, CB2, MB4a, SF1, WBMBP, MB5a, C1
- Land use: maize, bean, potato, tea, wheat, bean, livestock, horticulture, coffee, banana, sunflower, sorghum, cassava, tobacco, fingermillet, wattle, pigeon pea, forest
- Proportion of cultivated land: generally medium to very high, low in rocky terrains
- Carrying capacity: ranging from low to high
- Agro-ecological zones: Gn-1b, 2, 3, 5b, 6a, 6b

**FS group 2d1, Coffee-Maize-Bean-Livestock/Dairy sequence with ranches in low to medium rainfall zones with intermediate to cool temperatures on schist and granite**

Coffee-Banana (2) in the medium rainfall areas and Maize with dairy (ML1d) in the low rainfall areas.

- Central/Northern Kagera, Karagwe, Ngara
- Altitude (m): 1000-1500
- Temperature regime: 1-2
- Annual rainfall (mm): 800
- Rainfall pattern: bimodal
- Length of growing season: >7?
- Drought risk: low to moderate
- Dependency on soil moisture availability: high
- Geology: Karagwe/Ankolean (1) schist and granite
- Physiographic units: W4, W5
- CMU: C3h
- Mapping units: B2h, D1c, D2d
- Landform: undulating to rolling plains and valleys
- Soil group: 17
- Soil types:
  - Dominant: 366
  - Associated: 115, 116
  - Inclusions: 685, 785
- Climate related constraint: radiation?
- Soil related constraints: fertility, (acidity?), low organic matter ?, soil depth (drought stress), flooding
- Farming systems: CMB2, ML1d
- Land use: ranching
- Proportion of cultivated land: high?
- Carrying capacity: medium
- Agro-ecological zones: LW-2a, 3a

**FS group 2d2, Maize-Finger millet sequence (Ufipa plateau) in low to medium rainfall zones with intermediate to cool temperatures on gneiss**

Maize-Finger millet (1b) in medium to low rainfall areas towards Maize-Finger millet (2) in low rainfall areas with drought risk.

- Namanyere-Laela plain and shallow soil areas in Southern highlands
- Associated farming system groups: 1b1, 1e1, 1f2, 2b3, 2g1
- Altitude (m): 1000-1800
- Temperature regime: 1-2
- Annual rainfall (mm): 750-1000

- Rainfall pattern: monomodal
- Length of growing season: 4-7
- Drought risk: low to moderate
- Dependency on soil moisture availability: high
- Geology: Ubendian gneiss
- Physiographic units: U1, HP6, RT
- CMU: D6
- Mapping units: B2d2, C2a2, D1a
- Landform: undulating to hilly plains and plateaux with steep hill ridges and footslopes
- Soil group: 25d
- Soil types:
  - Dominant: 111, 335a, 501
  - Associated: 210, 421, 477, 651
  - Inclusions: 685
- Climate related constraint: temperature
- Soil related constraints: fertility, low organic matter, soil depth (drought stress), soil degradation (gully erosion), acidity, flooding/drainage, salinity ?, capping/sealing
- Farming systems: MFm1b, MFm2
- Land use: maize, fingermillet, bean, sunflower, cassava, livestock, fruit, sorghum, groundnut, forest, vegetables, sugarcane
- Proportion of cultivated land: high
- Carrying capacity: medium
- Agro-ecological zones: Me-4a, 5a, 6a

**FS group 2e1, Cassava-Trees-Maize-Sorghum-Rice-Coconut sequence with sisal estates in medium to high rainfall zones with warm temperatures on limestone, marl and clay**

Cassava-Trees (East side of islands) in high rainfall areas and Maize-Sorghum (2a) and Rice-Coconut-Cassava in coastal plain areas with medium rainfall.

NB The Maize-Sorghum system (Eastern Coastal plain) may change to another main crop label when more data are available.

- Eastern Zanzibar and Pemba, Mafia, Southern and Eastern coastal plains
- Altitude (m): < 200
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: variable
- Length of growing season: 3-10
- Drought risk: variable
- Dependency on soil moisture availability: moderate to very high
- Geology: Pleistocene (2) limestone, marl, clay
- Physiographic units: CP1, CP2
- CMU: A3
- Mapping units: A3c, B3m1, B3m2
- Landform: gently undulating to rolling plains
- Soil group: 19
- Soil types:
  - Dominant: 144, 522
  - Associated: 401, 675, 721
  - Inclusions: 301, 333, 542
- Climate related constraint: drought

- Soil related constraints: fertility, soil depth (drought stress), workability, salinity, leaching, low organic matter
- Farming systems: CT, MS2a, RCC
- Land use: maize, sorghum, rice, cassava, coconut, sisal
- Proportion of cultivated land: medium to very high
- Carrying capacity: low to high
- Agro-ecological zones: Co-1a, 2a

**FS group 2f1, Coffee-Maize-Bean-Sorghum-Wheat-Barley-Pigeon pea-(Agro-)Pastoralism-Park sequence with sisal estates in very low to medium rainfall zones with intermediate temperatures on gneiss and granite**

Coffee-Maize-Bean (3b) in the medium rainfall areas. Towards drier areas either Maize-Sorghum-Pastoralism is found (low but variable rainfall) or Wheat-Barley-Maize-Bean-Pigeon pea or Maize-Bean-Pastoralism or Maize-Bean (5b) (low rainfall with drought risk). In the driest areas Pastoralism (2a,2b) is found or Parks (1c).

- Kilosa-west and Mpwapwa medium altitude plains, Northern Mbulu (C4h), Eastern Handeni and Northern Morogoro hilly plains and footslopes, South-eastern Babati-Northern Kondoa, Kondoa-Kibaya-West Handeni area, Pare footslopes, Kiteto, Northern Lushoto, Northern Monduli area
- Associated farming system group: 2c2
- Altitude (m): 750-1500
- Temperature regime: 1-2
- Annual rainfall (mm): 400-1000
- Rainfall pattern: variable
- Length of growing season: <2-5
- Drought risk: variable
- Dependency on soil moisture availability: low to moderate
- Geology: Basement complex, Mocambique, Dodoma gneiss and granite and Sub-recent (2) stream deposits
- Physiographic units: EH1, EH2, EM1, EM3, EPa1, EPa2, EPh1, HM3, HM5, PPw1, RT
- CMU: C4, C4d, C4h, C6h, H5h
- Mapping units: B2p2, C2b, D1d2, D2a1, D2e, D2g, D2k4, D2m1, D2m2, Eb1, Eb2, Ec2, Ed1
- Landforms: dissected and flat to rolling intramontane plains, rolling to hilly plains, gently undulating plains and hills
- Soil group: 5b
- Soil types:
  - Dominant: 111, 237, 272, 335b, 362, 421, 461, 735
  - Associated: 131, 338, 412
  - Inclusions: 501, 691, 763
- Climate related constraint: drought
- Soil related constraints: erosion, fertility, soil depth, sodicity, acidity, soil degradation (gully erosion), low organic matter, capping/sealing
- Farming systems: CMB3b, MSP1a, WBMBP, MB5b, MSP3, MBP, P2b, Park1c
- Land use: maize, finger millet, sorghum, bean, livestock, groundnut
- Proportion of cultivated land: very low to medium
- Carrying capacity: very low to medium
- Agro-ecological zones: Gn-4, 5c, 6b, 7

**FS group 2g1, Maize-Cassava-Cotton-Rice-Groundnut-Tobacco-Sorghum-(Agro-)Pastoralism sequence in all rainfall zones with intermediate temperatures on gneiss and granite**

Maize-Cassava-Cotton-Rice in the higher rainfall areas. In medium to low rainfall areas Maize-Groundnut-Tobacco-Pastoralism or Tobacco-Pastoralism (1a). In the drier areas Cotton-Sorghum-Pastoralism, Maize-Sorghum-Pastoralism or Maize-Groundnut-Livestock systems.

- Meatu-Maswa-Shinyanga, Central Northern plains (C6), Northern Sengerema, Ukerewe island, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, Chunya plain, Mpwapwa-Eastern Kondo plains
- Associated farming system groups: 1b1, 1e1, 1f2, 2b3, 2d2
- Altitude (m): 900-1800
- Temperature regime: 2
- Annual rainfall (mm): 550-1300
- Rainfall pattern: mainly monomodal, but also occurring in transitional and bimodal areas
- Length of growing season: 3-6
- Drought risk: low to moderate
- Dependency on soil moisture availability: variable
- Geology: Ubendian, Dodoma, Mocambique, basement complex gneiss and granite
- Physiographic units: EPa1, EPa2, PH1, PH2, PH3, PH4, PH5, PM2, Pp2, PPw1, PPw2, PPw3, PPw6, RT
- CMU: C5, C5d, C5h, C6, G6, C6h, G6, H5h
- Mapping units: A2b, B2d1, B2j1, B2j2, B2j3, B2j4, B2k, C2a1, D2b1, D2b2, D2c, (D2e), D2f, D2n, D2q1, D2q2, D2q3, D2q4, (Ec1)
- Landform: cuesta plateau with hills and plains, outwash plains and piedmont plains, undulating to rolling, dissected plateaux, gently undulating plains and hills and inselbergs
- Soil group: 25e
- Soil types:
  - Dominant: 111, 335a, 421, 461, 473, 691, 735
  - Associated: 131, 381, 501, 701
  - Inclusions: 108, 274, 604, 763
- Soil related constraints: fertility, soil depth (drought stress), workability, erosion, flooding, acidity, depth, soil degradation (gully erosion) low organic matter, capping/sealing
- Farming systems: MCCR, TPl1a, MGTP, MSP3, CSP, MGL
- Land use: maize, cotton, tobacco, bean, cassava, rice, pigeon pea, sorghum, finger millet, sweet potato, groundnut, livestock, bee-keeping, Miombo woodland, chickpea, cowpea, pine forest
- Proportion of cultivated land: ranging from low to very high
- Carrying capacity: generally low to very low
- Agro-ecological zones: Me-2b, 4a, 5a, 6b

**FS group 2h1, Maize-Livestock sequence in low to medium rainfall zones with intermediate temperatures on stream deposits (floodplains)**

The rainfall determines the importance of dairy cattle in these systems.

- Northern Kagera floodplain, Mara floodplain
- Altitude (m): 1000-1500
- Temperature regime: 2
- Annual rainfall (mm): 700-1500

- Rainfall pattern: bimodal
- Length of growing season: 4->9
- Drought risk: low
- Dependency on soil moisture availability: low
- Geology: Sub-recent (2) stream deposits
- Physiographic units: PR, W8, W9
- CMU: H1, H2
- Mapping units: B2e1, B2e2, D2p3
- Landform: undulating to rolling plains and quartzite ridges (with ironstone caps) and escarpments and seasonally waterlogged plains and floodplains
- Soil group: 10
- Soil types:
  - Dominant: 203, 652, 787
  - Associated: 704
- Climate related constraint: radiation?
- Soil related constraints: flooding, fertility, acidity
- Farming systems: ML 1a, 1b, 1c
- Land use: maize, livestock, sugarcane
- Proportion of cultivated land: high to very high
- Carrying capacity: medium
- Agro-ecological zones: Ka-4b, Lw-2b

**FS group 2h2, Cotton-Maize-Sorghum-Groundnut-(Agro-)Pastoralism sequence (Sukumaland, Central-Western plains) in low to medium rainfall zones with intermediate temperatures on granite or gneiss with wash deposits**

Cotton-Maize (1a) or Maize-Sorghum-Pastoralism (2) in the medium rainfall areas and Maize-Groundnut-Livestock or Sorghum in the low rainfall areas.

- Eastern Sukumaland (Luseni/Itogolo dominated) plains, Igunga-Tabora plain (H4), Central-Western plains (H6)
- Altitude (m): 1000-1400
- Temperature regime: 2
- Annual rainfall (mm): 500-1000
- Rainfall pattern: monomodal (to transitional)
- Length of growing season: 3-6
- Drought risk: ranging from low to high
- Dependency on soil moisture availability: low
- Geology: Pleistocene (3) sediment cover over Dodoma granite and gneiss
- Physiographic units: PH4, Pp1, Pp2, Pp3, Ppw1, Ppw7, Ppw8
- CMU: H4, H6, G7
- Mapping units: B2l1, B2l3, D2r1, D2r2, D2r3
- Landform: gently undulating plains, plateaux, eroded footslopes and waterlogged plains
- Soil group: 18
- Soil types:
  - Dominant: 336, 454, 602, 740
  - Associated: 382, 423, 502, 691, 702
  - Inclusions: 111, 678
- Soil related constraints: fertility, workability, soil degradation (gully erosion), soil depth (drought stress), acidity, low organic matter, drainage, capping/sealing
- Farming systems: CM1a, MSP2, S, MGL

- Land use: maize, cassava, cotton, rice, sorghum, millet, groundnut, grape, livestock, sweet potato, bean, chickpea
- Proportion of cultivated land: ranging from very low to very high
- Carrying capacity: low to very low
- Agro-ecological zones: Lw-2c, 3b

**FS group 2i1, Cashew-Maize-Sesame-Bean-Park sequence in low to high rainfall zones with intermediate to warm temperatures on sandstone and shale**

Cashew (1) in the higher rainfall areas, Maize-Sesame (1b), Maize-Bean (4b) or Cashew (2) systems in the low rainfall areas, with in areas with high drought risk a Game park (1c) is located.

- South-eastern Songea plain, Sedimentary plateaux, Ruhuha valley, Gumbiro valley
- Altitude (m): 200-1100
- Temperature regime: 2-3
- Annual rainfall (mm): 500-1200
- Rainfall pattern: transitional to monomodal
- Length of growing season: ranging from 3 to 9
- Drought risk: low to moderate
- Dependency on soil moisture availability: moderate to high
- Geology: Karroo sandstone and shale, partly covered by Plio-Pleistocene (4) coastal sand cover
- Physiographic units: EA4a, EI1, SD, SU
- CMU: B3, B3d, B5h, F2d
- Mapping units: (A2d6), A2f, A2g, B3f, C2d1, C2d2, C2f, C3g, D2i, D3c
- Landform: undulating to hilly and steeply dissected land with rock outcrops and hills
- Soil group: 14
- Soil types:
  - Dominant: 340, 342, 725
  - Associated: 110, 527
  - Inclusions: 650, 692
- Climate related constraints: drought (total rainfall, drought hazard), radiation?
- Soil related constraints: fertility, drainage, soil depth (drought stress), low organic matter, erosion, acidity?
- Farming systems: MSe1b, C1, C2, MF01a, MB4b, Park1b
- Land use: maize, cassava, sweet potato, groundnut, rice, sorghum, fruit, livestock, tobacco, cashew
- Proportion of cultivated land: nd
- Carrying capacity: nd
- Agro-ecological zones: Sa-1, 2a, 3a, 4, 5

**FS group 2j1, Cassava-Trees-Maize-Sorghum-Rice-Coconut-Cashew sequence (western side of islands and coastal hinterland plains) in low to high rainfall zones with warm temperatures on coastal sand and clay**

Cassava-Trees in the high rainfall areas. In the low to medium rainfall areas Maize-Sorghum (2a), Rice-Coconut-Cassava or Cashew (1) systems are found.

NB The Maize-Sorghum system (hinterland plains) may change to another main crops label when more data are available.

- Western Zanzibar and Pemba, Eastern and Southern coastal sand covered hinterland plains (A4)
- Altitude (m): < 200
- Temperature regime: 3
- Annual rainfall (mm): 800-1300
- Rainfall pattern: bimodal or monomodal to transitional
- Length of growing season: <3-5, (1-2.5)
- Drought risk: variable
- Dependency on soil moisture availability: moderate
- Geology: plio-Pleistocene (1) coastal sand and clay
- Physiographic units: CH1, CH4
- CMU: A4
- Mapping units: A3b, B311, B312, C3f
- Landform: Coastal plains and undulating to rolling hinterland plains
- Soil group: 27
- Soil types:
  - Dominant: 331, 451
  - Inclusions: 523, 643, 676
- Climate related constraint: drought (length of season)
- Soil related constraints: fertility, workability, acidity, leaching, low organic matter
- Farming systems: CT, C1, MS2a, RCC
- Land use: rice, coconut, cassava, maize, sorghum, sisal
- Proportion of cultivated land: medium to very high
- Carrying capacity: ranging from low to high
- Agro-ecological zones: Co-1b, 2b, 3b

**FS group 2k1, Pastoralism-Park sequence in low to very low rainfall zones with intermediate to cool temperatures in volcanic areas**

Pastoralism (1a) and Park (1a) are located in areas with a higher range of rainfall whereas Pastoralism (1b) is found in the driest areas.

- West Serengeti, Serengeti plain, Northern lowlands and steppes
- Associated farming system group: 2c1
- Altitude (m): around 1000
- Temperature regime: 1-2
- Annual rainfall (mm): 400-1000
- Rainfall pattern: nd
- Length of growing season: nd
- Drought risk: nd
- Dependency on soil moisture availability: nd
- Geology: all volcanic deposits as well as recent (2) stream and lake deposits
- Physiographic units: NA1, NA2, NA3, NA4, NA5, NA6, NA7, NA8, NR3, NV1, NV3b, NV3c
- CMU: C6v, D5v, E1, E1h, E2, E4, E4h, E5, H2v, H4v
- Mapping units: C2e, D1e, D2h1, D2h3, Ef1, Ef2, Ef3, Ef4a, Ef4c, Ef5
- Landform: gently undulating to rolling plains and plateaux, footslopes, some poorly drained flats
- Soil group: 4b
- Soil types:
  - Dominant: 102, 142, 231, 232, 251, 262, 271
  - Associated: 261a, 321, 732, 734, 772, 782



- Inclusions: 105, 311, 544
- Climate related constraint: drought (length of season, drought hazard, total rainfall)
- Soil related constraints: fertility, acidity?, workability, erosion, soil degradation (gully erosion), salinity/sodicity
- Farming systems: Pla, Plb, Parkla
- Land use: park, pastoralism
- Proportion of cultivated land: nd
- Carrying capacity: nd
- Agro-ecological zones: Vo-4c, 5a, 6

**FS group 211, Maize-Cassava-Cotton-Rice-Sorghum-Pastoralism sequence (Shinyanga) in very low to medium rainfall zones with intermediate temperatures on lake and stream deposits**

Maize-Cassava-Cotton-Rice is found in the medium rainfall areas. Cotton-Sorghum-Pastoralism in the low rainfall areas with drought risk, while Rice-Pastoralism (2) is located in the driest areas.

- Mbuga areas (H2), Shinyanga-Igunga (H2), Kwimbe-Northern Shinyanga (H2)(Sub-recent 2 sediments)
- Associated farming system group: 1j2
- Altitude (m): 1000-1200
- Temperature regime: 2
- Annual rainfall (mm): 400-1000
- Rainfall pattern: monomodal to transitional
- Length of growing season: 3-3.5
- Drought risk: low to moderate
- Dependency on soil moisture availability: nd
- Geology: Sub-recent (2) lake and stream deposits
- Physiographic units: Pp2, Pp1, Pp2
- CMU: H2
- Mapping units: B2m, D2p1, Ea1
- Landform: seasonally waterlogged plains
- Soil group: 22b
- Soil types:
  - Dominant: 604, 738
  - Associated: 239
  - Inclusions: 727
- Climate related constraint: drought (drought hazard, length of season, total rainfall)
- Soil related constraints: workability, soil degradation (gully erosion), flooding/drainage, low organic matter ?, salinity/sodicity?
- Farming systems: MCCR, CSP, RP2
- Land use: nd
- Proportion of cultivated land: nd
- Carrying capacity: nd
- Agro-ecological zones: Se-1, 2, 3a

**FS group 212, Rice-Livestock-Cotton-Sorghum-Pastoralism sequence in very low to medium rainfall zones with intermediate temperatures on marl, sand, clay or granite covered with wash, lake and stream deposits**

Rice-Livestock on Itogolo soils is found in the medium rainfall areas. In the low rainfall areas Cotton-Sorghum, Sorghum or Cotton-

Sorghum-Pastoralism systems are located. In the driest parts only Pastoralism (2b) is found.

- Eastern Sukumaland (Itogolo dominated)(H4), Ibushi plain (H3), Eastern lake Manjara shore (H3), Shinyanga-Igunga (H3), Lake Natron shore (H3)
- Altitude (m): 1000-1300
- Temperature regime: 2
- Annual rainfall (mm): 400-800
- Rainfall pattern: monomodal to transitional
- Length of growing season: 3-5
- Drought risk: low (to moderate)
- Dependency on soil moisture availability: low
- Geology: Plio-Pleistocene (3) marl, sand and clay
- Physiographic units: NR1, NR2, PH4, PPs1, PPw1, PPw4, PPw8
- CMU: H3, H4
- Mapping units: B2l2, D2o1, D2o2, D2o3, (D2r1), Eg2
- Landform: very gently undulating plains and hills with seasonally waterlogged plains, flat lacustrine plains on old lake sediments
- Soil group: 8
- Soil types:
  - Dominant: 238, 602
  - Associated: 462, 728, 771
- Climate related constraint: drought (length of season)
- Soil related constraints: erosion, soil degradation (gully erosion), drainage, flooding, sodicity, salinity, fertility, low organic matter, capping/sealing
- Farming systems: RL, CS, CSP, P2b
- Land use: cotton, sorghum, sweet potato
- Proportion of cultivated land: very high ?
- Carrying capacity: very low?
- Agro-ecological zones: La-1, 3, 4a

**FS group 2m1, Maize-Sorghum-Millet-Bambara groundnut-Cotton-Sesame-Bean-(non-bean) Legumes-(Agro-)Pastoralism sequence and sisal estates and ranches in low to medium rainfall zones with intermediate to warm temperatures on gneiss**

Maize-Sorghum-Pastoralism (1b), Sorghum-Millet-Bambara groundnuts (1a) or Pastoralism (1b) in the medium rainfall areas and in somewhat drier areas also Cotton-maize (1b), Maize-Sorghum (2a) or Maize-Sesame (1a). In the areas with low rainfall and drought risk Maize-Sorghum-Pastoralism (4), Maize-bean (5b) and Sorghum-Millet-(non-bean) legume (1b) systems are found.

NB The Maize-Sorghum system (Muheza, Segera-Mkata-Handeni) may change to another main crops label when more data are available.

- Usambara footslopes, Mahenge basin, Mkulula valley, West-Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachingwea plain, South-eastern Tunduru/Western Nachingwea plain, Eastern plains, Muheza plains, Southern plains
- Altitude (m): 150-1000
- Temperature regime: 2-3
- Annual rainfall (mm): 500-1000
- Rainfall pattern: variable
- Length of growing season: 3-9, (1-3)
- Drought risk: very variable
- Dependency on soil moisture availability: moderate to high

- Geology: Mocambique gneiss and Plio-Pleistocene (5) coastal sand cover
- Physiographic units: EF, EI1, EM1, (EPa1), EPh1, EPh2, EPh3, EPh4, EPh5, EPh7, EPh8
- CMU: B4, B5, B5d, B5h
- Mapping units: B2p1, B2r, B3c1, B3c2, B3c3, B3d1, B3d2, B3h1, B3h2, C3a1, C3a2, C3b, C3c, D2a2, D3a, D3b1, D3b2
- Landform: flat to rolling plains, strongly dissected foothills
- Soil group: 26
- Soil types:
  - Dominant: 334, 335, 362, 412, 461, 476
  - Associated: 452, 473, 503
  - Inclusions: 111, 501, 688, 735
- Soil related constraints: fertility, workability, erosion, acidity, drought, drainage, soil depth (drought stress), soil degradation (gully erosion), low organic matter, capping/sealing
- Farming systems: MSP1b, CM1b, SML1a, MSela, MS2a, MB5b, MSP4, SML1b
- Land use: maize, sorghum, sunflower, groundnut, cassava, cashew, tobacco, bean, cotton, pigeon pea, sisal, sesame
- Proportion of cultivated land: medium to high
- Carrying capacity: low to medium
- Agro-ecological zones: Me-4b, 5c, 7

**FS group 2n1, Cashew-Maize-Sorghum sequence with sisal estates in low to medium rainfall zones with warm temperatures on sandstone, limestone, shale**

The Cashew (1) system is found in the medium rainfall areas, while the Maize-Sorghum (2a) system is located in the low but variable rainfall areas. Probably Cassava-Coconut-Cashew will also be found. NB The Maize-Sorghum system (Eastern hinterland hills and plains) may change to another main crops label when more data are available.

- Eastern hinterland hills and plains (A5), Makonde plateau (CH2)
- Associated farming system group: 1g1
- Altitude (m): < 500
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: variable
- Length of growing season: < 3-4.5, (1-2)
- Drought risk: low to high
- Dependency on soil moisture availability: moderate
- Geology: Jurassic-Paleogene sandstone, limestone, shale
- Physiographic units: CH2
- CMU: A5
- Mapping units: B3g1, C3d
- Landform: coastal and hinterland plains
- Soil group: 15b
- Soil types:
  - Dominant: 541
  - Associated: 107?, 236?, 674, 722?
- Climate related constraint: drought (length of season, drought hazard)
- Soil related constraints: fertility, acidity, workability, compaction, low organic matter, soil depth drought stress)
- Farming systems: C1, CCC, MS2a
- Land use: cashew, cassava, livestock, maize, sorghum, sisal

- Proportion of cultivated land: medium to very high
- Carrying capacity: low
- Agro-ecological zones: Sa-2b, 3b

**FS group 2o1, Tobacco-Maize-Sorghum-Rice-Pastoralism sequence in the very low to low rainfall zones with intermediate temperatures on lake and stream deposits**

Depending on the combination of rainfall, soil type and flooding regime the systems like Tobacco-Pastoralism (1b), Maize-Sorghum-Pastoralism (5) or Rice-Pastoralism (1) occur.

- Rukwa valley and floodplain, Rukwa/Songwe valley, Nduli-Ismani flats, Usangu plain, Ruaha lowland and valley
- Altitude (m): 700-1500
- Temperature regime: 2
- Annual rainfall (mm): 400-1200
- Rainfall pattern: monomodal
- Length of growing season: 3-9
- Drought risk: low to moderate
- Dependency on soil moisture availability: variable
- Geology: Recent (2) lake and stream deposits
- Physiographic units: RA1, RA2, RA3, RA4, RA5, RA6, RP3
- CMU: G2
- Mapping units: C2c1, C2c2, C2c3, Ee1, Ee2, Ee3, Ee4
- Landform: floodplains, lacustrine and alluvial plains with terraces, gently undulating piedmont plains
- Soil group: 11
- Soil types:
  - Dominant: 109, 204, 335b, 634, 647, 767
  - Associated: 343, 414, 425, 509, 605, 730
  - Inclusions: 672
- Soil related constraints: sodicity, flooding, salinity, workability, fertility, drainage, soil degradation (gully erosion), low organic matter, soil depth (drought stress), capping/sealing
- Farming systems: TP1b, MSP5, RP1, P2a
- Land use: Tobacco, sorghum, groundnut, maize, bean, finger millet, sweet potato, rice, livestock, sunflower, cassava, pigeon pea, fish, cotton, vegetables, green gram, cowpea
- Proportion of cultivated land: low
- Carrying capacity: moderate
- Agro-ecological zones: La-2, 4b

### **3. FARMING SYSTEMS**

In annex 2 the list of farming system and the relation to agro-ecological zone, soil group, farming system group and mapping units is given.

Table 4 shows the overview of the farming systems per climatic zone and the relation with the farming system group, rainfall, temperature regime, geology, and soil group.

Table 4

2 pages

**LIST OF FARMING SYSTEMS****Banana (B)**

- Central Biharamulo
- Altitude (m): 1200-1600
- Temperature regime: 2
- Annual rainfall (mm): 800-1000
- Rainfall pattern: transitional
- Length of growing season (months): 4-6
- Drought risk: nd
- Dependency on soil moisture availability: medium
- Geology: Bukoba (2) sandstone and shale and Karagwe/Ankolean (2) phyllite and quartzite
- Physiographic unit: W7
- CMU: D2, D3
- Mapping units: B2f2, B2g2
- Landform: dissected and hilly with parallel ridges and narrow valleys in the sandstone areas and undulating to hilly and steeply dissected with valleys and swamps in the phyllite areas
- Sub-division:
  - Bukoba (2) sandstone, mapping unit B2f2, CMU D2 with banana (+ cassava, rice, tobacco, coffee). Soil types:
    - Dominant: 341, 391
    - Associated: 704, 784
  - Karagwean/Ankolean (2) phyllite and quartzite, mapping unit B2g2, CMU D3 with banana (+ coffee, maize). Soil types:
    - Dominant: 365
    - Associated: 106, 108
    - Inclusions: 684, 786
- Soil related constraints: fertility, acidity, drought
- Land use: banana, coffee, maize, cassava, rice, tobacco
- Proportion of cultivated land: very high
- Carrying capacity: medium

**Cashew (C)**

- Cashew, higher rainfall (C1)
- Cashew, lower rainfall (C2)

*Cashew, higher rainfall (C1)*

- Songea plateau, Sedimentary Eastern and Southern plateaux and hinterland plains
- Altitude (m): <100-1000
- Temperature regime: 2-3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: monomodal to transitional
- Length of growing season (months): 3-7
- Drought risk: low to medium
- Dependency on soil moisture availability: medium to high
- Geology: Karroo, Plio-Pleistocene 1, Jurassic-Paleogene
- Physiographic units: CH1,2,4, EPh6, SU
- CMU: A4, A5, B3, B3d, B5h
- Mapping units: A2f, B3e, B3f, B3g1, B3l1
- Landform: rolling to hilly, often steeply dissected
- Sub-division:

- On Karroo sandstone and shale, with influence of a Plio-Pleistocene (4) coastal sand cover, mapping units A2d6, A2f, B3e, B3f, CMU B3, B3d, B5h. Soil types:
  - Dominant: 342
  - Inclusions: 526, 527, 650, 693
- On Plio-Pleistocene (1)(Neogene) sandstone, cretaceous clays, shale, limestone, mapping unit B3l1, CMU A4, intergrades to FSZ CT, RCC, MS2a. Soil types:
  - Dominant: 331, 451
  - Inclusions: 523, 643, 676
- On Jurassic-Paleogene sandstone, limestone and shale, mapping unit B3g1, CMU A5, intergrade to FSZ Coconut-Cassava-Cashew. Soil types:
  - Dominant: 541
  - Associated: 674
- Soil related constraints: fertility, acidity
- Land use: cashew, cassava, livestock, rice, coconut
- Proportion of cultivated land: low to very high
- Carrying capacity: low to high

*Cashew, lower rainfall (C2)*

- Sedimentary Eastern and Southern plateaux
- Altitude (m): 200-1100
- Temperature regime: 2-3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: monomodal to transitional
- Length of growing season (months): <5-7
- Drought risk: low to medium
- Dependency on soil moisture availability: (medium to) high
- Geology: Karroo, Plio-Pleistocene (4)
- Physiographic units: SD, SU
- CMU: B3, B3d
- Mapping units: C2d2, C3g, D2j
- Landform: undulating to hilly, steeply dissected
- Soil types:
  - Dominant: 340, 342
  - Inclusions: 526, 527, 650, 692, 693
- Associated FSZ: Maize-Sesame (1b) and Park (1b)
- Soil related constraints: fertility, drought, ,low organic matter
- Land use: cashew, tobacco, cassava, groundnut, maize, sorghum, sisal
- Proportion of cultivated land: low
- Carrying capacity: low

**Cassava, rice (CR, CRO)**

- Cassava, rice
- Cassava, rice, oilpalm

*Cassava, rice (CR)*

- Altitude (m): 500->1000
- Temperature regime: 1-2
- Annual rainfall (mm): 900-1500
- Rainfall pattern: monomodal
- Length of growing season: 5->8
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Bukoba (2), Karagwe/Ankolean (1), Mocambique gneiss
- Physiographic units: HM3, U2, U4



- CMU: C2, D4, G5
- Mapping units: A2d4, A2e, Blf
- Landform: (very gently) undulating plains and hills
- Sub-division:
  - On Mocambique gneiss (unclear), Nyasa shore, mapping unit A2d4, CMU D4 (?). Soil types:
    - Dominant: 272
    - Inclusions: 111
  - On Bukoba (2) sandstone, mapping unit Blf, CMU C2. Soil types:
    - Dominant: 477
    - Associated/inclusions: 106, 341, 424, 506, 686
  - On Karagwe/Ankolean (1) schist and granite, mapping unit A2e, CMU G5. Soil types:
    - Dominant: 475
    - Inclusions: 106
- Soil related constraints: fertility, (erosion)
- Land use: Cassava, rice, (maize, fish, sweet potato, groundnut, coconut, fruit, livestock)
- Proportion of cultivated land: high to very high
- Carrying capacity: medium to high

#### *Cassava, rice, oilpalm (CRO)*

- Altitude (m): 800-1800
- Temperature regime: 2
- Annual rainfall (mm): 800-1300
- Rainfall pattern: monomodal
- Length of growing season: 6-7.5
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Bukoba (1) and (2), possibly Ubendian gneiss
- Physiographic units: PC1, PC3?, PPw5
- CMU: G3, G4h
- Mapping units: B2s, B2t
- Landform: undulating plains and plateaux
- Sub-division:
  - On Bukoba (1) limestone and basalt, mapping unit B2s, CMU G3 with cassava, rice, oilpalm. Soil types:
    - Associated: 337, 474
    - Inclusions: 113, 505, 687
  - On Bukoba (2) sandstone, shale, possibly with some Ubendian gneiss, mapping unit B2t, CMU G4h, with cassava, rice (+ coffee, maize, bean, banana, tobacco). Soil types:
    - Dominant: 341, 473
    - Associated: 106, 364, 421, 477
    - Inclusions: 210, 651, 686
- Soil related constraints: fertility, erosion
- Land use: cassava, rice, oilpalm, maize, sweet potato, groundnut, sorghum, livestock
- Proportion of cultivated land: very low
- Carrying capacity: low

#### **Cassava, trees (spices) (CT)**

- Altitude (m): < 200
- Temperature regime: 3
- Annual rainfall (mm): 1000-1300
- Rainfall pattern: bimodal
- Length of growing season: 4->5, 1.5-2.5
- Drought risk: moderate
- Dependency on soil moisture availability: moderate

- Geology: Pleistocene (2), Plio-Pleistocene (1)
- Physiographic units: CH1, CP1, CP2
- CMU: A3, A4
- Mapping units: A3b, A3c
- Landform: undulating to rolling plains
- Sub-division:
  - On Plio-Pleistocene (1) coastal sand and clay, mapping unit A3b, CMU A4. Soil types:
    - Dominant: 331
    - Inclusions: 523, 643, 676
  - On Pleistocene (2) limestone, marl and clay, mapping unit A3c, CMU A3. Soil types:
    - Dominant: 144, 522
    - Associated: 401
    - Inclusions: 301, 333, 542, 721
- Soil related constraints: nd
- Land use: nd
- Proportion of cultivated land: very high
- Carrying capacity: high

#### **Coconut, cassava, cashew (CCC)**

- Altitude (m): <100-200
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: variable
- Length of growing season (months): 3-4.5, 1-2
- Drought risk: low to high
- Dependency on soil moisture availability: moderate
- Geology: Jurassic-Paleogene limestone, cretaceous clays, shale, sandstone and marl
- Physiographic units: CD2, CD3, CH2
- CMU: A5, A5d
- Mapping units: B3g2, B3g3
- Landform: undulating to rolling, steeply dissected
- Soil types:
  - Dominant: 541
  - Associated: 107,112, 236, 674, 722
- Soil related constraints: salinity, fertility, workability, drought
- Land use: Rice, coconut, cassava, maize, sorghum, sisal, cashew
- Proportion of cultivated land: moderate to very high
- Carrying capacity: low

#### **Coffee, banana (CB)**

- Coffee, banana on volcanic ash (CB1)
- Coffee, banana on gneiss (CB2)
- Coffee, banana (+ tea) on sandstone, or phyllite (CB3)

#### *Coffee, banana on volcanic ash (CB1)*

- Rungwe highlands, Meru and Kilimanjaro slopes
- Altitude (m): 600/900-2000
- Temperature regime: 1
- Annual rainfall (mm): 1000-2600
- Rainfall pattern: monomodal (to transitional?)
- Length of growing season (months): 5-12?
- Drought risk: low to medium
- Dependency on soil moisture availability: very low
- Geology: Sub-recent 3v, Pleistocene 4v, Plio-Pleistocene 8v

- Physiographic units: HU2, HV1, HV2, NA7, NV3a
- CMU: E2, E3, E3h, E4
- Mapping units: Alh1, Alh2, Alk1, Alk2
- Landform: undulating to rolling lava plains and plateaux, some steep hills and footslopes in Rungwe highlands and steep volcanic slopes in the Meru and Kilimanjaro areas
- Sub-division:
  - On Sub-recent (3v) volcanic ash, Mt. Meru area, mapping unit Alk2, CMU E2. Soil types:
    - Dominant: 262
    - Inclusions: 231, 734
  - On Pleistocene (4v) volcanic ash and basic metamorphic intrusions and basalt in Rungwe highlands, mapping units Alh1, Alh2, CMU E3, E3h. Associated FSZ Maize-Potato (1a) (mapping units Alb, Alc). Soil types:
    - Dominant: 265
    - Associated: 275, 364
    - Inclusions: 103, 111
  - On Plio-Pleistocene (8v) volcanic ash, Kilimanjaro area, mapping unit Alk1, CMU E4. Soil types:
    - Dominant: 271, 321, 782
    - Inclusions: 102
- Soil related constraints: fertility, erosion, leaching, acidity, low organic matter, depth
- Land use: coffee, banana, horticulture, dairy, maize, rice, bean, tea, fruits, sugarcane, cassava, sweet potato, bambara nuts, cardamom
- Proportion of cultivated land: very high
- Carrying capacity: high to very high

*Coffee, banana on gneiss (CB2)*

- Altitude (m): 1500-2000
- Temperature regime: 1
- Annual rainfall (mm): 800->1000
- Rainfall pattern: monomodal
- Length of growing season: 5-12?
- Drought risk: low
- Dependency on soil moisture availability: very low
- Geology: Mocambique or Ubendian gneiss
- Physiographic units: EM5, HU2
- CMU: D4, D6d
- Mapping units: Alh3, Blb3
- Landform: steep hills and footslopes in the Rungwe highlands; rare or absent on Pare (or Usambara) mountains
- Sub-division:
  - On Mocambique gneiss, Pare/Usambara mountains, mapping unit Blb3, CMU D4. Soil types:
    - Dominant: 272
    - Associated: 111, 363
  - On Ubendian gneiss, Rungwe highlands, mapping units Alh3, CMU D6d. Soil types:
    - Associated: 275, 364
    - Inclusions: 111
- Soil related constraints: fertility, erosion
- Land use: Coffee, banana
- Proportion of cultivated land: very high
- Carrying capacity: low

*Coffee, banana on sandstone or phyllite, including tea estates (CB3)*

- Altitude (m): 1100-1800
- Temperature regime: 2
- Annual rainfall (mm): 800-2000
- Rainfall pattern: bimodal to transitional
- Length of growing season (months): 6-12?
- Drought risk: low
- Dependency on soil moisture availability: very low to moderate
- Geology: Bukoba (2) sandstone and shale, Karagwe/Ankolean (2) phyllite and quartzite
- Physiographic units: W3, W4, W6, W7
- CMU: C2h, D2, D3d
- Mapping units: A2a1, A2a2, B2f4, B2g1
- Landform: undulating to rolling plains, quartzite ridges to more dissected hills at higher altitude
- Sub-division:
  - Bukoba (2) sandstone and shale, mapping units A2a1, A2a2, B2f4, CMU C2h, D2 with coffee, banana (+ cassava, rice, tobacco).  
Soil types:
    - Dominant: 341, 368, 391
    - Associated: 106, 704, 784
    - Inclusions: 108, 686
  - Karagwe/Ankolean (2) phyllite/quartzite, mapping unit B2g1, CMU D3d with coffee, banana and others (see below). Soil types:
    - Dominant: 365
    - Associated: 108, 116
    - Inclusions: 684, 786
- Soil related constraints: fertility, acidity, drainage, depth, erosion, leaching
- Land use: Coffee, banana, cassava, bean, maize, sweet potato, round potato, cowpea, bambara groundnut, yam, groundnut, tea
- Proportion of cultivated land: high to very high
- Carrying capacity: medium

**Coffee, maize, bean (CMB)**

- Coffee, maize, bean on volcanic ash (CMB1)
- Coffee, maize, bean on granite, schist, phyllite, sandstone or limestone (CMB2)
- Coffee, maize, bean on gneiss, high rainfall (CMB3a)
- Coffee, maize, bean on gneiss, medium rainfall (CMB3b)

*Coffee, maize, bean on volcanic ash, including coffee estates (CMB1)*

- Altitude (m): 1200-1800
- Temperature regime: 1
- Annual rainfall (mm): 800-1200
- Rainfall pattern: nd
- Length of growing season (months): 6-9
- Drought risk: nd
- Dependency on soil moisture availability: high
- Geology: Plio-Pleistocene 8v cover over Ubendian gneiss
- Physiographic unit: HP5
- CMU: D6v
- Mapping unit: B1d
- Landform: undulating to rolling plains and plateaux with rift benches, steep hills and footslopes
- Soil types on Plio-Pleistocene (8v) volcanic ash and intermediate and basic metamorphic intrusions and basalt:
  - Dominant: 264

- Inclusions: 275
- Soil related constraints: nd
- Land use: Maize, coffee, (cassava, sweet potato, groundnut, banana, bean, livestock, finger millet, vegetables, dairy)
- Proportion of cultivated land: very high
- Carrying capacity: high

*Coffee, maize, bean on granite, schist, phyllite, sandstone and limestone (CMB2)*

- Altitude (m): 1500-1700
- Temperature regime: 1
- Annual rainfall (mm): 1000-1500
- Rainfall pattern: monomodal to transitional
- Length of growing season (months): 6-8
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Karagwe/Ankolean (1) and (2) schist, granite, phyllite, quartzite and Bukoba (2) sandstone and limestone
- Physiographic units: RT, W2
- CMU: C3h, D1, D3d
- Mapping units: Ale, Alf, B2h
- Landform: dissected hilly plateaux with tablelands, scarps and steep valleys on limestone and sandstone and undulating to rolling, steeply dissected on phyllite and undulating to rolling plains on schist and granite
- Sub-division:
  - Karagwe/Ankolean (1) schist and granite, mapping unit B2h, CMU C3h. Soil types:
    - Dominant: 366
    - Associated: 115
    - Inclusions: 685, 785
  - Karagwe/Ankolean (2) phyllite and quartzite, mapping unit Alf, CMU D3d. Associated soil types: 108, 116, 276, 365, 367, 479, 685, 686, 687
  - Bukoba (2) sandstone and limestone, mapping unit Ale, CMU D1. Soil types:
    - Dominant: 276, 367
    - Inclusions: 113, 687
- Soil related constraints: fertility, acidity, erosion, (drought?)
- Land use: maize, bean, coffee, livestock, cassava, banana, (oilpalm)
- Proportion of cultivated land: high
- Carrying capacity: moderate

*Coffee, maize, bean on gneiss, high rainfall (CMB3a)*

- Altitude (m): 1300-1600
- Temperature regime: 1
- Annual rainfall (mm): 1200-1500
- Rainfall pattern: monomodal
- Length of growing season (months): 6-9
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Mocambique gneiss
- Physiographic unit: HM4
- CMU: D4
- Mapping unit: Alj1
- Landform: strongly dissected, hilly plateau with rocky hills and escarpments
- Soil types on Mocambique gneiss:

- Dominant: 272
- Inclusions: 208, 649
- Soil related constraints: workability, landslides, erosion
- Land use: Coffee, maize, (bean, wheat, banana, finger millet, dairy, forest, livestock)
- Proportion of cultivated land: very high
- Carrying capacity: high

*Coffee, maize, bean on gneiss with medium rainfall (CMB3b)*

- Altitude (m): 750-1500
- Temperature regime: 2
- Annual rainfall (mm): 800-1000
- Rainfall pattern: transitional ?
- Length of growing season (months): 3-5
- Drought risk: nd
- Dependency on soil moisture availability: moderate
- Geology: Mocambique gneiss
- Physiographic units: HM3, HM5
- CMU: C4d, C4h
- Mapping unit: B2p2
- Landform: dissected and flat to rolling intramontane plains
- Soil types on Mocambique gneiss:
  - Dominant 272
  - Associated: 338, 461
  - Inclusions: 111
- Soil related constraints: nd
- Land use: Coffee, maize, bean
- Proportion of cultivated land: moderate
- Carrying capacity: moderate

**Cotton, maize (CM)**

- Cotton, maize, Lake zone (CM1a)
- Cotton, maize, Eastern zone (CM1b)

*Cotton, maize (CM1a)*

- Lake zone
- Altitude (m): 1000-1300
- Temperature regime: 2
- Annual rainfall (mm): 800-1000
- Rainfall pattern: transitional
- Length of growing season (months): 3-3.5
- Drought risk: low to high
- Dependency on soil moisture availability: very low to moderate
- Geology: Pleistocene (3)
- Physiographic unit: PPs3
- CMU: H4
- Mapping unit: B211
- Landform: plains and hills with seasonally waterlogged plains
- Soil types on Pleistocene (3) cover over granite or gneiss:
  - Dominant: 602
  - Associated: 336, 502
  - Inclusions: 111, 423, 740
- Associated FSZ Maize-Sorghum-Pastoralism (2)
- Soil related constraints: fertility, drought, workability
- Land use: Maize, cotton, cassava, rice, sorghum, pigeon pea, sweet potato, bean, groundnut, chickpea
- Proportion of cultivated land: very high
- Carrying capacity: low

*Cotton, maize (CM1b)*

- Eastern zone
- Altitude (m): 250-1000
- Temperature regime: 2-3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: transitional to monomodal
- Length of growing season (months): 4-9
- Drought risk: low to moderate
- Dependency on soil moisture availability: high
- Geology: Mocambique gneiss, Plio-Pleistocene (5)
- Physiographic units: EF, E11, EPh1, EPh5, EPh8
- CMU: B4, B5, B5d, B5h
- Mapping units: B2r, B3c1, B3c2, B3h1, C3a2
- Landform: level to rolling plain with some dissected uplands
- Soil types:
  - Dominant: 335, 362, 476
  - Associated: 412, 453, 473, 503
  - Inclusions: 111, 688
- Possible sub-division:
  - On Plio-Pleistocene (5) coastal sand cover over Mocambique gneiss, mapping unit B2r, CMU B4.
  - On Mocambique gneiss, mapping units B3c1, B3c2, B3h1, C3a2, CMU B5, B5h. Associated FSZ Maize-Sorghum (2a).
- Soil related constraints: fertility, workability, erosion, acidity, depth, degradation
- Land use: Maize, bean, cotton, sesame, sweet potato, cassava, sunflower, rice, sorghum
- Proportion of cultivated land: moderate
- Carrying capacity: low to medium

**Cotton, sorghum (CS)**

- Altitude (m): 1000-1100
- Temperature regime: 2
- Annual rainfall (mm): 400-800
- Rainfall pattern: monomodal to transitional
- Length of growing season: 3-3.5
- Drought risk: low ?
- Dependency on soil moisture availability: low ?
- Geology: Plio-Pleistocene (3)
- Physiographic unit: PPw4
- CMU: H3
- Mapping unit: D2o1
- Landform: flat to very gently undulating plain developed in old lake sediments
- Soil types:
  - Dominant: 238
  - Inclusions: 728, 765
- Associated FSZ Cotton-Sorghum-Pastoralism
- Soil related constraints: erosion, degradation
- Land use: cotton, sorghum, sweet potato, cowpea, maize
- Proportion of cultivated land: very high?
- Carrying capacity: very low

**Cotton, sorghum, pastoralism (CSP)**

- Altitude (m): 600-800
- Temperature regime: 2
- Annual rainfall (mm): 600-800
- Rainfall pattern: nd

- Length of growing season: 3-3.5
- Drought risk: nd
- Dependency on soil moisture availability: low ?
- Geology: Sub-recent (2), Plio-Pleistocene (3), Basement complex granite
- Physiographic units: PH1, PPs1, PPs2, PPw1
- CMU: H2, H3, H5h
- Mapping units: D2p1, D2o3, D2n
- Landform: nd
- Sub-division:
  - On Sub-recent (2) deposits, Shinyanga-Igunga area, mapping unit D2p1, CMU H2. Soil types:
    - Dominant: 604
    - Associated: 239
    - Inclusion: 727
  - On Plio-Pleistocene (3) marl, sand and clay, Shinyanga-igunga, mapping unit D2o3, CMH H3. Soil types:
    - Dominant: 602
    - Associated: 728
    - Inclusion: 238
  - On Basement Complex granite, Meatu-Maswa-Shinyanga, mapping units D2n, CMU H5h. Soil types:
    - Dominant: 335, 421
    - Inclusions: 111, 131, 421, 501, 691, 735
- Soil related constraints: degradation, erosion
- Land use: nd
- Proportion of cultivated land: very high
- Carrying capacity: low to very low

#### **Maize, bean (MB)**

- Maize, bean on volcanic ash, higher rainfall, Meru/Kili (MB1a)
- Maize, bean on volcanic ash, higher rainfall, Karatu (MB1b)
- Maize, bean on gneiss, higher rainfall (MB2)
- Maize, bean on basalt, limestone, sandstone, higher rainfall (MB3)
- Maize, bean on granite or gneiss, lower rainfall (MB4a)
- Maize, bean, tobacco on sandstone or shale, lower rainfall (MB4b)
- Maize, bean on volcanic ash, lower rainfall MB4c)
- Maize, bean (handhoe, Mbulu), lower rainfall (MB5a)
- Maize, bean (handhoe, Kiteto, Pare footslopes), lower rainfall (MB5b)

#### *Maize, bean, higher rainfall on volcanic ash (MB1a)*

- Meru/Kilimanjaro areas
- Altitude (m): 900-2000
- Temperature regime: 2-3
- Annual rainfall (mm): 800-1200
- Rainfall pattern: bimodal to transitional
- Length of growing season: 3->6, depending on altitude
- Drought risk: moderate to high
- Dependency on soil moisture availability: (moderate to) high
- Geology: Sub-recent (3v), Plio-Pleistocene (8v)
- Physiographic units: NA6, NA7, NV3a
- CMU: E2, E4, (H2v)
- Mapping units: B2b1, B2b2
- Landform: volcano footslopes and flat to rolling plains
- Sub-division:
  - On Sub-recent (3v) volcanic ash, Mt. Meru area, mapping unit B2b1, CMU E2, (H2v). Soil types:
    - Dominant: 233, 262



- Associated: 132, 231, 734
- On Plio-Pleistocene (8v) volcanic ash, Kilimanjaro area, mapping unit B2b2, CMU E4. Soil types:
  - Dominant: 271, 321, 782
  - Inclusions: 102
- Soil related constraints: drought, erosion, degradation, soil depth
- Land use: maize, bean, coffee, banana, horticulture, dairy, cassava, sugarcane, sorghum, potato, sweet potato, pigeon pea
- Proportion of cultivated land: high to very high
- Carrying capacity: high to very high

*Maize, bean, higher rainfall on volcanic ash (MB1b)*

- Oldeani area, Karatu
- Altitude (m): > 2000
- Temperature regime: 1
- Annual rainfall (mm): nd
- Rainfall pattern: nd
- Length of growing season: nd
- Drought risk: nd
- Dependency on soil moisture availability:
- Geology: Plio-Pleistocene (8v)
- Physiographic unit: NC2
- CMU: E4h
- Mapping unit: B1a2
- Landform: rolling to hilly, dissected plateau
- Soil types:
  - Associated: 102, 141, 271, 782
- Soil related constraints: nd
- Land use: maize, bean, plus ?
- Proportion of cultivated land: nd
- Carrying capacity: nd

*Maize, bean, higher rainfall on gneiss, including tea estates (MB2)*

Farming system with wide variation, tentatively split on geology

- Altitude (m): 500-2500
- Temperature regime: 1-2
- Annual rainfall (mm): 800->1500
- Rainfall pattern: monomodal to transitional
- Length of growing season: > 5
- Drought risk: low to moderate
- Dependency on soil moisture availability: high
- Geology: Ubendian and Mocambique gneiss
- Physiographic units: EF, EI2, EM2, EM4, EM5, EPh6, HM2, HM3, HM4, HP1, PC1, PPw3, RP1
- CMU: B5h, D4, D5, G6, G6h
- Mapping units: Ald4, Ald5, Ald6, Ald7, A1i, A2c, A2d1, A2d2, A2d3, A2d6, A2d7, B1b1, B1b3, B1d5, B1d6, B2d3
- Landform: gently undulating and lacustrine plains on Ubendian gneiss and undulating to rolling plains, dissected, sometimes strongly dissected rolling to hilly mountain slopes and plateaux and footslopes on Mocambique gneiss
- Sub-division:
  - On Mocambique gneiss, mapping units: Ald4, Ald5, Ald6, Ald7, A2d1, A2d2, A2d3, A2d6, A2d7, B1b1, B1b3, B1d5, B1d6, CMU B5h, D4, D5, D5d. Soil types:
    - Dominant: 272, 412, 473
    - Associated: 111, 362, 363, 421, 461
    - Inclusions: 335, 501

- On Ubendian gneiss, mapping unit Ali, A2c, B2d3, CMU G6, G6h.  
Soil types:
  - Dominant: 335, 473, 506?
  - Associated: 364, 421
  - Inclusions: 111, 210, 651, 691, 735
- Soil related constraints: fertility, erosion, acidity, sodicity, landslides, low organic matter, flooding, degradation, workability, soil depth
- Land use: maize, bean, potato, horticulture, coffee, livestock, sorghum, groundnut, sunflower, cassava, fruit, dairy, banana, tobacco, fingermillet, sweet potato, bambara nuts, rice, pigeon pea, wheat
- Proportion of cultivated land: (very low?) to very high
- Carrying capacity: low to high

*Maize, bean with higher rainfall on basalt, limestone, sandstone (MB3)*

- Altitude (m): 1000-1500
- Temperature regime: 1
- Annual rainfall (mm): 800-1400
- Rainfall pattern: monomodal to transitional
- Length of growing season: 6.5-8
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Bukoba (1) limestone, basalt and argileaceous sandstone
- Physiographic unit: W1
- CMU: Clh
- Mapping unit: Ble
- Landform: dissected highlands
- Soil types:
  - Associated: 276, 367
  - Inclusions, 113, 687
- Soil related constraints: erosion, fertility, drought
- Land use: nd
- Proportion of cultivated land: high
- Carrying capacity: medium

*Maize, bean with lower rainfall on granite or gneiss (MB4a)*

- Altitude (m): 1200-2100
- Temperature regime: 1
- Annual rainfall (mm): 600-900
- Rainfall pattern: monomodal
- Length of growing season: 5-9
- Drought risk: low
- Dependency on soil moisture availability: moderate to high
- Geology: Mocambique gneiss
- Physiographic units: HM1, HM2, HP1, HP2
- CMU: D5, D5d
- Mapping units: C1d1, C1d2, D1b1, D1b2
- Landform: flat to rolling plains and plateaux
- Soil types:
  - Dominant: 111, 272
  - Associated: 473
  - Inclusions: 237, 501
- Associated FSZ in lower rainfall areas Sorghum-Finger millet (1)
- Soil related constraints: fertility, drought, low organic matter
- Land use: maize, bean, livestock, sunflower, sorghum, groundnut, horticulture, tobacco, bamboo, wheat, potato (oxen or mechanized system)

- Proportion of cultivated land: medium to very high
- Carrying capacity: low to medium

*Maize, bean, tobacco with lower rainfall on sandstone or shale (MB4b)*

- Gumbiro area
- Altitude (m): 500-1500
- Temperature regime: 2
- Annual rainfall (mm): 600-1200
- Rainfall pattern: monomodal
- Length of growing season: 5-9
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Karroo sandstone and shale
- Physiographic units: EA4a, EA4b, EI1
- CMU: F2d
- Mapping units: C2d1, D2i
- Landform: steeply dissected ridges, scarps and alluvial plains
- Soil types:
  - Dominant: 342, 725
  - Associated: 527
  - Inclusions: 693
- Soil related constraints: fertility, drainage
- Land use: maize, bean, cassava, rice, tobacco, groundnut, pigeon pea, livestock, sweet potato, sorghum, fruits (oxen or mechanized system)
- Proportion of cultivated land: medium
- Carrying capacity: low

*Maize, bean with lower rainfall on volcanic ash (MB4c)*

- Altitude (m): 1200-1900
- Temperature regime: 1
- Annual rainfall (mm): 600-1500
- Rainfall pattern: monomodal
- Length of growing season: 6-9
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Pleistocene (4v)
- Physiographic units: HP4, HV2
- CMU: E3h
- Mapping unit: C1c
- Landform: undulating to rolling lava plains and plateaux, some steep hills and footslopes
- Soil types:
  - Dominant: 265
  - Associated: 275
  - Inclusions: 103, 111
- Soil related constraints: nd
- Land use: maize, bean, coffee, wheat, livestock, horticulture, finger millet, pea, dairy, potato, sweet potato (oxen or mechanized system)
- Proportion of cultivated land: very high
- Carrying capacity: high

*Maize, bean with lower rainfall (MB5a)*

- Mbulu area
- Altitude (m): 1500-2500
- Temperature regime: 1(-2)
- Annual rainfall (mm): 500-> 1500

- Rainfall pattern: monomodal
- Length of growing season: 3-5
- Drought risk: low to high
- Dependency on soil moisture availability: moderate to high
- Geology: Mocambique gneiss
- Physiographic units: NP1, NP2
- CMU: D4
- Mapping unit: D1d1
- Landform: rolling to hilly
- Soil types:
  - Dominant: 273 ?
  - Inclusions: 111, 322
- Associated FSZ Maize-Bean (4a) and Wheat-Barley-Maize-Bean-Pigeon pea
- Soil related constraints: fertility, workability, erosion
- Land use: maize, bean, pigeon pea, sunflower (mountain handhoe system)
- Proportion of cultivated land: medium
- Carrying capacity: low

*Maize, bean with lower rainfall, including sisal estates (MB5b)*

- Kiteto, Pare
- Altitude (m): (500)/1000-1500
- Temperature regime: 2
- Annual rainfall (mm): 500-1000
- Rainfall pattern: bimodal (to transitional?)
- Length of growing season: 2-4.5
- Drought risk: moderate to high
- Dependency on soil moisture availability: low
- Geology: Mocambique gneiss and Sub-recent (2) colluvial footslopes
- Physiographic units: EH1, EH2, EM1, EPa1, EPa3, EPh1
- CMU: B5h, C4, C4h, H2
- Mapping units: D2a1, D2a2, D2e, D2m1, D2m2
- Landform: nd
- Soil types:
  - Dominant: 362, 461
  - Associated: 412
  - Inclusions: 111, 363, 501, 735
- Soil related constraints: erosion, fertility, drought, salinity, sodicity, workability
- Land use: maize, fingermillet, sorghum, bean, livestock (handhoe system)
- Proportion of cultivated land: very low to high (?)
- Carrying capacity: very low

**Maize, bean, pastoralism (MBP)**

*Maize, bean, pastoralism on volcanic ash, including bean, wheat, and sugarcane estates and ranches (MBP)*

- Altitude (m): 500-1700
- Temperature regime: 2
- Annual rainfall (mm): 500-1000
- Rainfall pattern: bimodal to transitional
- Length of growing season: 2-3.5
- Drought risk: moderate to high
- Dependency on soil moisture availability: low
- Geology: Sub-recent (3v), Plio-Pleistocene (8v), (Mocambique gneiss)
- Physiographic units: E2, EPa1NA6, NA7, NV3a

- CMU: C4, E2, E4, H2v
- Mapping units: D2g ,D2h2, D2k3, D2l
- Landform: level to rolling
- Sub-division:
  - On Sub-recent (3v) volcanic ash, mapping units D2g, D2h2, D2k3, CMU E2, H2v. Soil types:
    - Dominant: 231, 262, 461, 735
    - Associated: 734
    - Inclusions: 111, 501, 763
  - On Plio-Pleistocene (8v) volcanic ash, mapping unit D2l, CMU E4. Soil types:
    - Dominant: 321
    - Inclusions: 102
- Soil related constraints: fertility, degradation, depth, acidity ?, erosion, salinity
- Land use: maize, bean, livestock, fingermillet, sugarcane, wheat, pigeon pea, rice, sorghum
- Proportion of cultivated land: high to very high
- Carrying capacity: very low to low

#### **Maize, cassava, cotton, rice (MCCR)**

- Altitude (m): 1000-1300
- Temperature regime: 2
- Annual rainfall (mm): 800-1200
- Rainfall pattern: bimodal to monomodal
- Length of growing season: 3-5
- Drought risk: low to moderate
- Dependency on soil moisture availability: low to moderate
- Geology: Sub-recent (2), Basement complex granite
- Physiographic units: PH1, PH4, PPp2, PPw1
- CMU: H2, H5h
- Mapping units: A2b, B2m
- Landform: nd
- Sub-division:
  - On Basement Complex granite, mapping unit A2b, CMU H5h. Soil types:
    - Dominant: 335(a)
    - Associated: 111, 381, 421 (a)
    - Inclusions: 131, 501, 683, 691, 735, 741
  - On Sub-recent (2) deposits, mapping unit B2m, CMU H2 with more rice and livestock ?, Soil types:
    - Dominant: 738
    - Inclusion: 604
- Soil related constraints: fertility, drought, workability, (acidity?)
- Land use: nd
- Proportion of cultivated land: very high
- Carrying capacity: low

#### **Maize, fingermillet (MFm)**

- Maize, fingermillet on gneiss, schist or granite, higher rainfall (MFm1a)
- Maize, fingermillet on shallow soils (rocky terrain) (MFm1b)
- Maize, fingermillet on gneiss, lower rainfall (MFm2)

*Maize, finger millet with higher rainfall on gneiss, schist or granite (MFm1a)*

- Ufipa plateau

- Altitude (m): 1000-2500
- Temperature regime: 1-2
- Annual rainfall (mm): 850-1400
- Rainfall pattern: monomodal
- Length of growing season: 5-9
- Drought risk: low
- Dependency on soil moisture availability: high
- Geology: Karagwe/Ankolean (1), Ubendian gneiss
- Physiographic units: U3, U5, u6
- CMU: D3a, D6
- Mapping units: B1c, B2a1, B2a2
- Landform: flat to undulating to rolling plain, sometimes steeply dissected
- Sub-division:
  - Karagwe/Ankolean (1) schist and granite, mapping unit B1c, CMU D3a. Soil types:
    - Dominant: 339, 475, 504
    - Associated: 422
    - Inclusions: 115, 685
  - On Ubendian gneiss, mapping units B2a1, B2a2, CMU D6. Soil types:
    - Dominant: 473
    - Associated: 111, 210, 339, 421, 651
    - Inclusions: 501, 685
- Associated FSZ Maize-Fingermillet (1b)
- Soil related constraints: fertility, low organic matter content, drought, erosion, workability
- Land use: wheat, potato, maize, pyrethrum, coffee, bean, livestock, dairy, sunflower, groundnut, fingermillet, sweet potato, tea, fruits
- Proportion of cultivated land: high
- Carrying capacity: medium

*Maize, finger millet on rocky terrain with shallow soils (MFm1b)*

- Altitude (m): 1000-1800
- Temperature regime: 2
- Annual rainfall (mm): 750-1000
- Rainfall pattern: monomodal
- Length of growing season: 4-7
- Drought risk: low to moderate
- Dependency on soil moisture availability: nd
- Geology: Ubendian gneiss
- Physiographic units: U1, RT
- CMU: D6
- Mapping units: B2d2, C2a2
- Landform: nd
- Soil types:
  - Dominant: 111, 335, 501
  - Associated: 421, 477
  - Inclusions: 685
- Soil related constraints: nd
- Land use: maize, fingermillet, bean, sunflower, fruits, livestock, sorghum, cassava, forest
- Proportion of cultivated land: nd
- Carrying capacity: nd

*Maize, fingermillet with lower rainfall on gneiss (MFm2)*

- Ufipa plateau
- Altitude (m): 1200-1700

- Temperature regime: 1
- Annual rainfall (mm): 750-900
- Rainfall pattern: monomodal
- Length of growing season: 5-6.5
- Drought risk: low to moderate
- Dependency on soil moisture availability: high
- Geology: Ubendian gneiss
- Physiographic unit: U1
- CMU: D6
- Mapping unit: D1a
- Landform: gently undulating plains
- Soil types:
  - Dominant: 335, 501
  - Associated: 210, 421, 477, 651
  - Inclusions: 685
- Soil related constraints: nd
- Land use: maize, finger millet, livestock, bean, cassava, sorghum, sunflower, groundnut, vegetables, sugarcane
- Proportion of cultivated land: high
- Carrying capacity: medium

#### **Maize, forest (MFo)**

- Maize, forest, higher rainfall (MFo1a)
- Maize, forest, lower rainfall (MFo1b)

#### *Maize, forest with higher rainfall (MFo1a)*

- Altitude (m): 700-2800
- Temperature regime: 1-2
- Annual rainfall (mm): 1200-1400
- Rainfall pattern: monomodal
- Length of growing season: 5-7
- Drought risk: low to moderate
- Dependency on soil moisture availability: nd
- Geology: Mocambique gneiss (and Karroo sandstone)
- Physiographic unit: RT
- CMU: D4, D5, F2d
- Mapping units: A1d1, A1d2, A2d5, A2g, B2c, B2i
- Landform: mountainous, rolling to strongly dissected
- Soil types:
  - Dominant: 110, 111, 146, 261 (b), 272
  - Inclusions: 105, 275
- Soil related constraints: nd
- Land use: maize, forest
- Proportion of cultivated land: nd
- Carrying capacity: nd

#### *Maize, forestry with lower rainfall (MFo1b)*

- Altitude (m): > 1500
- Temperature regime: 1
- Annual rainfall (mm): 800
- Rainfall pattern: nd
- Length of growing season: nd
- Drought risk: nd
- Dependency on soil moisture availability: nd
- Geology: Ubendian gneiss
- Physiographic units: HP6, HU2, RT
- CMU: D6d
- Mapping unit: C1b

- Landform: low mountains
- Soil types:
  - Dominant: 111, 473
  - Associated: 682
  - Inclusion: 275
- Soil related constraints: nd
- Land use: maize, forest
- Proportion of cultivated land: nd
- Carrying capacity: nd

#### **Maize, groundnut, livestock (MGL)**

- Altitude (m): 1100-1400
- Temperature regime: 2
- Annual rainfall (mm): 400-800
- Rainfall pattern: monomodal
- Length of growing season: 2-3.5
- Drought risk: low to moderate
- Dependency on soil moisture availability: low
- Geology: Pleistocene (3), Dodoma granite and gneiss
- Physiographic units: PH1, PH2, PH3, PH4, PPp1, PPp2, PPw1, PPw7, PPw8
- CMU: C6, C6h, H6
- Mapping units: D2q1, D2q2, D2q3, D2q4, D2r2, D2r3, Ec1
- Landform: gently undulating plain
- Sub-division:
  - 
  - On Pleistocene (3) cover over Dodoma granite or gneiss, mapping units D2r2, D2r3, CMU H6. Soil types:
    - Dominant: 454, 740
    - Associated: 336, 423, 691, 702
    - Inclusions: 602, 678
  - On Dodoma granite or gneiss, mapping units D2q1-4, Ec1, CMU C6, C6h. Soil types:
    - Dominant: 111, 335, 421, 735
    - Associated: 131, 381
    - Inclusions: 501, 603, 691
- Soil related constraints: fertility, depth, acidity, erosion, degradation, drought
- Land use: sorghum, millet, groundnut, grape, maize, livestock
- Proportion of cultivated land: very low to medium
- Carrying capacity: very low (to low)

#### **Maize, groundnut, tobacco, pastoralism (MGTP)**

- Altitude (m): 1000-1300
- Temperature regime: 2
- Annual rainfall (mm): 800-1000
- Rainfall pattern: monomodal (to transitional)
- Length of growing season: 4-5/6
- Drought risk: low to moderate
- Dependency on soil moisture availability: low
- Geology: Dodoma granite and gneiss, Basement complex granite
- Physiographic units: PH1, PPw1, RT
- CMU: C6, C6h
- Mapping units: B2j1, B2j2, B2j3, B2j4, B2k
- Landform: gently undulating plains (partly strongly dissected) and hills, some seasonally waterlogged plains
- Soil types:
  - Dominant: 335
  - Associated: 381, 421, 691, 735



- Inclusions: 111, 131, 501, 604, 683, 701, 741
- Soil related constraints: fertility, acidity, depth, flooding
- Land use: maize, cotton, sorghum, tobacco, cassava, bean, pigeon pea, bee-keeping, Miombo woodland, sweet potato, groundnut, chickpea, livestock
- Proportion of cultivated land: low?(to high)
- Carrying capacity: low

#### **Maize, livestock/dairy (ML)**

- Maize, livestock/dairy, higher rainfall (ML1a-c)
- Maize, livestock/dairy, lower rainfall (ML1d)

#### *Maize, (dairy, livestock) with higher rainfall, including sugar estates (ML1a-c)*

- Northern Kagera river floodplain, Kagera river floodplain along border, Mara floodplain
- Altitude (m): 1000-1500
- Temperature regime: 2
- Annual rainfall (mm): 700-1500
- Rainfall pattern: bimodal
- Length of growing season: 4-5, up to > 9
- Drought risk: low
- Dependency on soil moisture availability: low
- Geology: Sub-recent (2)
- Physiographic units: PR, W8, W9
- CMU: H1, H2
- Mapping units: B2e1, B2e2, D2p3
- Landform: alluvial plains
- Sub-division:
  - B climate zone, CMU H1, physiographic unit W8, mapping unit B2e1. Soil types:
    - Dominant: 203, 652
    - Associated: 704, 787
  - B-climate zone, CMU H2, physiographic unit PR, mapping unit B2e2. Soil types:
    - Associated: 202, 642
  - D-climate zone, CMU H1, physiographic unit W9, mapping unit D2p3. Soil types:
    - Dominant: 787
    - Associated: 704
- Soil related constraints: fertility, flooding, acidity
- Land use: maize, dairy, livestock, sugarcane
- Proportion of cultivated land: high
- Carrying capacity: medium

#### *Maize (dairy, livestock) with lower rainfall, including ranches (ML1d)*

- Central Kagera
- Altitude (m): 1000-1500
- Temperature regime: 1-2
- Annual rainfall (mm): 800
- Rainfall pattern: bimodal
- Length of growing season: > 7
- Drought risk: low to moderate
- Dependency on soil moisture availability: low ?
- Geology: Karagwe/Ankolean (1)
- Physiographic units: W4, W5
- CMU: C3h

- Mapping units: B2h, D1c, D2d
- Landform: undulating to rolling plains and valleys
- Soil types:
  - Dominant: 366
  - Associated: 115, 116
  - Inclusions: 685, 785
- Soil related constraints: nd
- Land use: maize
- Proportion of cultivated land: high (?)
- Carrying capacity: medium

#### **Maize, potato (MP)**

- Maize, potato, on volcanic ash, high rainfall, Southern Highlands (MP1a)
- Maize, potato, on volcanic ash, high rainfall, Karatu (MP1b)
- Maize, potato, (tea, wattle) on gneiss, high rainfall, Njombe (MP2)

#### *Maize, potato with high rainfall on volcanic ash (MP1a)*

- Southern highlands
- Altitude (m): 1500-2900
- Temperature regime: 1
- Annual rainfall (mm): 1000-2000
- Rainfall pattern: monomodal
- Length of growing season: > 6
- Drought risk: low
- Dependency on soil moisture availability: moderate to high?
- Geology: Pleistocene (4v), Plio-Pleistocene (7v)
- Physiographic units: HP3, HP4, HU2, HV1, HV2
- CMU: D5v, E3, E3h
- Mapping units: Ala1, Ala2, Alb, Alc, Alg1, Alg2
- Landform: undulating to rolling plains and plateaux, some steep hills and footslopes, sometimes steeply dissected
- Sub-division:
  - On Pleistocene (4v) volcanic ash and Mocambique gneiss, mapping units Alb, Alc, CMU E3, E3h, D5d. Soil types:
    - Dominant: 133, 145, 261 (b), 265
    - Associated: 275, 364
    - Inclusions: 103, 105, 111, 272
  - On Plio-Pleistocene (7v) volcanic ash, mapping units Ala1, Ala2, Alc, Alg1, Alg2, CMU D5v. Soil types:
    - Dominant: 133, 261 (b), 265, 473
    - Inclusions: 105, 111, 275, 501
- Soil related constraints: fertility, leaching, erosion, landslides
- Land use: maize, potato, tea, bean, coffee, livestock, wheat, pea, pyrethrum, barley, dairy, fruits, vegetables, bamboo, sunflower, fingermillet, forest
- Proportion of cultivated land: low to very high
- Carrying capacity: low to high

#### *Maize, potato, (coffee) with higher rainfall on volcanic ash (MP1b)*

- Karatu/Oldeani
- Altitude (m): 1500-2500
- Temperature regime: 1
- Annual rainfall (mm): 800->1000
- Rainfall pattern: transitional to bimodal
- Length of growing season: 3-5
- Drought risk: low to high

- Dependency on soil moisture availability: moderate
- Geology: Plio-Pleistocene (8v)
- Physiographic unit: NP3
- CMU: E4
- Mapping unit: Bl1a1
- Landform: rolling to hilly, dissected plateau
- Soil types:
  - Associated: 271, 321
- Soil related constraints: erosion, drought
- Land use: maize, coffee, potato
- Proportion of cultivated land: medium
- Carrying capacity: low

*Maize, potato, (tea) with higher rainfall on gneiss, including tea estates and wattle plantations (MP2)*

- Njombe
- Altitude (m): 900-2000
- Temperature regime: 1-2
- Annual rainfall (mm): 900-1600
- Rainfall pattern: monomodal to transitional
- Length of growing season: 5-9
- Drought risk: low to moderate
- Dependency on soil moisture availability: (moderate to) high
- Geology: Mocambique gneiss
- Physiographic units: EF, HM1, HM2, HM5, HP1, HP2, HP3, HU1, HU2
- CMU: B5h, D4, D5, D5d
- Mapping units: Ald3, Alj3, A2d2, Blb1, Blb2, Blb4
- Landform: undulating to rolling plains and strongly dissected plateaux and valleys
- Soil types:
  - Dominant: 272, 362?, 473
  - Associated: 338, 363, 412, 461
  - Inclusions: 111, 237, 501
- Soil related constraints: erosion, leaching, fertility, workability, low organic matter, drought
- Land use: tea, maize, coffee, bean, sorghum, livestock, millet, potato, wheat, sunflower, fruit, wood, pea, bamboo, horticulture, dairy
- Proportion of cultivated land: medium to very high
- Carrying capacity: low to high

#### **Maize, sesame (MSe)**

- Maize, sesame on Ferralsols (MSela)
- Maize, sesame on Cambisols (MSe1b)

*Maize, sesame, on Ferralsols developed on gneiss and coastal sand cover (MSela)*

- Tunduru semi-humid plain
- Altitude (m): <500-600
- Temperature regime: 3
- Annual rainfall (mm): 750-1000
- Rainfall pattern: monomodal (to transitional)
- Length of growing season: 3-7
- Drought risk: low (to moderate)
- Dependency on soil moisture availability: (moderate to) high
- Geology: Plio-Pleistocene (5) coastal sand cover over Mocambique gneiss
- Physiographic units: EPh2, EPh3, EPh4, EPh5, EPh7

- CMU: B4, B5
- Mapping units: B3d1, B3d2, C3b, C3c
- Landform: gently undulating to rolling plains, sometimes steeply dissected
- Soil types:
  - Dominant: 334, 363, 413, 476
  - Associated: 452, 453, 503, 473
  - Inclusions: 111, 688, 736
- Soil related constraints: fertility, acidity?
- Land use: maize, tobacco, cassava, cashew, sweet potato, cowpea, rice, groundnut, sesame, sunflower, pigeon pea
- Proportion of cultivated land: medium to high
- Carrying capacity: low

*Maize, sesame, on Cambisols developed on sandstone and shale (MSe1b)*

- Altitude (m): 400-600
- Temperature regime: 2
- Annual rainfall (mm): nd
- Rainfall pattern: nd
- Length of growing season: 5-7
- Drought risk: nd
- Dependency on soil moisture availability: moderate to high
- Geology: Plio-Pleistocene (4)
- Physiographic unit: SU
- CMU: B3
- Mapping unit: C2f
- Landform: undulating to rolling plateau
- Soil types:
  - Dominant: 340
  - Inclusions: 526, 692
- Soil related constraints: fertility, acidity
- Land use: nd
- Proportion of cultivated land: low to very high
- Carrying capacity: low

**Maize, sorghum (MS)**

- Maize, sorghum, cassava, banana on volcanic rocks (MS1)
- Maize, sorghum, sisal, ranches on gneiss, coastal sands, limestone, marl, sandstone (bimodal rainfall pattern) (MS2a)
- Maize, sorghum on gneiss, sandstone, limestone (monomodal rainfall pattern) (MS2b)

*Maize, sorghum, cassava, banana on volcanic rocks (MS1)*

- Altitude (m): 1500-1800
- Temperature regime: 1
- Annual rainfall (mm): 800->1200
- Rainfall pattern: bimodal
- Length of growing season: 6-10
- Drought risk: low to high
- Dependency on soil moisture availability: low
- Geology: Miocene
- Physiographic unit: NP4
- CMU: E6
- Mapping unit: C1a
- Landform: undulating to rolling plains and plateaux
- Soil types:
  - Associated: 273, 361, 411
  - Inclusions: 104, 209, 648

- Soil related constraints: fertility, drought
- Land use: maize, sorghum, cassava, bean, banana, coffee, livestock, millet, sweet potato, vegetables
- Proportion of cultivated land: very high
- Carrying capacity: high

*Maize, sorghum, bimodal rainfall pattern, on gneiss, coastal sands, limestone, marl, sandstone, including sisal estates and ranches (MS2a)*

- Altitude (m): 150-1000
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: bimodal
- Length of growing season: <3-4.5, 1-3
- Drought risk: low to high
- Dependency on soil moisture availability: moderate
- Geology: Pleistocene (2), Plio-Pleistocene (1), Jurassic-Paleogene and Mocambique gneiss
- Physiographic units: CH1, CH2, CP1, EPh1
- CMU: A3, A4, A5, B5
- Mapping units: B3h2, B3l2, B3m1, C3a1, C3d
- Landform: undulating to rolling plains
- Sub-division:
  - On Pleistocene (2) limestone, marl and clay, mapping unit B3m1, CMU A3. Soil types:
    - Dominant: 522
    - Associated: 675, 721
    - Inclusions: 144, 301, 333, 401
    - Associated FSZ Rice-Coconut-Cassava
  - On Plio-Pleistocene (1) coastal sand and clay, mapping unit B3l2, CMU A4. Soil types:
    - Dominant: 331
    - Inclusions: 523, 643, 676
    - Associated FSZ Rice-Coconut-Cassava
  - On Mocambique gneiss, mapping units B3h2, C3a1 CMU B5. Soil types:
    - Dominant: 362
    - Associated: 412
    - Associated FSZ Cotton-Maize (1b)
  - On Jurassic-Paleogene sandstone, limestone, shale, mapping unit C3d, CMU A5. Soil types:
    - Dominant: 541
    - Associated: 674
    - Associated FSZ Coconut-Cassava-Cashew
- Soil related constraints: fertility, acidity, drought, workability, salinity
- Land use: maize, cassava, pigeon pea, cowpea, green gram, sorghum, millet, rice, sunflower, groundnut, pasture, sweet potato, sisal, coconut, cashew, citrus
- Proportion of cultivated land: medium to very high
- Carrying capacity: low to medium

*Maize, sorghum, monomodal rainfall pattern, on gneiss, sandstone, limestone (MS2b)*

- Altitude (m): 1000-1200
- Temperature regime: 2
- Annual rainfall (mm): 900-1000
- Rainfall pattern: monomodal
- Length of growing season: 5-6

- Drought risk: low to moderate
- Dependency on soil moisture availability: low to moderate
- Geology: Ubendian gneiss, Jurassic-Paleogene
- Physiographic units: PM1, PPw3
- CMU: A5, G6
- Mapping unit: B2d4
- Landform: gently undulating to rolling (outwash) plains, sometimes strongly dissected, with inselbergs
- Soil types:
  - Dominant: 335, 473
  - Inclusions: 111, 501, 691, 735
- Associated FSZ Maize-Bean (2)
- Soil related constraints: fertility, flooding, drought, workability
- Land use: maize, sorghum, cassava, groundnut, livestock, fingermillet, cowpea, tobacco, rice
- Proportion of cultivated land: low to medium
- Carrying capacity: low

#### **Maize, sorghum, pastoralism (MSP)**

- Maize, sorghum, pastoralism on gneiss, higher rainfall (MSP1a)
- Maize, sorghum, pastoralism (+ citrus, ranching) on coastal sands and clays, lower altitude, higher rainfall (MSP2)
- Maize, sorghum, tobacco, pastoralism (+ ranching), lower rainfall, monomodal rainfall pattern (MSP3)
- Maize, sorghum, pastoralism, lower rainfall, bimodal rainfall pattern (MSP4)

#### *Maize, sorghum, pastoralism with higher rainfall, on gneiss (MSP1a)*

- Altitude (m): 750-1800
- Temperature regime: 2
- Annual rainfall (mm): 600?-1000
- Rainfall pattern: monomodal
- Length of growing season: 5-9
- Drought risk: low ?
- Dependency on soil moisture availability: moderate to high
- Geology: Mocambique gneiss
- Physiographic units: EF, EM1, EM3, RT
- CMU: B5h, C4h
- Mapping units: C2b, B2p1 (could possibly be split into C2b as MSP1a and B2p1 as MSP1b)
- Landform: strongly dissected foothills
- Soil types:
  - Dominant: 237, 461
  - Associated: 363, 412
  - Inclusion: 111
- Soil related constraints: fertility, drought, low organic matter, erosion, leaching
- Land use: maize, sorghum, sunflower, groundnut, onion, bean, pigeon pea, livestock
- Proportion of cultivated land: low to high?
- Carrying capacity: low to high

#### *Maize, sorghum, pastoralism, lower altitude, coastal sands and clays, including ranches and citrus plantations (MSP2)*

- Altitude (m): 200
- Temperature regime: 3
- Annual rainfall (mm): 800-1000

- Rainfall pattern: transitional
- Length of growing season: <3-4.5
- Drought risk: nd
- Dependency on soil moisture availability: moderate
- Geology: Pleistocene (3), Plio-Pleistocene (2)
- Physiographic unit: CD1
- CMU: A4d
- Mapping units: B2l3, B3k, C3e
- Landform: nd
- Sub-division:
  - On Plio-Pleistocene (2) coastal sand and clay, mapping units B3k, C3e, CMU A4d. Soil types:
    - Dominant: 471
    - Associated: 472
    - Inclusions: 524, 525, 644, 645
  - On Pleistocene (3) cover over Dodoma granite or gneiss, mapping unit B2l3, CMU G7. Soil types:
    - Dominant: 336
    - Associated: 423
    - Inclusions: 111, 502, 690, 740
- Associated FSZ Cotton-Maize (1a)
- Soil related constraints: nd
- Land use: nd
- Proportion of cultivated land: very high
- Carrying capacity: low

*Maize, sorghum, tobacco, pastoralism with lower rainfall with monomodal pattern, including ranches (MSP3)*

- Central and Southern highlands
- Altitude (m): 1000-1500
- Temperature regime: 2
- Annual rainfall (mm): 550-900
- Rainfall pattern: monomodal
- Length of growing season: 4-5
- Drought risk: low to moderate
- Dependency on soil moisture availability: low to moderate
- Geology: Mocambique, Dodoma and possibly Ubendian gneiss
- Physiographic units: PH1, PH4, PPw3, RT
- CMU: C4, C5, C5h, C6h
- Mapping units: D2b1, D2b2, D2c, D2e, D2f
- Landform: gently undulating to rolling plains and plateaux with inselbergs
- Soil types:
  - Dominant: 335, 421, 461, 473
  - Associated: 111, 131, 381
  - Inclusions: 108, 363, 501, 691, 735, 763
- Soil related constraints: fertility, drought
- Land use: maize, cassava, sweet potato, agro-pastoralism
- Proportion of cultivated land: low
- Carrying capacity: low

*Maize, sorghum, pastoralism, lower rainfall with more bimodal pattern (MSP4)*

- Eastern zone
- Altitude (m): 200-1200
- Temperature regime: 2-3
- Annual rainfall (mm): 500-1000
- Rainfall pattern: bimodal (to transitional)
- Length of growing season: 2-4.5, 1-2

- Drought risk: low to very high
- Dependency on soil moisture availability: low
- Geology: Mocambique gneiss
- Physiographic units: EM1, (Epa1), EPh1
- CMU: B5, B5h
- Mapping units: D2a2, D3b1, D3b2
- Landform: flat to rolling plains
- Soil types:
  - Dominant: 362, 412, 461
  - Inclusions: 111, 363, 501, 735
- Soil related constraints: fertility, acidity, (erosion?)
- Land use: maize, sorghum, cassava, cowpea, green gram, pigeon pea, sesame, sweet potato
- Proportion of cultivated land: medium?
- Carrying capacity: low

#### **Maize, sorghum, sunflower, pastoralism (MSP5)**

*Maize, sorghum, sunflower, pastoralism with very low rainfall, on granite, gneiss, coastal sand or sediments (MSP5)*

- Ruaha lowland/valley, Rukwa/Songwe valley
- Altitude (m): 700-1500
- Temperature regime: 2
- Annual rainfall (mm): 400-600/900/1200
- Rainfall pattern: monomodal
- Length of growing season: 3-3.5
- Drought risk: low to moderate
- Dependency on soil moisture availability: low
- Geology: Recent (2), Plio-Pleistocene (6), possibly Dodoma granite or gneiss
- Physiographic units: PH1, PPw1, RA1, RA2, RA4, RA5, RP2, RP3
- CMU: C6, G2, G8
- Mapping units: C2c3, Eb3, Ec1, Ee1, Ee3, Ee4
- Landform: gently undulating piedmont plains and hills on older surfaces and lacustrine plains, floodplains and alluvial complexes
- Sub-division:
  - On Plio-Pleistocene (6) cover over Dodoma granite or gneiss, mapping units Eb3, Ec1, CMU: G8. Soil types:
    - Dominant: 335, 421, 735, 766
    - Associated: 344, 455, 507, 679
    - Inclusions: 111, 131, 501, 691
    - Associated FSZ Rice-Pastoralism (1)
  - On Recent (2) deposits, mapping units C2c3, Ee1, Ee3, Ee4, CMU G2. Soil types:
    - Dominant: 109, 204, 335, 343, 647, 767
    - Associated: 344, 425, 509, 605
    - Associated FSZ in C-climatic zone Tobacco-Pastoralism (1b) and in E-climatic zones Rice-Pastoralism (1)
- Soil related constraints: fertility, depth, acidity, workability, sodicity, salinity
- Land use: sorghum, groundnut, maize, rice, sunflower, livestock, cotton, finger millet, fishing, bean, sugarcane, sweet potato, pigeon pea, tobacco, green gram, cowpea
- Proportion of cultivated land: low
- Carrying capacity: very low

#### **Game parks (Park)**

- Game park on volcanic ash (Park 1a)
- Game park on sandstone and shale (Park 1b)



- Game park on granite and gneiss (Park 1c)

*Game park on volcanic ash (Park 1a)*

- Altitude (m): 1000
- Temperature regime: 1-2
- Annual rainfall (mm): 400-1000
- Rainfall pattern: nd
- Length of growing season: nd
- Drought risk: nd
- Dependency on soil moisture availability: nd
- Geology: Sub-recent (3v), Plio-Pleistocene (7v and 8v)
- Physiographic units: NA1, NA2, NA3, NA4, NA5, NV3b, NV3c
- CMU: C6v, E1, E1h, E4, E4h, H4v
- Mapping units: D1e, D2h1, D2h3, Ef1, Ef3
- Landform: gently undulating to rolling plains and plateaux with footslopes and some poorly drained flats
- Soil types:
  - Dominant: 232, 235, 271, 251, 252
  - Associated: 102, 141, 231, 261(a), 321, 732, 734, 782
  - Inclusions: 101, 105, 311, 544
- Associated FSZ Maize-Bean-Pastoralism and Pastoralism (1a)
- Soil related constraints: nd
- Land use: park
- Proportion of cultivated land: nd
- Carrying capacity: nd

*Game park on sandstone and shale (Park 1b)*

- Altitude (m): 200-500
- Temperature regime: 3
- Annual rainfall (mm): 500-800
- Rainfall pattern: transitional
- Length of growing season: 3-4.5
- Drought risk: low to moderate
- Dependency on soil moisture availability: moderate
- Geology: Plio-Pleistocene (4)
- Physiographic unit: SU
- CMU: B3
- Mapping unit: D3c
- Landform: gently undulating to rolling plateau
- Soil types:
  - Dominant: 340
  - Inclusions: 526, 692
- Soil related constraints: fertility, drought
- Land use: park
- Proportion of cultivated land: very low
- Carrying capacity: low

*Game park on granite and gneiss (Park 1c)*

- Altitude (m): 1200
- Temperature regime: 2
- Annual rainfall (mm): nd
- Rainfall pattern: nd
- Length of growing season: nd
- Drought risk: nd
- Dependency on soil moisture availability: nd
- Geology: Dodoma granite and gneiss
- Physiographic unit: RT
- CMU: C6h

- Mapping unit: Ec2
- Landform: gently undulating plains and hills
- Soil types:
  - Dominant: 111
  - Inclusions: 131, 335, 421, 501, 691, 735
- Soil related constraints: nd
- Land use: park
- Proportion of cultivated land: nd
- Carrying capacity: nd

### **Pastoralism (P)**

- Pastoralism on volcanic ash, higher rainfall (P1a)
- Pastoralism on volcanic ash, very low rainfall (P1b)
- Pastoralism on gneiss or sediments (P2a)
- Pastoralism on gneiss, granite or marl (P2b)

#### *Pastoralism on volcanic ash with higher rainfall (P1a)*

- Altitude (m): 900-1000
- Temperature regime: 1-2
- Annual rainfall (mm): 600-1000
- Rainfall pattern: nd
- Length of growing season: nd
- Drought risk: nd
- Dependency on soil moisture availability: nd
- Geology: Sub-recent (3v), Plio-Pleistocene (7v)
- Physiographic units: NA1, NA2, NA3, NA4
- CMU: C6v, E1, E1h, H4v
- Mapping units: C2e, D1e, D2h1
- Landform: gently undulating to rolling plains and plateaux with footslopes and some poorly drained flats
- Soil types:
  - Dominant: 232, 251, 252
  - Associated: 231, 261 (a), 732, 734
  - Inclusions: 101, 105, 544
- Associated FSZ Maize-Bean-Pastoralism and Park (1a)
- Soil related constraints: nd
- Land use: nd
- Proportion of cultivated land: nd
- Carrying capacity: nd

#### *Pastoralism on volcanic ash with very low rainfall (P1b)*

- Altitude (m): 1500
- Temperature regime: 2
- Annual rainfall (mm): 400-600
- Rainfall pattern: bimodal (to transitional)
- Length of growing season: 2-3
- Drought risk: nd
- Dependency on soil moisture availability: nd
- Geology: Sub-recent (3v), Plio-Pleistocene (7v), Pliocene
- Physiographic units: NA3, NA4, NA5, NA6, NA7, NA8, NR3, NV1
- CMU: E1, E1h, E2, E5, H2v
- Mapping units: Ef1, Ef2, Ef4a, Ef4c, Ef5
- Landform: volcanic ash plains
- Soil types:
  - Dominant: 102, 142, 231, 232, 233, 262
  - Associated: 143, 263, 261(a), 733, 734, 772
  - Inclusions: 101, 105, 252, 311, 544, 732
- Soil related constraints: nd

- Land use: nd
- Proportion of cultivated land: nd
- Carrying capacity: nd

*Pastoralism, on gneiss or sediments (P2a)*

- Southern highlands and Central zone
- Altitude (m): 1100-1300
- Temperature regime: 2
- Annual rainfall (mm): 400-600
- Rainfall pattern: monomodal ?
- Length of growing season: 3-3.5
- Drought risk: low to moderate
- Dependency on soil moisture availability: nd
- Geology: Sub-recent (2), Dodoma gneiss, Recent (2)
- Physiographic units: NR1, PH1, Pp2, PPw1, RP3
- CMU: C6, C6h, G2, H2
- Mapping units: Ea2, Ec1, Ed2, Ee1, Eg1
- Landform: gently undulating piedmont plains and hills
- Soil types:
  - Dominant: 335, 343?, 421, 724?, 735, 738, 772
  - Associated: 421, 425, 509, 605
  - Inclusions: 111, 131, 501, 604, 689, 691, 734
- Associated FSZ Rice-Pastoralism (2)
- Soil related constraints: nd
- Land use: nd
- Proportion of cultivated land: nd
- Carrying capacity: nd

*Pastoralism on gneiss, granite or marl (P2b)*

- Lake zone
- Altitude (m): 1000-1500
- Temperature regime: 2
- Annual rainfall (mm): 400-800
- Rainfall pattern: bimodal to monomodal
- Length of growing season: <2-3.5
- Drought risk: low to high
- Dependency on soil moisture availability: low
- Geology: Plio-Pleistocene (3), Mocambique gneiss or Basement complex granite
- Physiographic units: EPa1, EPa2, NR1, NR2, PH1, PPw1
- CMU: C4, H3, H5h
- Mapping units: D2o2, Eb1, Eb2, Ed1, Eg2
- Landform: flat to undulating plains and hills with flats on old lake sediments with volcanic ash influence
- Sub-division:
  - On Plio-Pleistocene (3) marl, sand and clay, mapping units D2o2, Eg2, CMU H3. Soil types:
    - Dominant: 771
    - Associated: 234, 462, 731
  - On Basement Complex granite or Mocambique gneiss, mapping units Eb1, Eb2, Ed1, CMU C4, C4h, H5h. Soil types:
    - Dominant: 111, 335, 461, 735
    - Associated: 421
    - Inclusions: 501, 691, 763
- Soil related constraints: fertility, acidity, depth
- Land use: nd
- Proportion of cultivated land: low
- Carrying capacity: very low to low

**Rice, cocoa (RC)**

- Altitude (m): 500
- Temperature regime: 3
- Annual rainfall (mm): 1000-2600
- Rainfall pattern: monomodal
- Length of growing season: >8
- Drought risk: low
- Dependency on soil moisture availability: low
- Geology: Recent (2)
- Physiographic unit: HL
- CMU: F1
- Mapping unit: A3a
- Landform: flat to very gently undulating lacustrine plain with alluvial fans and bajados and piedmonts
- Soil types:
  - Dominant: 647
  - Associated: 206
- Soil related constraints: flooding
- Land use: rice, banana, maize, cocoa, bean, cassava, oilpalm, fruit, cashew, livestock, groundnut, fishing, dairy
- Proportion of cultivated land: very high
- Carrying capacity: high

**Rice, coconut, cassava, including sisal estates (RCC)**

- Altitude (m): <200
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: monomodal to transitional
- Length of growing season: 3-4.5
- Drought risk: low to moderate
- Dependency on soil moisture availability: moderate
- Geology: Pleistocene (2), Plio-Pleistocene (1)
- Physiographic units: CH1, CH4, CP1
- CMU: A3, A4
- Mapping units: B3m2, C3f
- Landform: gently undulating, dissected, hinterland plains
- Sub-division:
  - On Pleistocene (2) limestone, marl and clay, mapping unit B3m2, CMU A3. Soil types:
    - Dominant: 522
    - Associated: 675, 721
    - Inclusions: 144, 301, 333, 401
    - Associated FSZ Maize-Sorghum (2a)
  - On Plio-Pleistocene (1) coastal sand and clay, mapping unit C3f, CMU A4. Soil types:
    - Dominant: 331
    - Inclusions: 523, 643, 676
    - Associated FSZ Maize-Sorghum (2a)
- Soil related constraints: fertility, salinity, workability
- Land use: rice, cassava, coconut
- Proportion of cultivated land: very high
- Carrying capacity: low

**Rice, livestock on Itogolo soils (RL)**

- Lake zone
- Altitude (m): 1200-1300
- Temperature regime: 2
- Annual rainfall (mm): 800-1000

- Rainfall pattern: transitional
- Length of growing season: 4-5
- Drought risk: low to high
- Dependency on soil moisture availability: low to moderate
- Geology: Plio-Pleistocene (3), Basement Complex granite
- Physiographic unit: PPs1
- CMU: H4
- Mapping unit: B212
- Landform: plains and hills with seasonally waterlogged plains
- Soil types:
  - Dominant: 602
  - Associated: 728
  - Inclusion: 240
- Soil related constraints: fertility, drought, workability, flooding, acidity
- Land use: nd
- Proportion of cultivated land: very high
- Carrying capacity: low

**Rice, maize, cassava, cotton, including sisal and sugarcane estate (RMC)**

- Altitude (m): < 600
- Temperature regime: 3
- Annual rainfall (mm): 800-1200/1500
- Rainfall pattern: transitional (to bimodal)
- Length of growing season: < 3-8 (flooding)
- Drought risk: low to moderate
- Dependency on soil moisture availability: variable
- Geology: Recent (1), Sub-recent (1), Pleistocene (1)
- Physiographic units: CF1, CF2, EA1, EA2a, EA2b
- CMU: A1, B1, B2
- Mapping units: B3a, B3b, B3i, B3j1, C3i
- Landform: flat floodplain and alluvial complexes, deltas
- Sub-division:
  - On Pleistocene (1) stream deposits (terraces), mapping unit B3a, CMU B2. Soil types:
    - Dominant: 205, 611
    - Associated: 633, 648
  - On Recent (1) deposits, mapping units B3b, B3i, C3i, CMU A1. Soil types:
    - Associated: 201, 641, 751, 761
    - Inclusions: 621
  - On Sub-recent (1) stream deposits, mapping unit B3j1, CMU B1. Soil types:
    - Dominant: 632
    - Associated: 724, 781
- Associated FSZ Rice-Maize-Sweet potato
- Soil related constraints: fertility, flooding, (acidity)
- Land use: rice, maize, cassava, sweet potato, pigeon pea, cowpea, green gram, sesame, sunflower, sugarcane, cotton
- Proportion of cultivated land: high
- Carrying capacity: low to very high

**Rice, maize, sweet potato (RMSp)**

- Kilombero valley
- Altitude (m): < 500
- Temperature regime: 2-3
- Annual rainfall (mm): 500-.1000
- Rainfall pattern: transitional to monomodal

- Length of growing season: <2-4.5, flooding
- Drought risk: nd
- Dependency on soil moisture availability: low-moderate
- Geology: Sub-recent (1 and 2)
- Physiographic units: CH3, CT, EA3a
- CMU: A2, H2
- Mapping units: B3j2, C3h, D2p2
- Landform: non-flooded flat plains on old alluvium (terraces)
- Sub-division:
  - On Sub-recent (1) deposits, mapping units B3j2, C3h, CMU A2. Soil types:
    - Dominant: 601
    - Associated: 332, 521, 723
    - Inclusions: 631, 677, 761
    - Associated FSZ Rice-Maize-Cassava-Cotton
  - On Sub-recent (1) deposits, mapping unit D2p2, CMU H2. Soil types:
    - Dominant: 762
    - Associated: 724
    - Inclusion: 461
- Soil related constraints: fertility, flooding, salinity, sodicity, workability
- Land use: cassava, maize, rice, sweet potato, pigeon pea, cowpea, green gram, sunflower, sesame, sugarcane, sorghum
- Proportion of cultivated land: low to very low
- Carrying capacity: very low to medium

#### **Rice, pastoralism (RP)**

- Rice, pastoralism, Usanga plain (RP1)
- Rice, pastoraalism, Kwimbe/Shinyanga (RP2)

#### *Rice, pastoralism, including rice schemes (RP1)*

- Usanga plain
- Altitude (m): 750-1500
- Temperature regime: 2
- Annual rainfall (mm): 400-600
- Rainfall pattern: monomodal
- Length of growing season: 4-5, flooding
- Drought risk: low?
- Dependency on soil moisture availability: low
- Geology: Recent (2), Plio-Pleistocene (6), Dodoma granite or gneiss
- Physiographic units: RA1, RA5, RT
- CMU: G2, G8
- Mapping units: Eb4, Ee2
- Landform: flat to very gently undulating lacustrine, alluvial plains with complex pattern
- Sub-division:
  - On Recent (2) deposits, mapping unit Ee2, CMU G2. Soil types:
    - Dominant: 634
    - Associated: 605, 767
    - Inclusions; 109, 207, 647, 673, 729
  - On Plio-Pleistocene (6) cover over Dodoma granite or gneiss, mapping unit Eb4, CMU G8. Soil types:
    - Dominant: 111
    - Associated: 766
    - Inclusions: 344, 455, 507, 679
- Soil related constraints: workability, flooding, salinity, drainage

- Land use: rice, maize, cassava, sweet potato, sunflower, groundnut, sorghum, bean, finger millet, vegetables, pigeon pea, cotton, livestock
- Proportion of cultivated land: low (?)
- Carrying capacity: medium

*Rice, pastoralism, Kwimbe-Shinyanga (RP2)*

- Altitude (m): 1100-1200
- Temperature regime: 2
- Annual rainfall (mm): 400-800
- Rainfall pattern: bimodal
- Length of growing season: nd
- Drought risk: nd
- Dependency on soil moisture availability: nd
- Geology: Sub-recent (2)
- Physiographic units: Pp2, Pp1
- CMU: H2
- Mapping unit: Eal
- Landform: seasonally waterlogged plains
- Soil types:
  - Dominant: 738
  - Inclusions: 604, 739
- Soil related constraints: nd
- Land use: rice, livestock
- Proportion of cultivated land: nd
- Carrying capacity: nd

**Rice, sorghum, millet (RSM)**

- Central irrigated or flooded area
- Altitude (m): 900
- Temperature regime: 2
- Annual rainfall (mm): 500-700
- Rainfall pattern: monomodal to transitional
- Length of growing season: 3-3.5, variable due to flooding
- Drought risk: low to high
- Dependency on soil moisture availability: low
- Geology: Sub-recent (2)
- Physiographic units: PSa, PSb
- CMU: H2
- Mapping unit: D2s
- Landform: flats, swamps, waterlogged plains
- Soil types:
  - Dominant: 604, 764
  - Inclusions: 508, 726
- Soil related constraints: fertility, workability, salinity, sodicity, flooding
- Land use: rice, sorghum, millet, sunflower, sesame, castor, cassava, sweet potato, bean
- Proportion of cultivated land: high
- Carrying capacity: very low

**Rice, sweet potato (RSp)**

- Western swamps
- Altitude (m): 900-1200
- Temperature regime: 2
- Annual rainfall (mm): 800-1000
- Rainfall pattern: monomodal
- Length of growing season: 5-6, flooding

- Drought risk: low to moderate
- Dependency on soil moisture availability: low
- Geology: Recent (2)
- Physiographic units: PPp1, PPp2, PPp3
- CMU: G1
- Mapping unit: B2o
- Landform: flat, seasonally inundated lowland plains and swamps
- Soil types:
  - Dominant: 671, 737
  - Associated: 701, 783
- Soil related constraints: flooding, drainage
- Land use: rice, sweet potato, pigeon pea, groundnut
- Proportion of cultivated land: very low
- Carrying capacity: medium

#### **Sorghum (S)**

- Altitude (m): 1100-1300
- Temperature regime: 2
- Annual rainfall (mm): 700-800
- Rainfall pattern: monomodal
- Length of growing season: 4-5
- Drought risk: low to moderate?
- Dependency on soil moisture availability: low
- Geology: Pleistocene (3)
- Physiographic units: PH4, PPw1, PPw8
- CMU: H4
- Mapping unit: D2r1
- Landform: gently undulating plains and hills
- Soil types:
  - Dominant: 336, 454
  - Associated: 382, 423
  - Inclusions: 111, 502, 602, 678, 740
- Soil related constraints: fertility, depth, acidity
- Land use: nd
- Proportion of cultivated land: low
- Carrying capacity: low

#### **Sorghum, finger millet, on gneiss (including rocky terrain) (SF1)**

- Altitude (m): 1000-1800
- Temperature regime: 1
- Annual rainfall (mm): 900
- Rainfall pattern: monomodal
- Length of growing season: 5-7
- Drought risk: low?
- Dependency on soil moisture availability: high
- Geology: Mocambique gneiss
- Physiographic units: HU1, RT
- CMU: D5d, D6d
- Mapping units: C1d2, C1d3
- Landform: rolling
- Soil types:
  - Dominant: 111, 272
- Associated FSZ Maize-Bean (4a)
- Soil related constraints: fertility, drought, low organic matter, erosion, leaching
- Land use: maize, woodland, livestock, sorghum, groundnut, fingermillet, bamboo
- Proportion of cultivated land: variable
- Carrying capacity: low



**Sorghum, millet, grain legumes (SML)**

- Sorghum, millet, bambara groundnuts on gneiss, Southern zone (SML1a)
- Sorghum, millet, non-bean legumes, ranching, Eastern zone (SML1b)

*Sorghum, millet, (bambara groundnuts), on gneiss (SML1a)*

- Altitude (m): 400-500
- Temperature regime: 3
- Annual rainfall (mm): 800-1000
- Rainfall pattern: monomodal
- Length of growing season: 5-6
- Drought risk: low
- Dependency on soil moisture availability: moderate
- Geology: Mocambique gneiss
- Physiographic unit: EPh8
- CMU: B5d
- Mapping unit: B3c3
- Landform: level to undulating plains
- Soil types:
  - Dominant: 335
  - Associated: 412, 473
  - Inclusion: 111
- Soil related constraints: fertility
- Land use: sorghum, millet, groundnut, cassava, cashew
- Proportion of cultivated land: high
- Carrying capacity: low

*Sorghum, millet, non-bean legumes, (ranching) on gneiss with coastal sand cover, including ranches (SML 1b)*

- Altitude (m): 300-400
- Temperature regime: 3
- Annual rainfall (mm): 700-1000
- Rainfall pattern: bimodal to transitional
- Length of growing season: 3-4, 1-2
- Drought risk: moderate to high
- Dependency on soil moisture availability: moderate
- Geology: Plio-Pleistocene (5)
- Physiographic unit: EPh8
- CMU: B5d
- Mapping unit: D3a
- Landform: flat to rolling plains
- Soil types:
  - Dominant: 334
  - Associated: 413, 476
  - Inclusion: 111
- Soil related constraints: flooding, drainage, drought
- Land use: maize, sorghum, cassava, millet, legumes
- Proportion of cultivated land: medium
- Carrying capacity: low

**Tobacco, pastoralism (TP)**

- Tobacco, pastoralism on gneiss or sandstone, higher rainfall (TP1a)
- Tobacco, pastoralism on recent sediments, lower rainfall (TP1b)

*Tobacco, pastoralism with higher rainfall, on gneiss or sandstone (TP 1a)*

- Southern highlands
- Altitude (m): 850-1800
- Temperature regime: 2
- Annual rainfall (mm): 700-1300
- Rainfall pattern: monomodal
- Length of growing season: 4-7.5
- Drought risk: low
- Dependency on soil moisture availability: moderate (variable)
- Geology: Bukoba (2) and Ubendian gneiss
- Physiographic units: PC2, PH5, PM2, PPw5, PPw6
- CMU: C2, C5d, G4h, G6
- Mapping units: B2d1, B2f1, B2f3, C2a1
- Landform: gently undulating to rolling outwash plains, sometimes strongly dissected; undulating cuesta plateaux, piedmont plains
- Sub-division:
  - On Bukoba (2) sandstone and shale, mapping units B2f1, B2f3, CMU C2, D2. Soil types:
    - Dominant: 341, 477, 506
    - Inclusions: 106, 686
    - Associated FSZ Cassava-Rice, Coffee-Banana and Banana
  - On Ubendian gneiss, mapping units B2d1, C2a1, CMU C5d, C6. Soil types:
    - Dominant: 335, 501
    - Associated: 421
    - Inclusions: 111, 274, 473, 691
    - Associated FSZ Maize-Bean (2), Maize-Sorghum (2a) or Maize-Sorghum-Pastoralism (3)
- Soil related constraints: fertility, erosion, flooding
- Land use: tobacco, livestock, maize, bean, sorghum, cowpea, cassava, rice, groundnut, sunflower, pigeon pea, fruit, fingermillet, sweet potato, pine forest
- Proportion of cultivated land: low
- Carrying capacity: low (to medium)

*Tobacco, pastoralism with lower rainfall, on recent sediments (TP1b)*

- Rukwa/Songwe valley/floodplain
- Altitude (m): 800-1200
- Temperature regime: 2
- Annual rainfall (mm): 600-1200
- Rainfall pattern: monomodal
- Length of growing season: 5-9, highly variable
- Drought risk: low to moderate
- Dependency on soil moisture availability: high
- Geology: Recent (2)
- Physiographic units: RA2, RA3, RA6
- CMU: G2
- Mapping units: C2c1, C2c2
- Landform: flat lacustrine plains with terraces and deltas, floodplains and piedmont plains
- Soil types:
  - Dominant: 767
  - Associated: 343, 414, 425, 509, 634, 730
  - Inclusions: 207, 672
- Associated FSZ Maize-Sorghum-Pastoralism (5)
- Soil related constraints: fertility, flooding, sodicity, salinity
- Land use: tobacco, livestock, maize, bean, sorghum, fingermillet, cassava, groundnut, sweet potato, rice, sunflower, pigeon pea, cotton, fishing
- Proportion of cultivated land: low

- Carrying capacity: medium

**Wheat, barley, maize, bean, pigeon pea (WBMBP)**

*Wheat, barley, maize, bean, pigeon pea, including wheat and barley schemes (WBMBP)*

- Altitude (m): 1500-2500
- Temperature regime: 1-2
- Annual rainfall (mm): 500-800
- Rainfall pattern: transitional (to bimodal)
- Length of growing season: 2-5
- Drought risk: low to high
- Dependency on soil moisture availability: moderate to high
- Geology: Sub-recent (3v), Mocambique gneiss
- Physiographic units: NA9, NP1, NP2
- CMU: C4h, D4, E2
- Mapping units: D1d1, D1d2, D2k1, D2k4
- Landform: flat to rolling plains to hilly, dissected plateaux
- Sub-division:
  - On Sub-recent (3v) volcanic ash, mapping units D2k1, D2k4?, CMU C4h, E2. Soil types:
    - Dominant: 231
    - Associated: 461?
    - Inclusions: 111, 363?, 501?, 543, 734
  - On Mocambique gneiss, mapping units D1d1, D1d2, D2k4, CMU C4h, D4. Soil types:
    - Dominant: 231, 273?, 421, 461
    - Associated: 131
    - Inclusions: 111, 322, 335, 363?, 501?, 543, 734
- Soil related constraints: fertility, workability, erosion, drought
- Land use: maize, bean, pigeon pea, sunflower, wheat, sorghum, millet, cassava
- Proportion of cultivated land: medium
- Carrying capacity: low

Annex 1

3 pages

Annex 2

3 pages

Annex 1. List of farming system groups and the relation to agro-ecological zone									
FSgroup	AEZ	Soil group	FSZ	Unit	FSgroup	AEZ	Soil group	FSZ	Unit
<b>Maize-Potato, high rainfall, cool temperature, volcanic ash</b>					<b>Coffee-Maize-Bean-Livestock/Dairy, low to medium rainfall, intermediate to cool temperature, schist, granite</b>				
1a1	Vo-1a	1a	MP1a	A1a1	2d1	Lw-2a	17	CMB2, ML1d	B2h
1a1	Vo-1a	1a	MP1a	A1a2	2d1	Lw-3a	17	ML1d	D1c
1a1 (2a2)	Vo-1a	1a,1b	MP1a	A1c	2d1	Lw-3a	17	ML1d	D2d
1a1	Vo-1a	1a	MP1a	A1g1	2d1	Lw-3a	17	ML1d	D2d
1a1	Vo-1a	1a	MP1a	A1g2	<b>Maize-Fingermillet, low to medium rainfall, intermediate to cool temperature, gneiss</b>				
<b>Coffee-Maize-Bean, high rainfall, cool temperature, sandstone and limestone</b>					2d2	Me-4a	25d	MFm1b	B2d2
1a2	Ka-1	7a	CMB2	A1e	2d2	Me-5a	25d	MFm1b	C2a2
<b>Cassava-Rice, high rainfall, intermediate temperature, schist, granite, gneiss</b>					2d2	Me-6a	25d	MFm2	D1a
<b>Cassava-Trees-Maize-Sorghum-Rice-Coconut, medium to high rainfall, warm temperature, limestone, marl, clay</b>									
1b1	Me-2a	25b?	CR	A2d4	2e1	Co-1a	19	CT	A3c
1b1	Me-2a	25b	CR	A2e	2e1	Co-2a	19	MS2a, sisal	B3m1
<b>Rice-Cocoa, high rainfall, warm temperature, lacustrine sediments</b>					2e1	Co-2a	19	RCC, sisal	B3m2
1c1	Me-2c	9	RC	A3a	<b>Coffee-Maize-Bean-Sorghum-Wheat-Pigeon pea-Pastoralism, very low to medium rainfall, intermediate temperature, gneiss, granite</b>				
<b>Maize-Bean, medium rainfall, cool temperature, basalt, limestone, sandstone</b>					2f1	Gn-4	5b	CMB3b	B2p2
1d1	Ka-3a	7b	MB3	B1e	2f1	Gn-5c	5b	MSP1a	C2b
<b>Coffee-Maize-Bean, medium rainfall, cool temperature, granite, gneiss and volcanic ash</b>					2f1	Gn-6b	5b	WBMBP	D1d2
1d2	Vo-2	2	CMB1, coffee	B1d	2f1	Gn-6b	5b	MB5b	D2a1
<b>Maize-Fingermillet, medium rainfall, cool to intermediate temperature, schist, granite, gneiss</b>					2f1 (2g1)	Gn-6b	5b	MB5b, MSP3	D2e
1e1	Me-3	25a	MFm1a	B1c	2f1 (2c1)	Gn-6b	5b,(4a?)	MBP, bean	D2g
1e1	Me-4a	25a	MFm1a	B2a1	2f1 (2c1)	Gn-6b	5b,(4a?)	WBMBP	D2k4
1e1	Me-4a	25a	MFm1a	B2a2	2f1	Gn-6b	5b	MB5b	D2m1
1e1	Me-4a	25a	MFm1a	B2a2	2f1	Gn-6b	5b	MB5b, sisal	D2m2
<b>Rice-Sweet potato, medium rainfall, intermediate temperature, lake and stream deposits</b>					2f1	Gn-7	5b	P2b	Eb1
1f1	Lw-1b	13	RSp	B2o	2f1	Gn-7	5b	P2b	Eb2
<b>Cassava-Rice-Oilpalm, medium rainfall, intermediate temperature, limestone, basalt</b>					2f1	Gn-7	5b	Park1c	Ec2
1f2	Lw-1a	20	CRO	B2s	2f1	Gn-7	5b	P2b	Ed1
<b>Cassava-Rice, medium rainfall, intermediate temperature, sandstone, shale</b>					<b>Maize-Cassava-Cotton-Rice-Groundnut-Tobacco-Pastoralism, wide range of rainfall, intermediate temperature, gneiss, granite</b>				
1f3	Ka-4c	29b	CRO	B2t	2g1	Me-2b	25e	MCCR	A2b
<b>Coconut-Cassava-Cashew, medium rainfall, warm temperature, sandstone, limestone, shale</b>					2g1	Me-4a	25e	TP1a	B2d1
1g1	Sa-2b	15a	CCC	B3g2	2g1	Me-4a	25e	MGTP	B2j1
1g1	Sa-2b	15a	CCC	B3g3	2g1	Me-4a	25e	MGTP	B2j2
<b>Rice-Maize-Cassava-Cotton, medium rainfall, warm temperature, stream deposits</b>					2g1	Me-4a	25e	MGTP	B2j3
1g2	Sa-2c	12	RMC, s/cane	B3a	2g1	Me-4a	25e	MGTP	B2j4
<b>Rice-Maize-Sweet potato-Cassava-Cotton, low to medium rainfall, warm temperature, stream deposits</b>					2g1	Me-5a	25e	TP1a	C2a1
1h1	Me-5d	23	RMC, sisal	B3j1	2g1	Me-6b	25e	MSP3	D2b1
1h1	Me-5d	23	RMSp	B3j2	2g1	Me-6b	25e	MSP3	D2b2
1h1	Me-5d	23	RMSp	C3h	2g1	Me-6b	25e	MSP3	D2c
<b>Maize-Sorghum-Pastoralism, low to medium rainfall, warm temperature, coastal sand cover over limestone, shale and marl</b>					2g1	Me-6b	25e	MSP3	D2f
1h2	Co-3a	24	MSP2, citrus	B3k	2g1	Me-6b	25e	CSP	D2n
1h2	Co-3a	24	MSP2	C3e	2g1	Me-6b	25e	MGL	D2q1
<b>Rice-Maize-Cassava, low to medium rainfall, warm temperature, stream deposits</b>					2g1	Me-6b	25e	MGL	D2q2
1h3	Me-5b	28	RMC	B3b	2g1	Me-6b	25e	MGL	D2q3
1h3	Me-5b	28	RMC	B3i	2g1	Me-6b	25e	MGL	D2q4
1h3	Me-5d	28	RMC	C3i	<b>Maize-Livestock/Dairy, low to medium rainfall, intermediate temperature, stream deposits</b>				
<b>Maize-Cassava-Sorghum, low but variable rainfall, cool temperature, volcanic phonolites</b>					2h1	Ka-4b	10	ML1a, s/cane	B2e1
1i1	Vo-4b	6	MS1	C1a	2h1	Lw-2b	10	ML1b	B2e2
<b>Rice-Maize-Sweet potato, low rainfall, intermediate temperature, stream deposits</b>					2h1	Ka-4b	10	ML1c	D2p3
1j1	Vo-5c	16	RMSp	D2p2	<b>Cotton-Maize-Sorghum-Groundnut-Pastoralism, low to medium rainfall, intermediate temperature, granite, gneiss with wash deposits</b>				
<b>Rice-Sorghum-Millet, low rainfall, intermediate temperature, stream deposits</b>					2h2	Lw-2c	18	CM1a	B2l1
1j2	Se-2	22a	RSM	D2s	2h2	Lw-2c	18	MSP2	B2l3
<b>Maize-Rice-Sorghum-Sunflower-Pastoralism, very low rainfall, intermediate temperature, granite, gneiss with older wash deposits</b>					2h2 (2l2)	Lw-3b	18	S	D2r1
					2h2	Lw-3b	18	MGL	D2r2
					2h2	Lw-3b	18	MGL	D2r3
<b>Cashew-Maize-Sesame-Bean-Pastoralism, low to high rainfall intermediate to warm temperature, sandstone, shale</b>									
					2i1	Sa-1	14	C1	A2f
					2i1	Sa-1	14	MFo1a	A2g
					2i1	Sa-2a	14	C1, C2	B3f

1k1	Se-3b	21b	MSP5	Eb3	2i1	Sa-3a	14	MB4b	C2d1
1k1	Se-3b	21b	RP1	Eb4	2i1	Sa-3a	14	C2	C2d2
FSgroup	AEZ	Soil group	FSZ	Unit	FSgroup	AEZ	Soil group	FSZ	Unit
<b>Pastoralism, very low rainfall, intermediate temperature, granite, gneiss, lake and stream deposits</b>					2i1	Sa-3a	14	MSe1b	C2f
					2i1	Sa-3a	14	C2, C1	C3g
1k2	Se-3b	21a	P2a	Ea2	2i1	Sa-4	14	MB4b	D2i
1k2 (1k1,2g1)	Se-3b	21a	MGL, MSP5, P2a	Ec1	2i1	Sa-5	14	Park1b	D3c
1k2	Se-3b	21a	P2a	Ed2	<b>Cassava-Trees-Maize-Sorghum-Rice-Coconut-Cashew, low to high rainfall, warm temperature, coastal sand and clay</b>				
<b>Coffee-Banana-Maize, low to high rainfall, cool temperature, gneiss</b>					2j1	Co-1b	27	CT	A3b
					2j1	Co-2b	27	C1	B3l1
2a1	Gn-1a	3	CB2	A1h3	2j1	Co-2b	27	MS2a	B3l2
2a1	Gn-5a	3	MFo1b	C1b	2j1	Co-3b	27	RCC	C3f
<b>Maize-Potato-Coffee-Banana-Bean, low to high rainfall, cool temperature, basalt and other volcanic materials</b>					<b>Pastoralism, low to very low rainfall, intermediate to cool temperature, volcanic ash</b>				
2a2	Vo-1a	1b	MP1a	A1b	2k1	Vo-4c	4b	P1a	C2e
2a2	Vo-1b	1b	CB1	A1h1	2k1	Vo-5a	4b	Park1a, P1a	D1e
2a2	Vo-1b	1b	CB1	A1h2	2k1	Vo-5a	4b	Park1a, P1a	D2h1
2a2	Vo-4a	1b	MB4c	C1c	2k1	Vo-5a	4b	Park1a	D2h3
<b>Coffee-Banana-Cassava-Rice-Tobacco-Pastoralism, medium to high rainfall, intermediate to cool temperature, sandstone, shale</b>					2k1	Vo-6	4b	Park1a, P1b	Ef1
					2k1	Vo-6	4b	P1b	Ef2
					2k1	Vo-6	4b	Park1a	Ef3
2b1	Ka-2	29a	CB3, tea	A2a1	2k1	Vo-6	4b	P1b	Ef4a
2b1	Ka-2	29a	CB3	A2a2	2k1	Vo-6	4b	P1b	Ef4c
2b1	Ka-3b	29a	CR	B1f	2k1	Vo-6	4b	P1b	Ef5
2b1	Ka-4c	29a	TP1a	B2f1	<b>Maize-Cassava-Cotton-Rice-Sorghum-Pastoralism, very low to medium rainfall, intermediate temperature, lake and stream deposits</b>				
2b1	Ka-4c	29a	B	B2f2					
2b1	Ka-4c	29a	TP1a	B2f3					
2b1	Ka-4c	29a	CB3	B2f4	2i1	Se-1	22b	MCCR	B2m
<b>Coffee-Maize-Bean-Banana, medium to high rainfall, intermediate to cool temperature, phyllite, quartzite</b>					2i1	Se-2	22b	CSP	D2p1
					2i1	Se-3a	22b	RP2	Ea1
2b2	Ka-1	7c	CMB2	A1f	<b>Rice-Livestock-Cotton-Sorghum-Pastoralism, very low to medium rainfall, intermediate temperature, marl, sand, clay or granite with cover of wash, lake and stream deposits</b>				
2b2	Ka-4a	7c	CB3	B2g1					
2b2	Ka-4a	7c	B	B2g2					
<b>Maize-Bean-Sorghum, medium to high rainfall, intermediate to cool temperature, gneiss</b>					2l2	La-1	8	RL	B2l2
2b3	Me-1	25c	MB2	A1i	2l2	La-3	8	CS	D2o1
2b3	Me-2a	25c	MB2	A2c	2l2	La-3	8	P2b	D2o2
2b3	Me-4a	25c	MB2	B2d3	2l2	La-3	8	CSP	D2o3
2b3	Me-4a	25c	MS2	B2d4	2l2	La-4b	8	P2b	Eg2
<b>Coffee-Banana-Maize-Bean-Potato-Wheat-Pigeon pea-Pastoralism, low to high rainfall, intermediate to cool temperature, volcanic ash</b>					<b>Maize-Sorghum-Millet-Legume-Cotton-Sesame-Pastoralism, low to medium rainfall, intermediate to warm temperature, gneiss</b>				
2c1	Vo-1c	4a	CB1	A1k1	2m1	Me-4b	26	MSP1b	B2p1
2c1	Vo-1c	4a	CB1	A1k2	2m1	Me-4b	26	CM1b	B2r
2c1	Vo-3	4a	MP1b	B1a1	2m1	Me-4b	26	CM1b	B3c1
2c1	Vo-3	4a	MB1b	B1a2	2m1	Me-4b	26	CM1b	B3c2
2c1	Vo-3	4a	MB1a	B2b1	2m1	Me-4b	26	SML1a	B3c3
2c1	Vo-3	4a	MB1a	B2b2	2m1	Me-4b	26	MSe1a	B3d1
2c1	Vo-5b	4a	MBP	D2h2	2m1	Me-4b	26	MSe1a	B3d2
2c1	Vo-5b	4a	WBMBP	D2k1	2m1	Me-4b	26	CM1b	B3h1
2c1	Vo-5b	4a	MBP	D2k3	2m1	Me-4b	26	MS2a, sisal	B3h2
2c1	Vo-5b	4a	MBP, s/cane	D2l	2m1	Me-5c	26	MS2a, sisal	C3a1
<b>Coffee-Maize-Bean-Potato-Sorghum-Finger millet, low to high rainfall, intermediate to high temperature, gneiss or granite</b>					2m1	Me-5c	26	CM1b	C3a2
					2m1	Me-5c	26	MSe1a	C3b
					2m1	Me-5c	26	MSe1a	C3c
2c2	Gn-1b	5a	MFo1a	A1d1	2m1	Me-7	26	MB5b, MSP4	D2a2
2c2	Gn-1b	5a	MFo1a	A1d2	2m1	Me-7	26	SML1b, ranching	D3a
2c2	Gn-1b	5a	MP2	A1d3	2m1	Me-7	26	MSP4	D3b1
2c2	Gn-1b	5a	MB2	A1d4	2m1	Me-7	26	MSP4	D3b2
2c2	Gn-1b	5a	MB2	A1d5	<b>Cashew-Maize-Sorghum, low to medium rainfall, warm temperature, sandstone, limestone, shale</b>				
2c2	Gn-1b	5a	MB2, tea	A1d6					
2c2	Gn-1b	5a	MB2	A1d7	2n1	Sa-2b	15b	C1, CCC	B3g1
2c2	Gn-1b	5a	CMB3a	A1j1	2n1	Sa-3b	15b	MS2a, CCC, sisal	C3d
2c2	Gn-1b	5a	MB2	A1j2	<b>Tobacco-Maize-Sorghum-Rice-Pastoralism, very low to low rainfall, intermediate temperature, lake and stream deposits</b>				
2c2	Gn-1b	5a	MP2	A1j3					
2c2	Gn-2	5a	MB2	A2d1					
2c2	Gn-2	5a	MP2	A2d2	2o1	La-2	11	TP1b	C2c1
2c2	Gn-2	5a	MB2	A2d3	2o1	La-2	11	TP1b	C2c2
2c2	Gn-2	5a	MFo1a	A2d5	2o1	La-2	11	MSP5	C2c3
2c2 (2i1)	Gn-2	5a	MB2, C1	A2d6	2o1 (1k2)	La-4a	11	MSP5, P2a	Ee1
2c2	Gn-2	5a	MB2	A2d7	2o1	La-4a	11	RP1, rice	Ee2

2c2	Gn-3	5a	MB2, MP2	B1b1		2o1	La-4a	11	MSP5	Ee3
2c2	Gn-3	5a	MP2, tea, wattle	B1b2		2o1	La-4a	11	MSP5	Ee4
2c2	Gn-3	5a	CB2, MB2	B1b3						
2c2	Gn-3	5a	MP2	B1b4						
FSgroup	AEZ	Soil group	FSZ	Unit		FSgroup	AEZ	Soil group	FSZ	Unit
2c2	Gn-3	5a	MB2	B1b5		<b>None</b>				
2c2	Gn-3	5a	MB2	B1b6		none (2c1)	Vo-5b	4a	Bare	D2k2
2c2	Gn-3	5a	MB2	B2c		none	Vo-6	4b	Bare	Ef4b
2c2?	Gn-3	5a?	MFo1a	B2i						
2c2	Gn-5b	5a	MB4a	C1d1						
2c2	Gn-5b	5a	MB4a, SF1	C1d2						
2c2	Gn-5b	5a	SF1	C1d3						
2c2	Gn-6a	5a	MB4a, SF1	D1b1						
2c2	Gn-6a	5a	MB4a, SF1	D1b2						
2c2	Gn-6b	5a	WBMBP, MB5a	D1d1						



Annex 2. List of farming systems, agro-ecological zones, soil groups, farming system groups and mapping units								
FSZ	AEZ	Soil group	FSgroup	Unit	FSZ	AEZ	Soil group	FSgroup
<b>Banana</b>					<b>Maize, livestock/dairy (1a-1c)</b>			
B	Ka-4a	7c	2b2	B2g2	ML1a, s/cane	Ka-4b	10	2h1
B	Ka-4c	29a	2b1	B2f2	ML1b	Lw-2b	10	2h1
<b>Cashew (1)</b>					ML1c	Ka-4b	10	2h1
C1	Gn-2	5a	2c2 (2i1)	A2d6	<b>Maize, livestock (1d)</b>			
C1	Sa-1	14	2i1	A2f	ML1d	Lw-2a	17	2d1
C1	Sa-2a	14	2i1	B3f	ML1d	Lw-3a	17	2d1
C1	Sa-2b	15b	2n1	B3g1	ML1d	Lw-3a	17	2d1
C1	Co-2b	27	2j1	B3l1	<b>Maize, potato, high rainfall, on volcanic ash (1a)</b>			
C1	Sa-3a	14	2i1	C3g	MP1a	Vo-1a	1a	1a1
<b>Cashew (2)</b>					MP1a	Vo-1a	1a	1a1
C2	Sa-2a	14	2i1	B3f	MP1a	Vo-1a	1b	2a2
C2	Sa-3a	14	2i1	C2d2	MP1a	Vo-1a	1a,1b	1a1 (2a2)
C2	Sa-3a	14	2i1	C3g	MP1a	Vo-1a	1a	1a1
<b>Coffee, banana on volcanic ash (1)</b>					MP1a	Vo-1a	1a	1a1
CB1	Vo-1b	1b	2a2	A1h1	<b>Maize, potato, higher rainfall, on volcanic ash (1b)</b>			
CB1	Vo-1b	1b	2a2	A1h2	MP1b	Vo-3	4a	2c1
CB1	Vo-1c	4a	2c1	A1k1	<b>Maize, potato, higher rainfall, on gneiss (2)</b>			
CB1	Vo-1c	4a	2c1	A1k2	MP2	Gn-1b	5a	2c2
<b>Coffee, banana on gneiss (2)</b>					MP2	Gn-1b	5a	2c2
CB2	Gn-1a	3	2a1	A1h3	MP2	Gn-2	5a	2c2
CB2	Gn-3	5a	2c2	B1b3	MP2	Gn-3	5a	2c2
<b>Coffee, banana on sandstone, or phyllite (3)</b>					MP2, tea, wattle	Gn-3	5a	2c2
CB3	Ka-2	29a	2b1	A2a2	MP2	Gn-3	5a	2c2
CB3	Ka-4a	7c	2b2	B2g1	<b>Maize, sorghum, on volcanic rocks (1)</b>			
CB3	Ka-4c	29a	2b1	B2f4	MS1	Vo-4b	6	1i1
CB3, tea	Ka-2	29a	2b1	A2a1	<b>Maize, sorghum, bimodal rainfall pattern, on gneiss coastal sands, limestone, marl, sandstone (2a)</b>			
<b>Coconut, cassava, cashew</b>					MS2a, sisal	Me-4b	26	2m1
CCC	Sa-2b	15b	2n1	B3g1	MS2a	Co-2b	27	2j1
CCC	Sa-2b	15a	1g1	B3g2	MS2a, sisal	Co-2a	19	2e1
CCC	Sa-2b	15a	1g1	B3g3	MS2a, sisal	Me-5c	26	2m1
CCC, sisal	Sa-3b	15b	2n1	C3d	MS2a, sisal	Sa-3b	15b	2n1
<b>Cotton, maize (1a)</b>					MS2a, sisal	Sa-3b	15b	2n1
CM1a	Lw-2c	18	2h2	B2l1	<b>Maize, sorghum, monomodal rainfall pattern, on gneiss sandstone, limestone (2b)</b>			
CM1b	Me-4b	26	2m1	B2r	MS2b	Me-4a	25c	2b3
CM1b	Me-4b	26	2m1	B3c1	<b>Maize, sesame, on Ferralsols developed on gneiss and coastal sand cover (1a)</b>			
CM1b	Me-4b	26	2m1	B3c2	MSe1a	Me-4b	26	2m1
CM1b	Me-4b	26	2m1	B3h1	MSe1a	Me-4b	26	2m1
CM1b	Me-5c	26	2m1	C3a2	MSe1a	Me-5c	26	2m1
<b>Coffee, maize, bean on volcanic ash (1)</b>					MSe1a	Me-5c	26	2m1
CMB1, coffee	Vo-2	2	1d2	B1d	MSe1a	Me-5c	26	2m1
<b>Coffee, maize, bean on granite, schist, phyllite, sandstone and limestone (2)</b>					<b>Maize, sesame, on Cambisols developed on sandstone and shale (1b)</b>			
CMB2	Ka-1	7a	1a2	A1e	MSe1b	Sa-3a	14	2i1
CMB2	Ka-1	7c	2b2	A1f	<b>Maize, sorghum, pastoralism, higher rainfall, on gneiss and limestone (2)</b>			
CMB2	Lw-2a	17	2d1	B2h	MSP1	Me-4b	26	2m1
<b>Coffee, maize, bean on gneiss, high rainfall (3a)</b>					MSP1	Gn-5c	5b	2f1
CMB3a	Gn-1b	5a	2c2	A1j1	<b>Maize, sorghum, pastoralism, lower rainfall, on coastal sands and clay (2)</b>			
<b>Coffee, maize, bean on gneiss, medium rainfall (3b)</b>					MSP2	Lw-2c	18	2h2
CMB3b	Gn-4	5b	2f1	B2p2	MSP2, citrus	Co-3a	24	1h2
<b>Cassava, rice</b>					MSP2	Co-3a	24	1h2
CR	Me-2a	25b?	1b1	A2d4	<b>Maize, sorghum, tobacco, pastoralism, lower rainfall, monomodal pattern (3)</b>			
CR	Me-2a	25b	1b1	A2e	MSP3	Me-6b	25e	2g1
CR	Ka-3b	29a	2b1	B1f	MSP3	Me-6b	25e	2g1
<b>Cassava, rice, oilpalm</b>					MSP3	Me-6b	25e	2g1
CRO	Lw-1a	20	1f2	B2s	MSP3	Gn-6b	5b	2f1 (2g1)
CRO	Ka-4c	29b	1f3	B2t	MSP3	Me-6b	25e	2g1
<b>Cotton, sorghum</b>					MSP3	Me-6b	25e	2g1
CS	La-3	8	2l2	D2o1	MSP3	Me-6b	25e	2g1
<b>Cotton, sorghum, pastoralism</b>					<b>Maize, sorghum, pastoralism, lower rainfall with bimodal pattern (4)</b>			
CSP	Me-6b	25e	2g1	D2n	MSP4	Me-7	26	2m1
CSP	La-3	8	2l2	D2o3	MSP4	Me-7	26	2m1
CSP	Se-2	22b	2l1	D2p1	MSP4	Me-7	26	2m1
<b>Cassava, (spice) trees</b>					MSP4	Me-7	26	2m1
CT	Co-1b	27	2j1	A3b				
CT	Co-1a	19	2e1	A3c				

FSZ	AEZ	Soil group	FSgroup	Unit	FSZ	AEZ	Soil group	FSgroup
<b>Maize, bean, higher rainfall, on volcanic ash (1a)</b>					<b>Maize, sorghum, sunflower, pastoralism, very low rainfall on granite, gneiss, coastal sand or sediments (5)</b>			
MB1a	Vo-3	4a	2c1	B2b1				
MB1a	Vo-3	4a	2c1	B2b2	MSP5	La-2	11	2o1
<b>Maize, bean, higher rainfall, on volcanic ash (1b)</b>					MSP5	Se-3b	21b	1k1
MB1b	Vo-3	4a	2c1	B1a2	MSP5	Se-3b	21a	1k2 (1k1,2g1)
<b>Maize, bean, higher rainfall, on gneiss (2)</b>					MSP5	La-4a	11	2o1 (1k2)
MB2	Gn-1b	5a	2c2	A1d4	MSP5	La-4a	11	2o1
MB2	Gn-1b	5a	2c2	A1d5	MSP5	La-4a	11	2o1
MB2, tea	Gn-1b	5a	2c2	A1d6	<b>Pastoralism, on volcanic ash, higher rainfall (1a)</b>			
MB2	Gn-1b	5a	2c2	A1d7	P1a	Vo-4c	4b	2k1
MB2	Me-1	25c	2b3	A1i	P1a	Vo-5a	4b	2k1
MB2	Gn-1b	5a	2c2	A1j2	P1a	Vo-5a	4b	2k1
MB2	Me-2a	25c	2b3	A2c	<b>Pastoralism, on volcanic ash, very low rainfall (1b)</b>			
MB2	Gn-2	5a	2c2	A2d1	P1b	Vo-6	4b	2k1
MB2	Gn-2	5a	2c2	A2d3	P1b	Vo-6	4b	2k1
MB2	Gn-2	5a	2c2 (2i1)	A2d6	P1b	Vo-6	4b	2k1
MB2	Gn-2	5a	2c2	A2d7	P1b	Vo-6	4b	2k1
MB2	Gn-3	5a	2c2	B1b1	P1b	Vo-6	4b	2k1
MB2	Gn-3	5a	2c2	B1b3	<b>Pastoralism, on gneiss or sediments (2a)</b>			
MB2	Gn-3	5a	2c2	B1b5	P2a	Se-3b	21a	1k2
MB2	Gn-3	5a	2c2	B1b6	P2a	Se-3b	21a	1k2 (1k1,2g1)
MB2	Gn-3	5a	2c2	B2c	P2a	Se-3b	21a	1k2
MB2	Me-4a	25c	2b3	B2d3	P2a	La-4a	11	2o1 (1k2)
<b>Maize, bean, higher rainfall, on basalt, limestone, sandstone (3)</b>					P2a	Se-3b	21a	1k2
					<b>Pastoralism, on gneiss, granite or marl (2b)</b>			
MB3	Ka-3a	7b	1d1	B1e	P2b	La-3	8	2i2
<b>Maize, bean, lower rainfall, on granite or gneiss (4a)</b>					P2b	Gn-7	5b	2f1
MB4a	Gn-5b	5a	2c2	C1d1	P2b	Gn-7	5b	2f1
MB4a	Gn-5b	5a	2c2	C1d2	P2b	Gn-7	5b	2f1
MB4a	Gn-6a	5a	2c2	D1b1	P2b	La-4b	8	2i2
MB4a	Gn-6a	5a	2c2	D1b2	<b>Game park, on volcanic ash (1a)</b>			
<b>Maize, bean, tobacco, lower rainfall, on sandstone or shale (4b)</b>					Park1a	Vo-5a	4b	2k1
					Park1a	Vo-5a	4b	2k1
MB4b	Sa-3a	14	2i1	C2d1	Park1a	Vo-5a	4b	2k1
MB4b	Sa-4	14	2i1	D2i	Park1a	Vo-6	4b	2k1
<b>Maize, bean, lower rainfall, on volcanic ash (4c)</b>					Park1a	Vo-6	4b	2k1
MB4c	Vo-4a	1b	2a2	C1c	<b>Game park, on sandstone and shale (1b)</b>			
<b>Maize, bean, lower rainfall (5a)</b>					Park1b	Sa-5	14	2i1
MB5a	Gn-6b	5a	2c2	D1d1	<b>Game park, on granite and gneiss (1c)</b>			
<b>Maize, bean, lower rainfall (5b)</b>					Park1c	Gn-7	5b	2f1
MB5b	Gn-6b	5b	2f1	D2a1	<b>Rice, cocoa</b>			
MB5b	Me-7	26	2m1	D2a2	RC	Me-2c	9	1c1
MB5b	Gn-6b	5b	2f1 (2g1)	D2e	<b>Rice, coconut, cassava</b>			
MB5b	Gn-6b	5b	2f1	D2m1	RCC, sisal	Co-2a	19	2e1
MB5b, sisal	Gn-6b	5b	2f1	D2m2	RCC	Co-3b	27	2j1
<b>Maize, bean, pastoralism, on volcanic ash</b>					<b>Rice, livestock on Itogolo soils</b>			
MBP, bean	Gn-6b	5b,(4a?)	2f1 (2c1)	D2g	RL	La-1	8	2i2
MBP	Vo-5b	4a	2c1	D2h2	<b>Rice, maize, cassava, cotton</b>			
MBP	Vo-5b	4a	2c1	D2k3	RMC, s/cane	Sa-2c	12	1g2
MBP, s/cane	Vo-5b	4a	2c1	D2l	RMC	Me-5b	28	1h3
<b>Maize, cassava, cotton, rice</b>					RMC	Me-5b	28	1h3
MCCR	Me-2b	25e	2g1	A2b	RMC, sisal	Me-5d	23	1h1
MCCR	Se-1	22b	2i1	B2m	RMC	Me-5d	28	1h3
<b>Maize, finger millet, higher rainfall, on gneiss, schist or granite (1a)</b>					<b>Rice, maize, sweet potato</b>			
					RMSp	Me-5d	23	1h1
MFm1a	Me-3	25a	1e1	B1c	RMSp	Me-5d	23	1h1
MFm1a	Me-4a	25a	1e1	B2a1	RMSp	Vo-5c	16	1j1
MFm1a	Me-4a	25a	1e1	B2a2	<b>Rice, pastoralism (1)</b>			
<b>Maize, finger millet, rocky terrain/shallow soils (1b)</b>					RP1	Se-3b	21b	1k1
MFm1b	Me-4a	25d	2d2	B2d2	RP1, rice	La-4a	11	2o1
MFm1b	Me-5a	25d	2d2	C2a2	<b>Rice, pastoralism (2)</b>			
<b>Maize, finger millet, lower rainfall, on gneiss (2)</b>					RP2	Se-3a	22b	2i1
MFm2	Me-6a	25d	2d2	D1a	<b>Rice, sorghum, millet</b>			
<b>Maize, forest, higher rainfall (1a)</b>					RSM	Se-2	22a	1j2
MFo1a	Gn-1b	5a	2c2	A1d1	<b>Rice, sweet potato</b>			
MFo1a	Gn-1b	5a	2c2	A1d2	RSp	Lw-1b	13	1f1
MFo1a	Gn-2	5a	2c2	A2d5	<b>Sorghum</b>			
MFo1a	Sa-1	14	2i1	A2g	S	Lw-3b	18	2h2 (2i2)

FSZ	AEZ	Soil group	FSgroup	Unit	FSZ	AEZ	Soil group	FSgroup
MFo1a	Gn-3	5a?	2c2?	B2i	<b>Sorghum, fingermillet, on gneiss (1)</b>			
<b>Maize, forest, lower rainfall (1b)</b>					SF1	Gn-5b	5a	2c2
MFo1b	Gn-5a	3	2a1	C1b	SF1	Gn-5b	5a	2c2
<b>Maize, groundnut, livestock</b>					SF1	Gn-6a	5a	2c2
MGL	Me-6b	25e	2g1	D2q1	SF1	Gn-6a	5a	2c2
MGL	Me-6b	25e	2g1	D2q2	<b>Sorghum, millet, bambara groundnut, on gneiss (1a)</b>			
MGL	Me-6b	25e	2g1	D2q3	SML1a	Me-4b	26	2m1
MGL	Me-6b	25e	2g1	D2q4	<b>Sorghum, millet, non-bean legumes, on gneiss with coastal sand cover</b>			
MGL	Lw-3b	18	2h2	D2r2				
MGL	Lw-3b	18	2h2	D2r3	SML1b, ranching	Me-7	26	2m1
MGL	Se-3b	21a	1k2 (1k1,2g1)	Ec1	<b>Tobacco, pastoralism, higher rainfall, on gneiss or sandstone (1a)</b>			
<b>Maize, groundnut, tobacco, pastoralism</b>								
MGTP	Me-4a	25e	2g1	B2j1	TP1a	Me-4a	25e	2g1
MGTP	Me-4a	25e	2g1	B2j2	TP1a	Ka-4c	29a	2b1
MGTP	Me-4a	25e	2g1	B2j3	TP1a	Ka-4c	29a	2b1
MGTP	Me-4a	25e	2g1	B2j4	TP1a	Me-5a	25e	2g1
MGTP	Me-4a	25e	2g1	B2k	<b>Tobacco, pastoralism, lower rainfall, on recent sedi (1b)</b>			
					TP1b	La-2	11	2o1
					TP1b	La-2	11	2o1
					<b>Wheat, barley, maize, bean, pigeon pea</b>			
					WBMBP	Gn-6b	5a	2c2
					WBMBP	Gn-6b	5b	2f1
					WBMBP	Vo-5b	4a	2c1
					WBMBP	Gn-6b	5b,(4a?)	2f1 (2c1)
					<b>None</b>			
					Bare	Vo-5b	4a	none (2c1)
					Bare	Vo-6	4b	none

Unit
B2e1
B2e2
D2p3
B2h
D1c
D2d
A1a1
A1a2
A1b
A1c
A1g1
A1g2
B1a1
A1d3
A1j3
A2d2
B1b1
B1b2
B1b4
C1a
B3h2
B3l2
B3m1
C3a1
C3d
<b>miss,</b>
B2d4
<b>and</b>
B3d1
B3d2
C3b
C3c
<b>one</b>
C2f
<b>miss (1)</b>
B2p1
C2b
<b>stal</b>
B2l3
B3k
C3e
<b>l with</b>
D2b1
D2b2
D2c
D2e
D2f
<b>nodal</b>
D2a2
D3b1
D3b2

Unit
<b>ainfall,</b>
C2c3
Eb3
Ec1
Ee1
Ee3
Ee4
C2e
D1e
D2h1
Ef1
Ef2
Ef4a
Ef4c
Ef5
Ea2
Ec1
Ed2
Ee1
Eg1
D2o2
Eb1
Eb2
Ed1
Eg2
D1e
D2h1
D2h3
Ef1
Ef3
D3c
Ec2
A3a
B3m2
C3f
B2l2
B3a
B3b
B3i
B3j1
C3i
B3j2
C3h
D2p2
Eb4
Ee2
Ea1
D2s
B2o
D2r1

Unit
C1d2
C1d3
D1b1
D1b2
)
B3c3
D3a
B2d1
B2f1
B2f3
C2a1
<b>ments</b>
C2c1
C2c2
D1d1
D1d2
D2k1
D2k4
D2k2
Ef4b

Table 4. Overview of farming systems per climatic zone and the relation with farming

FSgroup	Rain	Temp	Geology	Soil group	CMU
Single or combined double system(s) per climatic zone (toposequences)					
1a1	A	1	PP7v	1a	C6v,D5v,E1(h)
1a2	A	1	Buk2	7a	D1
1b1	A	2	K/A1,Moc?	25b	D4?,G5
1c1	A	3	R2	9	F1
1d1	B	1	Buk1	7b	C1h
1d2	B	1	PP8v/Uben	2	D6v
1e1	B	1-2	K/A1, Uben	25a	D3a,D6
1f1	B	2	R2	13	G1
1f2	B	2	Buk1	25f	G3
1f3	B	2	Buk2 (+Uben)	29b	G4h
1g1	B	3	JP	15a	A5(d)
1g2	B	3	PI1	12	B2
1h1	B-C	3	SR1	23	A2,B1
1h2	B-C	3	PP2	24	A4d
1h3	B-C	3	R1	28	A1
1i1	C	1	Mio	6	E6
1j1	D	2	SR1	16	H2
1j2	D	2	SR2	22a	H2
1k1	E	2	PP6,Dod	21b	C6h,G8
1k2	E	2	SR2,Dod,R2	21a	C6,C6h,G2,H2
Climosequences					
2a1	A-C	1	Uben	3	D6d
2a2	A-C	1	PI4v	1b	E3,E3h
2b1	A-B	1-2	Buk2	29a	C2(h),D2,G4(h)
2b2	A-B	1-2	K/A2	7c	D3(d)
2b3	A-B	1-2	Uben	25c	G6,G6h
2c1	A-D	1-2	SR3v,PP8v	4a	E2(h),E4,E4h,H2v,H4v
2c2	A-D	1-2	Moc,Uben	5a	B5(h),D4,D5(d)
FSgroup	Rain	Temp	Geology	Soil group	CMU
Climosequences					

2d1	B-D	1-2	K/A1	17	C3h
2d2	B-D	1-2	Uben	25d	D6
2e1	A-B	3	PI2	19	A3
2f1	B-E	(1-)-2	BC,Moc,Dod,SR2	5b	C4,C4(d,h),C6h,H5h
2g1	A-E	2	Uben,Dod,Moc,BC	25e	B5hC4(h),C5(d,h),C6(h),H5h
2h1	B-D	2	SR2	10	H1,H2
2h2	B-D	2	PI3	18	G7,H4,H6
2i1	A-D	2-3	Kar,PP4	14	B3(d),F2d
2j1	A-C	3	PP1	27	A4
2k1	C-E	1-2	R2,SR3v,Plio,PP7v,8v	4b	C6v,D5v,E1(h),E4(h),E5,(H2)
2l1	B-E	2	SR2	22b	H2
2l2	B-E	2	PP3,(PI3)	8	H3,H4
2m1	B-D	2-3	Moc,PP5	26	B4,B5,B5d,B5h
2n1	B-C	3	JP	15b	A5
2o1	C-E	2	R2	11	G2



| system groups, rainfall, temperature regime, geology

Mapping units	Farming systems per climatic zone				
	A	A-B	B	B-C	C
A1a1-2,A1c,A1g1-2 A1e	MP1a CMB2				
A2d4,A2e	CR				
A3a	RC				
B1e B1d			MB3 CMB1		
B1c,B2a1-2			MFm1a		
B2o B2s B2t			RSp CROa CROb		
B3g2-3 B3a			CCC RMC		
B3j1-2,C3h B3k,C3e B3b,B3i,C3i				RMSp+RMC MSP2 RMC	
C1a					MS1
D2p2 D2s					
Eb3-4,Ec1 Ea2,Ec1,Ed2,Ee1,Eg1					
A1h3,C1b A1b,A1c,A1h1-2,C1c	CB2 CB1,MP1a				MFo1b MB4c
A2a1-2,B1f,B2f1-4 A1f,B2g1-2 A1i,A2c,B2d3,B2d4	CB3 CMB2	MB2	CR,TP1a,B,CB3 B,CB3 MS2b		
A1k1-2,B1a1-2,B2b1-2,D2g,D2h2, D2k1,D2k3,D2k4?,D2l A1d1-7,A1j1-3,A2d1-3,A2d5-7, B1b1-6,B2c,B2i,C1d1-3,D1b1-2,D1d1	CB1 CMB3a,MP2,MFo1a		MB1a,1b,MP1b MB2		SF1
Mapping units	A	A-B	B	B-C	C

B2h,D1c,D2d B2d2,C2a2,D1a		CMB2	MFm1b
A3c,B3m1-2	CT	MS2a,RCC	
B2p2,C2b,D1d2,D2a1,D2e,D2g, D2m1-2,D2k4,Eb1-2,Ec2,Ed1		CMB3b	MSP1a
A2b,B2d1,B2j1-4,B2k,C2a1,D2b1-2, D2c,D2e,D2f,D2n,D2q1-4,Ec1	MCCR	MGTP	TP1a
B2e1-2,D2p3 B2l1,B2l3,D2r2-3		ML1a,b CM1a,MSP2	
A2d6,A2f,A2g,B3e,B3f,C2d1-2, C2f,C3g,D2i,D2j,D3c	C1		MSe1b
A3b,B3l1-2,C3f	CT	MS2a,RCC,C1	
C2e,D1e,D2h1,D2h3,Ef1-3,Ef4a,Ef4c,Ef5			
B2m,D2p1,Ea1 B2l2,D2o1-3,Eg2,(D2r1)		MCCR RL	
B2p1,B2r,B3c1-3,B3d1-2,B3h1-2,C3a1-2, C3b,C3c,D2a2,D3a,D3b1-2	B:P1b,SML1a,MSP1b		B-C:CM1b,MS2a,MSe
B3g1,C3d		C1	MS2a
C2c1-3,Ee1-4			

C-D      D      D-E      E

RMSp  
RSM

MSP5+RP1  
P2a

WBMBP,MBP

MB4a      MB5a

C-D      D      D-E      E

ML1d  
MFm2

WBMBP,MBP,MB5b P2a,P2b,Park1c

CSP,MSP3 MGL

ML1c  
MGL,S

MB4b,C2 Park1c

P1a,Park1a

P1b

CSP  
CS,CSP P2b

RP2

1a MSP4,MB5b,SML1b

C-E: TP1b+MSP5+RP1