ZONATION AND INTEGRATED PLANT NUTRIENT MANAGEMENT STRATEGIES AND OPTIONS IN TANZANIA

Volume II. Soil types and soil groups

W.J. Veldkamp

NSS publication no.

National Soil Service
Mlingano Agricultural Research Institute
P.O. Box 5088
Tanga, Tanzania
Tel.: 027-2647647
E-mail: mlingano@twiga.com

Table on contents

I. INTRODUCTION

In this volume the soil types are described. The basis of the different soil types has been taken from de Pauw's 41 soil units, which has been taken as broad groups of soils. They have been sub-divided on basis of the geology and other aspects as could be distinguished in order to form tentative soil families. In a later stage some of the soil types have been combined as the difference between them did not seem sufficient for distinction at the soil family level. In more detailed studies the distinction could prove to be useful.
Each soil type needs to be verified by using the soil profiles descriptions of available soil survey reports. Moreover, each profile description and its analytical data should be entered into the SOTER database for further storage and retrieval and its link to the GIS unit.

Firstly, in chapter 2, the soil types are given. In Vol. V, Annex 2 a tentative classification list is given to be used for determination of the soil type (family) for each soil profile description given in the soil survey reports.
In chapter 3 the soil types have been combined in soil groups, with has been useful in linkage with farming system groups and agro-ecological zones.
In the chapter 4 of this volume the soil group per agro-ecological zone is given. Tables for verification of the different soil types are provided.

2. SOIL TYPES

The main distinction of soil types has been made on basis of:

- Soil depth (very shallow and shallow soils)
- Better drained Fluvisols
- Other well drained fertile soils, such as Phaeozem, cambisols, Andosols, Niti- and Nitosols including better drained Solonetz
- Well drained sandy soils
- Well drained ferralsols
- Well drained loamy and clayey soils, moderately or strongly leached
- Arenosols
- Soils with a hardpan
- Poorly drained Fluvisols
- Gleysols, moderately or strongly leached
- Vertisols, better and poorly drained
- Salty and/or sodic soils
- Peat soils

1. VERY SHALLOW (< 25 cm) WITH ROCK OUTCROPS

Key to the very shallow soils on basis of geology, CMU-unit and physiographic unit

No. soil type	Associated soil type	Geology	CMU	Physiographic unit
101	102	Sub-recent 3v	E2(h),H2v,H4 v	NA 1,4,8,9
102	101	PP8v	E4(h)	NC 2, NV 1,3
103		Pl4v	E3(h)	HV 1,2
104		Plio/Miocene	E5, E6	NP 4
105		PP7v	E1(h), C6v, D5v, D6v	HP 3,4
106		Bukoba 2	C2(h), D1, D2, G4h	HP 3,4, U 2,4
107	112	JP	A5(d)	CD2
108		K/A 2 (quartzite)	D3(d)	W 3,4,6
109		Recent 2	F1, G 1,2	RA 2
110		Karroo	F2d	RT
111		Gneiss/granite	many	many
112	107	JP	A5(d)	CD2
113		Bukoba 1	C1h, G3	W 1
114		Bukoba 2	D1	W 2
115		K/A 1	C3h, D3a, G5	U 3,5, W 4
116		K/A 2 (phyllite)	D3(d)	W 5

Main soil types (bold indicating the main number) and soil groups:

- 101+**102**, soil group 4: very shallow Phaeozem or Vitric Andosol on volcanic ash (Meru and Kilimanjaro plains, Karatu plateau, Northern lowlands, Hanang, Babati, Serengeti)
- 106, soil groups 7 and 29: Lithosol on sandstone, possibly on shale or limestone (Karagwe plains and hills, Kigoma lakeshore, Katumba plateau, Busando hills, Central Biharamulo, South-western Kagera)
- **107**+112, soil group 15: Lithosol on Karroo or Jurassic sandstone, possibly on shale on coastal hinterland plains (Sedimentary plateau in Eastern zone, South-eastern Songea/Northern Tunduru, Southern and Eastern hinterland plains and hills, Makonde plateau)
- 108, soil group 7: Lithosol on quartzite or ironstone (Kigoma highlands, Bukoba high rainfall area, Karagwe hills and plains)
- 109, soil group 11: Lithosol or Regosol on ironstone (Rukwa valley and floodplain and Rukwa/Songwe valley)
- 110, soil group 14: Lithosol, on Karroo sandstone (South-eastern Songea plain)
- 111, soil groups 3, 5, 21 and 25: Lithosol on gneiss or granite (widespread, especially occurring in areas like Northern-Sengerema, Ukerewe island, Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, dissected Chunya plain, Meatu-Maswa-Shinyanga area, Central-Northern plains, Chunya plain, Wago hills, Mpwapwa-Eastern Kondoa plains, Eastern Iringa highalnds, Mahenge highlands, Usambara highlands, Morogoro highlands, Matengo highlands, Wino Ward, Ludewa plateau, Mbinga area, Lupembe-Niave hills, Songea plateau, Madaba-Mahanje area,

Ruhuhu escarpment, Mufindi/Kidugala plateau, (east) Njombe plateau, Pare mountains, Mpwapwa plateau, Eastern and Northern Ubena plateaux, various shallow soil areas in Southern Highlands, upper Lukosi valley, lower Mufindi plateau, Usanga flat border, Iringa plain, Kiteto, Northern Lushoto area, Northern Monduli area, Western Mbulu area, Northern Irambu steppes)
- 115 and 116, soil group 17: Lithosol, on schist, phyllite or granite (Ngara area, Central Kagera, Karagwe plains and hills, Kate-Mwazye hills, Nkungwe mountain, Kigoma highlands)

Other very shallow soil types of less importance are:
- 103, soil group 1 on volcanic ash (very shallow Humic Andosols, Southern Highlands)
- 104, soil group 6 on volcanic ash and granite or gneiss (Tarime highlands, Monduli steppes)
- 105, soil group 1 and 4 on volcanic ash (very shallow Andosols, Southern Highlands, Serengeti
- 113, soil group 20 on limestone, basalt or argilleceous sandstone (Kasuli-Kibomobo medium altitude plains, Kigoma lowlands)
- 114, soil group 7 on sandstone and shale (Kigoma highlands)

The main constraints of the very shallow soils are soil depth, drought and erosion.

Descriptions of the very shallow soil types

102 (101). Very shallow soils (Phaeozem or Vitric Andosol) on lava hills in crater highlands and on volcano slopes at higher altitudes developed on volcanic ash
- Rainfall regime: A-E, mainly B-E
- Temperature regime: 1-2
- Geology:
  - 102: Plio-Pleistocene (8v) volcanics, basalts, phonolites
  - 101: Sub-recent (3v) volcanics and basalts
- Physiographic units:
  - 102: NC2, NV1, NV3
  - 101: NA1, NA4, NA8
- CMU:
  - 102: E4(h)
  - 101: E2(h), H2v,H4v
- Mapping units:
  - 102: A1k1, B1a2, B2b2, D2l, Ef3
  - 101: D2h1, D2k2, Ef4a, Ef4b
- Agro-ecological zones: Vo-3, 5b, 6
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming systems: Coffee-Banana (1, high rainfall), Maize-Bean (1a, Southern highlands), Maize-Bean 1b, Oldeani), Maize-Bean-Pastoralism (low rainfall), Pastoralism (1a, 1b) and Park (1a) (low to very low rainfall)
- Farming system group: 2c1, 2k1
- Soil group: 4 (dominant)
- Possible constraints: erosion, soil depth

103. Very shallow soils (Humic Andosol) on volcanoes developed on volcanic ash (basalt and lava plains)
- Rainfall regime: A-C
- Temperature regime: 1

- Geology: Pleistocene (4v) volcanics and basalts
- Physiographic units: HV1, HV2
- CMU: E3(h)
- Mapping units: A1b, A1h1, A1h2, C1c
- Agro-ecological zone: Vo-1
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming system: Coffee-Banana (1)
- Farming system group: 2a2
- Soil group: probably 1

104. Very shallow soils (Lithosol) on hill tops developed on volcanic ash (lavas) and granite or gneiss
- Rainfall regime: C-E
- Temperature regime: 1
- Geology: Miocene or Pliocene volcanics and phonolites
- Physiographic units: NP4
- CMU: E5, E6
- Mapping units: C1a, Ef2
- Agro-ecological zone: Vo-4b, 6
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming system: Maize-Sorghum (1) (higher rainfall) and Pastoralism (1b), Park (1a) (very low rainfall)
- Farming system group 1i1
- Soil group: 6 (inclusion)

105. Very shallow soils on hill tops developed on volcanic ash
- Rainfall regime: A-E
- Temperature regime: 1-2
- Geology: Plio-Pleistocene (7v) volcanics, ash and tuffs
- Physiographic units: HP3, HP4, NA1(see 101), NA 3, NA4
- CMU: C6v, D5v, E1(h)
- Mapping units: A1a1, A1a2, A1c, A1g, C2e, D1e, Ef1
- Agro-ecological zone: Vo-2
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming systems: Maize-Potato (1a, higher rainfall, high altitude), Maize-Bean (4c, lower rainfall), Pastoralism (1a, low rainfall), Pastoralism (1b, very low rainfall), Park (1a)
- Farming system group: 1a1, 2k1
- Soil group: 4b, 1a (inclusion)

106. Very shallow soils (Lithosol) on hill tops on Ufipa plateau developed on sandstone
- Rainfall regime: A-B
- Temperature regime: 1-2
- Geology: Bukoba (2) sandstone, possibly shale and limestone
- Physiographic units: U2, U4, W2 (see 114), W3
- CMU: C2, C2h, D1, D3, G4h, G5
- Mapping units: A1e, A2a1?, A2e, B1f, B2f1, B2f3, B2f4, B2g2, B2t
- Agro-ecological zones:Ka-4a, 4c, Me-2a?
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming systems: Coffee-Maize-Bean (2, higher altitude, higher rainfall), Coffee-Banana (3, lower altitude, higher rainfall),

Banana or Cassava-Rice or Cassava-Rice-Oilpalm (medium rainfall), Tobacco-Pastoralism (1a, lower rainfall)
- Farming system group: 1a2, 1b1, 1f3, 2b1, 2b2
- Soil group: 7 and 29 (common), 25 (inclusion)
- Possible constraints: erosion, soil depth

107 (112). Very shallow soils (Lithosol/Regosol developed on Jurassic sandstone, possibly shale and limestone
- Rainfall regime: B
- Temperature regime: 3
- Geology: Jurassic-Paleogene sandstone, limestone and shale
- Physiographic unit: CD2, CD3
- CMU: A5, A5d
- Mapping unit: B3g2
- Agro-ecological zones: Sa-2a, 2b
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming system: Coconut-Cassava-Cashew
- Farming system group: 1g1
- Soil group: 15

108. Very shallow soils (Lithosol) on hill tops and escarpment, ironstone caps and on lower slope positions developed on quartzite or ironstone
- Rainfall regime: A-B
- Temperature regime: 1-2
- Geology: Karagwe/Ankolean (2) phyllite, conglomerate and quartzite
- Physiographic units: W3, W4, W6
- CMU: C2h, D2, D3d
- Mapping units: A1f, A2a1, B2g1, B2g2
- Agro-ecological zones: Ka-1, 2, 4a
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming systems: Coffee-Maize-Bean (2, higher altitude, higher rainfall), Coffee-Banana or Banana (3, medium altitude, medium rainfall), Cotton-Maize (1a, lower altitude, lower rainfall)
- Farming system group: 2b1, 2b2, 2g1
- Soil group: 7 (common), 25 and 29 (inclusion)
- Possible constraints: erosion, soil depth

109. Very shallow soils (Lithosol/Regosol) on low hills in lacustrine plains developed on ironstone
- Rainfall regime: C-E, mainly C
- Temperature regime: 2
- Geology: Recent (2) lake deposits
- Physiographic units: RA2
- CMU: G2
- Mapping units: C2c3, Ee2
- Agro-ecological zone: La-2
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming systems: Maize-Sorghum-Tobacco-Pastoralism (3a and in rocky terrain 3b) (higher rainfall), Maize-Sorghum-Sunflower-Pastoralism (5) or Rice-Pastoralism (1) or Park (1c) (lower rainfall)
- Farming system zone: 2o1
- Soil group: 11 (dominant)

110. Very shallow soils (Lithosol) developed on Karroo sandstone
- Rainfall regime: A
- Temperature regime: 2
- Geology: Karroo sandstone and shale
- Physiographic unit: RT
- CMU: F2d
- Mapping unit: A2g
- Agro-ecological zone: Sa-1
- Available water holding capacity: low to medium
- Maximum available water hoding capacity: very low
- Farming systems: Maize-Forestry (1a)
- Farming system group: 2i1
- Soil group: 14 (common)

111. Very shallow soils (Lithosol) developed on granite or gneiss
- Rainfall regime: A-E
- Temperature regime: 1-3
- Geology: granite or gneiss (Dodoma, Ubendian, Mocambique, Basement Complex)
- Physiographic units: EF,EH1-2, EI1-2,EM1-5, EPa1, EPh5-8, HM1-4, HP1-2, HP6, HU1-2, NP1-2, PC2, PH1-5, PM1-2, PPs3, PPw1-2, PPw5-6, RA5
- CMU: many (unspecified)
- Mapping units: many (unspecified)
- Agro-ecological zones:
  - A-E: Gn-1b, 2, 3, 5a, 5b, 6a, 7, me-2b, 4a, 5a, 6b
  - E: Se-3b
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming systems: many (unspecified)
- Farming system groups: 1a1, 1e1, 1k1, 1k2, 2a1, 2b3, 2c1, 2c2, 2d2, 2f1, 2g1, 2h2
- Soil groups: 3, 5, 21 and 25 (dominant(, 1, 4 and 18 (inclusion)
- Possible constraints: erosion, land slides, soil depth

113. Very shallow soils (Lithosol/Regosol) on tops of scarps or at lower slope positions developed on limestone, basalt, argilleceous sandstone
- Rainfall regime: B
- Temperature regime: 1-2
- Geology: Bukoba (1) limestone, basalt and argilleceous sandstone
- Physiographic unit: W1
- CMU: C1h, G3
- Mapping units: B1e, B2s
- Agro-ecological zone: Ka-3a, Lw-1a
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming systems: Maize-Bean (3, higher altitude), Cassava-Rice-Oilpalm (lower altitude)
- Farming system group: 1d1, 1f2
- Soil group: 20 (inclusion)

114. Very shallow soils (Lithosol/Regosol) in depressions on tablelands developed on sandstone and shale
- Rainfall regime: A
- Temperature regime: 1

- Geology: Bukoba (1 or 2) sandstone and shale
- Physiographic unit: W2
- CMU: D1
- Mapping unit: A1e
- Agro-ecological zone: Ka-1
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming system: Coffee-Maize-Bean (2)
- Farming system group: 1a2
- Soil group: 7 (common), 25 and 29 (inclusion)
- Possible constraints: erosion, soil depth

115 (116). Very shallow soils (Lithosol) on hill tops developed on schist and granite and on lower positions in broad valleys developed on phyllite

- Rainfall regime: A-D
- Temperature regime: 1-2
- Geology:
  - 115: Karagwe/Ankolean (1) schist and granite
  - 116: Karagwe/Ankolean (2) phyllite, possibly conglomerate
- Physiographic units:
  - 115: U3, U5, W4
  - 116: W5
- CMU:
  - 115: C3h, D3a
  - 116: D3d
- Mapping units:
  - 115: A2d4?, B1c, B2h, D1c, D2d
  - 116: A1f, B2g1?
- Agro-ecological zones: Lw-2a, 3a, Me-3, Ka-1, Ka-4a?
- Available water holding capacity: low to medium
- Maximum total available water in soil: very low
- Farming systems: Coffee-Maize-Bean (2, higher altitudes, higher rainfall), Coffee-Banana (3)(lower altitudes) Maize-Fingermillet (1a, medium altitude, medium rainfall, especially on shallow soils?) Maize-Livestock (1d, lower rainfall)
- Farming system group: 1e1, 2b2, 2d1
- Soil group: 7 and 17 (common), 25 (inclusion)
- Possible constraints: erosion, soil depth

SHALLOW SOILS (25-50 cm to rocks)

Key to the shallow soils:

No. soil type	Associated soil type	Geology	CMU	Physiographic unit
131		Gneiss/granite	many	PH 1,2
132		Sub-recent 3v	E2(h), H2v, H4v	NV 2
133	145	Pl4v, PP7v	?	HP 4, HV 2
141		PP8v	E4(h)	NC 1,2
142	143	Sub-recent 3v	E2(h), H2v, H4v	NV 1,2
143	142	Pliocene	E5	NA 8
144		Pl2	A3	CP 1,2
145	133	PP7v	?	HP 3
146		Gneiss	?	HU 1

Main soil types (bold indicating the main number) and soil groups:
- 131, soil groups 5 and 25: Phaeozem (Calcisol?) on granite or gneiss (Babati-Northern Kondoa, Kondoa-Kibaya-west Handeni, Pare footslopes, Northern lowlands, Eastern Mbulu, Meatu-Maswa-Shinyanga area, Central-Northern plains, Chunya plain, Wago hills, Mpwapwa-east Kondoa plains)
- **133**+145, soil group 1: shallow Humic Andosols on volcanic ash (Mbeya, Rungwe, (west) Njombe plateau)
- 141+**142**+143, soil group 4: shallow Vitric Andosol on volcanic ash (Meru and Kilimanjaro plains, Karatu plateau, Northern lowlands, Hanang, Babati, Northern steppes, Serengeti)
- 144, soil group 19: shallow soil type on (coral) limestone (Eastern Zanzibar and Pemba and Mafia)
- 146, soil group 5: Phaeozem (Calcisol?) on gneiss (Eastern Iringa highlands, Mahenge highlands, Usambara highlands, Morogoro highlands, Matengo highlands, Wino Ward, Ludewa plateau)

Other shallow soil types of less importance:
- 132, soil group 4: Phaeozem? on volcanic ash (Meru-Kilimanjaro volcanic ash plains)

Main constraints are soil depth, erosion, drought, land slides.

Descriptions of the shallow soil types

131. Shallow, well drained, gritty, loamy Phaeozems or other soils with a mollic epipedon on rocky hill tops on plains, footslopes, piedmonts on granite or gneiss (Basement complex, Udendian, Mocambique, Dodoma)
- Rainfall regime: A-E, mainly D
- Temperature regime: 1-2
- Geology: Basement Complex, Ubendian, Mocambique, Dodoma granite or gneiss
- Physiographic units: PH1, PH2
- CMU: C4h, C5h, C6, C6h, H5h
- Mapping units: A2b, B2j1, B2k, D1d2, D2b2, D2c, D2n, D2q2, D2q3, D2q4, Ec1, Ec2
- Agro-ecological zones: Gn-6b, Me-6b
- Available water holding capacity: low to medium

- Maximum total available moisture in soil: low
- Farming systems: Maize-Cassava-Cotton-Rice or Cotton-Maize (1a) or Rice-Livestock or Maize-Groundnut-Tobacco-Pastoralism (higher rainfall) and Wheat-Barley-Maize-Bean-Pigeon pea (higher altitudes, lower rainfall) and Cotton-Sorghum-Pastoralism or Maize-Groundnut-Livestock or Maize-Sorghum-Pastoralism (3a) (lower rainfall) and Maize-Sorghum-Pastoralism (5) or Park (1c) (lowest rainfall)
- Farming system group: 1k1, 1k2, 2f1, 2g1
- Soil group: 5 and 25 (common), 21 (inclusion)
- Possible constraints: erosion, landslides

132. Well drained, shallow, sandy loam to loam, dark brown or gray, (Luvic or Calcic) Phaeozem (?) developed on volcanic ash on stony, flat lava and lahar plains, footslopes, piemonts
- Rainfall regime: B
- Temperature regime: 2
- Geology: Sub-recent (3v) volcanics, basalts
- Physiograohic unit: NV2 (see 142)
- CMU: E2
- Mapping unit: B2b1
- Agro-ecological zone: Vo-3
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: medium
- Farming system: Maize-Bean (1a)
- Associated soil: 142
- Farming system group: 2c1
- Soil group: 4 (common)
- Possible constraint: erosion

133 (145). Well drained, stony, shallow, sandy loam to loam to sandy clay loam, dark brown or gray, Humic Andosol developed on volcanic ash
- Rainfall regime: A-E, mainly A
- Temperature regime: 1-2
- Geology: Pleistocene (4v) and Plio-Pleistocene (7v) volcanics, basalts, ash and tuffs
- Physiographic units: HP3
- CMU: D5d, E3(h)
- Mapping units: A1b, A1c
- Agro-ecological zones: Vo-1a, Vo-1b
- Available water holding capacity: high
- Maximum total available moisture in soil: very high
- Farming systems: Maize-Potato (1a)(higher rainfall) and Maize-Bean (4c)(lower rainfall)
- Farming system group: 1a1, 2a2
- Soil group: 1 (dominant)
- Possible constraint: landslides

142 (141,143). Shallow, stony, sandy loam to sandy clay loam soils developed on volcanic materials on crater highlands, on outwash plains, on lava and lahar plains
- Rainfall regime: B-E
- Temperature regime: 1-2
- Geology:
  - 142. Sub-recent (3v) volcanics, basalts
  - 141. Plio-Pleistocene (8v) volcanics, basalts, phonolites

  - 143. Pliocene volcanics, phonolites
- Physiographic units:
  - 142. NV1, NV2
  - 141. NC1, NC2
  - 143. NA8
- CMU:
  - 142. E2h, H2v
  - 141. E4(h)
  - 143. E5
- Mapping units:
  - 142. D2k2, Ef4a, Ef4b
  - 141. B1a2, Ef3
  - 143. Ef2
- Agro-ecological zones: Vo-3, 5b, 6
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: very low
- Farming systems: Maize-Bean (1b, higher rainfall), Pastoralism (1b) and Park (1a, lower rainfall)
- Farming system group: 2c1, 2k1
- Soil group: 4 (dominant)
- Possible constraint: erosion

144. Shallow, well drained, loamy sand to sandy loam soils developed on coral limestone rif materials
- Rainfall regime: A-B
- Temperature regime: 2-3
- Geology: Pleistocene (2) limestone, marl, clay
- Physiographic units: CP1, CP2
- CMU: A3
- Mapping units: A3c, B3m1, B3m2
- Agro-ecological zone: Co-1a
- Available water holding capacity: very low
- Farming systems: Cassava-Trees (higher rainfall) and Rice-Coconut-Cassava or Maize-Sorghum (2a) (lower rainfall)
- Farming system group: 2e1
- Soil group: 19 (dominant)

146. Shallow, stony, sandy loam to sandy clay loam Phaeozem/Calcisol (?)with high organic matter content developed on gneiss
- Rainfall regime: A-B
- Temperature regime: 1-2
- Geology: Ubendian or Mocambique gneiss
- Physiographic unit: HU1
- CMU: D5d
- Mapping unit: A1d1
- Agro-ecological zone: Gn-1a
- Available water holding capacity: medium
- Maximum total available moisture in soil: very high
- Farming system: Maize-Bean (2b)
- Farming system group: 2c2
- Soil group: 5 (dominant)
- Possible constraints: erosion, landslides

WELL TO MODERATELY WELL DRAINED FLUVISOLS, STRATIFIED ON YOUNGER ALLUVIUM

Key to well to moderately well drained Fluvisols:

No. soil type	Associated soil type	Geology	CMU	Physiographic unit
201		Recent 1	A1	CF 1
202	203	Sub-recent 2	H2	PR
203	202	Sub-recent 2	H1	W 8
204	207	Recent 2	G2	RA 4
205		Pl1	B2	EA 2a, 2b
206		Recent 2	F1,G1,G2	HL
207	204	Recent 1,2	A1,F1,G1,G2	RA 5,6
208		Moc. gneiss	many	HM4
209		Miocene	E6	NP 4
210		Uben. gneiss	many	PC 2

Main soil types (bold indicating the main number) and soil groups:
- 201, soil group 28: Fluvisol (Rufiji valley)
- 202+**203**, soil group 10: Fluvisol (Kagera river floodplain, Mara floodplain)
- **204**+207, soil group 11: Fluvisol (Nduli-Ismani flats, Usangu plain, Ruaha lowland and valley)
- 205, soil group 12: Fluvisol (Kilombero valley)
- 206, soil group 9: Fluvisol (Kyela plain)
- 210, soil group 25: Fluvisol (Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plains, Western Sukumaland plains, Namanyere-Laela plain)

Other Fluvisol types of less importance are:
- 208, soil group 5 on gneiss (Matengo highlands)
- 209, soil group 6 (Tarime highlands)

Main constraints are not well known (possibly sodicity, soil degradation/gully erosion?)

Descriptions of the better drained Fluvisol soil types

201. Well to moderately well drained, fine sandy to sandy clay loam, (stratified) Fluvisols developed on riverine floodplains
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Recent (1) stream deposits
- Physiographic unit: CF1
- CMU: A1
- Mapping units: B3b, B3i, C3i
- Agro-ecological zone: Me-5b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high to very high
- Farming system: Rice-Maize-Cassava-Cotton
- Farming system group: 1h3
- Soil group: probably 28 (inclusion)

203 (202). Well to moderately well drained, fine sandy to sandy clay loam, (stratified) Fluvisols in complex pattern developed on regularly flooded alluvial plains

- Rainfall regime: B-D
- Temperature regime: 2
- Geology: Sub-recent (2) stream deposits
- Physiographic unit:
  - 203, W8
  - 202, PR
- CMU:
  - 203, H1
  - 202, H2
- Mapping unit:
  - 203, B2e1
  - 202, B2e2
- Agro-ecological zones: Ka-4b, Lw-2b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high to very high
- Farming systems: Maize-Cassava-Cotton-Rice or Rice-livestoock or Maize-Livestock (1a,1b)(higher rainfall) and Maize(-Dairy) (1c, lower rainfall)
- Farming system group: 2h1
- Soil group: 10 (dominant)

204 (207). Well to moderately well drained, fine sandy to sandy clay loam, (stratified) Fluvisols in complex pattern developed on riverine floodplains and at depressional positions in alluvial complexes

- Rainfall regime: C-E, mainly E
- Temperature regime: 2
- Geology: Recent (1 and 2) stream deposits
- Physiographic unit:
  - 204, RA4
  - 207, RA5, RA6
- CMU: G2
- Mapping units:
  - 204, Ee3
  - 207, C2c1, C2c3, Ee2
- Agro-ecological zone: La-4a
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high to very high
- Farming system: Tobacco-Pastoralism (1b, higher rainfall) and Maize-Sorghum-Pastoralism (3a,3b, medium rainfall), but mainly Park(1c), possibly some Maize-Sorghum-Pastoralism (5) or Rice-Pastoralism (1)
- Farming system group: 2o1
- Soil group: 11 (dominant)

205. Well to moderately well drained, fine sand to clay loam, (stratified) Fluvisols in subsidence basins on alluvial plains

- Rainfall regime: B
- Temperature regime: 2
- Geology: Pleistocene (1) stream deposits
- Physiographic units: EA2a, EA2b
- CMU: B2
- Mapping unit: B3a
- Agro-ecological zone: Me-4c
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high to very high
- Farming system: possibly Rice-Maize-Cassava-Cotton

- Farming system group: 1g2
- Soil group; 12 (dominant)

206. Well to moderately well drained, fine sand to sandy clay loam, (stratified) Fluvisols in lacustrine plains
- Rainfall regime: A
- Temperature regime: 3
- Geology: Recent (2) lacustrine deposits
- Physiographic unit: HL
- CMU: F1
- Mapping unit: A3a
- Agro-ecological zone: Me-2c
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high to very high
- Farming system: Rice-Cocoa
- Farming system group: 1c1
- Soil group: 9 (common)

208. Well to moderately well drained, fine sand to sandy clay loam, (stratified) Fluvisols developed on intramountain plains
- Rainfall regime: A
- Temperature regime: 1
- Geology: Mocambique gneiss
- Physiographic unit: HM4
- CMU: D4
- Mapping unit: A1j1
- Agro-ecological zone: Gn-1b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high to very high
- Farming systems: Maize-Bean (2a) or Coffee-Maize-Bean (3a)
- Farming system group: 2c2
- Soil group: 5 (inclusion)

209. Well to moderately well drained, fine sand to sandy clay loam, (stratified) Fluvisols occurring in valley bottoms, developed on lavas and granites on high plateaux
- Rainfall regime: C
- Temperature regime: 1
- Geology: Miocene volcanics, phonolites
- Physiographic unit: NP4
- CMU: E6
- Mapping unit: C1a
- Agro-ecological zone: Vo-4b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high to very high
- Farming system: Maize-Sorghum (1)
- Farming system group: 1i1
- Soil group: 6 (inclusion)

210. Well to moderately well drained, fine sand to sandy clay loam, (stratified) Fluvisols occurring in valley bottoms developed on metamorphic rocks or in complex pattern on riverine plains on Ufipa plateau
- Rainfall regime: A-D, mainly B-D
- Temperature regime: 1-2
- Geology: Ubendian gneiss
- Physiographic unit: PC2

- CMU: D6, G4h, G6h
- Mapping units: A1i, B2a2, B2t, D1a
- Agro-ecological zones: Me-4a, 6a
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high to very high
- Farming systems: Maize-Bean (2a) or Cassava-Rice-Oilpalm (higher rainfall) and Maize-Fingermillet (2) or Maize(-Dairy) (1d) (lower rainfall)
- Farming system group: 1e1, 1f3, 2b3, 2d2
- Soil group: 25 (common), 29 (inclusion)

PHAEOZEMS OR CAMBISOLS

Key to Phaeozem, Cambisol:

No. soil type	Associated soil type	Geology	CMU	Physiographic unit
231		Sub-recent 3v	C4h, E2(h), H2v, H4v	NA 1,6,7,9, NR 3?
232	233,235	PP7v	E1(h),C6v, D5v, D6v	NA 1,2,3,4
233		Pliocene	E5	NA 6,8
234	238,240	PP3	H3	NR 2
235	232	PP8v	E4(h)	NC 1
236		JP	A5(d)	CD3
237		Moc. gneiss	B5(d,h), C4 (d,h), D4, D5(d)	HP 2, EM 3
238	234,240	PP3	H3	PPs1, PPw4
239		Sub-recent 2	H1, H2	PPs2
240	234,238	Pl3	G7, H4, H6	PPs1, PPw4

Main soil types (bold indicating the main number) and soil groups:
- 231, soil group 4: Luvic Phaeozem on volcanic ash (Meru-Kilimanjaro plains, Karatu plateau, Serengeti, Northern lowlands, Hanang, Babati, Northern steppes)
- **232**+233+235, soil group 4: Luvic Phaeozem on volcanic ash (Western Serengeti and especially in the Northern steppes and other parts of Serengeti)
- 234+**238**+340, soil group 8: Luvic Phaeozem (Ibushi) on older alluvial deposits (Ibushi plain, Eastern Lake Manjara shore, Shinyanga-Igunja area)
- 236, soil group 15: Phaeozem/Cambisol on Paleogene limestone or marl (Southern and Eastern hinterland plains and hills, Makonde plateau)
- 237, soil group 5: Phaeozem/Cambisol on gneiss (East Handeni and North Morogoro hills plains)
- 239, soil group 22: Phaeozem/Cambisol on old alluvial or colluvial plains (Central irrigated/flooded area, Shinyanga-Igunga area)

Main constraints are not well known (probably fertility?, (phosphate due to P-retention on volcanic ash soils)))

Descriptions of the Phaeozem or Cambisol soil types

231. Well drained, sandy loam to clay loam, dark brown or gray, (Luvic or Calcic) Phaeozem soils developed on volcanic ash plains, on stony, flat lava and lahar plans on volcano slopes
- Rainfall regime: A-E, mainly B-E
- Temperature regime: 1-2
- Geology: Sub-recent (3v) volcanics, basalts
- Physiographic units: NA1, NA6, NA7, NA9, NR3?
- CMU: C4h, E2(h), H2v, H4v
- Mapping units: A1k2, B2b1, D2h1, D2h2, D2k1, D2k2, D2k3, D2k4, Ef4c?, Ef5
  - Split:
    - Non-stony: most units
    - Stony (lava blocks): B2b1
- Agro-ecological zones: Gn-6b, Vo-3, 5a, 5b, 6

- Available water holding capacity: medium to high
- Maximum total available moisture in soil: high
- Farming systems: Coffee-Banana (1, higher rainfall, higher altitude), Maize-Bean (1a, lower altitude, medium rainfall), Wheat-Barley-Maize-Bean-Pigeon pea (higher altitude, lower rainfall), Maize-Bean-Pastoralism (lower rainfall), Pastoralism (1a,1b) or Park (1a) in lowest rainfall areas)
- Farming system group: 2c1, 2k1
- Soil group: 4 (dominant)

232 (233, 235). Well drained, sandy loam to clay loam, dark brown or gray, (Luvic or Calcic) Phaeozem soils developed on volcanic ash plains or on crater highlands
- Rainfall regime: C-E
- Temperature regime: 1-2
- Geology:
  - 232, Plio-Pleistocene (7v) volcanics, ash and tuffs
  - 233, Pliocene volcanics, phonolites
  - 235, Plio-Pleistocene (8v), volcanics, basalts, phonolites
- Physiographic units:
  - 232, NA1, NA2, NA3, NA4
  - 233, NA6, NA8
  - 235, NC1
- CMU:
  - 232, C6v, E1(h)
  - 233, E5
  - 235, E4(h)
- Mapping units:
  - 232, C2e, D1e, D2h3, Ef1
  - 233, Ef2
  - 235, Ef3
- Agro-ecological zones: Vo-4c, 5a, 6
- Available water holding capacity: very low to high
- Maximum total available moisture in soil: medium to high
- Farming systems: Maize-Bean (4c, higher rainfall) and Pastoralism (1a,1b) or Park (1a) (lower rainfall)
- Farming system group: 2k1
- Soil group: 4 (dominant)

236. Well to moderately well drained, friable clay loam to clay, grey or brown Phaeozem or Cambisol soils on low steep hills developed on Paleogene limestone and marl
- Rainfall regime: B
- Temperature regime: 3
- Geology: Jurassic-Paleogene limestone and marl
- Physiographic unit: CD3
- CMU: A5d
- Mapping unit: B3g2
- Agro-ecological zone: Sa-2b
- Available water holding capacity: high
- Maximum total available moisture in soil: high
- Farming system: Coconut-Cassava-Cashew
- Farming system group: 1g1
- Soil group: 15 (common)
- Possible constraints: fertility?, acidity?

237. Well to moderately well drained, friable clayloam to clay, grey or brown Phaeozem or Cambisol soils developed on plains or mountain block footslopes on gneiss
- Rainfall regime: A-D, mainly C
- Temperature regime: 1-2
- Geology: Mocambique gneiss
- Physiographic units: HP2, EM3
- CMU: C4h, D5(d)
- Mapping units: A1d3, C2b, D1b1
- Split:
  - Plains: A1d3, D1b1
  - Mountain footslopes C2b
- Agro-ecological zone: Gn-5c
- Available water holding capacity: medium to high
- Maximum total available moisture in soil: high
- Farming systems: Maize-Potato (2, higher rainfall) and Maize-Sorghum-Pastoralism (1a, lower rainfall)
- Farming system group: 2c2, 2f1
- Soil group: 5 (dominant)

238 (234, 240). Well to moderately well drained, friable clayloam to clay, grey or brown Phaeozem or Cambisol soils developed on old alluvial/colluvial plains (Ibushi) and possibly on higher parts in complex rift depressions.
- Rainfall regime: B-D
- Temperature regime: 2
- Geology:
  - 238, 234, Plio-Pleistocene (3) marl, sand, clay
  - 240, Pleistocene (3). Granite or gneiss with a Pleistocene cover
- Physiographic units:
  - 238, PPs1, PPw4
  - 234, NR2
  - 240, PPs1, PPw4
- CMU:
  - 238, 234, H3
  - 240, H4
- Mapping units:
  - 238, D2o1, D2o3
  - 234, D2o2
  - 240, B2l2
- Agro-ecological zone: La-3
- Available water holding capacity: very low to medium to high
- Maximum total available moisture in soil: medium to high
- Farming systems: Maize-Cassava-Rice-Cotton-Rice or Rice-Livestock (higher rainfall), Cotton-Sorghum or Cotton-Sorghum-Pastoralism (medium rainfall) or Pastoralism (2b)(low rainfall)
- Farming system group: 2l2
- Soil group: 8 (dominant)

239. Well to moderately well drained, friable clayloam to clay, grey or brown Phaeozem or Cambisol soils developed on old alluvial/colluvial plains (Ibushi)
- Rainfall regime: D
- Temperature regime: 2
- Geology: Sub-recent 2, stream deposits
- Physiographic units: PPs2

- CMU: H2
- Mapping unit: D2p1
- Agro-ecological zone: Se-2
- Available water holding capacity: medium to high
- Maximum total available moisture in soil: high
- Farming system: Cotton-Sorghum-Pastoralism
- Farming system group: 2l1
- Soil group: 22 (common)
- Possible constraint: erosion

WELL TO MODERATELY WELL DRAINED SOLONETZ

Key to the better drained Solonetz:

No. soil type	Associated soil type	Geology	CMU	Physiographic unit
251	252	Sub-recent 3v	H4v	NA 1,2,3
252	251	PP7v	C6v, E1(h)	NA 1,2,3

Main soil types (bold indicating the main number) and soil groups:
- **251**+252, soil group 4: Mollic Solonetz on volcanic ash (Serengeti)

Main constraints are sodicity, fertility, drainage, erosion, drought stress

Descriptions of the better drained Solonetz soil types

251 (252). Well to moderately well drained, clayloam to clay, sodic, dark brown or black Mollic Solonetz soils developed on volcanic ash plains (poor internal drainage and extra runoff)
- Rainfall regime: C-E
- Temperature regime: 1-2
- Geology:
  - 251, Sub-recent (3v) volcanics, basalts
  - 252, Plio-Pleistocene (7v) volcanics, ash and tuffs
- Physiographic units: NA1, NA2, NA3
- CMU:
  - 251, H4v
  - 252, C6v, E1, E1h
- Mapping units:
  - 251, D2h1
  - 252, C2e, D1e, D2h3, Ef1
- Agro-ecological zones: Vo-4c, 5a
- Available water holding capacity: medium to high
- Maximum total available moisture in soil: very low
- Farming systems: Maize-Bean (4c, higher altitude, medium rainfall) and Pastoralism (1a, 1b) or Park (1a)
- Farming system group: 2k1
- Soil group: 4 (dominant)

ANDOSOLS

Key to Andosols:

No. soil type	Associated soil type	Geology	CMU	Physiographic unit
261a		PP7v	D5v	HP 3
261b		PP7v	E1(h)	NA 3
262	263	Sub-recent 3v	E2(h), H2v, H4v	NA 6,7
263		Pliocene	E5	NA 6
264		PP8v	E4(h)	HP 5
265		Pl4v	E3(h)	HP 4, HV 1,2

Main soil types (bold indicating the main number) and soil groups:
- 261a, soil group 1, Humic or Mollic Andosols (Southern Highlands (Mbeya, Rungwe, Njombe plateau)
- 261b, soil group 4, Vitric Andosols on volcanic ash (Northern steppes, Serengeti)
- **262**+263, soil group 4: Vitric Andosols on volcanic ash (Meru-Kilimanjaro footslopes, Northern lowlands, Hanang, Babati, Northern steppes, Serengeti)
- 264, soil group 2: Humic or Mollic Andosol on volcanic ash (Mbozi plateau)
- 265, soil group 1, Humic or Mollic Andosol (Southern Highlands (Mbeya, Rungwe, Njombe plateau), Mbeya stepped plain)

Main constraints are wind erosion, drought, fertility (phosphate due to P-retention).

Descriptions of the Andosol soil types

261. Well drained, immature, loamy sand to loam, dark grey or brown, (Vitric) Andosol or more weathered (moderately to strongly leached), sandy loam to loam, black, dark grey or dark brown, (Humic or Mollic) Andosol or (Haplic) Phaeozem, developed on volcanic ash plains and plateaux and volcanic highlands
- Rainfall regime: A (261a)-D-E (261b)
- Temperature regime: 1-2
- Geology: Plio-Pleistocene (7v) volcanic ash and tuffs
- Physiographic units:
  - 261a, HP3
  - 261b, NA3
- CMU:
  - 261a, D5v
  - 261b, E1, E1h
- Mapping units:
  - 261a, A1a1, A1a2, A1c, A1g1
  - 261b, D1e, Ef1
- Agro-ecological zones:
  - 261a, Vo-1a, 1b
  - 261b, Vo-5a, 6
- Available water holding capacity: high
- Maximum total available moisture in soil: very high
- Farming systems: Maize-Potato (1a, higher altitude, high rainfall), Maize-Bean (4c, lower rainfall, but unlikely to occur) and in low rainfall areas Pastoralism (1a,1b) or Park (1a)
- Farming system group:

  - 261a, 1a1 and 2a2
  - 261b, 2k1
- Soil group:
  - 261a, 1 (dominant)
  - 261b, 4 (inclusion)

262 (263). Well drained, immature, loamy sand to loam, dark grey or brown, (Vitric) Andosol, developed on volcanic ash plains
- Rainfall regime: A-E
- Temperature regime: 1-2
- Geology:
  - 262, Sub-recent (3v) volcanics, basalts
  - 263, Pliocene volcanics, phonolites, basalts
- Physiographic units: NA6, NA7
- CMU:
  - 262, E2, H2v
  - 263, E5
- Mapping units:
  - 262, A1k2, B2b1, D2h2, D2k3, Ef4c, Ef5
  - 263, Ef2
- Agro-ecological zones: Vo-1c, Vo-5b, Vo-6
- Available water holding capacity: high
- Maximum total available moisture in soil: very high
- Farming systems: Coffee-banana (1, higher altitude, high rainfall), Maize-Bean (1a, lower altitude, medium rainfall), Maize-Bean-Pastoralism (lower rainfall) and in driest areas Pastoralism (1b)
- Farming system group: 2c1, 2k1
- Soil group: 4 (dominant)

264. Well drained, more weathered (moderately to strongly leached), sandy loam to loam, black, dark grey or dark brown, (Humic or Mollic) Andosol or (Haplic) Phaeozem, developed on high volcanic ash plains and plateaux and volcanic highlands
- Rainfall regime: B
- Temperature regime: 1
- Plio-Pleistoceene (8v) volcanics, basalts, phonolites
- Physiographic unit: HP5
- CMU: D6v
- Mapping unit: B1d
- Agro-ecological zone: Vo-2
- Available water holding capacity: high
- Maximum total available moisture in soil: very high
- Farming system: Coffee-Maize-Bean (1)
- Farming system group: 1d2
- Soil group: 2 (dominant)
- Possible constraint: fertility

265. Well drained, more weathered (moderately to strongly leached), sandy loam to loam, black, dark grey or dark brown, (Humic or Mollic) Andosol or (Haplic) Phaeozem, developed on high volcanic ash plains and plateaux and volcanic highlands
- Rainfall regime: A-C
- Temperature regime: 1
- Geology: Pleistocene (4v) volcanics, basalts
- Physiographic units: HP4, HV1, HV2
- CMU: E3, E3h

- Mapping units: A1b, A1h1, A1g2, A1h2, C1c
- Agro-ecological zones: Vo-1a, 1b, 4a
- Available water holding capacity: high
- Maximum total available moisture in soil: very high
- Farming systems: Coffee-Banana (1) or Maize-Potato (1a) at higher altitude and high rainfall, Maize-Bean (4c, lower rainfall)
- Farming system group: 1a1, 2a2
- Soil group: 1 (dominant)
- Possible constraint: fertility

NITI/NITOSOLS

Key to the Niti/Nitosols:

No. soil type	Associated soil type	Geology	CMU	Physiographic unit
271		PP8v	E4(h)	NC 2, NP 3, NV 3a, 3b
272		Moc. gneiss	many	EM 4, HM 2,3, HP 1,2, HU 1
273		Miocene	E6	NP 1,2,4
274		Uben. gneiss	many	PH 5
275		Pl4v, PP7v	C6v, D5v, D6v, E1(h), E3(h)	HP 3,4,5,6, HU 2, HV 2
276		Bukoba 1, K/A 2	C1h, D3(d), G3	W 1,2

Main soil types (bold indicating the main number) and soil groups:
- 271, soil group 4: Humic Nitisol on volcanic ash and tuff (Meru-Kilimanjaro footslopes and plains, Karatu plateau, Northern steppes, Serengeti)
- 272, soil group 5: Humic Nitisol on gneiss (Eastern Iringa highlands, Mahenge highlands, Usambara highlands, Morogoro highlands, Matengo highlands, Wino Ward, Ludewa plateau, Mbinga area, Lupembe-Niave hills, Songea plateau, Madaba-Mahanje area, Ruhuhu escarpment, Mufindi/Kidugala plateau, (east) Njombe plateau, Pare mountains, Mpwapwa plateau, Eastern and Northern Ubena plateaux, various shallow soil areas in Southern Highlands, Kilosa-west and Mpwapwa medium altitude plains, upper Lukosi valley, lower Mufindi plateau, Usanga flat border, Iringa plain)
- 273, soil group 6: Humic Nitisol on gneiss and old volcanic rocks (Tarime highlands)
- 275, soil group 3: Humic Nitisol on gneiss and volcanic ash (Southern Highlands (Mbeya, Rungwe, Njombe plateau)
- 276, soil group 7: Humic Nitosol on basalt or argilleceous sandstone (Kigoma highlands, Kasuli-Kibombo medium altitude plains)

Other Nitosol types of less importance:
- 274, soil group 25: Nitosol on gneiss (dissected Chunya plain)

Main constraints are not well known (possibly soil depth and acidity?)(possibly phosphate due to some P-retention)

Descriptions of the Nitisol and Nitosol soil types

271. Well drained, moderately leached, clayloam to clay, reddish, (Humic) Nitosol soils with relatively high organic matter content developed on crater highlands and high volcanic ash and tuff plateaux (altitude 1600-2000 m)
- Rainfall regime: A-E
- Temperature regime: 1-2
- Geology: Plio-Pleistocene (8v) volcanics, basalts, phonolites
- Physiographic units: NC2, NP3, NV3, NV3b
- CMU: E4, E4h
- Mapping units: A1k1, B1a1, B1a2, B2b2, Ef3
- Agro-ecological zones: Vo-1c, Vo-3, Vo-6
- Available water holding capacity: medium

- Maximum total available moisture in soil: high
- Farming systems: Coffee-banana (1, high altitude, high rainfall), Maize-Potato (1b, Oldeani, high altitude, medium rainfall), Maize-bean (1b, high altitude, medium rainfall), Maize-Bean (1a, medium rainfall) and in dry areas Park (1a)
- Farming system group: 2c1, 2k1
- Soil group: 4 (dominant)

272. Well drained, strongly leached, sandy clay to clay, yellowish or reddish, (Humic) Nitosol (or intergrades to Humic Acrisol or Ferric Luvisol) soils with relatively high organic matter content developed on granite or gneiss without influence of volcanic ash in complex pattern on inner mountain plateaux
- Rainfall regime: A-D
- Temperature regime: 1-2
- Geology: Mocambique gneiss
- Physiographic units: EM4, EM5, HM2, HM3, HM4, HM5, HP1, HP2, HU1
- CMU: C4d, C4h, D4, D5, D5d
- Mapping units: A1c, A1d1, A1d3, A1d4, A1d5, A1d6, A1d7, A1j1, A1j2, A1j3, A2d1, A2d4, B1b1, B1b3, B1b4, B2p2, C1d1, C1d2, D1b1 [NB. Split: this unit could be split in different classification units based on textural B and organic matter rich topsoil]
- Agro-ecological zones: Gn-1b, 2, 3, 4, 5b, 6a
- Available water holding capacity: medium
- Maximum total available moisture in soil: very high
- Farming systems: with higher rainfall systems are Maize-Potato (1a) or (2), Maize-Bean (2a, 2b) or Coffee-Maize-Bean (3a, 3b) or Coffee-Banana (2) or Cassava-Rice and in medium rainfall areas Maize-Sorghum-Pastoralism (1a) and in the drier (C-D) areas either Maize-Bean-Sunflower (4a, 4c) or Sorghum-Fingermillet (1)
- Farming system group: 1a1, 2a2 (inclusion), 2c2, 2f1 (dominant)
- Soil group: 5 (dominant), 1 (inclusion)

273. Well drained, strongly leached, sandy clay to clay, yellowish or reddish, (Humic) Nitosol (or intergrades to Humic Acrisol or Ferric Luvisol) soils with relatively high organic matter content developed on granite or gneiss with some influence of volcanic ash or high plateaux on gneiss
- Rainfall regime: C-D
- Temperature regime: 1
- Geology: Miocene volcanics, phonolites and Mocambique gneiss
- Physiographic units: NP1, NP2, NP4
- CMU: C4h, D4, E6
- Mapping units: C1a, D1d1, D1d2
- {NB. Split: the Tarime (C1a) zone on Miocene volcanics might be different from the D1 zones on gneiss with some influence of volcanics]
- Agro-ecological zone: Vo-4b
- Available water holding capacity: medium
- Maximum total available moisture in soil: very high
- Farming systems: Maize-Bean (4a, 5a), Maize-Sorghum(-Banana-Horticulture) (1) or possibly Wheat-Barley-Maize-Bean-Pigeon pea
- Farming system group: 1i1, (2c2, 2f1?)
- Soil group: 6 (common)

274. Well drained, strongly leached, sandy clay to clay, yellowish or reddish, (Humic) Nitosol (or intergrades to Humic Acrisol or Ferric Luvisol) soils with relatively high organic matter content developed

on gneiss without influence of volcanic ash occurring on hills, plains, footslopes, piemonts
- Rainfall regime: C
- Temperature regime: 2
- Geology: Ubendian gneiss
- Physiographic unit: PH5
- CMU: C5d
- Mapping unit: C2a1
- Agro-ecological zone: Me-5a
- Available water holding capacity: medium
- Maximum total available moisture in soil: very high
- Farming system: most likely Tobacco-Pastoralism (1a), others possibly Maize-Sorghum-Pastoralism (3b) or Cotton-Maize (1a)
- Farming system group: 2g1
- Soil group: 25 (inclusion)

275. Well drained, strongly leached, sandy clay to clay, yellowish or reddish (Humic) Nitosol soils (or intergrades to Humic Acrisol or Ferric Luvisol) with relatively high organic matter content developed on granite or gneiss, with some influence of volcanic ash
- Rainfall regime: A-C, mainly A
- Temperature regime: 1-2
- Geology: Pleistocene (4v) volcanics, basalts or Plio-Pleistocene (7v) volcanics, ash and tuff cover over Ubendian gneiss
- Physiographic units: HP3, HP4, HP5, HP6, HU2, HV2
- CMU: D5v, D6d, D6v, E3, E3h
- Mapping units: A1a1, A1a2, A1b, A1c, A1g1, A1g2, A1h1, A1h3, B1d, B2i, C1b, C1c
- Agro-ecological zones: Gn-1a, Vo-1a, Vo-1b
- Available water holding capacity: medium
- Maximum total available moisture in soil: very high
- Farming systems: at higher altitudes and high rainfall either Coffee-Banana (2) or Maize-Potato (1a), with medium rainfall Coffee-Maize-Bean (1) and with lower rainfall either Maize-bean (4c) or Maize-Forestry (1b)
- Farming system group: 1a1 (common), 1d2 (inclusion), 2a1 (dominant), 2a2 (common)
- Soil group: 3 (dominant), 1 (common), 2 (inclusion)

276. Well drained, SC-C, strongly leached, (Humic) Nitosol soils with relatively high organic matter content developed in depressions on dissected plateaux on basalt or argilleceous sandstone
- Rainfall regime: A-B
- Temperature regime: 1
- Geology: Bukoba (1) basalt, argilleceous sandstone
- Physiographic units: W1, W2
- CMU: C1h, D1, D3d
- Mapping units: A1e, A1f, B1e
- Agro-ecological zones: Ka-1, 3a
- Available water holding capacity: medium
- Maximum total available moisture in soil: very high
- Farming systems: Coffee-Maize-Bean (2) or Maize-Bean (3)
- Farming system group: 1a2, 1d1, 2b2
- Soil group: 7 (dominant)
- Possible constraints: acidity?, soil depth?

WELL DRAINED SANDY SOILS (Nitosol, Cambisol, Acrisol, Luvisol and Regosol)

Key to the well drained sandy soils:

No. soil type	Associated soil type	Geology	CMU	Physiographic unit
301		Pl2	A3	CP 1
311		PP7v	E1(h)	NA 5
321		PP8v	E4(h)	NP 3, NV 3a, 3b
322		Moc. gneiss	D4	NP 1
331		PP1	A4	CH 1
332		Sub-recent 1	A2	CT
333		Pl2	A3	CP 1
334		PP5	B4, B5d	EPh 2,8
335		Gneiss, granite	many	EPh 6,8, PC 2, PH 1,2,3, PM 1, PPs3, PPw 1,3,6, RP 1, U 1,3,6
336		Pl3	G7, H4, H6	PPs 1,3, PPw 1,4,7,8
337		Bukoba 1	G3	PPw5
338		Moc. gneiss	C4(d,h), D4	HM 5
339		K/A 1	D3a, D6	U 3,5,6?
340	342	PP4	B3, B5	SU
341		Bukoba 2	C2(h),D2,G4h	PC 1,2,3, PM 1, PPw5, U 5, W 6,7
342	340	Karroo	B3(d), B5h, F2d	EA 4a, 4b, SD, SU
343	344?	Recent 2, sub-recent 2	G2, H2	RA 2,6, RP 3?
344		PP6	G2, G8	RA 2, RP 2

Main soil types (bold indicating the main number) and soil groups:

- 321, soil group 4: sandy Eutric Nitosol on volcanic ash (Meru-Kilimanjaro footslopes and plains, Karatu plateau, Northern lowlands, Hanang, Babati)
- 331, soil group 27: sandy Cambi/Luvi/Acrisol on coastal plains (Western Zanzibar and Pemba, Eastern and Southern coastal sand hinterland plains)
- 332, soil group 23: moderately leached Luvi/Acri/Cambisol on alluvial plains (Eastern alluvial plains)
- 334, soil group 26: moderately leached Luvi/Acri/Cambisol on coastal sand cover over metamorphic rocks (Eastern and Southern plains, Usambara footslopes)
- 335a, soil groups 25, 26: moderately leached Luvi/Acri/Cambisol or Ferralic Cambisol on metamorphic rocks in A-D climatic zones (Mwese-Mpande range, Northern Sengerema, Ukerewe island, Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plains, Western Sukumaland plains, Mahenge basin, Mkulula valley, west Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachinwea plain, Eastern plains, Muheza plain, south-eastern Tunduru and west Nachinwea plain, Namanyere-Laela plain, Meatu-Maswa-Shinyanga area, Central-Northern plains, Chunya

plain, Wago hills, Northern iringa shallow soil hill range, Mpwapwa-eastern Kondoa plains)
- 335b, soil groups 5, 11 and 21: sandy Luvisol or Ferralic Cambisol on metamorhic rocks in E-climatic zones (Kiteto, Northern Lushoto area, northern Monduli, Western Mbulu, Northern Irambu steppes, Nduli-Ismani flats, Usangu plain, Ruaha lowland and valley, Southern Dodoma, Western Iringa, Lake Manjara shore)
- 336, soil group 18: moderately leached Luvi/Acri/Cambisol on granite or gneiss (Luseni/Itogolo dominated Eastern Sukumaland, South-eastern Bukombe- plains and Sikonge-Msisi plain, Igunga-Tabora plain, Central-Western plains on continental deposits)
- 337, soil group 20: moderately leached Luvi/Acri/Cambisol on limestone and basalt (Kigoma lakeshore)
- 338, soil group 5: sandy Luvisol on gneiss (Mufindi/Kidugapa plateau, (east) Njombe plateau, Pare mountains, Mpwapwa plateau, eastern and Northern Ubena plateau, Kilosa-west and Mpwapwa medium altitude plains)
- 339, soil group 25: Ferralic Cambisol on schist and granite (Kate-Mwazye hills, Nkungwe mountain, Yambamrizi range, Ipumba hills, Western plateau, inyonga and Kipembawwe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains)
- **340**+342, soil group 14: Ferralic Cambisol on sandstone (South-eastern Songea plain, Sedimentary plateau in Eastern and North-Eastern Songea/Tunduru, Ruhuha valley, (dissected) sedimentary plateau in Southern zone, Gumbiro area, Southern plains)
- 341, soil group 29: moderately leached, Luvi/Acri/Cambisol on sandstone (Bukoba high rainfall area, Kigoma lakeshore, Katumba plateau, Busando hills, Central Biharamulo, South-western Kagera)
- **343**+344, soil group 11 and 21: moderately leached Luvi/Acri/Cambisol or Ferralic Cambisol, sometimes salty or sodic on lacustrine or alluvial deposits (Rukwa valley and floodplain, Rukwa/Songwe valley, Nduli-ismani flats, Usangu plain, Ruaha lowland and valley, Southern Dodoma, Western Iringa , Western Mbulu, Northern Irambu, Lake Manjara shore)

Other well drained sandy soil types of less importance:
- 301, soil group 19: coastal sand (Eastern Zanzibar and Pemba and Mafia, Eastern and Southern coastal plains)
- 311, soil group 4: volcanic sand dunes (East Serengeti steppe)
- 322, soil group 5: moderately leached, sandy Eutric Nitosol on gneiss (Eastern Mbulu)
- 333, soil group 19: moderately leached, sandy Cambi/Luvi/Acrisols (Eastern Zanzibar and Pemba and Mafia)

Main constraints are fertility, drought, low organic matter content, possibly acidity and leaching in A-climatic zones).

Descriptions of the well drained sandy soil types

Coastal sands

301. Well drained, immature, dark grey or dark greyish brown sand overlying deep pale brown to dark yellowish brown (coastal) sands (with likely influence of saline or brackish groundwater)
- Rainfall regime: A-B
- Temperature regime: 3
- Geology: Pleistocene (2) limestone, marl, clay
- Physiographic unit: CP1
- CMU: A3

- Mapping units: A3c, B3m1, B3m2
- Agro-ecological zone: Co-1a, 2a
- Available water holding capacity: very low
- Maximum total available moisture in soil: very low to low
- Farming systems: Cassava-Trees (Zanzibar, high rainfall), Rice-Coconut-Cassava (medium rainfall) or Maize-Sorghum (2a, lower rainfall)
- Farming system group: 2e1
- Soil group: 19 (inclusion)
- Possible constraints: fertility, drought

Volcanic ash sand dunes

311. Well drained, immature, windblown sands in (stabilised) dunes on volcanic ash plains
- Rainfall regime: E
- Temperature regime: 2
- Geology: Plio-Pleistocene (7v) volcanics, ash and tuffs
- Physiographic unit: NA5
- CMU: E1, E1h
- Mapping unit: Ef1
- Agro-ecological zone: Vo-6
- Available water holding capacity: nd
- Maximum total available moisture in soil: nd
- Farming systems: Pastoralism (1b) or Park (1a)
- Farming system group: 2k1
- Soil group: 4 (inclusion)

Sandy Nitosols

321. Well drained, moderately leached, sand to loamy sand, reddish or yellowish, (Eutric) Nitosol soils on high plateaux on volcanic ash and tuff and on volcano slopes (altitude 1200-1600 m), developed on volcanic ash materials
- Rainfall regime: A-E
- Temperature regime: 1-2
- Geology: Plio-Pleistocene (8v) volcanics, basalts, phonolites
- Physiographic units: NP3, NV3a, NV3b
- CMU: E4, E4h
- Mapping units: A1k1, B1a1, B2b2, D2l, Ef3
- Agro-ecological zones: Vo-1c, 3, 5b
- Available water holding capacity: medium
- Maximum total available moisture in soil: high
- Farming systems: Coffee-Banana (1, higher altitude, high rainfall), Maize-Potato (1, high altitude, medium rainfall), Maize-Bean (1a, lower altitudes, medium rainfall), Maize-Bean-Pastoralism (lower rainfall) and Park (1a, lowest rainfall)
- Farming system group: 2c1, 2k1
- Soil group: 4 (dominant)
- Possible constraints: drought?, low organic matter?

322. Well drained, moderately leached, sand to loamy sand, reddish or yellowish, (Eutric) Nitosol soils developed on gneisses, occurring on high plateaux
- Rainfall regime: D
- Temperature regime: 1
- Geology: Mocambique gneiss

- Physiographic unit: NP1
- CMU: D4
- Mapping unit: D1d1
- Agro-ecological zone: Gn-6b
- Available water holding capacity: medium
- Maximum total available moisture in soil: high
- Farming systems: Wheat-Barley-Maize-Bean-Pigeon pea or Maize-Bean (5a)
- Farming system group: 2c2
- Soil group: probably 5 (inclusion)

Sandy Cambisols, Luvisols, Acrisols

331. Well drained, moderately leached, sand to loamy sand, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols developed on the coastal plain
- Rainfall regime: A-C
- Temperature regime: 3
- Geology: Plio-Pleistocene (1) coastal sands and clays
- Physiographic unit: CH1
- CMU: A4
- Mapping units: A3b, B3l1, B3l2, C3f
- Agro-ecological zones: Co-1b, 2b, 3b
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming systems: in higher rainfall areas Cashew (1) or Cassava-Trees (Zanzibar) and in medium rainfall areas Rice-Coconut-Cassava or Maize-Sorghum (2a)
- Farming system group: 2j1
- Soil group: 27 (dominant)
- Possible constraints: fertility, drought

332. Well drained, moderately leached, sand to loamy sand, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols developed on alluvial plains
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Sub-recent (1) stream deposits (terraces)
- Physiographic unit: CT
- CMU: A2
- Mapping units: B3j2, C3h
- Agro-ecological zone: Me-5d
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming system: Rice-Maize-Sweet potato
- Farming system group: 1h1, 2c2
- Soil group: 23 (common), 5 (inclusion)
- Possible constraints: fertility, acidity

333. Well drained, moderately leached, sand to loamy sand, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols developed on the coastal plain
- Rainfall regime: A-B
- Temperature regime: 3
- Geology: Pleistocene (2) sand and clay over limestone, marl and clay
- Physiographic unit: CP1

- CMU: A3
- Mapping units: A3c, B3m1, B3m2
- Agro-ecological zones: Co-1a, 2a
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming systems: in higher rainfall areas Cassava-Trees (Zanzibar) and in medium rainfall areas Rice-Coconut-Cassava or Maize-Sorghum (2a)
- Farming system group: 2e1
- Soil group: 19 (inclusion)
- Possible constraints: fertility, drought

334. Well drained, moderately leached, sand to loamy sand, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols on lower slopes developed on coastal sand cover over intermediate metamorphic rocks or in complex pattern on coastal sand cover over acid metamorphic rocks

- Rainfall regime: C-D
- Temperature regime: 3
- Geology: Plio-Pleistocene (5) coastal sand cover over Mocambique gneiss
- Physiographic units: EPh2, EPh8
- CMU: B4, B5d
- Mapping units: C3b, D3a
  - Split: Int. meta: EPh2 (zone C3b, CMU B4)
    Acid meta: EPh8 (zone D3a, CMU B5d)
- Agro-ecological zones: Me-5c, 7
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming system: Sorghum-Millet-(non-bean) Legumes (1b)
- Farming system group: 2m1
- Soil group: 26 (dominant)
- Possible constraints: fertility, acidity?, drought

335. Well drained, moderately leached, sand to loamy sand, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols on lower or middle slopes on plains, on hills, footslopes, piedmonts developed on metamorphic rocks (Kikungu)

- Occurring in association with soil type 473
- Rainfall regime:
  - 335a, A-D
  - 335b, E
- Temperature regime: 1-3
- Geology: Mocambique gneiss, Ubendian gneiss, Dodoma granite or gneiss, Basement complex granite
- Physiographic units: EPh6, EPh8, PC2, PH1, PH2, PH3, PM1, PPs3, PPw1, PPw3, PPw6, RP1, U1, U3, U6
- CMU: B5h, C4h, C5, C5h, C6, C6h, D6, G6, G6h, H5h
- Mapping units: A1i, A2b, A2c, A2d3, A2d6, B2d1, B2d2, b2d3, B2d4, B2j1, B2j3, B2j4, B2k, B3c2, B3c3, B3h1, D1a, D1d2, D2b1, D2b2, D2c, D2n, D2q1, D2q2, D2q3, D2q4, Ec1, Ec2, Ed1
- [NB. Split: Intermediate metamorphic rocks
  Acid metamorphic rocks (B3c3)
  More acidified, leached soil types (A2b)
- Agro-ecological zones:
  - 335a, Me-1, 2b, 4a, 4b, 6a, 6b
  - 335b, Gn-7, La-4a, Se-3b

- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming systems:
    - In higher altitude (1-2), higher rainfall (A-B) areas Maize-Bean (2a), Maize-Cassava-Cotton-Rice
    - In lower altitude (2-3), medium rainfall (B) areas Rice-Livestock, Cotton-Maize (1a), Maize-Groundnut-Tobacco-Pastoralism, Maize-Sorghum (2b)
    - At low altitude (3) and with medium (B) rainfall Sorghum-Maize-Legumes (e.g. Bambara groundnuts)
    - At lower altitudes (2-3) and medium (B-C) rainfall Maize-Fingermillet (1b) or Tobacco-Pastoralism (1a) or Cotton-Maize (1b)
    - At medium (B-C) rainfall at low (3) altitudes Maize-Sesame (1a)
    - At lower (D) rainfall, but at higher (1-2) altitude Maize-Fingermillet (2) or Wheat-Barley-Maize-Bean-Pigeon pea
    - At medium (2) altitude and rather low (D) rainfall Cotton-Sorghum-Pastoralism or Maize-Sorghum-Tobacco-Pastoralism
    - In areas with lowest (D-E) rainfall Maize-Groundnut-Livestock, Maize-Sorghum-Sunflower-Pastoralism, Pastoralism (2a, 2b) or Park (1c)
- Farming system groups: 1k1, 1k2, 2b3, 2c2, 2d2, 2f1, 2g1, 2m1, 2o1
- Soil groups:
    - 335a, 25 and 26 (dominant)
    - 335b, 5, 11, 21 (dominant)

336. Well drained, moderately leached, sand to loamy, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols on footslopes, developed on (Plio-)Pleistocene cover over granite or gneiss

- Rainfall regime: B-D
- Temperature regime: 2
- Geology: Pleistocene cover (3) or Plio-Pleistocene (3) marl, sand and clay cover over granite or gneiss
- Physiographic units: PPs1 ?, PPs3, PPw1, PPw4, PPw7, PPw8
- CMU: G7, H4, H6
- Mapping units: B2l1, B2l3, D2r1, D2r2, D2r3
- Agro-ecological zones: Lw-2c, 3b
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming systems: in higher rainfall areas Cotton-Maize (1a) and in lower rainfall areas Sorghum or Maize-Groundnut-Livestock
- Farming system group: 2h2
- Soil group: 18 (dominant)
- Possible constraints: fertility, drought

337. Well drained, moderately leached, sand to loamy, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols on footslopes, developed on limestone and basalt

- Rainfall regime: B
- Temperature regime: 2
- Geology: Bukoba (1) limestone, basalt
- Physiographic unit: PPw5
- CMU: G3
- Mapping unit: B2s
- Agro-ecological zone: Lw-1a

- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming system: Cassava-Rice-Oilpalm
- Farming system group: 1f2
- Soil group: 20 (dominant)
- Possible constraint: fertility

338. Well drained, moderately leached, sand to loamy, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols on intermountain plains, developed on gneiss
- Rainfall regime: B
- Temperature regime: 1-2
- Geology: Mocambique gneiss
- Physiographic unit: HM5
- CMU: C4d, C4h, D4
- Mapping units: B1d4, B2p2
- Agro-ecological zones: Gn-3, 4
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming systems: Maize-Potato (2) or Coffee-Maize-Bean (3b)
- Farming system group: 2c2, 2f1
- Soil group: 5 (common)
- Possible constraints: low organic matter, fertility, acidity, drought?

339. Well drained, moderately leached, sand to loamy, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols on middle slope positions on Ufipa plateau, developed on schist and granite
- Rainfall regime: B
- Temperature regime: 1-2
- Geology: Karagwe/Ankolean (1) schist and granite
- Physiographic units: U3, U5, U6?
- CMU: D3a, D6
- Mapping units: B1c, B2a1, B2a2
- Agro-ecological zones: Me-3, 4a
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming system: Maize-Fingermillet (1a)
- Farming system group: 1e1
- Soil group: 25 (common)
- Possible constraints: fertility, acidity?, drought

340 (342). Well drained, moderately leached, sand to loamy, reddish or yellowish, (Ferric) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols at higher positions on inland sedimentary plateau, on alluvial plains, in subsidence basins, developed on sandstone and Plio-Pleistocene coastal sand cover
- Rainfall regime: A-D
- Temperature regime: 2-3
- Geology:
  - 340, Plio-Pleistocene (4) coastal sand cover over Karroo sandstone
  - 342, Karroo sandstone
- Physiographic unit:
  - 340, SU
  - 342, EA4a, EA4b, SD, SU

- CMU:
  - 340, B3, B5
  - 342, B3, B3d, B5h, F2d
- Mapping units:
  - 340, C2f, D2j, D3c
  - 342, A2f, B3e, B3f, C2d1, C2d2, C3g, D2i
- Agro-ecological zones: Sa-1, 2a, 3a, 4, 5
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming systems: with high rainfall Cashew (1),in slightly lower rainfall areas Maize-Sesame (1b, on Cambisols) or Cashew (2) and in lower rainfall areas Park (1b)
- Farming system group: 2i1
- Soil group: 14 (dominant)
- Possible constraints: fertility, drought, low organic matter

341. Well drained, moderately leached, sand to loamy, reddish or yellowish, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols on upper slopes on hills, plains, footslopes, piedmonts, developed on sandstone
- Occurring in association with soil types 391 and 477
- Rainfall regime: A-B
- Temperature regime: 1-2
- Geology: Bukoba (2) sandstone, possibly shale
- Physiographic units: PC1, PC2, PC3?, PM1, PPw5, U4, W6, W7
- CMU: C2, C2h, D2, G4h
- Mapping units: A2a1, A2a2, B1f, B2f1, B2f2, B2t
- Agro-ecological zones: Ka-2, 4c
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming systems: in somewhat higher rainfall areas Cassava-Rice or Coffee-Banana (3) and in medium rainfall areas Banana or Tobacco-Pastoralism (1a)
- Farming system group: 1f3, 2b1
- Soil group: 29 (dominant)
- Possible constraints: fertility, acidity, leaching (A climatic zone), drought??

343 (344). Well drained, moderately leached, sand to sandy loam, reddish or yellowish, saline, sodic, (Ferralic) Cambisols, (Chromic or Orthic) Luvisols or (Orthic) Acrisols on middle and footslopes or on saline and sodic alluvial or lacustrine plains, developed on lacustrine and alluvial deposits
- Occurring sometimes in association with soil type 477
- Rainfall regime: C-E
- Temperature regime: 2
- Geology:
  - 343, Recent (2) or Sub-recent (2) lacustrine and alluvial deposits
  - 344, Plio-Pleistocene (6) cover over granite or gneiss
- Physiographic units:
  - 343, RA2, RA6, RP3?
  - 344, RA2, RP2
- CMU:
  - 343, G2, H2
  - 344, G2, G8
- Mapping units:

  - 343, C2c1, C2c2, C2c3, Ed2, Ee1
  - 344, Eb3, Eb4, Ee4
- Agro-ecological zones: La-2, 4a, Se-3b
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low to medium
- Farming systems: in better rainfall areas Tobacco-Pastoralism (1b), in somewhat drier areas Maize-Sorghum-Pastoralism (3a,3b,5) and in driest areas either Rice-Pastoralism (1), Pastoralism (2a) or Park (1c)
- Farming system group: 1k2, 2o1
- Soil group: 21 (dominant), 11 (common)
- Possible constraints: fertility, acidity

FERRALSOLS

Key to the Ferralsols:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
361		Miocene	E6	NP 4
362	363	Moc. gneiss	many	EPh 1,6
363		PP5	B4	EPh 2,4, EF, EM 1,2,3,4,5
364		Uben. gneiss	many	HU 2, PC 2
365		K/A 2	D3(d)	W (1?), 2,3
366		K/A 1	C3h, D3a, G5	W 4,5
367	(479)	Bukoba 1	C1h, G3	W 1,2
368		Bukoba 2	C2(h), D1, d2, G4h	W (2?), 4
381		BC,Uben.,Dod. gneiss or granite	many	PH 4, PPw2
382		Pl3	G7, H4, H6	PH 4, PPw2
391		Pl2	A3	CP 1,2

Main soil types (bold indicating the main number) and soil groups:

- 361, soil group 6: clayey Rhodic Ferralsol on lavas and granite (Tarime highlands)
- **362**+363, soil groups 5 and 26: clayey Rhodic Ferralsol on gneiss (Eastern Iringa highlands, Mahenge highlands, Usambara highlands, Morogoro highlands, Matengo highlands, Wino ward, Ludewa plateau, Mbinga area, Lupembe-Niave hills, Songea plateau, Madaba-Mahanje area, Ruhuhu escarpment, Mufindi/Kidugala plateau, (east) Njombe plateau, Pare mountains, Mpwapwa plateau, Eastern and Northern Ubena plateau, East Handeni and North Morogoro hilly plains, Babati-Northern Kondoa, Kondoa-Kibaya-western Handeni, Pare footslopes, Northern lowlands, Eastern Mbulu, Mahenge basin, Mkulula valley, west Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachinwea plain, Eastern and Southern plains, Muheza plain, south-eastern Tunduru and western Nachingwea plain, Usambara footslopes)
- 364, soil groups 1, 3 and 29: clayey (Rhodic?) Ferralsol on more basic metamorphic rocks (Mwese-Mpande range, Rungwe highlands, (west) Njombe plateau, Kigoma lakeshore, Katumba plateau, Busando hills, central Biharamulo, South-western Kagera, possibly Lake Tanganyika and Nyasa shore and Karema depression)
- 365, soil group 7: clayey Ferralsol on phyllite (Kigoma highlands, Karagwe plains and hills)
- 366, soil group 17: clayey Ferralsol on schist and granite (Ngara area, Kigoma town, Central Kagera, Karagwe plains and hills)
- 367, soil group 7: clayey Ferralsol on argilleceous sandstone or basalt (Kigoma highlands, Kasuli-Kibombo medium altitude plains)
- 368, soil group 7: clayey Ferralsol on sandstone or shale (Bukoba high rainfall area, Kigoma lakeshore, Katumba plateau, Busando hills, Cental Biharamulo, South-western Kagera)
- 381, soil group 25: clayey, better structured and more fertile Rhodic Ferralsol on basic metamorphic rocks (Nduha) (Northern Sengerema, Ukerewe island, Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, Meatu-Maswa-Shinyanga area, Central-Northern plains, Chunya plain, Wago hills, Mpwapwa-East Kondoa plains)

- 382, soil group 18: clayey, better structured and more fertile Ferralsol on basic metamorphic rocks and a Pleistocene cover (Igunga-Tabora plain, Central-Western plains on continental deposits)
- 391, soil group 29: loamy Ferralsol on sandstone (Bukoba high rainfall zone, Kigoma lakeshore, Katumba plateau, Busando hills, Central Biharamulo, South-western Kagera)

Main constraints are fertility, acidity, leaching, drought.

Descriptions of the Ferralsol soil types

361. Well drained, strongly leached, sandy clay to clay, reddish Rhodic Ferralsols on high plateaux, developed on lavas and granites, possibly with acid subsoil
- Rainfall regime: C
- Temperature regime: 1
- Geology: Miocene volcanics and phonolites
- Physiographic unit: NP4
- CMU: E6
- Mapping unit: C1a
- Agro-ecological zone: Vo-4b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: low to high, depending on acid subsoil
- Farming systems: Maize-Sorghum (1)
- Farming system group: 1i1
- Soil group: 6 (common)
- Possible constraint: fertility

362 (363). Well drained, strongly leached, sandy clay to clay, yellowish or reddish (Rhodic, Orthic or Xanthic) Ferralsols on plains, probably in association with soil type 473, developed on intermediate metamorphic rocks with a possible PP (5) coastal sand cover
- Rainfall regime: A-D
- Temperature regime: 1-3
- Geology:
  - 362, Mocambique gneiss
  - 363, Plio-Pleistocene (5) cover over granite or gneiss
- Physiographic unit:
  - 362, EPh1, EPh6
  - 363, EPh2, EPh4
- CMU:
  - 362, many
  - 363, B4
- Mapping units:
  - 362, A1d3?, A1j2?, A1j3?, A2d3, A2d6, B3c1, B3c2, B3h2, C3a1, C3a2, D2m1, D3b1
  - 363, A1d4, A1d5, A1d6, A1d7, A2d2, B1b3, B2p1, B3d1, C2b, C3b, D2e, D2k4, D2m2, D3b2
- Agro-ecological zones: Gn-1b?, 2, 3, 5c, 6b, Me-4b, 5c, 7
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: low to high, depending on acid subsoil
- Farming systems:

  - Maize-Potato (2), Coffee-Banana (2) or Maize-Bean (2) in higher rainfall and cooler temperature;
  - Cashew (1) in higher rainfall areas with warmer temperatures;
  - Cotton-Maize (1b), Maize-Sorghum (2a) Maize-Sorghum-Pastoralism (1) in medium rainfall areas;
  - Wheat-Barley-Maize-Bean-pastoralism at higher altitudes and Maize-Sorghum-Pastoralism (4) or Maize-Bean (5b) at intermediate altitudes in low rainfall areas
- Farming system group: 2c1?, 2c2, 2f1, 2m1
- Soil group: 5 and 26 (dominant)
- Possible constraints: fertility, acidity, drought, leaching (in A climatic zones)

364. Well drained, strongly leached, sandy clay to clay, yellowish or reddish (Rhodic, Orthic or Xanthic) Ferralsols on dissected uplands and on complexes of rocky hills, valleys and plateaux, developed on (acid?), intermediate or basic metamorphic rocks
- Rainfall regime: A-B
- Temperature regime: 1-2
- Geology: Ubendian or Dodoma gneiss
- Physiographic unit: HU2, PC2
- CMU: many
- Mapping units: A1b, A1c, A1e, A1h1, A1h3, A1i, A2c, B2t
- Agro-ecological zones: Gn-1a, Ka-4c, Me-1, 2a?, Vo-1a, 1b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: low to high, depending on acid subsoil
- Associated soil type: 473
- Farming systems:
  - In high rainfall, cool areas Coffee-Banana (1) or Maize-Potato (1a)
  - In slight less rainfall areas Coffee-Banana (2) or maize-bean (2) systems occur
  - In the drier and warmer areas Cassava-Rice-Oilpalm is the likely farming system
- Farming system group: 1a1, 1f3, 2a1, 2a2, 2b3
- Soil group: 3 (dominant), 1 and 29 (common), 25 (inclusion)
- Possible constraints: leaching, fertility, acidity

365. Well drained, strongly leached, sandy clay to clay, yellowish or reddish (Rhodic, Orthic or Xanthic) Ferralsols on hills and plains, developed on phyllite and quartzite (unlikely to occur on basalt or argillaceous sandstone with dissected hilly plateaux, see 367))
- Rainfall regime: A-B
- Temperature regime: 1-2
- Geology: Karagwe/Ankolean (2) phyllite and quartzite (plus conglomerate)
- Physiographic unit: W3 (unlikely in W1 or W2)
- CMU: D3(d)
- Mapping units: A1f, B2g1, B2g2
- Agro-ecological zones: Ka-1, Ka-4a
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: low to high, depending on acid subsoil
- Farming systems: in higher rainfall areas, either Coffee-Maize-bean (2) in cooler areas or Coffee-Banana (3) is slightly warmer

temperatures; In drier and warmer areas the Banana-based system occurs
- Farming system group: 2b2
- Soil group: 7 (dominant)
- Possible constraints: fertility, acidity

366. Well drained, strongly leached, sandy clay to clay, yellowish or reddish (Rhodic, Orthic or Xanthic) Ferralsols on hills and plains, developed on schist and granite
- Rainfall regime: B-D
- Temperature regime: 102
- Geology: Karagwe/Ankolean schist and granite
- Physiographic unit: W4, W5
- CMU: C3h, D3a, G5
- Mapping units: B2h, D1c, D2d
- Agro-ecological zones: Lw-2a, 3a
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: low to high, depending on acid subsoil
- Farming systems: In higher rainfall areas Coffee-Maize-Bean (2), in slightly drier areas Maize-Fingermillet (1a) and in the driest areas Maize-Livestock (Dairy)(1d)
- Farming system group: 2d1
- Soil group: 17 (dominant)
- Possible constraints: fertility, acidity?

367. Well drained, strongly leached, sandy clay to clay, yellowish or reddish (Rhodic, Orthic or Xanthic) Ferralsols on dissected hilly plateaux, developed on argilleous sandstone or basalt
- Rainfall regime: A-B
- Temperature regime: 1
- Geology: Bukoba (1) basalt or argilleceous sandstone
- Physiographic unit: W1, W2
- CMU: C1h, G3
- Mapping units: A1e, A1f, B1e
- Agro-ecological zones: Ka-1, 3a
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: low to high, depending on acid subsoil
- Farming systems: in wetter areas Coffee-Maize-Bean (2) and in drier areas Maize-Bean (3)
- Farming system group: 1a2, 2b2, (1d1)
- Soil group: 7 (dominant)
- Possible constraints: fertility, acidity

368. Well drained, strongly leached, sandy clay to clay, yellowish or reddish (Rhodic, Orthic or Xanthic) Ferralsols on hills and plains, developed on (argilleceous) sandstone or shale, possibly also on phyllite and quartzite (Kibanja, Kikamba)
- Rainfall regime: A-B
- Temperature regime: 2
- Geology: Bukoba (2) sandstone or shale
- Physiographic unit: W4, W2?
- CMU: C2h
- Mapping units: A2a1, B2f4
- Agro-ecological zones: Ka-2, 4c
- Available water holding capacity: low to medium

- Maximum total available moisture in soil: low to high, depending on acid subsoil
- Farming systems: Coffee-Banana (3)
- Farming system group: 2b1
- Soil group: 29 (dominant)
- Possible constraints: fertility, acidity, leaching (A climatic zones)

Better structured Ferralsols

381. Well drained, strongly leached, sandy clay to clay, reddish Rhodic Ferralsols on footslopes of banded ironstone hills and on higher parts of basic metamorphic rock plains, with higher waterholding capacity, developed on basic metamorphic rocks (granite or gneiss) (more fertile and better structured than 361-367)(Nduha)
- Rainfall regime: A-D
- Temperature regime: 2
- Geology: Basic metamorphic rocks (Basement Complex, Ubendian, Dodoma)
- Physiographic unit: PH4, PPw2
- CMU: many
- Mapping units: A2b, B2j2, B2k, D2b2, D2q1
- Agro-ecological zones: Me-2b, 4a, 6b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high
- Farming systems: in higher rainfall zones Maize-Cassava-Cotton-Rice, or Cotton-Maize (1a) or Rice-Livestock or Maize-Groundnut-Tobacco-pastoralism. In drier areas either Maize-Sorghum-Pastoralism (3) or Maize-groundnut-Livestock
- Farming system group: 2g1
- Soil group: 25 (inclusion)
- Possible constraints: fertility, acidity?

382. Well drained, strongly leached, sandy clay to clay, yellowish or reddish Ferralsols on footslopes of banded ironstone hills or higher parts on basic metamorphic rocks, with higher waterholding capacity, developed on basic metamorphic rocks with possibly a Pleistocene (3) cover (more fertile and better structured than 361-367)
- Rainfall regime: D
- Temperature regime: 2
- Geology: Pleistocene (3) cover over basic metamorphic rocks
- Physiographic unit: PPw2
- CMU: H4
- Mapping unit: D2r1
- Agro-ecological zone: Lw-3b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: high
- Farming systems: Sorghum or Maize-Groundnut-Livestock
- Farming system group: 2h2
- Soil group: probably 18

Loamy Ferralsols

391. Well drained, strongly leached, sandy loam to sandy clay loam, reddish or brown, (Rhodic or Orthic) Ferralsols in association with soil type 341, developed on sandstone, possibly with acid subsoil
- Rainfall regime: A-B

- Temperature regime: 2
- Geology: Bukoba (2) sandstone
- Physiographic unit: W6, W7
- CMU: C2h, D2
- Mapping units: A2a1, A2a2, B2f2
- Agro-ecological zones: Ka-2, 4c
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, depending on acid subsoil
- Farming systems: in wetter areas Coffee-Banana (3) and in drier areas Banana
- Farming system group: 2b1
- Soil group: 29 (dominant)
- Possible constraints: fertility, acidity, leaching (A climatic zones)

WELL DRAINED, MODERATELY LEACHED LOAMY AND CLAYEY SOILS

Key to the well drained, moderately leached, heavier textured soils:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
401		Pl2	A3	CP 1,2
411		Miocene	E6	NP 4
412	413?	Moc. gneiss or Sub-recent 2	many	EF, EM 1,2,3, EPh 1,6, maybe EPh 3,8
413	412?	PP5	B4, B5d	EPh 2,3,8
414		Recent 2	F1, G1, G2	RA 6
421		Gneiss, granite	many	EI 2, PC 2, PH 1,2,3,5, PPw 1, PPs3, U 1, 3?
422		K/A 1	C3h, D3a, G5	U 3,5
423		Pl3, PP3	G7, H3, H4, H6	PPs1, PPw 1,7
424		Bukoba 2	C2(h), D1, D2, G4h	U 4
425		Recent 2 or Sub-recent 2	G2, H1, H2	RA 6, RP 3

Main soil types (bold indicating the main number) and soil groups:

- 401, soil group 19: (loamy?) Chromic Luvisol (?) on coastal plains (Eastern Zanzibar and Pemba and Mafia)
- 411, soil group 6: moderately leached, clayey Luvi/Acri/Cambisol on lavas and granite (Tarime highlands)
- **412**+413, soil group 5 and 26: moderately leached, clayey, Luvi/Acri/Cambisol on gneiss (Eastern Iringa highlands, Mahenge highlands, Usambara highlands, Morogoro highlands, Matengo highlands, Wino Ward, Ludewa plateau, Mbinga area, Lupembe-Niave hills, Songea plateau, Madaba-Mahanje area, Ruhuhu escarpment, East Handeni and North Morogoro hilly plains, Babati-North Kondoa, Kondoa-Kibaya-West Handeni, Pare footslopes, Northern lowlands, Mahenge basin, Mkulula valley, west Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachinwea plain, Eastern and Southern plains, Muheza plain, South-eastern Tunduru and Western Nachinwea plain, Usambara footslopes)
- 414, soil group 11: moderately leached, clayey, sometimes salty and sodic Luvi/Acri/Cambisol on alluvial sediments (Rukwa valley and floodplain, Rukwa/Songwe valley)
- 421, soil groups 5, 21, 25 and 29: moderately leached, loamy Luvi/Acri/Cambisol on granite or gneiss (Mbinga area, Lupembe-Niave hills, Songea plateau, Madaba-Mahanje area, Ruhuhu escarpment, Babati-North Kondoa, Kondoa-Kibaya-West Handeni, Pare footslopes, Northern lowlands, Eastern Mbulu, Kiteto, Northern Lushoto, Northern Monduli, Western Mbulu, Northern Irambu steppes, Kigoma lakeshore, Katumba plateau, Busando hills, Central Biharamulo, South-western Kagera, Mwese-Mpande range, Northern Sengerema, Ukerewe island, Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, dissected Chunya plain, Namanyere-Laela plain, Meatu-Maswa-Shinyanga area, Central-Northern plains, Chunya plain, Wago hills, Mpwapwa-Eastern Kondoa plains)

- 422, soil group 25: moderately leached, loamy Luvi/Acri/Cambisol on schist or granite (Kate-Mwazye hills, Nkungwe mountain)
- 423, soil group 18: moderately leached, loamy Luvi/Acri/Cambisol on granite or gneiss (Luseni/Itogolo dominated Eastern Sukumaland, South-eastern Bukombe plain, Sikonge-Msisi plain, Igunga-Tabora plain, Central-Western plain on continental deposits)
- 424, soil group 29: moderately leached, loamy, Luvi/Acri/Cambisol on sandstone (Nkansi-Kasanga plain)
- 425, soil group 11 and 21: moderately leached, loamy Luvi/Acri/Cambisol on alluvial, lacustrine and other sediments (Rukwa valley and floodplain, Rukwa/Songwe valley, Nduli-Ismani flats, Usangu plain, Ruaha lowland and valley)

Main constraints are fertility (N,P) and drought.

Descriptions of the well drained moderately leached loamy and clayey soil types

Moderately leached coastal plain (loamy?) soils

401. Well drained, moderately leached, friable sandy clay loam to clay, reddish, (Chromic or Ferric) Luvisol developed on the coastal plain
- Rainfall regime: A-B
- Temperature regime: 3
- Geology: Pleistocene (2) limestone, marl and clay
- Physiographic units: CP1, probably also CP 2
- CMU: A3
- Mapping units: A3c, B3m1, B3m2
- Agro-ecological zone: Co-1a
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium
- Farming systems: in higher rainfall areas Cassava-(Spice)trees, and in drier areas Rice-Coconut-Cassava (incl. Sisal) or Maize-Sorghum (2a)
- Farming system group: 2e1
- Soil group: 19 (common)
- Possible constraints: fertility, drought?

Moderately leached, clayey soils (more than x % clay at)

411. Well drained, moderately leached, friable clay, (Orthic, Chromic, Ferric) Luvisol, (Chromic) Cambisol, (Orthic) Acrisol on high plateaux, developed on lavas and granite
- Rainfall regime: C
- Temperature regime: 1
- Geology: Miocene volcanics and phonolites
- Physiographic units: NP4
- CMU: E6
- Mapping unit: C1a
- Agro-ecological zone: Vo-4b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium
- Farming system: Maize-Sorghum-Banana (1)
- Farming system group: 1i1
- Soil group: 6 (common)
- Possible constraints: fertility, drought

412 (413). Well drained, moderately leached, friable clay, (Orthic, Chromic, Ferric) Luvisol, (Chromic) Cambisol, (Orthic) Acrisol on foothills, footslopes, plains, developed on intermediate or acid metamorphic rocks or on a Plio-Pleistocene (5) cover over such rocks

- Rainfall regime: A-D
- Temperature regime: 1-3
- Geology:
  - 412, Mocambique gneiss or Sub-recent (2) cover
  - 413, Plio-Pleistocene (5) cover
- Physiographic units:
  - 412, EF, EM1, EM2, EM3, EPh1, EPh6, possibly EPh3 and EPh8
  - 413, EPh2, EPh3, EPh8
- CMU:
  - 412, various
  - 413, B4, B5d
- Mapping units:
  - 412, A1d6, A1d7, A2d2, A2d3, A2d6, B2p1, B3c1, B3c2, B3c3, B3h1, B3h2, C2b, C3a1, C3a2, D2a2, D2m1, D2m2, D3b1, D3b2
  - 413, C3b, C3c, D3a
- Agro-ecological zones: Gn-1b, 2, 5c, 6b, Me-4b, 5c, 7
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium
- Farming systems:
  - In higher rainfall and cooler areas Maize-Potato (2) or Maize-Bean (2)
  - In B climatic areas with intermediate temperatures Maize-Sorghum-Pastoralism (1b)
  - In B-climatic areas with warm temperatures Sorghum-Millet-(non-bean)Legumes (and ranches)(1a)
  - In B-C climatic zones either Maize-Sorghum-Pastoralism (1a) or with slightly warmer temperatures Cotton-Maize (1b) and at lower altitudes and warmer conditions Maize-Sorghum (2a)
  - In C climatic areas Maize-Sesame (1a)
  - In driest areas either Maize-Bean (5b) and at lower altitudes Maize-Sorghum-Pastoralism (4) or Sorghum-Millet-(non bean) Legumes (1b), including ranches
- Farming system group: 2c2, 2f1, 2m1
- Soil group: 5 and 26 (dominant)
- Possible constraint: fertility

414. Well drained, moderately leached, friable clay, (Orthic, Chromic, Ferric) Luvisol, (Chromic) Cambisol, (Orthic) Acrisol on higher positions, developed in alluvial complexes

- Rainfall regime: C
- Temperature regime: 2
- Geology: Recent (2) deposits, sediments
- Physiographic unit: RA6
- CMU: G2
- Mapping unit: C2c1
- Agro-ecological zone: La-2
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium
- Farming systems: Maize-Sorghum-Sunflower-Pastoralism (5) or Tobacco-Pastoralism (1b)
- Farming system group: 2o1
- Soil group: 11 (common)
- Possible constraint: fertility?

Moderately leached, loamy soils

421. Well drained, moderately leached, sandy loam to sandy clay loam, reddish brown, (Ferric or Chromic) Cambisol, (Ferric) Acrisols, (Ferric or Chromic) Luvisol on upper slopes or higher footslopes, on hill-plain complexes or associations, developed on granite or gneiss

- Rainfall regime: A-E
- Temperature regime: 1-2
- Geology: Mocambique, Ubendian, Dodoma, Basement Complex granite or gneiss
- Physiographic units: EI2, PC2, PH1, PH2, PH3, PH5, PPw1, PPs3, U1, maybe U3
- CMU: many
- Mapping units: A1i, A2b, A2d3, A2d6, B2a1, B2d2, B2j1, B2j3, B2j4, B2k, B2t, C2a1, D1a1, D1a2, D1d2, D2b2, D2c, D2n, D2q1, D2q2, D2q3, D2q4, Ec1, Ec2, Ed1, Ed2
- Agro-ecological zones: Gn-2, 6b, 7, Ka-4c, Me-1, 2b, 4a, 5a, 6a, 6b, Se-3b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium to high, depending on surface capping
- Farming systems:
    - In higher rainfall area and cooler temperatures Maize-Bean (2) and in slightly warmer areas Maize-Cassava-Cotton-Rice
    - In B climatic zones Maize-Fingermillet (1a) in the cooler areas, Maize-groundnut-Tobacco-Pastoralism or Rice-Livestock or Cotton-maize (1a) or Cassava-Rice-Oilpalm
    - In B-C climatic zones with intermediate temperatures Tobacco-Pastoralism (1a) or Maize-Fingermillet (1b)
    - In D climatic zones with cooler temperatures Wheat-Barley-Maize-Bean-Pigeon pea and with warmer temperatures either Cotton-Sorghum-Pastoralism, Maize-Sorghum-Pastoralism (3)
    - in D-E climatic zones with intermediate temperatures either Maize-Groundnut-Livestock or Pastoralism (2b)
    - In the driest areas Maize-Sorghum-Pastoralism (5), Pastoralism (2a) or Park (1c)
- Farming system group: 1e1, 1f3, 1k1, 1k2, 2b3, 2c2, 2d2, 2f1, 2g1
- Soil group: 5 and 21 (dominant), 25 and 29 (common)
- Possible constraint: fertility

422. Well drained, moderately leached, sandy loam to sandy clay loam, reddish brown, (Ferric or Chromic) Cambisol, (Ferric) Acrisols, (Ferric or Chromic) Luvisol on upper slope positions, developed on schist or granite

- Rainfall regime: B
- Temperature regime: 1
- Geology: Karagwe/Ankolean (1) schist and granite
- Physiographic units: U3, U5
- CMU: D3a
- Mapping unit: B1c
- Agro-ecological zone: Me-3
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium to high, depending on surface capping
- Farming systems: Maize-Fingermillet (1a)
- Farming system group: 1e1
- Soil group: 25 (common)

- Possible constraint: fertility

423. Well drained, moderately leached, sandy loam to sandy clay loam, reddish brown, (Ferric or Chromic) Cambisol, (Ferric) Acrisols, (Ferric or Chromic) Luvisol on higher footslopes in plains, developed on (Plio-)Pleistocene (3) cover over granite or gneiss
- Rainfall regime: B-D
- Temperature regime: 2
- Geology: Pleistocene (3) or Plio-Pleistocene (3) cover over Basement Complex or Dodoma granite or gneiss
- Physiographic units: PPs3, PPw1, PPw7
- CMU: G7, H4, H6
- Mapping units: B2l1, B2l3, D2r1, D2r3
- Agro-eccological zones: Lw-2c, 3b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium to high, depending on surface capping
- Farming systems: In higher rainfall areas Cotton-Maize (1a) and in the drier areas either Sorghum or Maize-Groundnut-Livestock
- Farming system group: 2h2
- Soil group: 18 (common)
- Possible constraint: fertility

424. Well drained, moderately leached, sandy loam to sandy clay loam, reddish brown, (Ferric or Chromic) Cambisol, (Ferric) Acrisols, (Ferric or Chromic) Luvisol on upper slope positions or possibly in hill-plain complexes, developed on sandstone (maybe shale)
- Rainfall regime: B
- Temperature regime: 1
- Geology: Bukoba (2) sandstone and possibly shale
- Physiographic units: U4
- CMU: C2
- Mapping unit: B1f
- Agro-ecological zone: Ka-3b
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium to high, depending on surface capping
- Farming systems: Cassava-Rice
- Farming system group: 2b1
- Soil group: 29 (common)

425. Well drained, moderately leached, sandy loam to sandy clay loam, reddish brown, (Ferric or Chromic) Cambisol, (Ferric) Acrisols, (Ferric or Chromic) Luvisol at higher positions in alluvial complexes, on higher footslopes in plains or on upper slope positions in non-alluvial plains, developed on recent deposits
- Rainfall regime: C-E
- Temperature regime: 2
- Geology: Recent (2) or possibly Sub-recent (2) sediments or colluvium
- Physiographic units: RA6, RP3
- CMU: G2, H2?
- Mapping units: C2c1, Ed2?, Ee1
- Agro-ecological zones: La-2, 4a, Se-3b?
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: medium to high, depending on surface capping

- Farming systems: In higher rainfall areas Maize-Sorghum-Pastoralism (3 or 5) or Tobacco-Pastoralism (1b). In driest areas Rice-Pastoralism (1) or Pastoralism (2a)
- Farming system group: 1k2, 2o1
- Soil group: 11 and 21 (common)
- Possible constraint: fertility

WELL DRAINED, STRONGLY LEACHED SOILS

Key to the well drained, strongly leached soils:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
451		PP1	A4	CH 4
452	453	Moc. gneiss	many	EPh 7
453	452	PP5	B4	EPh 4,5,7
454		Pl3	G7, H4, H6	PPw 8
455		PP6	G8	RP 2
461		Moc. gneiss or Sub-recent 2	many	EA 3a, 3b, EH 1,2, EM 1, EP a1, a2, HM 5
462		PP3+volcanic ash	H3	NR 2
471	472	PP2	A4d	CD 1
472	471	JP	A5(d)	CD 2
473	(335,362,363,364)	Gneiss or granite	many	EPh 8, HM 1, HP 1,6, PC 2, PM 2, PPw 3, RP 1, U 3?
474	337	Bukoba 1	C1h, G3	PPw 5
475		K/A 1	C3h, D3a, G5	U 3, 2?
476		PP5	B4, B5d	EPh 3,5,8
477	341	Bukoba 2	C2(h), D1, D2, G4h	PC 1,3,4, PPw 5, U 1,4, 2?
478		Pl4v, PP7v, PP8v	C6v, D5v, D6v, E1(h), E3(h), E4(h)	HP 5,6
479		Bukoba 1,2, K/A 2	C1h, C2(h), D1, D2, D3(d),G3, G4h	W 2

Main soil types (bold indicating the main number) and soil groups:

- 451, soil group 27: sandy to loamy, strongly leached Ferralsol/Acrisol (Paleosol) on Neogene sediments ((Eastern and Southern coastal sand hinterland plains)
- **452**+453, soil group 26: sandy to loamy, strongly leached Ferralsol/Acrisol on metamorphic rocks possibly with a Plio-Pleistocene coastal sand cover (Mahenge basin, Mkulula valley, west Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachingwea plain, Eastern and Southern plains, Muheza plain, South-eastern Tunduru and western Nachinwea plain
- 454, soil group 18: strongly leached, sandy to loamy Acrisol on continental deposits (Igunga-Tabora plain, Central-Western plains on continental deposits)
- 455, soil group 21: sandy to loamy, strongly leached Ferralsol/Acrisol (Paleosol) on various alluvial and non-alluvial sediments (Ruaha lowland and valley, Southern Dodoma, Western Iringa, Western Mbulu, Northern Irambu, Lake Manjara shores)
- 461, soil group 4,5 and 26: strongly leached, loamy to clayey Paleosol on metamorphic rocks (Eastern Iringa highlands, Mahenge highlands, Usambara highlands, Morogoro highlands, Matengo highlands, Wino Ward, Ludewa plateau, Mufindi/Kidugala plateau, (east) Njombe plateau, Pare mountain, Mpwapwa plateau, Eastern and Northern ubena plateau, Kilosa-west and Mpwapwa medium altitude plains, East Handeni and North Morogoro hilly plains, Babati-North

Kondoa, Kondoa-Kibaya-West Handeni, Pare footslopes, Northern lowlands, Eastern Mbulu, Kiteto, Northern Lushoto, Northern Monduli, Western Mbulu, Northern Irambu steppes, Meatu-Maswa-Shinyanga area, Central-Northern plains, Chunya plain, Wago hills, Mpwapwa-Eastern Kondoa plains, Usambara footslopes, semi-arid Eastern plains)

- 462, soil group 8: strongly leached, loamy to clayey Paleosol on old lacustrine sediments (Ibushi plain, Eastern Lake Manjara shore, Shinyanga-Igunja area)
- **471**+472, soil group 24: loamy to clayey strongly leached Ferralsol/Acrisol on Neogene or Jurassic sandstone, shale and limestone (Eastern and Southern hinterland plains with coastal sand cover)
- 473, soil groups 1,3,5,25 and 29: loamy to clayey strongly leached Ferralsol/Acrisol on metamorphic rocks or granite (Mufindi/Kidugala plateau, (east) Njombe plateau, Pare mountains, Mpwapwa plateau, Eastern and Northern Ubena plateau, North Mbeya and Mbozi rock terrain, Upper Lukosi valley, lower Mufindi plateau, Usanga flat border, Iringa plain, Rungwe highlands, (west) Njombe plateau, Kigoma lakeshore, Katumba plateau, Busando hills, Central Biharamulo, South-western Kagera, Mwese-Mpande range, lake Tanganyika and Nyasa shores, Karema depression, Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, Mahenge basin, Mkulula valley, west Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachinwea plain, Eastern and Southern plains, Muheza plain, South-eastern Tunduru and west Nachinwea plain, Meatu-Maswa-Shinyanga area, central-Northern plains, Chunya plain, Wago hills, Mpwapwa-Eastern Kondoa plains)
- 474, soil group 20: loamy to clayey strongly leached Ferralsol/Acrisol on limestone, basalt or argilleceous sandstone (Kigoma lakeshore)
- 475, soil group 25: loamy to clayey strongly leached Ferralsol/Acrisol on schist and granite (Kate-Mwazye hills, Nkungwe mountain)
- 476, soil group 26: loamy to clayey strongly leached Ferralsol/Acrisol on metamorphic rocks (Mahenge basin, Mkulula valley, west Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachinwea plain, Eastern and Southern plains, Muheza plain, South-eastern Tunduru and west Nachinwea plain, Usambara footslopes)
- 477, soil group 29: loamy to clayey strongly leached Ferralsol/Acrisol on sandstone (Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, Namanyere-Laela plain, Nkansi-Kasanga plain, Kigoma lakeshore, Katumba plateau, Busando hills, Central Biharamulo, South-western Kagera)
- 478, soil group 2: Ferric Acrisol on granite or gneiss and volcanic ash (Mbozi plateau)
- 479, soil group 7: loamy to clayey strongly leached Ferralsol/Acrisol on argilleceous sandstone (Kigoma highlands)

Main constraints are fertility, drought, leaching, acidity, soil degradation, erosion

Descriptions of the well drained, strongly leached loamy and clayey soil types

Strongly leached, sandy to loamy textured soils (Paleosols)

451. Excessively to moderately well drained, strongly leached, loamy sandy to sandy clay loam, grey, brown or reddish Paleosols on coastal hinterland plains, developed on Neogene sediments capped by ironstone, possibly with acid subsoil
- Rainfall regime: B
- Temperature regime: 3
- Geology: Plio-Pleistocene (1) coastal sand and clay
- Physiographic units: CH4
- CMU: A4
- Mapping unit: B3l1
- Agro-ecological zone: Co-2b
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, very low in case of severe subsoil acidity
- Farming systems: in higher rainfall areas Cashew (1) and in lower rainfall areas either Rice-Coconut-Cassava or Maize-Sorghum (2a)
- Farming system group: 2j1
- Soil group: 27 (dominant)
- Possible constraints: fertility, drought

452 (453). Excessively to moderately well drained, strongly leached, loamy sand to sandy clay loam, grey, brown or reddish Paleosol soils on plains, developed on intermediate metamorphic rocks or on a PP (5) cover) over these rocks, possibly with acid subsoil
- Rainfall regime: B-C
- Temperature regime: 2-3
- Geology:
  - 452, Mocambique gneiss
  - 453, Plio-Pleistocene (5) cover over gneiss
- Physiographic units:
  - 452, EPh7
  - 453, EPh4, EPh5, EPh7
- CMU: B4
- Mapping units:
  - 452, C3b
  - 453, B2r, B3d1, B3d2, C3b
- Agro-ecological zones: Me-4b, 5c
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, very low in case of severe subsoil acidity
- Farming systems: in higher rainfall areas cashew (1) and in lower rainfall areas Cotton-maize (1b) of Maize-Sesame (1a)
- Farming system group: 2m1
- Soil group: 26 (common)
- Possible constraints: fertility, acidity

454. Excessively to moderately well drained, strongly leached, loamy sand to sandy clay loam, grey, brown or reddish Paleosol soils on plains, developed on 'continental deposits' (indurated hilltops overlying granite), possibly with acid subsoil
- Rainfall regime: D
- Temperature regime: 2

- Geology: Pleistocene (3) cover over granite or gneiss
- Physiographic units: PPw8
- CMU: H4, H6
- Mapping units: D2r1, D2r2, D2r3
- Agro-ecological zone: Lw-3b
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, very low in case of severe subsoil acidity
- Farming systems: Sorghum or Maize-Groundnut-Livestock
- Farming system group: 2h2
- Soil group: 18 (dominant)
- Possible constraints: fertility, acidity?

455. Excessively to moderately well drained, strongly leached, loamy sand to sandy loam, grey, brown or reddish Paleosol soils on hill top positions, probably with an indurated surface developed on alluvial or non-alluvial deposits, possibly with acid subsoil
- Rainfall regime: E
- Temperature regime: 2
- Geology: Plio-Pleistocene (6) cover over granite or gneiss
- Physiographic units: RP2
- CMU: G8
- Mapping units: Eb3, Eb4
- Agro-ecological zone: Se-3b
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, very low in case of severe subsoil acidity
- Farming systems: Maize-Sorghum-Pastoralism (5) or Rice-Pastoralism (1)
- Farming system group: 1k1
- Soil group: 21 (common)
- Possible constraints: fertility, acidity

Strongly leached, loamy to clayey Paleosols, often in semi-arid environment

461. Well drained, sandy clay loam, reddish, Paleosols, (Luvic, Calcic or Haplic)) Xerosol or (Ferric or Orthic) Luvisol on flat alluvial plains with complex sedimentation pattern in subsistence basins or lower slope positions on footslopes, on strongly dissected hill-footslope associations or on intramontane plains, developed on intermediate metamorphic rocks
- Rainfall regime: A-E, mainly D-E
- Temperature regime: 1-3
- Geology: Sub-recent 2 deposits or Mocambique gneiss
- Physiographic units: EA3a, EA3b, EH1, EH2, EM1, EPa1, EPa2, HM5
- CMU: many
- Mapping units: A1d4, B1b4, B2p2, C2b, D2a1, D2a2, D2e, D2f, D2g, D2k4, D2m1, D2m2, D2p2, D3b1, D3b2, Eb1, Eb2
- Agro-ecological zones: Gn-1b, 3, 4, 5c, 6b, 7, Me-6b, 7
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: very low to low with tendency of surface sealing causing run-off
- Farming systems:
    - In higher rainfall areas Maize-Bean (2) or Maize-Potato (2) or Coffee-Maize-Bean (3b)
    - In medium rainfall areas Maize-Sorghum-Pastoralism (3)

    - In the drier areas with cooler temperatures Wheat-Barley-Maize-Bean-Pigeon pea
    - In the drier areas with intermediate temperatures Maize-Bean (5b), Rice-Maize-Sweet potato, Maize-Bean-Pastoralism or Maize-Sorghum-Pastoralism (3)
    - In the drier areas with warmer temperatures Maize-Sorghum-Pastoralism (4)
    - In the driest areas Pastoralism (2b)
- Farming system group: 1j1, 2c1, 2c2, 2f1, 2g1, 2m1
- Soil group: 4, 5 and 26 (dominant), 16 and 25 (inclusion)
- Possible constraints: acidity, fertility, leaching (A climatic zones)

462. Well drained, sandy clay loam to sandy clay, reddish, Paleosols, (Luvic, Calcic or Haplic)) Xerosol or (Ferric or Orthic) Luvisol on flat plains in rift depressions, developed on old lake sediments with influence of volcanic ash
- Rainfall regime: D
- Temperature regime: 2
- Geology: Plio-Pleistocene (3) old lake sediments with some volcanic ash
- Physiographic units: NR2
- CMU: H3
- Mapping unit: D2o2
- Agro-ecological zone: La-2
- Available water holding capacity: low to medium
- Maximum total available moisture in soil: very low to low with a tendency of surface sealing, causing run-off
- Farming systems: Pastoralism (2b), possibly some Cotton-Sorghum-Pastoralism
- Farming system group: 2l2
- Soil group: 8 (common)
- Possible constraint: soil degradation (gully erosion)

Strongly leached, loamy to clayey soils
[Some of these soils should be compared with the Ferralsols and be distinguished accordingly]

471 (472). Well drained, strongly leached, sandy clay loam to sandy clay, yellowish or reddish, (Orthic or Xanthic) Ferralsol, (Ferralic) Cambisol, (Ferric) Acrisol soils on strongly dissected uplands in coastal hinterland, developed on Neogene materials or on Jurassic sandstone, shale and limestone
- Rainfall regime: B-C
- Temperature regime: 3
- Geology:
    - 471, Plio-Pleistocene (2) coastal sand and clay over limestone, marl and clay
    - 472, Jurassic-Paleogene sandstone, shale and limestone
- Physiographic units:
    - 471, CD1
    - 472, CD2
- CMU: A4d (possible A5d?)
- Mapping units: B3k, C3e
- Agro-ecological zone: Co-3a
- Available water holding capacity: low

- Maximum total available moisture in soil: low to medium, depending on surface capping
- Farming systems: Maize-Sorghum-Pastoralism (2)
- Farming system group: 1h2
- Soil group: 24 (dominant)
- Possible constraints: fertility, acidity?

473. Well drained, strongly leached, sandy clay loam to sandy clay, yellowish or reddish, (Orthic or Xanthic) Ferralsol, (Ferralic) Cambisol, (Ferric) Acrisol on hill-plain complexes, on upper slope positions on piedmont slopes below escarpments, on hill tops in plains on higher positions in non-alluvial plains, at upper slope positions on plateaux, on rocky upper slopes and undulating to hilly plateau crests and on high plains and plateaux, in association with soil types 335 and possibly 362, 363 and 364, developed on intermediate or acid metamorphic rocks or granite

- Rainfall regime: A-D
- Temperature regime: 1-3
- Geology: Mocambique and Ubendian gneiss
- Physiographic units: EPh8 (acid meta), HM1, HP1, HP6, PC2, PM2, PPw3, RP1, maybe U3
- CMU: many
- Mapping units: A1i, A2c, B1b1, B1b4, B2a1, B2d1, B2d3, B2d4, B2t, B3c2, B3c3, B3h1, C1b, C1d1, C3c, D1b1, D1b2, D2b1
- Split: int meta
  acid meta, see 476 (EPh8)
- Check for Ferralsols to be correlated with: 362 (EPh1, EPh6); 363 EPh2, EPh4) and 364 (HU2, PC2)
- Agro-ecological zones: Vo-1a, 1b, Gn-3, 5a, 5b, 6a, Ka-4c, Me-1, 2a, 4a, 4b, 5c, 6b
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, depending on surface capping
- Farming systems:
  - In higher rainfall areas and cool temperatures Maize-Potato (1a)
  - In higher rainfall areas with slightly warmer temperatures Maize-(Foresty)(1b), Maize-Bean (2) or Maize-Potato (2a)
  - In B climatic areas with cooler temperatures Maize-Fingermillet (1a)
  - In B climatic areas with intermediate temperatures Cassava-Rice-Oilpalm or Maize-Sorghum (2b)
  - In B climatic areas with warm temperatures Sorghum-Millet-Bambara groundnut
  - In B-C climatic area with intermediate temperatures Tobacco-Pastoralism (1a)
  - In B-C climatic areas with intermediate to warm temperatures Cotton-Maize (1b)
  - In B-C climatic areas with warm temperatures Maize-Sesame (1a)
  - In drier (C-D climatic zones) with cool temperatures Maize-Bean (4a)
  - in the driest areas with intermediate temperatures Maize-Sorghum-Pastoralism (3a)
- Farming system group: 1a1, 1e1, 1f3, 2a1, 2b3, 2c2, 2g1, 2m1
- Soil group: 1, 3, 5, 25 and 29 (dominant), 26 (common)
- Possible constraints: fertility, acidity, leaching (A climatic zones), erosion?

474. Well drained, strongly leached, sandy clay loam to sandy clay, yellowish or reddish, (Orthic or Xanthic) Ferralsol, (Ferralic) Cambisol, (Ferric) Acrisol soils on hill tops in plains, in association with soil type 337, developed on limestone, basalt or argilleceous sandstone

- Rainfall regime: B
- Temperature regime: 2
- Geology: Bukoba (1) limestone, basalt and argilleceous sandstone
- Physiographic units: PPw5
- CMU: G3
- Mapping unit: B2s
- Agro-ecological zone: Lw-1a
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, depending on surface capping
- Farming systems: Cassava-Rice-Oilpalm
- Farming system group: 1f2
- Soil group: 20 (dominant)
- Possible constraint: fertility

475. Well drained, strongly leached, sandy clay loam to sandy clay, yellowish or reddish, (Orthic or Xanthic) Ferralsol, (Ferralic) Cambisol, (Ferric) Acrisol at upper slope positions, developed on schist and granite

- Rainfall regime: A-B, mainly B
- Temperature regime: 1-2
- Geology: Karagwe/Ankolean (1) schist and granite
- Physiographic units: U3, U 2?
- CMU: D3a, G5
- Mapping units: A2e, B1c
- Agro-ecological zones: Me-2a?, 3
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, depending on surface capping
- Farming systems: In high rainfall areas with intermediate temperatures Cassava-Rice and in drier areas with cool temperatures Maize-Fingermillet (1a)
- Farming system group: 1b1, 1e1
- Soil group: 25 (dominant)
- Possible constraints: fertility, acidity

476. Well drained, strongly leached, sandy clay loam to sandy clay, yellowish or reddish, (Orthic or Xanthic) Ferralsol, (Ferralic) Cambisol, (Ferric) Acrisol on plains, developed in a Plio-Pleistocene (5) cover over acid or intermediate metamorphic rocks

- Rainfall regime: B-D
- Temperature regime: 2-3
- Geology: Plio-Pleistocene (5) cover over acid and intermediate metamorphic rocks
- Physiographic units: EPh3, EPh5, EPh8 (see 473)
- CMU: B4, B5d
- Mapping units: B2r, B3d2, C3b, D3a
- Agro-ecological zones: Me-4b, 5c, 7
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, depending on surface capping

- Farming systems: in higher rainfall areas with intermediate temperatures Cotton-Maize (1b); in B-C climatic zones with warm temperatures maize-Sesame 91a) and in the driest areas with warm temperatures Sorghum-Millet-Bambara groundnut(1b)
- Farming system group: 2m1
- Soil group: 26 (dominant)
- Possible constraints: fertility, acidity

477. Well drained, strongly leached, sandy clay loam to sandy clay, yellowish or reddish, (Orthic or Xanthic) Ferralsol, (Ferric) Cambisol, (Ferric) Acrisol on hill tops in plains, at upper slope positions on plateaux, on hill-plain complexes, in association with soil type 341, developed on sandstone
- Rainfall regime: B-D
- Temperature regime: 1-2
- Geology: Bukoba (2) sandstone
- Physiographic units: PC1, PC3, PC4, PPw5 (see 474), U4, maybe U2 (see 475)
- CMU: C2, D6, G4h
- Mapping units: B1f, B2d2, B2f1, B2f3, B2t, D1a
- Agro-ecological zones: Ka-3b, 4c, Me-4a, Me-6a
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, depending on surface capping
- Farming systems: in higher rainfall areas with cool temperatures Cassava-Rice and with intermediate temperatures either Tobacco-Pastoralism (1a) or Maize-Fingermillet (1b) or Cassava-Rice-Oilpalm; in drier areas with cool temperatures Maize-Fingermillet (2)
- Farming system group: 1f3, 2b1, 2d2
- Soil group: 29 (dominant), 25 (inclusion)
- Check for Ferralsols, to be correlated with: 364 (HU2, PC2)
- Possible constraints: fertility, acidity, erosion?

478. Well drained, strongly leached, sandy clay loam to sandy clay, yellowish or reddish, (Orthic or Xanthic) Ferralsol, (Ferralic) Cambisol, (Ferric) Acrisol on high plains and plateaux, developed on granite or gneiss, possibly with some volcanic influence
- Rainfall regime: B
- Temperature regime: 1
- Geology: Granite or gneiss with volcanic ash influence
- Physiographic units: HP5, HP6 (see 473)
- CMU: D6v
- Mapping unit: B1d
- Agro-ecological zone: Vo-2
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, depending on surface capping
- Farming systems: Coffee-Maize-Bean (1)
- Farming system group: (1d2)
- Soil group: 2 (inclusion)

479. Well drained, strongly leached, sandy clay loam to sandy clay, yellowish or reddish, (Orthic or Xanthic) Ferralsol, (Ferralic) Cambisol, (Ferric) Acrisol on dissected hilly plateaux, in association with soil type 367, developed on argilleceous sandstone and possibly shale
- Rainfall regime: A

- Temperature regime: 1
- Geology: argilleceous sandstone (Bukoba 2, or possibly Bukoba 1 or Karagwe/Ankolean 2)
- Physiographic units: W2
- CMU: D1, D3d
- Mapping units: A1e, A1f
- Agro-ecological zone: Ka-1
- Available water holding capacity: low
- Maximum total available moisture in soil: low to medium, depending on surface capping
- Farming systems: Coffee-Maize-Bean (2)
- Farming system group: 1a2, 2b2
- Soil group: 7 (dominant)
- Possible constraints: fertility, acidity, erosion, drought?

ARENOSOLS

Key to the Arenosols:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
501		Gneiss or granite	many	EH2, EPa 1, HP 1,2, PM 1, PPs 3, PPw 1,6, U 1,3
502		Pl3, PP3	G7, H3, H4, H6	PPs 3, PPw 1
503		PP5	B4	EPh 4,5
504		K/A 1	C3h, D3a, G5	U 3,4
505		Bukoba 1	C1h, G3	PPw 5
506		Bukoba 2	C2(h), D1, D2, G4h	PC 4, 3?, PPw 5, U 4
507		PP6	G8	RA 2
508		Sub-recent 2	H1, h2	PSa
509		Recent 2	F1, G1, G2	RA 2, 6, RP 3
521		Sub-recent 1,2	A2, H1, H2	CT
522		Pl2	A3	CP 1,2
523		PP1	A4	CH 1,4
524	525	PP2	A4d	CD 1
525	524	JP	A5(d)	CD 2
526	527	PP4	B3	SU
527	526	Karroo	B3d, F2d	EP4a, SD, SU

Main soil types (bold indicating the main number) and the soil groups:

- 501, soil group 25: Arenosol without a more clayey subsoil on granite or gneiss (occurring as inclusion in many areas, but more important in Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains)
- 502, soil group 18: Arenosol without a more clayey subsoil on colluvial or alluvial sediments (Luseni/Itogolo dominated Eastern Sukumaland, South-eastern Bukombe plain and Sikonge-Msisi plain)
- 503, soil group 26: Arenosol without a more clayey subsoil on gneiss (Mahenge basin, Mkulula valley, west Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachinwea plain, Eastern and Southern plains, Muheza plain, South-eastern Tunduru and Western Nachinwea plain)
- 504, soil group 25: Arenosol without a more clayey subsoil on schist and granite (Kate-Mwazye hills, Nkungwe mountain)
- 506, soil group 29: Arenosol without a more clayey subsoil on sandstone (Kigoma lakeshore, Katumba plateau, Busando hills, Central Biharamulo, South-western Kagera, possibly Mwese-Mpande range)
- 507, soil group 21: Arenosol without a more clayey subsoil on alluvial or lacustrine sediments (Ruaha lowland and valley, North-west and south-west areas of Lake Eyasi, Southern Dodoma, Western Iringa, Western Mbulu, Northern Irambu, lake Manjara shores)
- 509, soil group 11 and 21: Arenosol without a more clayey subsoil on alluvial and lacustrine sediments (Rukwa valley and floodplain, Rukwa/Songwe valley, Nduli-Ismani flats, Usangu plain, Ruaha lowland and valley)

- 521, soil group 23: Arenosol with a more clayey subsoil on old alluvium (Eastern alluvial plains)
- 522, soil group 19: Arenosol with a more clayey subsoil on coastal limestone and marl sediments (Eastern Zanzibar and Pemba and Mafia, Southern and Eastern coastal plains)
- 526+**527**, soil group 14: Arenosol with a more clayey subsoil on Karroo sandstone and shale (Ruhuha valley, (dissected sedimentary plateau in Southern zone, Gumbiro area).

Other Arenosols of less importance are:
- 505, soil group 20: Arenosol without a more clayey subsoil on limestone or basalt (Kigoma lowlands)
- 508, soil group 22: Arenosol without a more clayey subsoil on alluvial or lacustrine sediments (Irrigated/flooded area in Central zone)
- 523, soil group 27: Arenosol with a more clayey subsoil on coastal sand cover on coastal plain (Eastern Zanzibar and Pemba and Mafia, Eastern and Southern hinterland plains)
- **524**+525, soil group 24: Arenosol with a more clayey subsoil on coastal sandy cover or sediments derived from Jurassic-Paleogene sandstone, limestone and shale (Eastern and Southern hinterland hills and dissected uplands)

Main constraints are fertility (N, P and possibly K and micro-nutrients), low organic matter content, drought and possibly acidity

Descriptions of the Arenosol soil types

Moderately well to imperfectly drained, bleached Arenosols without a clayey subsoil

501. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil, on strongly dissected hill-footslope associations, on plains, on middle slope positions on plateaux, on lower slope positions on high plains and plateaux and on footslopes of cuesta plateaux, developed on intermediate metamorphic rocks or granite/gneiss
- Rainfall regime: A-E, mainly B-D
- Temperature regime: 1-3
- Geology: Mocambique, Ubendian, Basement Complex, Dodoma granite or gneiss
- Physiographic units: EH2, EPa1, HP1, HP2, PPs3, PPw1, PPw6 (sandstone ?), U1, U3
- CMU: many
- Mapping units: A1d3, A2b, B1b1, B1b2, B2a1, B2d1, B2d2, B2d4, B2j1, B2j3, B2j4, B2k, D1a, D1b1, D2a1, D2e, D2f, D2g, D2k4, D2m1, D2n, D2q1, D2q2, D3b1, Eb1, Eb2, Ec1, Ec2, Ed1, Ed2
- Split: granite/gneiss
  sandstone (shale) ?
- Agro-ecological zones: Me-4a, 6a
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems:
  - In high rainfall areas with cool temperatures Maize-Potato (1a)
  - In A-B climatic areas with intermediate to cool temperatures Maize-Potato (2a) or Maize-Bean (2)

  - In A-B climatic areas with intermediate temperatures Maize-Cassava-Cotton-Rice
  - In B climatic areas with intermediate to cool temperatures Maize-Fingermillet (1a)
  - In B climatic areas with intermediate temperatures Rice-Livestock, Cotton-Maize (1a), Maize-Groundnut-Tobacco-Pastoralism or Maize-Sorghum (2a)
  - In B-C climatic zones with intermediate temperatures maize-Fingermillet (1b) or Tobacco-Pastoralism (1a)
  - In C climatic areas with intermediate temperatures Pastoralism (2a)
  - In C-D climatic areas with cool temperatures Maize-Bean (4a)
  - In D climatic areas with cool temperatures Maize-Fingermillet (2a)
  - In D climatic areas with intermediate to cool temperatures possibly (but unsure, unit D2k4) Wheat-Barley-Maize-Bean-Pigeon pea
  - In D climatic areas with intermediate temperatures Cotton-Sorghum-Pastoralism, Maize-Sorghum-Pastoralism, Maize-Bean (5b) or Maize-Bean-Pastoralism
  - In D climatic zones with intermediate to warm temperatures Maize-Sorghum-Pastoralism (4)
  - In D-E climatic areas with intermediate temperatures Maize-Groundnut-Livestock or Pastoralism (2b)
  - In E climatic zones with intermediate temperatures maize-Sorghum-Pastoralism (5) or Park (1c)
- Farming system group: 1a1, 1e1, 1k1, 1k2, 2b3, 2c1, 2c2, 2d2, 2f1, 2g1, 2m1
- Soil group: 25 (common), 1,4, 5, 21, 26 (inclusions)
- Possible constraints: low organic matter, fertility, acidity?, drought

502. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil on plains, developed on colluvial or alluvial materials over granite
- Rainfall regime: B-D, mainly B
- Temperature regime: 2
- Geology: Pleistocene (3) or Plio-Pleistocene (3) cover over granite
- Physiographic units: PPs3, PPw1 (see 501)
- CMU: G7, H4
- Mapping units: B2l1, B2l3, D2r1
- Agro-ecological zone: Lw-2c
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: in higher rainfaal areas either Cotton-Maize 91a) or Maize-Sorghum-Pastoralism (2) and in the drier areas Sorghum
- Farming system group: 2h2
- Soil group: 18 (common)
- Possible constraints: fertility, drought

503. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil on plains, developed on a Plio-Pleistocene (5) cover over intermediate metamorphic rocks
- Rainfall regime: B-C
- Temperature regime: 2-3

- Geology: Plio-Pleistocene (5) cover over gneiss
- Physiographic units: EPh4, EPh5
- CMU: B4
- Mapping units: B2r, B3d1, B3d2, C3b
- Agro-ecological zones: Me-4b, Me-5c
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: with more rainfall and intermediate temperatures Cotton-Maize (1b) and with less rainfall with warmer temperatures Maize-Sesame (1a)
- Farming system group: 2m1
- Soil group: 26 (common)
- Possible constraints: fertility, drought

504. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil on middle slope positions on plateaux, developed on schist and granite
- Rainfall regime: B
- Temperature regime: 1
- Geology: Karagwe/Ankolean (1) schist and granite
- Physiographic units: U3 (see 501), U4
- CMU: D3a
- Mapping unit: B1c
- Agro-ecological zones: Me-3
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: Maize-Fingermillet (1a)
- Farming system group: 1e1
- Soil group: 25 (common)
- Possible constraints: fertility, drought, acidity?

505. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil on undulating plains and plateaux, developed on limestone and basalt
- Rainfall regime: B
- Temperature regime: 2
- Geology: Bukoba (1) limestone and basalt
- Physiographic units: PPw5
- CMU: G3
- Mapping unit: B2s
- Agro-ecological zone: Lw-1a
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: Cassava-Rice-Oilpalm
- Farming system group: 1f2
- Soil group: 20 (inclusion)
- Possible constraint: fertility

506. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil, on footslopes of cuesta plateaux and on lower slope positions on hill-plain complexes and on middle slope positions on plateaux, developed on sandstone, with or without shale, quartzite
- Rainfall regime: (A-)B

- Temperature regime: 1-2
- Geology: Bukoba (2) sandstone (+shale, quartzite)
- Physiographic units: PC4, PPw5 (see 505), U4, maybe PC3
- CMU: C2, G4h
- Mapping units: B1f, B2f1, B2f3
- Agro-ecological zones: Ka-4c, Me-1?
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: with cool temperatures Cassava-Rice and with intermediate temperatures Tobacco-Pastoralism (1a)
- Farming system group: 2b2, 2b3?
- Soil group: 29 (dominant)
- Possible constraints: fertility, acidity, drought?

507. Moderately well to imperfectly drained, without prolonged waterlogging, bleached sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil, at higher positions in lacustrine plains, developed on alluvial or lacustrine Plio-Pleistocene (6) cover materials
- Rainfall regime: E
- Temperature regime: 2
- Geology: Plio-Pleistocene (6) cover over granite or gneiss
- Physiographic units: RA2
- CMU: G8
- Mapping units: Eb3, Eb4
- Agro-ecological zone: Se-3b
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: Maize-Sorghum-Pastoralism (5) or Rice-Pastoralism (1)
- Farming system group: 1k1
- Soil group: 21 (common)
- Possible constraints: fertility, drought

508. Moderately well to imperfectly drained, without prolonged waterlogging, bleached sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil, on marginal flats in subsidence basins, developed on sub-recent (2) alluvial or lacustrine materials
- Rainfall regime: D
- Temperature regime: 2
- Geology: Sub-recent (2) sediments
- Physiographic units: PSa
- CMU: H2
- Mapping unit: D2s
- Agro-ecological zone: Se-2
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: Rice-Sorghum-Millet, possibly Cotton-Maize-Pastoralism
- Farming system group: 1j2
- Soil group: 22 (inclusion)
- Possible constraint: fertility?

509. Moderately well to imperfectly drained, without prolonged waterlogging, bleached sand to loamy sand (Ferric, Cambic or Albic) Arenosols without a clayey subsoil, at higher positions in lacustrine plains, on middle slope positions in alluvial complexes, at lower

slope positions on undulating piedmont plains between alluvial flat and highlands, on plains, developed on recent (2) alluvial or lacustrine sediments over granite or gneiss
- Rainfall regime: C-E
- Temperature regime: 2
- Geology: Recent (2) sediments over granite or gneiss
- Physiographic units: RA2 (see 507), RA6, RP3
- CMU: G2
- Mapping units: C2c1, C2c2, C2c3, Ee1, Ee4
- Agro-ecological zones: La-2, La-4a
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: in higher rainfall areas either Tobacco-Pastoralism (1b) or Maize-Sorghum-Pastoralism (5); in drier areas either Maize-Sorghum-Pastoralism (5) or Pastoralism (2a)
- Farming system group: 1k2, 2o1
- Soil group: 11 and 21 (common)
- Possible constraints: fertility, drought

Moderately well to imperfectly drained, bleached Arenosols with a more clayey subsoil

521. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand with more clayey subsoil, (Cambic or Ferric) Arenosol, on gently undulating plains, developed in old alluvium with complex pattern
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Sub-recent (1) alluvium
- Physiographic units: CT
- CMU: A2
- Mapping units: B3j2, C3h
- Agro-ecological zone: Me-5d
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: Rice-Maize-Sweet potato
- Farming system group: 1h1
- Soil group: 23 (common)
- Possible constraints: fertility, acidity?

522. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand with more clayey subsoil, (Cambic or Ferric) Arenosol, on coastal plains on sedimentary rocks and Pleistocene (2) limestone, marl and clayey sediments
- Rainfall regime: A-B
- Temperature regime: 3
- Geology: Pleistocene (2) limestone, marl and clay
- Physiographic units: CP1, CP2
- CMU: A3
- Mapping units: A3c, B3m1, B3m2
- Agro-ecological zones: Co-1a, 2a
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: in higher rainfall area Cassava-(Spice) trees and in lower rainfall areas Rice-Coconut-Cassava or Maize-Sorghum (2a) and Sisal
- Farming system group: 2e1

- Soil group: 19 (dominant)
- Possible constraints: fertility, drought

523. Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand with more clayey subsoil, (Cambic or Ferric) Arenosol, on plains and plateaux on coastal hinterland with Plio-Pleistocene (1) sandy and clayey cover
- Rainfall regime: A-C
- Temperature regime: 3
- Geology: Plio-Pleistocene (1) coastal sand and clay
- Physiographic units: CH1, CH4
- CMU: A4
- Mapping units: A3c, B3l1, B3l2, C3f
- Agro-ecological zone: Co-1a, 2b, 3b
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: in higher rainfall areas Cassava-(Spice) trees, in medium rainfall areas either Cashew (1) or Maize-Sorghum (2a) and in lower rainfall areas Rice-Coconut-Cassava
- Farming system group: 2j1
- Soil group: 27 (inclusion)

524 (525). Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand with more clayey subsoil, (Cambic or Ferric) Arenosol, on strongly dissected coastal hinterland uplands with a Plio-Pleistocene (2) coastal sandy and clayey cover or on strongly dissected coastal hinterland uplands, developed on Jurassic-Paleogene sediments derived from sandstone, limestone and shale
- Rainfall regime: B-C
- Temperature regime: 3
- Geology:
  - 524, Plio-Pleistocene (2) coastal sand and clay
  - 525, Jurassic-Paleogene sandstone, limestone, shale
- Physiographic units:
  - 524, CD1
  - 525, CD2
- CMU: A4d or A5d?
- Mapping units: B3k, C3e
- Agro-ecological zone: Co-3a
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: Maize-Sorghum-Pastoralism (2)
- Farming system group: 1h2
- Soil group: 24 (inclusion)
- Possible constraints: fertility, drought?

527 (526). Moderately well to imperfectly drained, without prolonged waterlogging, bleached, sand to loamy sand with more clayey subsoil, (Cambic or Ferric) Arenosol at lower slope positions in possibly strongly dissected inland sedimentary plateaux, developed on Karroo sandstone and shale or in a Plio-Pleistocene (4) coastal sand cover over Karroo sandstone and shale
- Rainfall regime: A-D, mainly C-D
- Temperature regime: 2-3
- Geology:
  - 527, Karroo sandstone and shale

  - 526, Plio-Pleistocene (4) coastal sand cover over gneiss
- Physiographic units:
  - 527, EP4a, SD, SU
  - 526, SU
- CMU:
  - 527, B3d, F2d
  - 526, B3
- Mapping units:
  - 527, B3e, B3f, C2d1, C2d2, C3g, D2i
  - 526, A2f, C2f, D2j, D3c
- Agro-ecological zones: Sa-3a, Sa-4
- Available water holding capacity: very low
- Maximum total available moisture in soil: low
- Farming systems: in high rainfall areas Cashew (1); in medium rainfall areas Maize-Sesame (1b) or Maize-Bean (4c) and in the driest areas either with intermediate temperature Cashew (2) and with warmer temperatures Park (1b)
- Farming system group: 2i1
- Soil group: 14 (common)
- Possible constraints: fertility, drought, low organic matter

BETTER DRAINED VERTISOLS

Key to the better drained Vertisols:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
541		JP	A5(d)	CH 2
542		Pl2	A3	CP 2
543		Sub-recent 3v	E2(h),H2v,h4 v	NA 9
544		PP7v	C6v,D5v,D6v, E1(h),	NA 4

Main soil types and soil groups:
- 541, soil group 15: vertisol on Jurassic or Creteceous clays, shale, marl, sandstone (Southern and Eastern hinterland plains and hills)

Other better drained Vertisol types of less importance:
- 542, soil group 18 and 19: Vertisol on coralline limestone (Eastern Zanzibar and Pemba and Mafia)
- 543+**544**, soil group 4: Vertisol on volcanic ash sediments (Hanang, Babati, Serengeti)

Main constraint is workability.

Descriptions of the better drained Vertisols

Moderately well to imperfectly drained Vertisols without prolonged waterlogging

541. Moderately well to imperfectly drained, (shallow to deep), (Pellic or Chromic) Vertisols, without prolonged waterlogging, on complex plains and plateaux in coastal hinterland, developed on Jurassic and Creteceous clays, shale, marls, sandstone
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Jurassic-Paleogene
- Physiographic units: CH2
- CMU: (5(d)
- Agro-ecological zones: B3g1, B3g2, B3g3, C3d
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Coconut-Cassava-Cashew
- Farming system group: 1g1, 2n1
- Soil group: 15 (dominant)
- Possible constraints: workability

542. Moderately well to imperfectly drained, (shallow to deep), (Pellic or Chromic) Vertisols, without prolonged waterlogging, occurring in complex pattern on coastal plains, developed on coralline limestone
- Rainfall regime: A
- Temperature regime: 3
- Geology: Pleistocene (2) coralline limestone
- Physiographic units: CP2
- CMU: A3
- Agro-ecological zones: A3c
- Available water holding capacity: high

- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Cassava-Trees
- Farming system group: 2e1
- Soil group: 18 (inclusion)
- Possible constraints: workability

543. Moderately well to imperfectly drained, (shallow to deep), (Pellic or Chromic) Vertisol, without prolonged waterlogging, on lower positions on volcanic plains and plateaux, developed on sub-recent (3v) volcanic ash and sediments
- Rainfall regime: D
- Temperature regime: 2
- Geology: Sub-recent (3v) volcanic ash
- Physiographic units: NA9
- CMU: E2(h), H2v, H4v
- Agro-ecological zones: D2k1, D2k2, D2k4
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Wheat-Barley-Maize-Bean-Pigeon pea
- Farming system group: 2c1
- Soil group: 19 (inclusion)

544. Moderately well to imperfectly drained, (shallow to deep), (Pellic or Chromic) Vertisol, without prolonged waterlogging, on lower slope positions on volcanic plains and plateaux, developed on Plio-Pleistocene (7v) volcanic ash and sediments
- Rainfall regime: D-E
- Temperature regime: 1
- Geology: Plio-Pleistocene (7v) volcanic ash
- Physiographic units: NA4
- CMU: E1(h)
- Agro-ecological zones: D1e, Ef1
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Either Pastoralism (1a in D climatic zone and 1b in E climatic zone) or Park (1a)
- Farming system group: 2k1
- Soil group: 4 (inclusion)

IMPERFECTLY OR POORLY DRAINED HARDPAN SOILS, VARIABLE TEXTURED, PONDED DRAINAGE, PARTLY SALTY AND/OR SODIC

Key to the hardpan soils:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
601		Sub-recent 1	A2, B1	CH 3
602		Pl3, PP3	G7, H3, H4, H6	PPp 2, PPs 1,3, PPw 8
603		Gneiss or granite	many	PPs 3
604		Sub-recent 2	H1, H2, H5h	PPp 2, PPs 2, PPw 1, PSa
605		Recent 2	F1, G1, G2	RA 5, RP 3
611		Pl1	B2	EA2c

Main soil types (bold indicating the main number) and soil groups:
- 601, soil group 23: sandy to sandy-clayey hardpan soil on Neogene sandy clays (Eastern alluvial plains)
- 602, soil group 8 and 18: sandy to sandy-clayey hardpan soil (Itogolo) on old alluvium (Itogolo dominated areas in Eastern Sukumaland, Ibushi plain, Eastern Lake Manjara shore, Shinyanga-Igunja area, Luseni/Itogolo dominated eastern Sukumaland, South-eastern Bukombe plain and Sikonge-Msisi plain)
- 603+**604**, soil group 22 and 25: sandy to sandy-clayey hardpan soil on alluvium or continental deposits or granite (Central irrigated/flooded area, Shinyanga-Igunga area)
- 605, soil group 11 and 21: sandy to sandy-clayey hardpan soil on recent sediments (Rukwa valley and floodplain, Rukwa/Songwe valley)
- 611, soil group 12: sandy hardpan soil on old stream deposits (Kilombero valley)

Main constraints are erosion and soil degradation, drainage, salinity, soil depth, fertility (especially N).

Sandy to sandy clay hardpan soils

601. Imperfectly drained hardpan (with prolonged waterlogging), sand to sandy clay, (Eutric) Gleysol or (Gleyic) Solonetz on seasonally waterlogged plains in coastal hinterland plains, developed on Neogene sandy clays
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Sub-recent (1) Neogene sandy clayey sediments
- Physiographic units: CH3
- CMU: A2
- Mapping unit: B3j2
- Agro-ecological zone: Me-5d
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: very low due to hardpan at shallow depth
- Farming systems: Rice-Maize-Sweet potato
- Farming system group: (1h1)
- Soil group: 23 (inclusion)

602. Imperfectly drained hardpan (with prolonged waterlogging), sand to sandy clay, (Eutric) Gleysol or (Gleyic) Solonetz soils on plains, developed on old (Pleistocene (3) or Plio-Pleistocene (3) alluvium

- Rainfall regime: B-D
- Temperature regime: 2
- Geology: Pleistocene (3) cover over granite or Plio-Pleistocene (3) of marl, sand and clay
- Physiographic units: PPp2, PPs1, PPs3, PPw8
- CMU: H3, H4, H6
- Mapping units: B2l1, B2l2, D2o3, D2r1, D2r2, D2r3
- Agro-ecological zones: La-1, 2c, 3
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: very low due to hardpan at shallow depth
- Farming systems: in higher rainfall areas either Cotton-Maize (1a) or Rice-Livestock, in the drier areas either Sorghum or Cotton-Sorghum-Pastoralism or Maize-Groundnut-Livestock
- Farming system group: 2h2, 2l2
- Soil group: 8 and 18 (dominant)
- Possible constraints: erosion?, soil degradation (gully erosion)?

604 (603). Imperfectly drained hardpan (with prolonged waterlogging), sand to sandy clay, (Eutric) Gleysol or (Gleyic) Solonetz, developed on sub-recent (2) alluvium or continental deposits (indurated over granite)on granite or on granitic plains

- Rainfall regime: B-E, mainly D
- Temperature regime: 2
- Geology:
  - 604, Sub-recent (2) lake and stream deposits
  - 603, Dodoma or Basement Complex granite
- Physiographic units:
  - 604, PPp2, PPs2, (PPw1), PSa
  - 603, PPs3 (see 602)
  - Split: Subsidence basin (PSa)
Alluvial (PPp, PPs, Ppw)
- CMU:
  - 604, H2, (H5h)
  - 603, C6
- Mapping units:
  - 604, B2k, B2m, D2p1, D2s, Ea1, Ea2
  - 603, D2q1
- Agro-ecological zone: Se-2
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: very low due to hardpan at shallow depth
- Farming systems: in higher rainfall areas either Maize-Cassava-Cotton-Rice or Maize-Groundnut-Tobacco-Pastoralism; in D climatic areas either Cotton-Sorghum-Pastoralism or Rice-Sorghum-Millet or Maize-Groundnut-Livestock, maybe Maize-Sorghum-Pastoralism (3), while in the driest areas Rice-Pastoralism (2) or Pastoralism (2a) is found
- Farming system group: 1j2, 1k2, 2g1, 2l1
- Soil group:
  - 604, 22, (dominant), 21 and 25 (inclusion)
  - 603, 25 (inclusion)
- Possible constraints: salinity, sodicity?, fertility?

605. Imperfectly drained hardpan (with prolonged waterlogging), sand to sandy clay, (Eutric) Gleysol or (Gleyic) Solonetz soils in complex pattern on alluvial complexes and in depressions on granitic piedmont plains, developed in recent sediments

- Rainfall regime: C-E
- Temperature regime: 2
- Geology: Recent (2) stream deposits
- Physiographic units: RA5, RP3
- CMU: G2
- Mapping units: C2c3, Ee1, Ee2
  Split: alluvial
  piedmont
- Agro-ecological zones: La-2, 4a
- Available water holding capacity: very low to low
- Maximum total available moisture in soil: low due to hardpan at shallow depth
- Farming systems: in higher rainfall areas Maize-Sorghum-Pastoralism (5) and moving into drier areas with E climatic conditions, where also Rice-Pastoralism (1), including rice schemes, and Pastoralism (2a) is found
- Farming system group: 1k2, 2o1
- Soil group: 11 and 21 (common)
- Possible constraints: drainage, salinity?, soil depth

Sandy hardpan soils, Kilombero valley

611. Imperfectly to poorly drained bleached sand to loamy sand (Ferric or Cambic) Arenosol with ponded drained over ironstone layer or subsoil on older sand flats in flat alluvial plains in subsidence basins, developed in old stream deposits

- Rainfall regime: B
- Temperature regime: 3
- Geology: Pleistocene (1) stream deposits
- Physiographic units: EA2c
- CMU: B2
- Mapping unit: B3a
- Agro-ecological zone: Me-4c
- Available water holding capacity: very low
- Maximum total available moisture in soil: very low or more, depending on addition by run-off
- Farming systems: Rice-Maize-Cassava-Cotton, including sugarcane estate
- Farming system group: 1g2
- Soil group: 12 (dominant)
- Possible constraint: fertility?

POORLY DRAINED FLUVISOLS

Key to the poorly drained Fluvisols:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
621		Recent 1	A1	CF 1
631	632	Sub-recent 1,2, JP	A5(d), H1, H2	CT
632	631	Sub-recent 2	H1, H2	EA 1
633		Pl1	B2	EA 2b
634		Recent 2	F1, G1, G2	RA 1,3
641		Recent 1	A1	CF 1,2
642	652	Sub-recent 2	H1, H2	PR
643		PP1	A4	CH 1
644	645	PP2	A4d	CD 1
645	644	JP	A5(d)	CD 2
646		Pl1	B2	EA 2a,2b,2c
647		Recent 2	F1, G1, G2	HL, RA 1,3,4,5
648		Miocene	E6	NP 4
649		Moc. gneiss	D4	HM 4
650		Karroo	B3d, F2d	SD
651		Uben. gneiss	many	PC 2, RP 1, U 6
652	642	Sub-recent 2	H1	W 8
751		Recent 1	A1	CF 2

Main soil types (bold in indicating the main number) and soil groups:

- 621, soil group 28: coarse alluvial fine sandy to sandy clay loam Fluvisol on regularly flooded riverine floodplain in the coastal area (Rufiji valley, coastal floodplains and deltas)
- 631+**632**, soil group 23: clayey, sodic and salty Fluvisol on older alluvium not regularly floded ((Eastern alluvial plains)
- 633, soil group 12: clayey, sodic and salty Fluvisol on old alluvium (Kilombero valley)
- 634, soil group 11: clayey, sodic and salty Fluvisol in lacustrine plains and floodplains (Rukwa valley and floodplain, Rukwa/Songwe valley, Nduli-Ismani flats, Usangu plain, Ruaha lowland and valley)
- 641, soil group 28: clayloam, sandy clay or clayey Fluvisol in riverine floodplain, sometime salty ((Rufiji valley, coastal floodplains and deltas)
- 642+**652**, soil group 10: clayloam, sandy clay to clayey Fluvisol in riverine floodplains (Kagera floodplain, Mara floodplain)
- 646, soil group 12: clayloam, sandy clay to clayey Fluvisol in alluvial plains in subsidence basins (Kilombero valley)
- 647a, soil group 9: clayloam, sandy clay to clayey Fluvisol on alluvial complexes or floodplains in A-climatic areas (Kyela plain)
- 647b, soil group 11: clayloam, sandy clay to clayey Fluvisol on lacustrine plains in E-climatic areas (Nduli-Ismani flats, Usangu plain, Ruaha lowland and valley)
- 648, soil group 12: clayloam, sandy clay or clayey Fluvisol in depressions and valleys on high plateaux and plains developed on lavas and granite (Tarime highlands)
- 651, soil group 25: clayloam, sandy clay or clayey Fluvisol in riverine plains on granite (Yambamrizi range, Ipumba hills,

Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, Namanyere-Laela plain)
- 652, soil group 10: clayloam, sandy clay or clayey Fluvisol on alluvial plains (Kagera floodplain, Mara floodplain)

Other poorly drained Fluvisols of less importance are:
- 643, soil group 27: heavier textured Fluvisol on clayey coastal sediments (Western Zanzibar and Pemba, Eastern and Southern hinterland plains)
- **644**+645, soil group 24: heavier textured Fluvisol on clayey coastal sediments or sediments derived from Jurassic-Paleogene sedimentary rocks (Eastern and Southern hinterland plains and dissected uplands)
- 649, soil group 5: heavier textured Fluvisol in intramountain plains on gneiss (Matengo highlands, Wino Ward)
- 650, soil group 14: heavier textured Fluvisol on sandstone (Dissected sedimentary plateaux in Southern and Eastern zones)

Main constraints are flooding, drainage, salinity, sodicity.

Descriptions of the poorly drained Fluvisol soil types

Imperfectly to poorly drained coarse alluvial fine sands to sandy clay loams

621. Imperfectly to poorly drained, with variable drainage and flooding conditions, young alluvial, fine sand to sandy clay loam, stratified (Eutric) Fluvisol occurring on regularly flooded riverine floodplain in the coastal area
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Recent (1) stream deposits
- Physiographic units: CF1
- CMU: A1
- Mapping units: B3b, B3i, C3i
- Agro-ecological zone: Me-5b
- Available water holding capacity: very low
- Maximum total available moisture in soil: very low to low
- Farming systems: Rice-Maize-Cassava-Cotton
- Farming system group: 1h3
- Soil group: 28 (inclusion)

Imperfectly to poorly drained Fluvisols occurring on older alluvial (flood)plain or river terraces, partly salty and/or sodic, usually clayey textured

632 (631). Imperfectly to poorly drained, variable drainage and flooding conditions, deep, dark grey or grey brown clay, with high sodic or soluble salts in the subsoil, old alluvial (Eutric) Fluvisol, occurring on flat alluvial plains in subsidence basins or on old alluvial plains without flooding
- Rainfall regime: B-C
- Temperature regime: 3
- Geology:
  - 632, Sub-recent (2) stream deposits
  - 631, Sub-recent (1) stream deposits
- Physiographic units:

  - 632, EA1
  - 631, CT
- CMU:
  - 632, B1
  - 631, A2
- Mapping units:
  - 632, B3j1
  - 631, B3j2, C3h
- Agro-ecological zone: Me-5d
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems:
  - 632, Rice-Sorghum-Millet
  - 631, Rice-Maize-Sweet potato
- Farming system group: 1h1
- Soil group: 23 (dominant)

633. Imperfectly to poorly drained, variable drainage and flooding conditions, deep, dark grey or grey brown clay, with high sodic or soluble salts in the subsoil, old alluvial (Eutric) Fluvisol, developed in Pleistocene (1) stream deposits
- Rainfall regime: B
- Temperature regime: 3
- Geology: Pleistocene (1) stream deposits
- Physiographic units: EA2b
- CMU: B2
- Mapping unit: B3j1
- Agro-ecological zone: Me-4c
- Available water holding capacity: high
- Maximum total available moisure in soil: medium to high, depending on compact subsoil
- Farming systems: Rice-Maize-Cassava-Cotton
- Farming system group: 1g2
- Soil group: 12 (common)

634. Imperfectly to poorly drained, variable drainage and flooding conditions, deep, dark grey or grey brown clay, with high sodic or soluble salts in the subsoil, old alluvial (Eutric) Fluvisol, occurring in complex pattern in lacustrine plains and in floodplains
- Rainfall regime: C-E
- Temperature regime: 2
- Geology: Recent (2) lake and stream deposits
- Physiographic units: RA1, RA3
- CMU: G2
- Mapping units: C2c1, C2c3, Ee2
- Agro-ecological zones: La-2, 4a
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: in higher rainfall areas either Tobacco-Pastoralism (1b) or Maize-Sorghum-Pastoralism (5); in drier areas Rice-Pastoralism (1)
- Farming system group: 2o1
- Soil group: 11 (dominant)
- Possible constraints: flooding, salinity, sodicity?, drainage

Imperfectly to poorly drained, stratified, heavier textured Fluvisols, occurring in depressional locations

641. Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisols in complex pattern, developed in riverine floodplains, sometimes brackish
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Recent (1) stream deposits
- Physiographic units: CF1, CF2
- CMU: A1
- Mapping units: B3b, B3i, C3i
- Agro-ecological zone: Me-5b
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Rice-Maize-Cassava-Cotton
- Farming system group: 1h3
- Soil group: 28 (common)

643. Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisols in depressions and valleys on coastal hinterland plains and plateaux, developed in Plio-Pleistocene (1) coastal sand and clay
- Rainfall regime: A-C
- Temperature regime: 3
- Geology: Plio-Pleistocene (1) coastal sand and clay
- Physiographic units: CH1
- CMU: A4
- Mapping units: A3b, B3l1, B3l2, C3f
- Agro-ecological zone: Co-1b, 2b, 3b
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems:
    - In higher rainfall areas Cassava-Tress
    - In B climatic areas either Cashew (1) or Maize-Sorghum (2a)
    - In driest areas Rice-Coconut-Cassava
- Farming system group: 2j1
- Soil group: 27 (inclusion)

644 (645). Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisols in dissected coastal hinterland plains and hills with sedimentary rocks and sediments, developed in Plio-Pleistocene (2) coastal sand and clay or on uplands onderlain by Jurassic-Paleogene sedimentary rocks and sediments
- Rainfall regime: B-C
- Temperature regime: 3
- Geology:
    - 644, Plio-Pleistocene (2) coastal sand and clay over limestone, marl and clay
    - 645, Jurassic-Paleogene sediments
- Physiographic units:
    - 644, CD1

  - 645, CD2
- CMU:
  - 644, A4d
  - 645, A5(d) or A4d
- Mapping units:
  - 644, B3k, C3e
  - 645, B3k
- Agro-ecological zone: Co-3a
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Maize-Sorghum-Pastoralism (2)
- Farming system group: 1h2
- Soil group: 24 (inclusion)

646. Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clay loam, sandy clay or clay, young alluvial Fluvisols in complex pattern in alluvial plains in subsidence basins
- Rainfall regime: B
- Temperature regime: 3
- Geology: Pleistocene (1) stream deposits
- Physiographic units: EA2a, EA2b, EA2c
- CMU: B2
- Mapping unit: B3a
- Agro-ecological zone: Me-4c
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Rice-Maize-Cassava-Cotton, including sugarcane
- Farming system group: 1g2
- Soil group: 12 (inclusion probably)

647. Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisol in complex pattern in lacustrine plains or alluvial complexes or floodplains
- Rainfall regime: A-E
- Split: 647a, A
- 647b, C-E
- Temperature regime: 2-3
- Geology: Recent (2) lake and stream deposits
- Physiographic units:
  - 647a, HL
  - 647b, RA1, RA3, RA4, RA5
- CMU:
  - 647a, F1
  - 647b, G2
- Mapping units:
  - 647a, A3a
  - 647b, C2c3, Ee2, Ee3
    Split: lacustrine
    alluvial
    brackish
- Agro-ecological zones:
  - 647a, Me-2c
  - 647b, La-4a

- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems:
  - 647a, in A climatic areas with warm temperatures Rice-Cocoa
  - 647b, in C climatic area, intermediate temperatures Maize-Sorghum-Pastoralism (5)
  - 647b, in E climatic areas either Maize-Sorghum-Pastoralism (5) or Rice-Pastoralism (1)
- Farming system group:
  - 647a, 1c1
  - 647b, 2o1
- Soil group:
  - 647a, 9 (dominant)
  - 647b, 11 (dominant)
- Possible constraints: flooding, salinity, sodicity?, drainage

648. Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisols in depressions and valley bottoms on high plateaux and plains, developed from lavas and granites
- Rainfall regime: C
- Temperature regime: 1
- Geology: Miocene sediments
- Physiographic units: NP4
- CMU: E6
- Mapping unit: C1a
- Agro-ecological zone: Vo-4b
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Maize-Sorghum-Banana (1)
- Farming system group: 1g2, 1i1
- Soil group: 6 and 12 (common), 5 (inclusion)

649. Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisols on valley bottoms in intermountain plains on gneiss
- Rainfall regime: A
- Temperature regime: 1
- Geology: Mocambique gneiss
- Physiographic units: HM4
- CMU: D4
- Mapping units: A1j1, A1j2
- Agro-ecological zone: Gn-1b
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: either Coffee-Maize-Bean (3a) or Maize-Bean (2)
- Farming system group: 2c2
- Soil group: 5 (inclusion)

650. Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisols in depressions or valley bottoms on strongly dissected plateaux, developed on sandstone
- Rainfall regime: C

- Temperature regime: 2-3
- Geology: Karroo sandstone
- Physiographic units: SD
- CMU: B3d
- Mapping units: C2d2, C3g
- Agro-ecological zone: Sa-3a
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Cashew (2)
- Farming system group: 2i1
- Soil group: 14 (inclusion)
- Possible constraints: drainage

651. Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisols in depressions, in valley bottoms, in complex pattern in riverine plains, in hill-plain complexes, developed on gneiss
- Rainfall regime: A-D, mainly B-D
- Temperature regime: 1-2
- Geology: Ubendian gneiss
- Physiographic units: PC2, RP1, U6
- CMU: D6, G4h, G6(h)
- Mapping units: A1i, A2c, B2a2, B2t, D1a
- Agro-ecological zones: Me-4a, Me-6a
- Available water holding capacity: high
- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems:
    - In higher rainfall areas with cool to intermediate temperatures Maize-Bean (2)
    - In B climatic areas, intermediate temperatures either Maize-Fingermillet (1a) or Cassava-Roce-Oilpam
    - In D climatic areas, cool temperatures Maize-Fingermillet (2)
- Farming system group: 1e1, 1f3, 2b3, 2d2
- Soil group: 25 (common), 29 (inclusion)

652 (642). Imperfectly to poorly drained, variable drainage and flooding conditions, stratified, clayloam, sandy clay or clay, young alluvial Fluvisols in complex pattern on regularly flooded alluvial plains, probably very acid
- Rainfall regime: B-D
- Temperature regime: 2
- Geology: Sub-recent (2) stream deposits
- Physiographic units:
    - 652, W8
    - 642, PR
- CMU:
    - 652, H1
    - 642, H2
- Mapping units:
    - 652, B2e1
    - 642, B2e2
- Agro-ecological zones: Ka-4b, Lw-2b
- Available water holding capacity: high

- Maximum total available moisture in soil: medium to high, depending on compact subsoil
- Farming systems: Maize-Livestock (1a), including sugarcane estate
- Farming system group: 2h1
- Soil group: 10 (dominant)

MODERATELY LEACHED GLEYSOLS

Key to the moderately leached Gleysols:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
671	737	Recent 2	F1, G1, G2	PPp 1
672	673	Recent 1	A1, G2	RA 6
673	672	Recent 2	F1, G1, G2	RA 1
674		JP	A5	CH 2
675		Pl3	A3	CP 1
676		PP1	A4, A3?	CH 1
677		Sub-recent 1	A2, B1	CT
678	690, 740	Pl3	?	PPw 1,8
679		PP6	G8	RP 2
680		Pl4v	E3(h)	HP 6
681		PP8v	E4(h)	HP 5
682		Uben. gneiss	D6d	PPw 2
683	741	Basic BC	H5h	PPw 2
684		K/A 2	D3(d)	W 3,4
685		K/A 1	C3h, D3a, D6, G5	U 3,5, 1?, W 5, 4?
686		Bukoba 2	C2(h), D1, D2, G4h	PPw 5, W 4?
687		Bukoba 1	C1h, G3	PPw 5, W 1
688		PP5	B4	EPh 5
689	738	Sub-recent 2	H1, H2 ?	?
690	740	Pl3	G7, H4, H6	PPw 1,7
691	735	Gneiss or granit	many	PM 1,2, PPp 1, PPw 1,3,6
692	693	PP4	B3	SU
693	692	Karroo	B3d, F2d	EA 4a, SD, SU

Main soil types (bold indicating the main number) and soil groups:
- 671, soil group 13: moderately leached Gleysol or Gleyic Luvisol on recent alluvium (Western swamps)
- 674, soil group 15: moderately leached Gleysol or Gleyic Luvisol or Cambisol on sandstone, limestone and shale (Southern and Eastern hinterland plains and hills, Makonde plateau)
- 675, soil group 19: moderately leached Gleysol or Gleyic Luvisol on limestone, marl and clay on coastal plains (Southern and Eastern coastal plains)
- 679, soil group 21: moderately leached Gleysol or Gleyic Luvisol or Cambisol on old surfaces with indurated sediments over granite or gneiss (Ruaha lowland and valley, North-west and south-west of Lake Eyasi, southern Dodoma, Western Iringa, Western Mbulu, Northern Irambu, lake Manjara shore)
- 683+689+**691**, soil group 18 and 25: moderately leached Gleysol of Gleyic Luvisol or Cambisol on piedmont plains over granite or gneiss (Yambamrizi range, Ipumba hills, Western plateau, Inyonga and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, Igunga-Tabora plain, Central-Western plains on continental deposits)

Other moderately leached Gleysols of less importance are:
- **672**+673, soil group 11: Gleysol recent alluvial or lacustrine sediments (Rukwa valley and floodplain, Songwe/Msangano/Itumba through, Usangu plain)

- 676, soil group 27: Gleysol on older alluvium over coastal plain limestone, marl and clay (Western Zanzibar and Pemba, Eastern and Southern hinterland plains)
- 677, soil group 23: Gleysol on alluvial terraces over sandstone, limestone and shale (Eastern alluvial plains)
- **678**+690, soil group 18: Gleysol on continental deposits or on Pleistocene cover over gneiss or granite (South-eastern Bukombe and Sikonge-Msisi plain, Igunga-Tabora plain, Central-Western plains on continental deposits)
- 680+**681**, soil group 2: Gleysol on gneiss and Basement complex rocks possibly with some volcanic ash (Mbozi plateau)
- 682, soil group 3: Gleysol on gneiss (rocky terrain north of Mbeya and around Mbozi plateau)
- 684, soil group 7: Gleysol on phyllite (Karagwe plains and hills)
- 685, soil groups 7, 17 and 25: Gleysol on schist and granite (Kate-Mwazye hills, Nkungwe mountain, Yambamrizi range, Ipumba hills, Ngara area, Kigoma town, Namanyere-Laela plain, Central Kagera commercial ranching area, Karagwe plains and hills)
- 686, soil group 29: Gleysol on sandstone and shale (Nkansi-Kasanga plain, Katumba plateau, South-western Kagera, Kigoma lakeshore)
- 687, soil groups 7 and 20: Gleysol on basalt and argilleceous sandstone (Kasuli-Kibombo medium altitude plains, Kigoma lowlands)
- 688, soil group 26: Gleysol on coastal sand cover over gneiss (Kilombero-Mahenge plain, South-eastern Tunduru and western Nachinwea plain, Southern plains)
- 690, soil group 18: Gleysol on a Pleistocene cover over gneiss or granite (South-eastern Bukombe and Sikonge-Msisi plain)
- **692**+693, soil group 14: Gleysol on sandstone and shale ((dissected) Sedimentary plateau in Southern and Eastern zones, Gumbiro area, Southern plains, Songea plain, Ruhuhu valley)

Main constraints are drainage, fertility, flooding, workability, salinity, acidity.

Descriptions of the moderately leached Gleysols

Moderately leached, (base saturation more than x %), imperfectly to poorly drained Gleysols or Luvisols

671. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in predominantly waterlogged plains, developed in recent alluvium, often in association with soil type 737

- Rainfall regime: B
- Temperature regime: 2
- Geology: Recent (2) stream deposits
- Physiographic units: PPp1
- CMU: G1
- Mapping unit: B2o
- Agro-ecological zone: Lw-1b
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Associated soil type: 737
- Farming system: Rice-Sweet potato
- Farming system group: 1f1
- Soil group: 13 (dominant)

672 (673). Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in depressional positions in alluvial complexes, developed in recent alluvial or lacustrine sediments

- Rainfall regime: C-E
- Temperature regime: 2
- Geology: Recent (1 or 2) stream deposits
- Physiographic units:
  - 672, RA6
  - 673, RA1
- CMU: G2
- Mapping units:
  - 672, C2c1
  - 673, C2c3, Ee2
- Agro-ecological zone: La-2, 4a
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Tobacco-Pastoralism (1b), possibly Maize-Sorghum-Pastoralism (3,5) and in drier areas Rice-pastoralism (1)
- Farming system group: 2o1
- Soil group: 11 (inclusion)

674. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols on coastal hinterland plains, developed on older (Jurassic-Paleogene) alluvium (terraces, subsidence basin) on sandstone, limestone, shale

- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Jurassic-Paleogene sandstone, limestone, shale
- Physiographic units: CH2
- CMU: A5(d)
- Mapping units: B3g1, B3g2, B3g3, C3d
- Agro-ecological zones: Sa-2b, 3b
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Coconut-Cassava-Cashew or Cashew (1) in higher rainfall areas and maize-Sorghum (2a) or Coconut-Cassava-Cashew in the drier areas, including sisal estates
- Farming system group: 1g1, 2n1
- Soil group: 15 (common)
- Possible constraints: fertility?, acidity?

675. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols on coastal plains in a complex pattern, developed on older (Plio-Pleistocene (2) coastal sandy and clayey alluvium (terraces, subsidence basin) over limestone, marl and clay

- Rainfall regime: B
- Temperature regime: 3
- Geology: Plio-Pleistocene (2) coastal sand and clay over limestone, marl, clay

- Physiographic units: CP1
- CMU: A3
- Mapping units: B3m1, B3m2
- Agro-ecological zone: Co-2a
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: either Maize-Sorghum (2a) or Rice-Coconut-Cassava, including sisal estates
- Farming system group: 2e1
- Soil group: 19 (common)
- Possible constraints: workability?, salinity?

676. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols on coastal hinterland plains, developed on older (Plio-Pleistocene 1 or 2) coastal sandy and clayey alluvium (terraces, subsidence basin) over limestone, marl and clay
- Rainfall regime: A-C
- Temperature regime: 3
- Geology: Plio-Pleistocene (1,2) coastal sand and clay
- Physiographic units: CH1
- CMU: A4
- Mapping units: A3b, B3l1, B3l2, C3f
- Agro-ecological zone: Co-1b, 2b, 3b
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system:
    - In higher rainfall areas Cassava-Trees
    - In B climatic areas either cashew (1) or Maize-Sorghum (2a)
    - In the drier areas Rice-Coconut-Cassava
- Farming system group: 2e1
- Soil group: 27 (inclusion)

677. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols on older (Sub-recent 1) plains without flooding (terrraces), developed on stream deposits over sandstone, limestone, marl
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Sub-recent (1) stream deposits
- Physiographic units: CT
- CMU: A2
- Mapping units: B3j2, C3h
- Agro-ecological zone: Me-5d
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Rice-Maize-Sweet potato
- Farming system group: 1h1
- Soil group: 23 (inclusion)

678 (690). Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or

Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols on predominantly waterlogged plains, developed on continental deposits (indurated overlying granite)(Pleistocene 3) cover over granite or gneiss or young alluvium, often in association with soil type 740

- Rainfall regime: B-D
- Temperature regime: 2
- Geology: Pleistocene (3) cover over granite or gneiss
- Physiographic units:
  - 678, PPw1, PPw8, (PPp1 ?)
  - 690, PPw1, PPw7
- CMU:
  - 678, H4, H6
  - 690, G7
- Mapping units:
  - 678, D2r1, D2r2, D2r3
  - 690, B2l3
    Split: continental deposits, indurated (see 679)
    young alluvium (see 690)
- Agro-ecological zone: Lw-2c, 3b
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Associated soil type: 740
- Farming system: in B-climatic zone Maize-Sorghum-Pastoralism (2), possiibly Cotton-Maize (1a) and in drier areas either Sorghum or Maize-Groundnut-Livestock
- Farming system group: 2h2
- Soil group: 18 (inclusion)

679. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols on old surfaces with indurated deposits or on depressional positions on non-alluvial plains, developed in a Plio-Pleisocene (6) cover over granite or gneiss

- Rainfall regime: E
- Temperature regime: 2
- Geology: Plio-Pleistocene (6) cover over gneiss or granite
- Physiographic units: RP2
- CMU: G8
- Mapping units: Eb3, Eb4
- Agro-ecological zone: Se-3b
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Maize-Sorghum-Pastoralism (5) or Rice-Pastoralism (1)
- Farming system group: 1k1
- Soil group: 21 (common)

681 (680). Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols on medium altitude plateaux and plains, developed on gneiss and Basement complex rocks and possibly volcanic ash

- Rainfall regime: B
- Temperature regime: 1

- Geology: Plio-Pleistocene (8v) volcanic ash cover
- Physiographic units:
  - 681, HP5
  - 680, HP6
- CMU:
  - 681, D6v
  - 680, E3(h)
- Mapping unit: B1d
- Agro-ecological zone: Vo-2
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Coffee-Maize-Bean (1)
- Farming system group: 1d2
- Soil group: 2 (inclusion)

682. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols on medium altitude plateaux and plains, developed on gneiss
- Rainfall regime: C
- Temperature regime: 1
- Geology: Ubendian gneiss
- Physiographic units: HP5-6 (see 681)
- CMU: D6d
- Mapping unit: C1b
- Agro-ecological zone: Gn-5a
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Maize-Fingermillet (1b)
- Farming system group: 2a1
- Soil group: 3 (common)

684. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in depressions on dissected plateaux and plains with quartzite ridges, developed on phyllite
- Rainfall regime: B
- Temperature regime: 2
- Geology: Karagwe/Ankolean (2) phyllite, quartzite, conglomerate
- Physiographic units: W3, W4 (see 685, 686)
- CMU: D3(d)
- Mapping units: B2g1, B2g2
- Agro-ecological zone: Ka-4a
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Coffee-Banana (3) or Banana
- Farming system group: 2b2
- Soil group: 7 (inclusion)

685. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in depressions on

plateaux and plains with quartzite ridges, developed on schist and granite, possibly phyllite and gneiss
- Rainfall regime: B-D
- Temperature regime: 1-2
- Geology: Karagwe/Ankolean (1) schist and granite
- Physiographic units: U3, U5, W5, possibly W4, U1
- CMU: C3h, D3a, D6
- Mapping units: B1c, B2a1, B2d2, B2h, D1a, D1c, D2d
- Split:
  - More basic rocks (basalt, phyllite?)(see 687)
    More intermediate rocks (normal for K/A 1, schist, granite)
- Agro-ecological zone: Me-3, 4a, 6a, Lw-2a, 3a
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Maize-Fingermillet (1a in B climates and cool temperatures, 1b in B climates and intermediate temperatures and 2 in D climitic areas with cool temperatures) or Coffee-Maize-Bean in B climatic areas with intermediate temperatures. In drier areas Maize-Livestock (1d)
- Farming system group: 1e1, 2b2, 2d1, 2d2
- Soil group: 7, 17 and 25 (inclusions)

686. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in depressions on plains, developed on sandstone and shale
- Rainfall regime: B
- Temperature regime: 1-2
- Geology: Bukoba (2) sandstone and shale
- Physiographic units: PPw5, possibly W4
- CMU: C2(h), G4h
- Mapping units: B1f, B2f1, B2f4, B2t
- Agro-ecological zone: Ka-3b, 4c
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: Cassava-Rice-Oilpalm or Cassava-Rice or Coffee-Banana (3) or Tobacco-Pastoralism (1a)
- Farming system group: 1f3, 2b1, 2b2
- Soil group: 29 (common), 7 (inclusion)
- Possible constraints: drainage, fertility

687. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in depressions on dissected plateaux, developed on basalt and argilleceous sandstone
- Rainfall regime: B
- Temperature regime: 1-2
- Geology: Bukoba (1) basalt, argilleceous sandstone
- Physiographic units: PPw5, W1
- CMU: C1h, G3
- Mapping units: B1e, B2s
- Agro-ecological zones: Ka-3a, Lw-1a
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil

- Farming system: Maize-Bean (3) in cooler areas and Cassava-Rice-Oilpalm in warmer areas
- Farming system group: 1d1, 1f2, 2b2
- Soil group: 7 and 20 (inclusions)

688. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in depressions on plains, developed in a coastal sand Plio-Pleistocene (5) cover over gneiss
- Rainfall regime: B-C
- Temperature regime: 2-3
- Geology: Plio-Pleistocene (5) coastal sand cover over Mocambique gneiss
- Physiographic units: EPh5
- CMU: B4
- Mapping units: B2r, B3d2, C3b
- Agro-ecological zone: Me-4c, 5b
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: With intermediate temperatures Cotton-Maize (1b) and in warmer areas Maize-Sesame (1a)
- Farming system group: 2m1
- Soil group: 26 (inclusion)
- Possible constraints: drainage?

690. Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in plains, developed in a Pleistocene (3) cover over gneiss or granite, often in association with soil type 740
- Rainfall regime: B
- Temperature regime: 2
- Geology: Pleistocene (3) cover over granite or gneiss
- Physiographic units: PPw1, PPw7
- CMU: G7
- Mapping unit: B2l3
- Agro-ecological zone: Lw-2c
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Associated soil type: 740
- Farming system: Maize-Sorghum-Pastoralism (2), possibly Cotton-Maize (1a)
- Farming system group: 2h2
- Soil group: 18 (inclusion)

691 (683, 689). Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in plains, in depressions on piedmont plains, developed on gneiss or granite or basic metamorphic rocks, in association with soil type 735, 738 or 741
- Rainfall regime: A-E
- Temperature regime: 2
- Geology:

  - 691, Ubendian, basement Complex, Mocambique gneiss or granite
  - 683, Basement Complex granite
  - 689, Sub-recennt (2) stream deposits
- Physiographic units:
  - 691, PM1, PM2, PPw1, PPw3, PPw6
  - 683, PPw2
  - 689, PPw1?
- CMU:
  - 691, many
  - 683, C6, H5h
  - 689, H2
- Mapping units:
  - 691, A2b, B2d1, B2d3, B2d4, B2j1, B2j3, B2j4, B2k, D2b1, D2n, D2q1, D2q2, D2r3, Ec1, Ec2, Ed1
  - 683, A2b, B2j2, B2k
  - 689, Ed2
- Agro-ecological zones: Lw-3b, Me-4a
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Associated soil types: 735, 738, 741
- Farming system:
  - In higher rainfall areas with cool to intermediate temperatures Maize-Bean (2)
  - In higher rainfall areas with intermediate temperatures Maize-Cassava-Cotton-Rice
  - In B climatic areas either Rice-Livestock, Cotton-Maize (1a) or Maize-Groundnut-Tobacco-Pastoralism
  - In B-C climatic areas Tobacco-Pastoralism (1a)
  - In D climatic areas Cotton-Sorghum-Pastoralism or Maize-Sorghum-Pastoralism (3a)
  - In D-E climatic areas Maize-Groundnut-Livestock or Pastoralism (2b)
  - In E climatic areas Maize-Sorghum-Pastoralism (5), Pastoralism (2a) or Park (1c)
- Farming system group: 1k1, 1k2, 2b3, 2f1, 2g1, 2h2
- Soil group: 18 and 25 (common), 5 and 21 (inclusions)
- Possible constraints: fertility (18), flooding ? (25)

692 (693). Imperfectly to poorly drained, moderately leached, sandy loam to sandy clay, greyish, mottled, ponded drainage, (Eutric or Mollic) Gleysols or (Gleyic) Cambisol or (Gleyic) Luvisols in lower positions in, possibly strongly dissected, inland sedimentary plateaux or in depressions on piedmont plains or on strongly dissected depressions in subsidence basins, developed on sandstone and shale, partly covered by coastal sand

- Rainfall regime: A-D
- Temperature regime: 2-3
- Geology:
  - 692, Plio-Pleistocene (4) coastal sand cover over sandstone and shale
  - 693, Karroo sandstone and shale
- Physiographic units:
  - 692, SU
  - 693, EA4a, SD, SU
  - Split: Non-alluvial, possibly colluvial
  - On older alluvial terraces, subsidence basins

- CMU:
  - 692, B3
  - 693, B3d, F2d
- Mapping units:
  - 692, C2f, D2i, D3c
  - 693, A2f, B3f, C2d1, C2d2, C3g, D2i
- Agro-ecological zone: Sa-1, 2a, 3a, 4, 5
- Available water holding capacity: medium
- Maximum total available moisture in soil: low to high, depending on possibly very compact subsoil
- Farming system: in the higher rainfall areas Cashew (1); in the medium rainfall areas Maize-Sesame (1b), possibly cashew (2) or Maize-Bean-Tobacco(4b); in drier areas with intermediate temperatures Cashew (2) and with warmer temperatures Park (1b)
- Farming system group: 2i1
- Soil group: 14 (inclusion)
- Possible constraints: drainage?, fertility?

STRONGLY LEACHED GLEYSOLS

Key to the strongly leached Gleysols

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
701		Recent 2	F1, G1, G2	PPp 1
702		Pl3	G7, H4, H6	PPp 1
704		Sub-recent 2 or Bukoba 2	C1h, G3, H1, H2	W 6,7,8,9

Main soil types and soil groups:
- 701, soil group 13: strongly leached Gleysol on metamorphic rocks (Western swamps)
- 702, soil group 18: strongly leached Gleysol on a Pleistocene cover over metamorphic rocks (Igunga-Tabora plain, Central-Western plains on continental deposits)
- 704, soil groups 10 and 29: Humic/Dystric Gleysol on sandstone (Bukoba high rainfall area, Kagera river floodplain, Kigoma lakeshore, Katumba plateau, Busando hills, Central Biharamulo, South-western Kagera)

Main constraints are fertility, acidity, drainage

Descriptions of the strongly leached Gleysol soil types

Strongly leached, more acid (base saturation less than x %) imperfectly to poorly drained Gleysols

701. Imperfectly to poorly drained, strongly leached, ponded drainage, mottled, sandy loam to sandy clay, greyish, (Dystric or Humic) Gleysols in complex pattern on seasonally waterlogged plains, developed recent sediments derived from metamorphic rocks
- Rainfall regime: B
- Temperature regime: 2
- Geology: Recent (2) stream deposits
- Physiographic units: PPp1 (see 702)
- CMU: G1, H5h
- Mapping units: B2k, B2o
- Agro-ecological zone: Lw-1b
- Available water holding capacity: medium
- Maximum total available moisture in soil: very low to high; low in case of a very compact subsoil, very low in case of an acid
- subsoil
- Farming system: Rice-Sweet potato or Maize-Groundnut-Tobacco-Pastoralism, possibly Rice-Livestock
- Farming system group: 1f1. 2g1
- Soil group: 13 (common), 25 (inclusion)

702. Imperfectly to poorly drained, strongly leached, ponded drainage, mottled, sandy loam to sandy clay, greyish, (Dystric or Humic) Gleysols in complex pattern on seasonally waterlogged plains, developed in a Pleistocene cover over metamorphic rocks
- Rainfall regime: D
- Temperature regime: 2
- Geology: Pleistocene (3) cover over Dodoma granite or gneiss
- Physiographic units: PPp1 (see 701)
- CMU: H6

- Mapping unit: D2r3
- Agro-ecological zone: Lw-3b
- Available water holding capacity: medium
- Maximum total available moisture in soil: very low to high; low in case of a very compact subsoil, very low in case of an acid subsoil
- Farming system: Maize-Groundnut-Livestock, possibly Sorghum
- Farming system group: 2h2
- Soil group: 18 (common)
- Possible constraints: fertility, acidity

704. Imperfectly to poorly drained, strongly leached, ponded drainage, mottled, sandy loam to sandy clay, greyish, (Dystric or Humic) Gleysols in depressional positions on plains and plateaux with quartzite ridges, on dissected hilly plateaux, or in swampy areas, developed on sandstone

- Rainfall regime: A-D, mainly A-B
- Temperature regime: 2
- Geology: Bukoba (2) sandstone or sub-recent (2) stream deposits
- Physiographic units: W6, W7, W8, W9
- CMU: C2h, D2, h1
- Mapping units: A2a1, A2a2, B2e1, B2f2, D2p3
- Agro-ecological zones: Ka-2, 4b, 4c
- Available water holding capacity: medium
- Maximum total available moisture in soil: very low to high; low in case of a very compact subsoil, very low in case of an acid subsoil
- Farming system: In the higher rainfall areas Coffee-Banana (3) and tea estates, in B climatic areas Banana and in the drier areas and on the more alluvial areas Maize-(Dairy/Livestock)(1a,1c), including sugarcane estate
- Farming system group: 2b1, 2h1
- Soil group: 10 and 29 (common)
- Possible constraints: drainage, acidity, fertility

POORLY DRAINED VERTISOLS

Key to the poorly drained Vertisols:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
721		Pl2	A3	CP 1,2
722		JP	A5	CD 3
723		Sub-recent 1	A2	CH 3, CT
724		Sub-recent 1,2	B1, H1, H2	EA 1, EA 3a,3b
725		Karroo	F2d	EA 4b
726		Sub-recent 2	H1, H2	PSa
727		Sub-recent 2	H1, H2	PPs 2
728	731	PP3	H3	PPs 1, PPw 4
729	730	Recent 2	F1,G1,G2	RA 1
730	729	Recent 2	A2	RA 3
731	728	PP3	H3	PPs 1, PPw 4
732	733	PP7v	C6v, D5v, D6v, E1(h)	NA 4
733	732	Pliocene	E5	NA 6,8
734		Sub-recent 3v	E2(h), H2v, H4v	NA 1,2,6,7,9, NR 1.3
735	691	Gneiss or granite	many	EPa 1,2, EPh 3?, PPs 3, PPw 1,3, RP 1,
736		PP5	B4	EPh 2,3
737	671	Recent 2	F1, G1, G2	PPp 1,3
738	739	Sub-recent 2	H1, H2	PPp 2
739	692, 738	PP4	B3, H2	PPp 2, PPs 1
740	678	Pl3	G7, H4, H6	PPp 1,2, PPs 3, PPw 1,7,8
741	683	Basic basement Complex	H5h	PPw 2

Main soil types (bold indicating the main number) and soil groups:

- 721, soil group 21: Vertisol on Neogene marl, sand and clay (Southern and Eastern coastal plains)
- 722, soil group 15: Vertisol on Paleogene limestone and marl (Southern and Eastern hinterland plains and hills, Makonde plateau)
- 723, soil group 23: Vertisol on stream deposits derived from Neogene sandy clay deposits (Eastern alluvial plains)
- 724, soil groups 16 and 23: Vertisol on alluvial plains in subsidence basins (Eastern alluvial plains, Pangani river valley)
- 725, soil group 14: Vertisol on Karroo sandstone and shale (Gumbiro area)
- **728**+731, soil group 8: Vertisol on old lacustrine alluvium or colluvium (Itogolo dominated areas in Eastern Sukumaland, Ibushi plain, Eastern Lake Manjara shore, Shinyanga-Igunja area)
- 729+**730**, soil group 11: Vertisol on recent lake or stream deposits (Rukwa valley and floodplain, Rukwa/Songwe valley)
- **732**+733+734, soil group 4: Vertisol on volcanic ash (Serengeti, Northern steppes, Northern lowlands, Hanang, Babati)
- **735**+736+741, soil groups 4, 5, 21 and 25: Vertisol on metamorphic rocks or granite (Yambamrizi range, Ipumba hills, Western plateau,

Inyonha and Kipembawe plains, Uriwira plain, Bukombe-Kahama plateau, Tabora plain, Western Sukumaland plains, Meatu-Maswa-Shinyanga area, Central-Northern plains, Chunya plain, Wago hills, Mpwapwa-Eastern Kondoa plains, Ruaha lowland and valley, North-west and south-west Lake Eyasi, southern Dodoma, Western Iringa, Western Mbulu, Northern Irambu, Lake Manjara shore)

- 737, soil group 13: Vertisol on granite or gneiss (Western swamps)
- **738**+739, soil group 21 and 22: Vertisol on metamorphic rocks or granite sediments (Mbuga areas (Sukumaland), Southern Kwimbe-northern Shinyanga area, Ruaha lowland and valley, North-west and south-west lake Eyasi, Southern Dodoma, Western Iringa, Western Mbulu, Northern Irambu, lake manjara shore)
- 740, soil group 18: Vertisol on old indurated sediments (Igunga-Tabora plain, Central-Western plains on continental deposit)

Other poorly drained Vertisols of less importance:

- **726**+727, soil group 22: Vertisol on stream deposits or on old alluvium, colluvium or lake sediments (Central irrigated/flooded area, Shinyanga-Igunga area)

Main constraints are workability, salinity, flooding, drainage, (gully?) erosion, sodicity, soil degradation

Descriptions of the poorly drained Vertisols

Vertisols with ponded drainage

721. Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in complex pattern in depressions in the coastal plains, developed on Neogene marl, sand and clay

- Rainfall regime: A-B
- Temperature regime: 3
- Geology: Pleistocene (2)(Neogene) marl, sand and clay
- Physiographic units: CP1, CP2
- CMU: A3
- Mapping units: A3c, B3m1, B3m2
- Agro-ecological zone: Co-2a
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: in higher rainfall areas Cassava-Tress and in lower rainfall areas either Maize-Sorghum (2a) or Rice-Coconut-Cassava, including sisal estates
- Farming system group: 2e1
- Soil group: 21 (common)
- Possible constraints: workability, possibly salinity

722. Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring on low steep hills in the coastal plains and in subsidence basins, developed on Paleogene limestone and marl

- Rainfall regime: B
- Temperature regime: 3
- Geology: Jurassic-Paleogene sandstone, limestone, shale
- Physiographic units: CD3
- CMU: A5
- Mapping unit: B3g2

- Agro-ecological zone: Sa-2b
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: Coconut-Cassava-Cashew
- Farming system group: 1g1
- Soil group: 15 (common)
- Possible constraints: workability, salinity

723. Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in seasonally waterlogged plains in the coastal hinterland plains and in a complex pattern in subsidence basins in older alluvial plains, developed on sub-recent (1) stream deposits derived from Neogene sandy clay deposits
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Sub-recent (1) stream deposits
- Physiographic units: CH3, CT
- CMU: A2
- Mapping units: B3j2, C3h
- Agro-ecological zone: Me-5d
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: Rice-Maize-Sweet potato
- Farming system group: 1h1
- Soil group: 23 (common)
- Possible constraints: flooding

724. Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring on alluvial plains in subsidence basins, developed in sub-recent (1,2) stream deposits
- Rainfall regime: B-E
- Temperature regime: 2-3
- Geology: Sub-recent (1,2) stream deposits
- Physiographic units: EA1, EA3a, EA3b, PPw1?
- CMU: B1, H1, H2 ?
- Mapping units: B3j1, D2p2, Ed2?
- Agro-ecological zones: Me-5d, Vo-5c
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: Rice-Maize-Sweet potato
- Farming system group: 1h1, 1j1, 1k2?
- Soil group: 16 and 23 (common)
- Possible constraints: workability (group 16) and flooding (group 23)

725. Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in alluvial plains in subsidence basins, developed on Karroo shale and sandstone, possibly with a coastal sand cover
- Rainfall regime: D
- Temperature regime: 2
- Geology: Karroo sandstone and shale, possibly with coastal sand cover
- Physiographic units: EA4b

- CMU: F2d
- Mapping unit: D2i
- Agro-ecological zone: Sa-4
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: Maize-Bean (4b), possibly Cashew (2) or Park (1b)
- Farming system group: 2i1
- Soil group: 14 (dominant)

726 (727). Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring on marginal flats in subsidence basins, on sub-recent (2) stream deposits or occurring on plains, developed in old (sub-recent 2) alluvium or colluvium or old lake sedimnts
- Rainfall regime: D
- Temperature regime: 2
- Geology: Sub-recent (2) stream or lake deposits
- Physiographic units:
  - 726, PSa
  - 727, PPs2 (see 738)
- CMU: H2
- Mapping units:
  - 726, D2s
  - 727, D2p1
- Agro-ecological zone: Se-2
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: Rice-Sorghum-Millet and Cotton-Sorghum-Pastoralism
- Farming system group:
  - 726, 1j2
  - 727, 2l1
- Soil group: 22 (inclusion)
- Possible constraints: flooding, salinity, sodicity?, soil degradation (gully erosion)

728 (731). Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring on plains, developed on old Plio-Pleistocene (3) alluvium or colluvium or old lake sediments or marl, sand and clay, probably salty and sodic
- Rainfall regime: B-E
- Temperature regime: 2
- Geology: Plio-Pleistocene (3) marl, sand and clay
- Physiographic units:
  - 728, PPs1, PPw4
  - 731, NR1, NR2
- CMU: H3
- Mapping units:
  - 728, B2l2, D2o1, D2o3
  - 731, D2o2, Eg2
- Agro-ecological zones: La-1, 3
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil

- Farming systems: Rice-Livestock, possibly Maize-Cassava-Cotton-Rice in higher rainfall areas and in lower rainfall areas Cotton-Sorghum and in the driest areas Pastoralism (2b)
- Farming system group: 2l2
- Soil group: 8 (common)
- Possible constraints: erosion

730 (729). Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in a complex pattern in floodplains, developed on recent (2) stream and lake deposits
- Rainfall regime: C-E, mainly C
- Temperature regime: 2
- Geology: Recent (2) stream and lake sedeiments
- Physiographic units:
  - 730, RA3
  - 729, RA1
- CMU: G2
- Mapping units:
  - 730, C2c1
  - 729, C2c3, Ee2
- Agro-ecological zone: La-2
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: Tobacco-Pastoralism (1b), Maize-Sorghum-Pastoralism (3,5) and in drier areas Rice-Pastoralism (1)
- Farming system group: 2o1
- Soil group: 11 (common)
- Possible constraints: drainage, workability, flooding

731. Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in complex pattern on flat plains in rift depressions, developed in Plio-Pleistocene (3) marl, sand and clay, probably salty and sodic
- Rainfall regime: D-E
- Temperature regime: 2
- Geology: Plio-Pleistocene (3) marl, sand and clay
- Physiographic units: NR1, NR2
- CMU: H3
- Mapping units: D2o2, Eg2
- Agro-ecological zone: La-3
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Associated soil type: 728
- Farming systems: Pastoralism (2b), possibly some Cotton-Sorghum-Pastoralism
- Farming system group: 2l2
- Soil group: 8 (common)
- Possible constraints: erosion

732 (733). Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring on volcanic ash plains, developed in Pliocene or Plio-Pleistocene (7v) volcanic ash or occurring in a complex pattern on flat plains in rift depressions or on sub-recent (2) volcanic ash plains, probably salty and sodic

- Rainfall regime: C-E, mainly D-E
- Temperature regime: 1-2
- Geology:
  - 732, Plio-Pleistocene (7v) volcanic ash
  - 733, Pliocene volcanic ash
  - 734, sub-recent (2) volcanic ash
- Physiographic units:
  - 732, NA4
  - 733, NA6, NA8
  - 734, NA1, NA2, NA6, NA7, NA9, NR1, NR3
- CMU:
  - 732, C6v, E1(h)
  - 733, E5
  - 734, C4h, E2(h), H2v, H4v
- Mapping units:
  - 732, C2e, D1e, D2h3, Ef1
  - 733, Ef2
  - 734, D2h1, D2h2, D2k1, D2k2, D2k3, D2k4, Ef4a, Ef4b, Ef4c, Ef5, Eg1
- Agro-ecological zones: Vo-5a, 5b, 6
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems:
  - In D climatic area and intermediate temperatures either Maize-Bean-Pastoralism or Wheat-Barley-Maize-Bean-Pigeon pea, including wheat/barley estates or Pastoralism (1a)
  - In the driest areas Pastoralism (1b or 2a) or Park (1a)
- Farming system group:
  - 732, 733, 2k1
  - 734, 1k2, 2c1, 2k1
- Soil group: 4 (common), 21 (inclusion)

735 (736, 741). Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in plains, developed on intermediate metamorphic or granitic rock sediments, possibly with a Plio-Pleistocene (5) cover or developed on basic metamorphic rocks

- Rainfall regime: A-E, mainly B-E
- Temperature regime: 2-3
- Geology:
  - 735, gneiss or granite (Mocambique, Ubendian, Dodoma, Basement Complex)
  - 736, Plio-Pleistocene (5) cover)
  - 741, basic Basement Complex rocks
- Physiographic units:
  - 735, EPa1, EPa2, PPs3, PPw1, PPw3, RP1 and possibly EPh3
  - 736, EPh2, EPh3
  - 741, PPw2
- CMU:
  - 735, C4, C5, C6(h), H5h, G6
  - 736, B4
  - 741, C6, H5h
- Mapping units:
  - 735, A2b, A2c, B2d3, B2d4, B2j1, B2j3, B2j4, B2k, D2a1, D2b1, D2f, D2g, D2m1, D2n, D2q1, D2q2, D3b1, Eb1, Ec1, Ec2, Ed1, Ed2?

  - 736, C3b, C3c
  - 741, A2b, B2j2
- Agro-ecological zones: Me-4a, 6b, Se-3b
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems:
  - In higher rainfall areas, intermediate temperature either Maize-Cassava-Cotton-Rice or Maize-Bean (2)
  - In B climatic areas, intermediate temperatures, either Maize-Bean (2) or Maize-Groundnut-Tobacco-Pastoralism or Cotton-Maize (1a)
  - In C climatic areas Maize-Sesame (1a)
  - In D climatic areas with intermediate temperatures Maize-Bean (5b), Maize-Sorghum-Pastoralism (3), Maize-Groundnut-Livestock, Cotton-Sorghum-Pastoralism or Maize-Bean-Pastoralism including large scale bean estate
  - In D climatic areas with warm temperatures Maize-Sorghum-Pastoralism (4)
  - In the driest areas usually Pastoralism (2b) with some Maize-Groundnut-Livestock or Maize-Sorghum-Pastoralism (5) or Park (1c)
- Farming system group:
  - 735, 1k1, 1k2, 2b3, 2c1, 2f1, 2g1, 2m1
  - 736, 2m1
  - 741, 2g1
- Soil group: 4, 5, 21 and 25 (dominant), 26 (inclusion)
- Possible constraints: workability (group 5, 21, 25, 26), degradation (25), flooding (25), sodicity (25) and salinity (25), drainage? (26)

737. Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in plains, developed on recent (2) deposits derived from intermediate metamorphic or granitic rocks
- Rainfall regime: B
- Temperature regime: 2
- Geology: Recent (2) sediments
- Physiographic units: PPp1, PPp3
- CMU: G1
- Mapping unit: B2o
- Agro-ecological zone: Lw-1b
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: Rice-Sweet potato
- Farming system group: 1f1
- Soil group: 13 (dominant)

738 (739). Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in plains, developed on sub-recent (2) sediments derived from intermediate metamorphic or granitic rocks or in old alluvium or colluvium or old lake plains, developed in Plio-Pleistocene (4) coastal sand sediments
- Rainfall regime: B-E
- Temperature regime: 2-3
- Geology:

  - 738, sub-recent (2) sediments
  - 739, Plio-Pleistocene (4) coastal sand cover over Karroo sandstone and shale
- Physiographic units:
  - 738, PPp2
  - 739, PPp2, PPs1
- CMU: H2
- Mapping units:
  - 738, B2m, Ea1, Ea2
  - 739, Ea1
- Agro-ecological zones: Se-1, 3a, 3b
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: in higher rainfall areas Maize-Cassava-Cotton-Rice or Cotton-Sorghum and in the driest areas Rice-Pastoralism (2) or Pastoralism (2a)
- Farming system group: 1k2, 2l1
- Soil group: 21 and 22 (dominant)
- Possible constraints: workability (group 21) and flooding, salinity, sodicity? and degradation? (group 23)

740. Moderately well to imperfectly drained, (Pellic or Chromic) Vertisols with ponded drainage occurring in old alluvium or colluvium or old lake plains and plateaux, remnants of old indurated sediments overlying granite, developed in Pleistocene (3) sediments

- Rainfall regime: B-D
- Temperature regime: 2
- Geology: Pleistocene (3) cover over granit or gneiss
- Physiographic units: PPs3, PPw1, PPw7, PPw8, PPp1, PPp2
- CMU: G7, H4, H6
- Mapping units: B2l1, B2l3, D2r1, D2r2, D2r3
- Agro-ecological zone: Lw-3b
- Available water holding capacity: high
- Maximum total available moisture in soil: low due to compact subsoil
- Farming systems: in higher rainfall areas either Cotton-maize (1a) or Maize-Sorghum-Pastoralism (2); in drier areas either Sorghum or Maize-Groundnut-Livestock
- Farming system group: 2h2
- Soil group: 18 (dominant)
- Possible constraints: workability

ACID SULPHATE SOILS

(See key to poorly drained Fluvisols)

Main soil type and soil group:
- 751, soil group 28: Thionic Fluvisol in regularly flooded delta plains with marine influence (coastal deltas)

Main constraints are fertility, severe acidity when drained, flooding, drainage.

Description of the acid sulphate soil type

Strongly acid sulphate clays on marine deposits, in coastal plains

751. Very poorly drained, dark heavy clay, extremely acid sulphate clay (Thionic) Fluvisol soils in regularly flooded delta plains
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Recent (1) stream and marine deposits
- Physiographic units: CF2
- CMU: A1
- Mapping units: B3b, C3i
- Agro-ecological zone: Me-5b
- Available water holding capacity: nd
- Maximum total available moisture in soil: nd
- Farming systems: Rice (-Maize-Cassava ?)
- Farming system group: 1h3
- Soil group: 28 (common)

Possible constraint: acidity

VERY SALTY AND SODIC SOILS

Key to the very salty and sodic soils:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
761		Recent 1 or Sub-recent 1	A1, A2, B1	CH 3, CF 2
762		Sub-recent 1	A2, B1, H2	EA 3a, 3b
763		Moc. gneiss	many	EA 2a
764		Sub-recent 2	F1, G1, G2	PSb
765	771	PP3	H3	PPw 4
766		PP6	G8	RA 2
767		Receent 2 or Sub-recent 2	F1, G1, G2, H1, H2	RA 1,2,5,6
771	765	PP3	H3	NR 1,2
772		Sub-recent 2 or 3v	E2h, H2, H3	NR 1,3

Main soil types (bold indicating the main number) and soil groups:
- 761, soil group 28: Solonchak/Solonetz on regularly flooded delta plains (Rufiji valley, coastal floodplains and deltas)
- 762, soil group 16: Solonchak/Solonetz in subsidence basin with volcanic influence (Pangani river valley)
- 764, soil group 22: Solonchak/Solonetz in flat subsidence basins (Central irrigated/flooded area, Shinyanga-Igunga area)
- 765+**771**, soil group 8: Solonchak/Solonetz on old lake sediments (Ibushi plain, Eastern Lake Manjara shore, Shinyanga-Igunga area)
- 766, soil group 21: Solonchak/Solonetz on lacustrine plains (Ruaha lowland and valley, North-west and south-west lake Eyasi, Southern Dodoma, Western Iringa, Western Mbulu, Northern Irambu, Lake Manjara shore)
- 767, soil group 11: Solonchak/Solonetz on alluvial or lacustrine plains (Rukwa valley and floodplain, Rukwa/Songwe valley, Nduli-Ismani flats, Usangu plain, Ruaha lowland and valley)
- 772, soil group 4 and 21: Solonchak/Solonetz in rift depressions (Ruaha lowland and valley, North-west and south-west lake Eaysi, southern Dodoma, Western Iringa, Western Mbulu, Northern Irambu, Lake Manjara shore)

Other Solonchak/Solonetz of less importance:
- 763, soil groups 4,5 and 25: Solonchak/Solonetz on gneiss (Mpwapwa-eastern Kondoa plains, Northern lowlands, Kiteto, Northern Lushoto, North Monduli)

Main constraints are salinity, sodicity, soil degradation, erosion, flooding.

Descriptions of the very salty and/or sodic soil types

761. Salt affected Solonchak or Solonetz soils with variable drainage and flooding conditions, without volcanic influence, on coastal hinterland plains on Neogene sandy clay and in regularly flooded delta plains
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Recent (1) or Sub-recent (1) stream deposits
- Physiographic units: Cf2, CH3
- CMU: A1, A2

- Mapping units: B3b, B3j2, C3i
- Agro-ecological zone: Me-5b
- Farming system: Rice-Maize-Cassava-Cotton or Rice-Maize-Sweet potato
- Farming system group: 1h3
- Soil group: 28 (common)

762. Salt affected Solonchak or Solonetz soils with variable drainage and flooding conditions, with volcanic influence, occurring in subsidence basins
- Rainfall regime: D
- Temperature regime: 2
- Geology: Sub-recent (1) stream deposits
- Physiographic units: EA3a, EA3b
- CMU: H2
- Mapping unit: D2p2
- Agro-ecological zone: Vo-5c
- Farming system: Rice-Maize-Sweet potato
- Farming system group: 1j1
- Soil group: 16 (dominant)
- Possible constraints: salinity, sodicity

763. Salt affected Solonchak or Solonetz soils with variable drainage and flooding conditions, without volcanic influence, in poorly drained, semi-arid plains on gneiss
- Rainfall regime: D-E
- Temperature regime: 2
- Geology: Mocambique gneiss
- Physiographic units: EP2a
- CMU: C4
- Mapping units: D2f, D2g, Eb1
- Agro-ecological zones: Gn-6b, 7, Me-6b
- Farming system: Maize-Bean-Pastoralism or Maize-Sorghum-Pastoralism (3), including bean estate; in the driest areas Pastoralism (2b)
- Farming system group: 2c1, 2f1, 2g1
- Soil group: 4, 5 and 25 (inclusions)

764. Salt affected Solonchak or Solonetz soils with variable drainage and flooding conditions, without volcanic influence, occurring in semi-permanent swamps in flat subsidence basins
- Rainfall regime: D
- Temperature regime: 2
- Geology: Sub-recent (2) stream deposits
- Physiographic units: PSb
- CMU: H2
- Mapping unit: D2s
- Agro-ecological zone: Se-2
- Farming system: Rice-Sorghum-Millet, possibly Cotton-Sorghum-Pastoralism or Pastoralism (2b)
- Farming system group: 1j2
- Soil group: 22 (dominant)
- Possible constraints: salinity, sodicity, degradation

766. Salt affected Solonchak or Solonetz soils with variable drainage and flooding conditions, without volcanic influence, occurring in a complex pattern on lacustrine plains

- Rainfall regime: E
- Temperature regime: 2
- Geology: Plio-Pleistocene (6) cover over granite or gneiss
- Physiographic units: RA2 (see 767)
- CMU: G8
- Mapping units: Eb3, Eb4
- Agro-ecological zone: Se-3b
- Farming system: Maize-Sorghum-Pastoralism (5) or Rice-Pastoralism (1)
- Farming system group: 1k1
- Soil group: 21 (dominant)
- Possible constraints: flooding

767. Salt affected Solonchak or Solonetz soils with variable drainage and flooding conditions, without volcanic influence, occurring in alluvial complexes and in complex pattern on lacustrine plains
- Rainfall regime: C-E
- Temperature regime: 2
- Geology: recent (2) or sub-recent 92) lake and stream deposits
- Physiographic units: RA1, RA2, RA5, RA6
- CMU: G2
- Mapping units: C2c1, C2c2, C2c3, Ee2, Ee4
- Agro-ecological zones: La-2, 4a
- Farming system: In the higher rainfall areas Tobacco-Pastoralism (1b), in intermediate rainfall areas Maize-Sorghum-Pastoralism (5) and in the driest areas Rice-Pastoralism (1)
- Farming system group: 2o1
- Soil group: 11 (dominant)
- Possible constraints: salinity, sodicity, flooding

771 (765). Salt affected Solonchak or Solonetz soils with variable drainage and flooding conditions, with volcanic influence, occurring in complex pattern on flat plains in rift depressions or on old lake sediments
- Rainfall regime: D-E
- Temperature regime: 2
- Geology: Plio-Pleistocene (3) marl, sand and clay
- Physiographic units:
  - 771, NR1, NR2
  - 765, PPw4
- CMU: H3
- Mapping units:
  - 771, D2o2, Eg2
  - 765, D2o1
- Agro-ecological zones: La-3, 4b
- Farming system: Cotton-Sorghum and Pastoralism (2b)
- Farming system group: 2l2
- Soil group: 8 (common)
- Possible constraints: erosion, degradation

772.Salt affected Solonchak or Solonetz soils with variable drainage and flooding conditions, with volcanic influence, occurring in complex pattern on flat plains in rift depressions
- Rainfall regime: E
- Temperature regime: 2
- Geology: Sub-recent (2 and 3v) stream deposits
- Physiographic units: NR1, NR3

- CMU: E2h, H2, H2v
- Mapping units: Ef4a, Ef4b, Eg1
- Farming system: Pastoralism (1b,2a)
- Farming system group: 1k2, 2k1
- Soil group: 21 (dominant), 4 (common)
- Possible constraints: salinity, sodicity, degradation (4) and flooding (21)

PEAT SOILS

Key to the peat soils:

No. of soil type	Associated soil type	Geology	CMU	Physiographic unit
781		Sub-recent 1	A2, B1	AEA1
782		PP8v	E4(h)	NV 3c
783		Recent 2	F1, G1, G2	PPp 3
784		Bukoba 2	C2)h), D1, D2, G4h	W 6,7, 4?
785		K/A 1	C3h, D3a, G5	W 5, 4?
786		K/A 2	D3(d)	W 3,4
787		Sub-recent 2	H1, H2	W 8,9

Main soil types and soil groups:
- 781, soil group 23: Histosol in subsidence basins (Eastern alluvial plains)
- 782, soil group 4: Histosol on volcanic ash (Serengeti)
- 783, soil group 13: Histosol in swamps in metamorphic rock areas (Western swaamps)
- 784, soil group 29: Histosol on sandstone (Bukoba high rainfall area, Kigoma lakeshore, Katumba plateau, Busando hills, central Biharamulo, South-western Kagera)
- 787, soil group 10: Histosol in swamps on floodplains (Kagera floodplain)

Other peat soils of less importance:
- 785, soil group 17: Histosol on schist (Ngara area, Kigoma town?, Central Kagera commercial ranching area, Karagwe plains and hills)
- 786, soil group 7: Histosol on phyllite (Karagwe plains and hills)

Main constraints are flooding, drainage, fertility, acidity.

Descriptions of the peat soil types

Peat soils in subsidence basins

781. Peat soils (Histosol) in subsidence basins
- Rainfall regime: B-C
- Temperature regime: 3
- Geology: Sub-recent (1) stream deposits
- Physiographic units: EA1
- CMU: B1
- Mapping unit: B3j1
- Agro-ecological zone: Me-5d
- Farming system: Rice-Maize-Cassava-Cotton
- Farming system group: 1h1
- Soil group: 23 (common)

Peat soils on volcanic slopes at high altitudes

782. Peat soils (Histosol) on volcanic slopes at altitudes above 2000 m
- Rainfall regime: A-E, mainly E
- Temperature regime: 1-2
- Geology: Plio-Pleistocene (8v) volcanic ash
- Physiographic units: NV3c

- CMU: E4(h)
- Mapping units: A1k1?, B1a2, B2b2, Ef3
- Agro-ecological zone: Vo-6
- Farming system: Maize-Bean (1a), Park (1a)
- Farming system group: 2c1, 2k1
- Soil group: 4 (common)

Peat soils occurring in swamps

783. Peat soils (Histosol) in swamps in (semi-)permanent swamps on plains in metamorphic rock areas
- Rainfall regime: B
- Temperature regime: 2
- Geology: recent (2) stream deposits
- Physiographic units: PPp3
- CMU: G1
- Mapping unit: B2o
- Agro-ecological zone: Lw-1b
- Farming system: Rice-Sweet potato
- Farming system group: 1f1
- Soil group: 13 (common)

784. Peat soils (Histosol) in swamps and in valley bottoms in sandstone area
- Rainfall regime: A-B
- Temperature regime: 2
- Geology: Bukoba (2) sandstone and shale
- Physiographic units: W6, W7, possibly W4
- CMU: C2h, D2
- Mapping units: A2a1, A2a2, B2f2, B2f4
- Agro-ecological zones: Ka-2, 4c
- Farming system: Coffee-Banana (3) and in drier areas Banana
- Farming system group: 2b1
- Soil group: 29 (common)

785. Peat soils (Histosol) in swamps or in valley bottoms in schist area
- Rainfall regime: B-D
- Temperature regime: 1-2
- Geology: Karagwe/Ankolean (1) schist and granite
- Physiographic units: W5, possibly W4
- CMU: C3h
- Mapping units: B2h, D1c, D2d
- Agro-ecological zones: Lw-2a, 3a
- Farming system: Coffee-Maize-Bean (2) in the higher rainfall areas and in the drier areas Maize-(Dairy/Livestock)(1d)
- Farming system group: 2d1
- Soil group: 17 (inclusion)

786. Peat soils (Histosol) in swamps in strongly dissected sandstone and phyllite areas at higher altitudes (1300-1800 m) or in valley bottom on plains in phyllite areas with quartzite ridges
- Rainfall regime: B
- Temperature regime: 2
- Geology: karagwe/Ankolean (2) phyllite and quartzite
- Physiographic units: W3, W4
- CMU: D3(d)

- Mapping units: B2g1, B2g2
- Agro-ecological zone: Ka-4a
- Farming system: Coffee-Banana (3) or Banana
- Farming system group: 2b2
- Soil group: 7 (inclusion)

787. Peat soils (Histosol) in swamps in floodplains
- Rainfall regime: B-D, mainly B
- Temperature regime: 2
- Geology: Sub-recent (2) stream deposits
- Physiographic units: W8, W9
- CMU: C2h?, H1
- Mapping units: B2e1, B2f4?, D2p3
- Agro-ecological zone: Ka-4b
- Farming system: Coffee-Banana (3) and Maize-(Dairy/Livestock)(1a,1c)
- Farming system group: 2h1
- Soil group: 10 (dominant)

3. SOIL GROUPS

Soil types have been combined into soil groups. Each soil group is linked to one or more farming system groups and appears as one of the characteristics of the agro-ecological zones.
In Annex 1 tha database on soil groups as related to agro-ecological zones, farming system and mapping units is shown. In Annex 2 the soil groups are shown with the particular farming systems per climatic zone. In Annex an overview is shown of the main soil types occurring within each soil group.

Major soil types, major crops and soil related constraints per soil group

Soil group 1, on developed volcanic ash, basalt
Rungwe (D5v)/Mbeya highlands, (west) Njombe plateau, Mbeya stepped plain

Agro-ecological zones: Vo-1a, Vo-4a

Geology, parent material: Pleistocene (4v), Plio-Pleistocene (7v) volcanic ash
Climatic zones: A-C
Temperature regime: 1
Very shallow Andosols: 111 inclusion, maybe 101, 103, 105
Shallow Humic Andosols: 133 dominant
Humic/Mollic Andosols: 261 and 265 dominant, 275 common; inclusions 272, maybe 232, 252
Well drained sandy soils: none (maybe 311?)
Arenosols: 501 inclusion
Ferralsols: 364 common
Strongly leached loamy clayey Ferric Acrisols: 473 dominant
Moderately well drained Vertisols: maybe 544
Imperfectly to poorly drained Vertisols: maybe 732

Farming systems per climatic zone:
A: Coffee, banana (1), Maize, potato (1a)
C: Maize, bean (4c)
Farming system groups: 1a1, 2a2

Topography: undulating to rolling, some dissection
Proportion of cultivated land: very high
Carrying capacity: high
Dependency on soil available moisture: high, but variable
Drought risk: low

Dominant soil types: Shallow Humic Andosols; (Humic/Mollic) Andosol or (Haplic) Phaeozems; Ferric Acrisol
Common soil types: Humic Nitosols; Ferralsols
Major crops: Coffee, banana, maize, potato, bean
Constraints: leaching?, fertility, erosion, landslides?, radiation, temperature, soil depth, capping/sealing

Soil group 2, on developed granite, gneiss and volcanic ash (Mbozi plateau)

Agro-ecological zone: Vo-2

Geology, parent material: granite, gneiss and volcanic ash
Climatic zones: B
Temperature regime: 1
Humic/Mollic Andosols or Haplic Phaeozems: 264 dominant, 275 inclusion
Strongly leached loamy clayey Ferric Acrisols: 478 inclusion
Moderately leached Gleysols: 681 inclusion

Farming systems per climatic zone:
B: Coffee, maize, bean (1), coffee estates
Farming system group: 1d2

Topography: undulating to rolling
Proportion of cultivated land: very high
Carrying capacity: high
Dependency on soil available moisture: high
Drought risk: nd

Dominant soil types: (Humic/Mollic) Andosols or (Haplic) Phaeozems
Major crops: Coffee, maize, bean
Constraints: radiation, temperature, erosion, fertility, capping/sealing

Soil group 3, developed on gneiss (Rungwe highlands and N-Mbeya and Mbozi rocky terrain)

Agro-ecological zone: Gn-1a, Gn-5a

Geology, parent material: Ubendian gneiss
Climatic zones: A-C
Temperature regime: 1
Very shallow Lithosols: 111 dominant
Humic Nitisols: 275 dominant
Rhodic Ferralsols: 364 dominant
Strongly leached loamy clayey Ferric Acrisols: 473 dominant
Moderately leached Gleysols: 682 common

Farming systems per climatic zone:
A: Coffee, banana (2)
C: Maize, forestry (1b)
Farming system group: 2a1

Topography: steep hills and footslopes
Proportion of cultivated land: nd
Carrying capacity: nd
Dependency on soil available moisture: nd
Drought risk: nd
Dominant soil types: Very shallow Lithosols; Humic Nitosols; Rhodic Ferralsols; Ferric Acrisols
Common soil types: Moderately leached Gleysols
Major crops: Coffee, banana, maize
Constraints: radiation, temperature, erosion, fertility, acidity, soil depth, low organic matter content, capping/sealing, drought

Soil group 4, developed on volcanic ash
Meru/Kilimanjaro footslopes and plains, Karatu plateau, Northern lowlands, Hanang, Babati, Serengeti plains, Northern steppes

Agro-ecological zones: Vo-1c, Vo-3, Vo-4c, Vo-5a, Vo-5b, Vo-6

Geology, parent material: volcanic ash (Sub-recent (3v), Plio-Pleistocene (7v, 8v), Pliocene, Recent (2) sediments)
Climatic zones: A-E
Temperature regime: 1-2
Very shallow Phaeozems or Vitric Andosols: 102 dominant, 105 and 111 inclusions
Shallow Vitric Andosols: 142 dominant, 132, 141 and 143 common
Luvic Phaeozems or Humic Nitisols: 231, 232, 262 and 271 dominant, 261 common, maybe 272 and 275
Mollic Solonetz: 251 dominant
Well drained sandy Eutric Nitosols: 321 dominant, 311 inclusion
Arenosols: 501 inclusion
Ferralsols: maybe 362, 363?
Strongly leached loamy clayey Paleosols: 461 dominant, maybe 473?
Moderately well drained Vertisols: 543 and 544 inclusions
Imperfectly to poorly drained Vertisols: 735 dominant, 732, 734 common
Salty and/or sodic soils: 772 common, 763 inclusion
Peat soils: 782 common

Farming systems per climatic zone:
A: Coffee, banana (1)
B: Maize, bean (1a, 1b), Maize, potato (1b)
C: Park , pastoralism
D: Wheat, barley, maize, bean, pigeon pea, pastoralism, bean estates, wheat/barley estates, sugarcane estate, ranches
Farming system group: 2c1, 2k1

Topography: steep and gentle slopes, gently undulating to rolling, some dissection
Proportion of cultivated land: medium to very high
Carrying capacity: low, but high in high rainfall areas
Dependency on soil available moisture: variable
Drought risk: low to high

Dominant soil types: Phaeozems; (Vitric) Andosols; Humic Niitisols; Sandy Nitosols; Xerosols or Luvisols; Vertisols;
Solonetz
Common soil types: Peat soils (high altitude)
Major crops: Coffee, banana, maize, bean, potato, wheat, barley, pigeon pea
Constraints: erosion, drought, acidity, low organic matter, salinity, sodicity, soil depth, fertility, radiation, temperature, wind erosion, soil degradation (gully erosion), flooding/drainage

Soil group 5, developed on gneiss and granite
Southern highlands on gneiss, Eastern Iringa highlands, Mahenge highlands, Usambara, mountains, Morogoro highlands, Matengo highlands, Ludewa plateau, Mbinga area, Lupemba-Niave hills, Songea plateau, Ruhuhu escarpment, Mufindi plateau, Kidugala plateau, (east) Njombe plateau, eastern and northern Ubena plateau, Upper Lokosi valley, Usanga flat border, Iringa plain, Eastern Mbulu area, Kilosa-west and Mpwapwa medium altitude plains, east Handeni, N-Morogoro hilly plains and footslopes, north Mbulu (C4h), south-east Babati, northern Kondoa, Kiteto, north Lushoto, north Monduli areas, Kondoa-Kibaya-west Handeni areas, Pare footslopes

Agro-ecological zones: Gn-1b, Gn-2, Gn-3, Gn-4, Gn-5b, Gn-5c, Gn-6a, Gn-6b, Gn-7

Geology, parent material: gneiss, granite (Mocambique, Ubendian, basement complex, Dodoma, Sub-recent (2))
Climatic zones: A-E
Temperature regime: 1-2
Very shallow Lithosols: 111 dominant
Shallow Phaeozems/Calcisols: 146 dominant, 131 common
Phaeozems/Cambisols: 237 and 272 dominant
Sandy Acrisols and Luvisols: 335 dominant, 338 common, 332 inclusion
Arenosols: 501 inclusion
Rhodic Ferralsols: 362 dominant, maybe 364? as inclusion
Moderately leached loamy or clayey Luvi/Acri/Cambisols: 412, 421 dominant
Strongly leached loamy clayey paleosols and Ferralsols/Acrisols: 461 and 473 dominant
Well drained Fluvisols: 208 inclusion
Moderately leached Gleysols: 691 inclusion
Strongly leached Gleysols: maybe 705 ? as inclusion
Imperfectly to poorly drained Vertisols: 735 dominant
Poorly drained Fluvisols: 649 inclusion
Salty and/or sodic soils: 763 inclusion

Farming systems per climatic zone:
A: Coffee, maize, bean (3a), Maize, potato (2), Maize, forestry (1a)
B: Maize, bean (2), Coffee, maize, bean (3b), Tea and wattle estates
C: Sorghum, fingermillet (1), Maize, sorghum, (agro-)pastoralism (1a), Sisal estates
C-D: Maize, bean (4a)
D: Maize, bean (5a, 5b), Wheat, barley, maize, bean, pigeon pea
E: pastoralism (2a, 2b), park (1c)
Farming system group: 2c2, 2f1

Topography: (strongly) dissected and flat to undulating to rolling
Proportion of cultivated land: medium to very high, very low in rocky terrains
Carrying capacity: very low to high
Dependency on soil available moisture: low to moderate to high
Drought risk: low to moderate

Dominant soil types: Lithosols; Shallow Phaeozems/Calcisols; Phaeozems or Cambisols; Humic Nitosols; Cambisols; Rhodic Ferralsols; Luvisols; Strongly leached Paleosols; Acrisols; Vertisols
Major crops: Coffee, maize, bean, potato, tea, wattle, sorghum, fingermillet, wheat, barley, pigeon pea, sisal
Constraints: fertility, workability, erosion, acidity, low organic matter, soil depth, landslides, soil degradation (gully erosion),

leaching/, drought, radiation, temperature, salinity, sodicity, capping/sealing.

Soil group 6, developed on volcanic phonolites (Tarime highlands)

Agro-ecological zone: Vo-4b

Geology, parent material: volcanic phonolites (Miocene)
Climatic zones: C
Temperature regime: 1
Very shallow soils: 104 inclusion
Humic Nitisols: 273 common
Rhodic Ferralsols: 361 common
Moderately leached loamy or clayey Luvi/Acri/Cambisols: 411 common
Well drained Fluvisols: 209 inclusion
Poorly drained Fluvisols: 648 inclusion

Farming systems per climatic zone:
C: Maize, sorghum, banana, cassava, bean, (horticulture)
Farming system group: 1i1

Topography: undulating to rolling
Proportion of cultivated land: very high
Carrying capacity: high
Dependency on soil available moisture: low
Drought risk: low to high

Common soil types: Humic Nitisols; Rhodic Ferralsols; Cambisols
Major crops: maize, sorghum, banana, cassava, bean, horticulture
Constraints: fertility, drought, radiation, temperature, erosion, acidity, low organic matter, soil degradation (gully erosion).

Soil group 7, developed on sandstone, limestone, basalt, phyllite and quartzite

Kigoma highlands (D1 and D3d), Kasuli-Kibombo medium altitude plains, Karagwe hills and plains (D3)

Agro-ecological zones: ka-1, Ka-3a, Ka-4a

Geology, parent material: sandstone, limestone, basalt, phyllite, quartzite (Bukoba (1 and 2), Karagwe/Ankolean (2))
Climatic zones: A-B
Temperature regime: 1(-2)
Very shallow Lithosols: 106, 108, 114 and 116 common possibly in association, 113 as inclusion
Humic Nitisols: 276 dominant
Ferralsols: 365 and 367 dominant
Strongly leached loamy clayey Ferralsols/Acrisols: 479 dominant
Moderately leached Gleysols: 684-7 as inclusions
Peat soils: 786 as inclusion

Farming systems per climatic zone:
A: Coffee, maize, bean (2)
B: Maize, bean (3), Banana, Coffee, banana (3)
Farming system group: 1a2, 1d1, 2b2

Topography: dissected and hilly, in Karagwe also undulating to rolling
Proportion of cultivated land: high
Carrying capacity: medium
Dependency on soil available moisture: moderate
Drought risk: low

Dominant soil types: Humic Nitosols; Ferralsols; Acrisols
Common soil types: Lithosols
Major crops: Coffee, maize, bean, banana
Constraints: fertility, acidity, erosion, drought, soil depth, leaching, radiation, temperature, capping/sealing

Soil group 8, developed on wash, lake and stream cover over marl, sand, clay (Itogolo-Ibushi)
East Sukumaland, Itogolo dominated (H4), Ibushi plain, east lake Manjara shore, lake Natron shore, Shinyanga-Igunga plains (H3)

Agro-ecological zones: La-1, La-3, La-4b

Geology, parent material: wash, lake and stream (Plio-)Pleistocene (3) deposits covering marl, sand, clay and granite
Climatic zones: B-E
Temperature regime: 2
Luvic Phaeozems: 238 dominant
Strongly leached loamy clayey Paleosols: 462 common
Imperfectly drained hardpan soils: 602 dominant
Imperfectly to poorly drained Vertisols: 728 common
Salty and/or sodic soils: 771 common

Farming systems per climatic zone:
B: Rice, livestock
D: Cotton, sorghum, Cotton, sorghum, pastoralism
D-E: Pastoralism (2b)
Farming system group: 2l2

Topography: very gently undulating
Proportion of cultivated land: very high (?)
Carrying capacity: very low ?
Dependency on soil available moisture: low
Drought risk: low to moderate

Dominant soil types: Phaeozems; Itogolo soils
Common soil types: Xerosols or Luvisols; Vertisols; Solonetz
Major crops: Rice, cotton, sorghum
Constraints: erosion, soil degradation (gully erosion), drought, drainage, fertility, low organic matter, sodicity, salinity, capping/sealing, workability, flooding

Soil group 9, developed on lake deposits (Kyela plain)

Agro-ecological zone: Me-2c

Geology, parent material: lake sediments (Recent (2))
Climatic zones: A
Temperature regime: 3
Well drained Fluvisols: 206 common
Poorly drained Fluvisols: 647 dominant

Farming systems per climatic zone:
A: Rice, cocoa
Farming system group: 1c1

Topography: flat
Proportion of cultivated land: very high
Carrying capacity: high
Dependency on soil available moisture low
Drought risk: low

Dominant soil types: Poorly drained Fluvisols
Common soil types: Better drained Fluvisols
Major crops: Rice, cocoa, banana, maize, cassava
Constraints: flooding, excess rainfall, humidity, fertility, drainage

Soil group 10, developed on stream deposits (Northern Kagera, Mara floodplains)

Agro-ecological zones: Ka-4b, Lw-2b

Geology, parent material: stream deposits (Sub-recent (2)
Climatic zones: B-D
Temperature regime: 2
Well drained Fluvisols: 203 dominant
Strongly leached Gleysols: 704 common
Poorly drained Fluvisols: 652 dominant
Peat soils: 787 dominant

Farming systems per climatic zone:
B: Maize, livestock (1a, 1b), sugarcane estate
D: Maize, livestock (1c)
Farming system group: 2h1

Topography: undulating to rolling and ridges and floodplains
Proportion of cultivated land: high to very high
Carrying capacity: medium
Dependency on soil available moisture: low
Drought risk: low

Dominant soil types: Better drained Fluvisols; Poorly drained Fluvisols; Peat soils
Common soil types: Humic/Dystric Gleysols
Major crops: Maize, sugarcane
Constraints: flooding, fertility, acidity, radiation?

Soil group 11, developed on lake and stream deposits
Rukwa valley/floodplain, Rukwa/Songwe valley, Nduli-Ismani flats, Usanga plain, Ruaha lowland/valley

Agro-ecological zones: La-2, La-4a

Geology, parent material: lake and stream deposits (Recent (2))
Climatic zones: C-E
Temperature regime: 2
Very shallow Lithosols/Regosols: 109 dominant
Well drained sandy soils: 335 dominant, 343 common
Arenosols: 509 common
Moderately leached loamy or clayey Luvi/Acri/Cambisols: 414 and 425 common
Well drained Fluvisols: 204 dominant
Imperfectly drained hardpan soils: 605 common
Moderately leached Gleysols: 672 as inclusions
Imperfectly to poorly drained Vertisols: 730 common
Poorly drained Fluvisols: 634 and 647 dominant
Salty and/or sodic soils: 767 dominant

Farming systems per climatic zone:
C-E: Tobacco, (agro-)pastoralism (1b), Maize, sorghum, pastoralism (5), Rice, pastoralism (1)
Farming system group: 2o1

Topography: flat plains
Proportion of cultivated land: low
Carrying capacity: medium
Dependency on soil available moisture: variable
Drought risk: low to moderate

Dominant soil types: Lithosols/Regosols; Luvisols; Better drained Fluvisols; Poorly drained Fluvisols; Solonchak; Solonetz
Common soil types: Cambic Arenosols: Acrisols: Hardpan soils (Solonetz, Gleysols); Vertisols
Major crops: Tobacco, maize, sorghum, rice
Constraints: sodicity, flooding, salinity, workability, fertility, drainage, soil degradation (gully erosion), low organic mmatter, soil depth, drought, capping/sealing

Soil group 12, developed on stream deposits (Kilombero valley)

Agro-ecological zone: Me-4c

Geology, parent material: stream deposits
Climatic zones: B
Temperature regime: 3
Well drained Fluvisols: 205 dominant
Imperfectly drained hardpan soils: 611 dominant
Poorly drained Fluvisols: 633 and 648 common

Farming systems per climatic zone:
B: Rice, maize, cassava, cotton, sugarcane estates
Farming system group: 1g2

Topography: flat
Proportion of cultivated land: high
Carrying capacity: very high
Dependency on soil available moisture: high
Drought risk: moderate

Dominant soil types: Better drained Fluvisols; Ferric Arenosols
Common soil types: Poorly drained Fluvisols
Major crops: Rice, maize, cassava, cotton, sugarcane
Constraints: flooding, fertility, (acidity, low organic matter?)

Soil group 13, developed on lake and stream deposits (Western swamps)

Agro-ecological zone: Lw-1b

Geology, parent material: lake and stream deposits (Recent (2))
Climatic zones: B
Temperature regime: 2
Moderately leached Gleysols: 671 dominant
Strongly leached Gleysols: 701 common
Imperfectly to poorly drained Vertisols: 737 dominant
Peat soils: 783 common

Farming systems per climatic zone:
B: Rice, sweet potato
Farming system group: 1f1

Topography: flat
Proportion of cultivated land: very low
Carrying capacity: medium
Dependency on soil available moisture: low
Drought risk: low to moderate

Dominant soil types: Eutric Gleysols; Vertisols
Common soil types: Humic Gleysols; Peat soils
Major crops: Rice, sweet potato
Constraints: flooding, drainage, (fertility, acidity?)

Soil group 14, developed on sandstone and shale
South-east Songea plain (B5), Eastern and Southern sedimentary plateaux, Ruhuha valley, Gumbiro area

Agro-ecological zones: Sa-1, Sa-2a, Sa-3a, Sa-4, Sa-5

Geology, parent material: sandstone and shale
Climatic zones: A-D
Temperature regime: 2-3
Very shallow Lithosols: 110 common
Sandy ferralic Cambisols: 340 dominant
Arenosols: 527 common
Moderately leached Gleysols: 692 and 693 as inclusions
Imperfectly to poorly drained Vertisols: 725 dominant
Poorly drained Fluvisols: 650 as inclusion

Farming systems per climatic zone:
A-B: Cashew (1)
C: Maize-sesame (1b)
C-D: Maize, bean (4b), Cashew (2)
D: Park (1c)
Farming system group: 2i1

Topography: undulating to hilly, some dissection
Proportion of cultivated land: nd
Carrying capacity: nd
Dependency on soil available moisture: moderate to high
Drought risk: low to moderate

Dominant soil types: ferralic Cambisols, Luvisols; Vertisols
Common soil types: Lithosols; Cambic Arenosols
Major crops: Cashew, maize, sesame, bean
Constraints: fertility, drainage, drought, low organic matter, soil depth, acidity?, erosion, radiation?

Soil group 15, developed on sandstone, limestone, shale
Southern and Eastern sedimentary hinterland plains, Makonde plateau (A5,CH2)

Agro-ecological zones:a-2b, Sa-3b

Geology, parent material: sandstone, limestone, shale (Jurrassic-Paleogene)
Climatic zones: B-C
Temperature regime: 3
Very shallow Lithosol: 107 common
Phaeozems/Cambisols: 236 common
Moderately well drained Vertisols: 541 dominant
Moderately leached Gleysols: 674 common
Imperfectly to poorly drained Vertisols: 722 common

Farming systems per climatic zone:
B: Coconut, cassava, cashew, Cashew (1), sisal estates
C: Maize, sorghum (2a), pastoralism ?
Farming system group: 1g1, 2n1

Topography: undulating to rolling, some dissection
Proportion of cultivated land: medium to very high
Carrying capacity: low
Dependency on soil available moisture: moderate
Drought risk: low to high

Dominant soil types: Moderately well drained Vertisols
Common soil types: Lithosols; Phaeozems or Cambisols; Gleysols or Luvisols; Poorly drained Vertisols
Major crops: Coconut, cassava, cashew, maize, sorghum, sisal
Constraints: salinity, fertility, workability, drainage, acidity?, drought, compaction, low organic matter, soil depth, erosion, salinity

Soil group 16, developed on stream deposits (Pangani river valley)

Agro-ecological zone: Vo-5c

Geology, parent material: stream deposits (Sub-recent (1))
Climatic zones: D
Temperature regime: 2
Strongly leached loamy clayey Paleosols: 461 as inclusion
Imperfectly to poorly drained Vertisols: 724 common
Salty and/or sodic soils: 762 dominant

Farming systems per climatic zone:
D: Rice, maize, sweet potato
Farming system group: 1j1

Topography: flat
Proportion of cultivated land: very low
Carrying capacity: low
Dependency on soil available moisture: low
Drought risk: moderate

Dominant soil types: Solonetz ; Solonchaks
Common soil types: Vertisols
Major crops: Rice, maize, sweet potato
Constraints: salinity, sodicity, workability, drought, fertility, flooding/drainage, soil degradation (gully erosion), (capping/sealing??)

Soil group 17, developed on schist and granite (Central/northern Kagera (Karagwe, Ngara))

Agro-ecological zones: Lw-2a, Lw-3a

Geology, parent material: schist and granite
Climatic zones: B-D
Temperature regime: 1-2
Very shallow Lithosols: 115 common
Ferralsols: 366 dominant
Moderately leached Gleysols: 685 as inclusion
Poorly drained Fluvisols: none (?)
Peat soils: 785 as inclusion

Farming systems per climatic zone:
B: Coffee, maize, bean (2)
D: maize, livestock (1d), ranches
Farming system group: 2d1

Topography: undulating to rolling
Proportion of cultivated land: high ?
Carrying capacity: medium
Dependency on soil available moisture: high
Drought risk: low to moderate

Dominant soil types: Ferralsols
Common soil types: Lithosols
Major crops: Coffee, maize, bean
Constraints: fertility, low organic matter, acidity, soil depth, flooding, drought, radiation?

Soil group 18, developed on granite, gneiss and wash deposits
East Sukumaland, Luseni/Itogolo dominated (H4), Igunga-Tabora plain (H4), Central-Western plains (H6)

Agro-ecological zones: Lw-2c, Lw-3b

Geology, parent material: granite, gneiss and wash deposits (Pleistocene (3))
Climatic zones: B-D
Temperature regime: 2
Very shallow soils: 111 as inclusion
Well drained sandy Luvi/Acri/Cambisols: 336 dominant
Moderately well drained Arenosols: 502 common
Moderately leached loamy or clayey Luvi/Acri/Cambisols: 423 common
Strongly leached loamy clayey Acrisols: 454 dominant
Imperfectly drained hardpan soils: 602 dominant
Moderately leached Gleysols: 691 common, 678 inclusion
Strongly leached Gleysols: 702 common
Imperfectly to poorly drained Vertisols: 740 dominant

Farming systems per climatic zone:
B: Cotton, maize (1a), Maize, sorghum, (agro-)pastoralism (2)
D: Maize, groundnut, livestock, Sorghum
Farming system group: 2h2

Topography: gently undulating
Proportion of cultivated land: very low to very high
Carrying capacity: low to very low
Dependency on soil available moisture: low
Drought risk: low to high

Dominant soil types: Luvisols or Acrisols; Strongly leached Paleosols (indurated hilltops); Itogolo hardpan soils; Gleyic Luvisols; Mbuga Vertisols
Common soil types: Arenosols; Cambisols; Dystric Gleysols
Major crops: Cotton, maize, sorghum, groundnut
Constraints: fertility, drought, workability, soil degradation (gully erosion), soil depth, acidity, low organic matter, drainage, capping/sealing

Soil group 19, developed on limestone, marl, clay
East Zanzibar and Pemba, Mafia, Southern and Eastern coastal plains (A3)

Agro-ecological zones: Co-1a, Co-2a

Geology, parent material: limestone, marl, clay (Pleistocene (2))
Climatic zones: A-B
Temperature regime: 3
Shallow soils: 144 dominant
Well drained sandy soils: 301 and 333 as inclusions
Arenosols: 522 dominant
Chromic Luvisols: 401 common
Moderately well drained Vertisols: 542 as inclusion
Moderately leached Gleysols: 675 common
Imperfectly to poorly drained Vertisols: 721 common

Farming systems per climatic zone:
A: Cassava, trees
B: Maize, sorghum (2a), Rice, coconut, cassava, sisal
Farming system group: 2e1

Topography: gently undulating to rolling
Proportion of cultivated land: medium to very high
Carrying capacity: low to high
Dependency on soil available moisture: moderate to very high
Drought risk: variable

Dominant soil types: Shallow soils; Cambic Arenosols
Common soil types: Chromic Luvisols; Gleyic Luvisols; Vertisols
Major crops: Cassava, maize, sorghum, rice, coconut, sisal
Constraints: fertility, drought, workability, salinity, soil depth, leaching?, low organic matter

Soil group 20, developed on limestone and basalt
Kigoma lakeshore

Agro-ecological zone: Lw-1a

Geology, parent material: Bukoba (1) limestone, basalt
Climatic zone: B
Temperature regime: 2
Very shallow soils: 113 as inclusion
Well drained sandy Luvi/Acri/Cambisols: 337 dominant
Strongly leached loamy clayey Ferralsols/Acrisols: 474 dominant
Arenosols: 505 as inclusion
Moderately leached Gleysols: 687 as inclusion

Farming system per climatic zone:
B: Cassava, rice, oilpalm
Farming system groups: 1f2

Topography: undulating
proportion of cultivated land: very low
Carrying capacity: low
Dependency on soil available moisture: moderate
Drought risk: low

Dominant soil types: (ferric) Cambisols or Luvisols; Ferralsols or Acrisols
Major crops: cassava, rice, oilpalm
Constraints: fertility, acidity, radiation, humidity, capping/sealing

Soil group 21, developed on granite, gneiss and lake, stream and wash deposits

Ruaha lowland/valley, north and south lake Eyasi areas, south Dodoma, west Iringa, west Mbulu, north Irambu areas, lake Manjara shore

Agro-ecological zone: Se-3b

Geology, parent material: granite, gneiss and lake, stream and/or wash deposits
Climatic zones: E
Temperature regime: 2
Very shallow Lithosols: 111 dominant
Shallow Phaeozems: 131 as inclusion
Well drained sandy Ferralic Cambisols: 335 and 343 dominant
Arenosols: 507 and 509 common, 501 as inclusion
Moderately leached loamy or clayey Luvi/Acri/Cambisols: 421 dominant, 425 common
Strongly leached loamy clayey Paleosols: 455 common
Imperfectly drained hardpan soils: 605 common, 604 as inclusion
Moderately leached Gleysols: 679 common, 689 and 691 as inclusions
Imperfectly to poorly drained Vertisols: 735 and 738 dominant, 734 as inclusion
Salty and/or sodic soils: 766 and 772 dominant

Farming systems per climatic zone:
E: maize, sorghum, sunflower, pastoralism, Rice, pastoralism (1), pastoralism (2a)
Farming system group: 1k1, 1k2

Topography: gently undulating
Proportion of cultivated land: low
Carrying capacity: very low
Dependency on soil available moisture: low ?
Drought risk: low to moderate ?

Dominant soil types: Lithosols; ferralic Cambisols; Luvisols; Vertisols; Solonetz; Solonchaks
Common soil types: Arenosols; Paleosols; Hardpan soils; Eutric Gleysols
Major crops: Maize, sorghum, sunflower, rice
Constraints: fertility, workability, flooding, soil degradation (gully erosion), acidity?, soil depth, drought, salinity, sodicity, capping/sealing

Soil group 22, developed on stream and lake deposits
Central irrigated/flooded area, Mbuga areas in Lake zone, Shinyanga-Igunga, Kwimbe-Shinyanga areas (H2)

Agro-ecological zones: Se-1, Se-2, Se-3a

Geology, parent material: stream and lake deposits (Sub-recent (2))
Climatic zones: B-E
Temperature regime: 2
Phaeozems/Cambisols: 239 common
Arenosols: 508 as inclusion
Imperfectly drained hardpan soils: 604 dominant
Imperfectly to poorly drained Vertisols: 738 dominant, 726 and 727 as inclusions
Salty and/or sodic soils: 764 dominant

Farming systems per climatic zone:
B: maize, cssava, cotton, rice
D: Cotton, sorghum, pastoralism, Rice, sorghum, millet
E: Rice, pastoralism (2)
Farming system group: 1j2, 2l1

Topography: flat
Proportion of cultivated land: high
Carrying capacity: very low
Dependency on soil available moisture: low
Drought risk: low to high

Dominant soil types: Eutric Gleysols ot Gleyic Solonetz; Vertisols; Solonetz; Solonchaks
Common soil types: Cambisols
Major crops: Maize, cassava, cotton, rice, sorghum, millet
Constraints: fertility, flooding/drainage, workability, salinity, sodicity, soil degradation (gully erosion), low organic matter?, drought

Soil group 23, developed on stream deposits (Eastern alluvial plains)

Agro-ecological zone: Me-5d

Geology, parent material: stream deposits (Sub-recent (1))
Climatic zones: B-C
Temperature regime: 3
Well drained sandy Luvi/Acri/Cambisols: 332 common
Arenosols: 521 common
Imperfectly drained hardpan soils: 601 as inclusion
Moderately leached Gleysols: 677 as inclusion
Imperfectly to poorly drained Vertisols: 723 and 724 common
Poorly drained Fluvisols: 632 dominant
Salty and/or sodic soils: maybe 761 ?
Peat soils: 781 common

Farming systems per climatic zone:
B-C: Rice, maize, sweet potato, cassava, cotton, sisal estates
Farming system group: 1h1

Topography: flat
Proportion of cultivated land: low to high
Carrying capacity: medium
Dependency on soil available moisture: moderate to high
Drought risk: moderate

Dominant soil types: Fluvisols
Common soil types: Sandy Luvisols or Acrisols; Cambic or Ferric Arenosols; Vertisols; Peat soils
Major crops: Rice, maize, sweet potato, cassava, cotton, sisal
Constraints: fertility, flooding, acidity, drought, low organic matter

Soil group 24, developed on coastal sand cover over limestone, shale and marl
Eastern and Southern hinterland plains with coastal sand cover (A4)

Agro-ecological zone: Co-3a

Geology, parent material: coastal sand (Plio-Pleistocene (2)) covering limestone, shale and marl
Climatic zones: B-C
Temperature regime: 3
Moderately well drained Arenosols: 524 as inclusion
Strongly leached loamy clayey Ferralsols/Acrisols: 471 dominant
Poorly drained Fluvisols: 644 as inclusion

Farming systems per climatic zone:
B-C: Maize, sorghum, pastoralism (2), citrus
Farming system group: 1h2

Topography: nd
Proportion of cultivated land: very high
Carrying capacity: low
Dependency on soil available moisture; moderate
Drought risk: nd

Dominant soil types: Ferric Acrisols
Major crops: maize, sorghum, citrus
Constraints: drought, fertility, acidity, capping/sealing

Soil group 25, developed on gneiss, granite, schist, limestone, basalt

Lake Tanganyika and Nyasa shores, Kate-Mwazye hills and Nkungwe mountain, Yambamrizi range and Ipumba hills, Mwese-Mpande range, Karema depression, Western plateau, Inyonga and Kipembawe plains, Shallow soil areas (SH), Namanyere-Laela plain, Meatu-Maswa-Shinyanga area, Central-Northern plains, north-Sengerema, Ukerewe island, Uriwira plain, Bukombe-Kahama plateau, Tabora plains, west Sukumaland plains, Chunya plains, Mpwapwa-east Kondoa plains

Agro-ecological zones: Me-1, Me-2a, Me-2b, Me-3, Me-4a, Me-5a, Me-6a, Me-6b

Geology, parent material: granite, gneiss, schist (Karagwe/Ankolean (1), Ubendian, Bukoba (1), Mocambique, Dodoma, basement complex)
Climatic zones: A-E
Temperature regime: 1-2
Very shallow Lithosols: 111 dominant, 106, 108, 114, 115 as inclusions
Shallow Phaeozems: 131 common
High organic matter soils: 274 as inclusion
Well drained sandy Ferralic Cambisols: 335 dominant, 339 common
Arenosols: 501 and 504 common
Ferralsols: 364 and 381 as inclusion
Moderately leached loamy or clayey Luvi/Acri/Cambisols: 421 and 422 common
Strongly leached loamy clayey Ferralsols/Acrisols: 473 and 475 dominant, 461 and 477 as inclusions
Well drained Fluvisols: 210 common
Imperfectly drained hardpan soils: 603 and 604 as inclusions
Moderately leached Gleysols: 691 common, 683, 685 and 687 as inclusions
Strongly leached Gleysols: 701 as inclusion
Imperfectly to poorly drained Vertisols: 735 dominant, 741 as inclusion
Poorly drained Fluvisols: 651 common
Salty and/or sodic soils: 763 as inclusion

Farming systems per climatic zone:
A: Cassava, rice, Maize, cassava, cotton, rice
A-B: Maize, bean (2)
B: Maize, fingermillet (1a), Maize, sorghum (2b), Maize, groundnut, tobacco, (agro-) pastoralism
B-C: Maize, fingermillet (1b), tobacco, (agro-) pastoralism
D: maize, fingermillet (2), Cotton, sorghum, pastoralism, Maize, sorghum, pastoralism (3)
D-E: Maize, groundnut, livestock
Farming system groups: 1b1, 1e1, 2b3, 2d2, 2g1

Topography: very gently undulating to rolling, to hilly (2d2)
Proportion of cultivated land: low (2b3) to high to very high
Carrying capacity: low to medium (2b3) to medium to high
Dependency on soil available moisture: low to moderate to high
Drought risk: (very) low to moderate

Dominant soil types: Lithosols; Ferralic Cambisols; Acrisols; Vertisols
Common soil types: Shallow Phaeozems; Arenosols; Fluvisols; Gleysols
Major crops: cassava, rice, maize, bean, fingermillet, cotton, sorghum, tobacco, groundnut

Constraints: fertility, erosion, salinity, sodicity, flooding/drainage, drought, workability, acidity, soil degradation (gully erosion), soil depth, radiation, temperature, low organic matter, capping/sealing

Soil group 26, developed on gneiss
Usambara footslopes, Mahenge basin, Mkulula valley, west Mikumi, Kilombero-Mahenge plain, Eastern lowland footslopes, Masisi plain, Nachinwea plain, Eastern plains, Muheza plains, Southern plains, south-east Tunduru/west Nachinwea plain

Agro-ecological zones: Me-4b, Me-5c, Me-7

Geology, parent material: gneiss (Mocambique), maybe partly covered by Plio-Pleistocene (5) coastal sand
Climatic zones: B-D
Temperature regime: 2-3
Well drained sandy Luvi/Acri/Cambisols: 334 and 335 dominant
Arenosols: 503 common, 501 as inclusion
Ferralsols: 362 dominant (in association with 412)
Moderately leached loamy or clayey Luvi/Acri/Cambisols: 412 dominant
Strongly leached loamy clayey Paleosols and Ferralsols/Acrisols: 461 and 476 dominant, 452 and 473 common
Moderately leached Gleysols: 688 as inclusion
Imperfectly to poorly drained Vertisols: 735 and 736 as inclusions

Farming systems per climatic zone:
B: maize, sorghum, (agro-) pastoralism (1b), Sorghum, millet, bambara groundnuts, (agro-) pastoralism (1b)
B-C: Cotton, maize (1b), Maize, sorghum (2a), Maize, sesame (1a), Sisal estates
D: Maize, sorghum, pastoralism (4), maize, bean (5b), Sorghum, millet, (non bean) legumes
Farming system group: 2m1

Topography: flat to rolling
Proportion of cultivated land: medium to high
Carrying capacity: low to medium
Dependency on soil available moisture: moderate to high
Drought risk: very variable

Dominant soil types: Cambisols or Luvisols; Rhodic Ferralsols; Luvisols or Acrisols; Xerosols or Luvisols; Ferric Acrisols
Common soil types: Arenosols
Major crops: Maize, sorghum, millet, (non-bean) legumes, cotton, sesame, sisal
Constraints: fertility, workability, acidity, drought, drainage, soil depth, soil degradation (gully erosion), low organic matter, capping/sealing, flooding/drainage

Soil group 27, developed on coastal sand and clay
West Zanzibar/Pemba, Eastern and Southern coastal sand hinterland plains (A4)

Agro-ecological zones: Co-1b, Co-2b, Co-3b

Geology, parent material: coastal sand and clay (Plio-Pleistocene (1))
Climatic zones: A-C
Temperature regime: 3
Well drained sandy Cambi/Luvi/Acrisols: 331 dominant
Arenosols: 523 as inclusion
Strongly leached loamy clayey Paleosols: 451 dominant
Moderately leached Gleysols: 676 as inclusion
Poorly drained Fluvisols: 643 as inclusion

Farming systems per climatic zone:
A: Cassava, (spice) trees
B(-C): Maize, sorghum (2a), Rice, coconut, cassava, Cashew (1)
Farming system group: 2j1

Topography: undulating to rolling
Proportion of cultivated land: medium to very high
Carrying capacity: low to high
Dependency on soil available moisture: moderate
Drought risk: variable

Dominant soil types: Cambisols or Luvisols; Paleosols
Major crops: Cassava, maize, sorghum, cashew, rice, coconut
Constraints: fertility, drought, workability, acidity, leaching?, low organic matter

Soil group 28, developed on stream deposits (Rufiji valley, coastal floodplains and deltas)

Agro-ecological zone: Me-5b

Geology, parent material: stream deposits (Recent (1))
Climatic zones: B-C
Temperature regime: 3
Well drained Fluvisols: 201 common
Acid sulphate soils: 751 common
Poorly drained Fluvisols: 641 common, 621 as inclusion
Salty and/or sodic soils: 761 common

Farming systems per climatic zone:
B-C: Rice, maize, cassava, cotton (?)
Farming system group: 1h3

Topography: flat
Proportion of cultivated land: high
Carrying capacity: low
Dependency on soil available moisture: moderate
Drought risk: low to moderate

Common soil types: Fluvisols; Acid sulphate soils; Solonchaks
Major crops: Rice, maize, cassava, (cotton?)
Constraints: flooding, fertility, acidity?, low organic matter, salinity?, drought (length of season)

Soil group 29, developed on sandstone and shale
Kigoma lakeshore (G4h), Bukoba high rainfall area, Nkansi-Kasanga plain, Katumba plateau, Central Biharamulo, Busando hills, south-west Kagera

Agro-ecological zones: Ka-2, Ka-3b, Ka-4c

Geology, parent material: sandstone and shale (Bukoba (2) (and Ubendian gneiss)
Climatic zones: A-B
Temperature regime: 1-2
Very shallow soils: 106 common, and 108 and 114 as inclusions. Maybe 111 ?
Well drained sandy Luvi/Acri/Cambisols: 341 dominant, maybe 335?
Arenosols: 506 dominant, maybe 501 ?
Ferralsols: 368 and 391 dominant, 364 common
Moderately leached loamy or clayey soils: 421 and 424 common
Strongly leached loamy clayey Ferralsols/Acrisols: 473 and 477 dominant
Well drained Fluvisols: 210 as inclusion
Moderately leached Gleysols: 686 common, maybe 691 ?
Strongly leached Humic/Dystric Gleysols: 704 common
Imperfectly to poorly drained Vertisols: maybe 735 ?
Poorly drained Fluvisols: 651 as inclusion
Peat soils: 784 common

Farming systems per climatic zone:
A: Coffee, banana (3)
B: cassava, rice, Tobacco, (agro-) pastoralism (1a), Banana, Coffee, banana (3), Cassava, rice, oilpalm, maize, bean, Tea estates
Farming system group: 1f3, 2b1

Topography: undulating (1f3), gently undulating to rolling, some dissection (2b1)
Proportion of cultivated land: very low (1f3), low to very high (2b1)
Carrying capacity: low (to medium)
Dependency on soil available moisture: moderate
Drought risk: low

Dominant soil types: Ferric Acrisols; Ferric Arenosols; Ferralsols
Common soil types: Very shallow soils; Mollic (?) Gleysols; Humic Gleysols
Major crops: Coffee, banana, tea, cassava, rice, oilpalm, maize, bean, tobacco
Constraints: fertility, erosion, acidity, drainage, leaching, drought, soil depth, radiation, temperature, humidity, capping/sealing

4. SOIL GROUPS PER AGRO-ECOLOGICAL ZONE

In the following sections each agro-ecological zone with each specific soil group(s) and soil types is shown. The agro-ecological zones have been combined as follows:

- Coast: Co-I (Co-1a, 2a) and Co-II (Co-1b, 2b, 3a, 3b)
- Gneiss: all Gn (Gn-1a, 1b, 2, 3, 4, 5a, 5b, 6a, 6b, 7) and Vo-4b, 5c
- Kagera/Kigoma, metamorphic and sedimentary rocks: Ka-I (Ka-1, 3a, 4a, 4b) and Ka-II (Ka-2, 3b, 4c) and Lw-1a
- Lacustrine sediments: La-I (La-1, 3, 4a) and La-II (La-2, 4b)
- Sandstone: Sa-I (Sa-1, 2a, 3a, 4, 5) and Sa-II (Sa-2b, 3b)
- Lake/Western, various rocks and sediments: Lw-I (Lw-2a, 3a) and Lw-II (Lw-1b, 2b, 2c, 3b)
- Various sediments: all Se (Se-1, 2, 3a)
- Gneiss, granite, schist: Me-I (Me-1, 2a, 2b, 2c, 3, 4a, 5a, 6a, 6b and Se-3b); Me-II (Me-4b, 4c, 5c, 7); Me-III (Me-5b, 5d)
- Volcanic ash: Vo-I (Vo-1a, 1b, 2, 4a) and Vo-II (Vo-1c, 3, 4c, 5a, 5b, 6).

Coastal sediments (Co)

Coastal sediment group Co-I, A-B climate, temp. regime 3, cassava-(spice)trees-maize-sorghum-rice-coconut (2e1)

Soil group	Occurrence	Soil name (tentative)	Soil type no.	Verification
19	Dominant	Shallow soil	144	
		Arenosol	522	
	Associated	Chromic Luvisol	401	
		Mod. leached Gleysol or Gleyic Luvisol	675	
		Vertisol	721	
	Inclusion	Pure coastal sands	301	
		Moderately leached sandy Cambi/Luvi/Acrisol	333	
		Mod. well dr. Vertisol	542	

Coastal sediment group Co-II, A-C climate, temp. regime 3, cassava-(spice)trees-maize-sorghum-rice-coconut-cashew-pastoralism

24	Dominant	Strongly leached Ferralsol/Acrisol	471	
	Inclusion	Arenosol with more clayey subsoil	524	
		Heavier textured, poorly drained Fluvisol	644	
27	Dominant	Sandy Cambi/Luvi/Acrisol	331	
		Strongly leached Paleosol	451	
	Inclusion	Arenosol with more clayey subsoil	523	
		Heavier textured, poorly drained Fluvisol	643	
		Moderately leached Gleysol	676	

Gneiss (Gn)

Gneiss group Gn, A-E climate, temp. regime 1-2, coffee-banana-maize-bean-potato-cassava-sorghum-fingermillet-wheat-barley-pigeon pea-rice-sweet potato-pastoralism

Soil group	Occurrence	Soil name (tentative)	Number	Verification
3	Dominant	Lithosol	111	
		Humic Nitisol	275	
		Rhodic Ferralsol	364	
		Strongly leached Ferralsol/Acrisol	473	
	Associated	Moderately leached Gleysol	682	
5a-b	Dominant	Lithosol	111	
		Shallow Phaeozem/Calcisol (5a)	146	
		Phaeozem/Cambisol	237	
		Humic Nitisol	272	
		Sandy Luvisol	335b	
		Rhodic Ferralsol	362	
		Moderately leached, clayey Luvi/Acri/Cambisol	412	
		Moderately leached,loamy Luvi/Acri/Cambisol	421	
		Strongly leached Paleosol	461	
		Strongly leached Ferralsol/Acrisol (5a)	473	
		Vertisol	735	
	Associated	Shallow Phaeozem/Calcisol (5b)	131	
		Sandy Acrisol	338	
	Inclusion	Better drained Fluvisol (5a)	208	
		Sandy Cambi/Luvi/Acrisol (5a)	332	
		Arenosol	501	
		Poorly drained Fluvisol (5a)	649	
		Moderately leached Gleysol (5b)	691	
		Solonetz/Solonchak (5b)	763	
6	Dominant/ associated	Humic Nitisol	273	
		Rhodic Ferralsol	361	
		Moderately leached, clayey Luvi/Acri/Cambisol	411	
	Inclusion	Better dr. Fluvisol	209	
		Poorly dr. Fluvisol	648	
16	Dominant	Solonetz/Solonchak	762	
	Associated	Vertisol	724	
	Inclusion	Strongly leached Paleosol (Xerosol/Luvisol)	461	

Kagera/Kigoma (Ka)

Kagera/Kigoma (group Ka-I) metamorphic and sedimentary rocks A-B/(D) climate, temp. regime 1-2, Coffee-maize-bean-banana-livestock(dairy)

Soil group	Occurrence	Soil name	Number	Verification
7a-c	Dominant	Clayey Ferralsol (7c)	365	
		Clayey Ferralsol	367	
		Strongly leached Ferralsol/Acrisol (7a,7c)	479	
	Associated	Lithosol	106	
		Lithosol	108	
		Lithosol	116	
		Humic Nitisol	276	
	Inclusion	Lithosol (7b)	113	
		Lithosol (7a)	114	
		Moderately leached Gleysol (7b,7c)	684-7	
		Histosol	786	
10	Dominant	Better drained Fluvisol	203	
		Poorly drained Fluvisol	652	
		Histosol	787	
	Associated	Humic/Dystric Gleysol	704	

Kagera/Kigoma (group Ka-II) metamorphic and sedimentary rocks group 2, A-B climate, temp. regime 1-2, Coffee-banana-cassava-rice-oilpalm-maize-bean-tobacco-pastoralism

Soil group	Occurrence	Soil name	Number	Verification
20	Dominant	Moderately leached sandy Luvi/Acri/Cambisol	337	
		Strongly leached Ferralsol/Acrisol	474	
	Inclusion	Lithosol	113	
		Arenosol	505	
		Moderately leached Gleysol	687	
29a-b	Dominant	Moderately leached sandy Luvi/Acri/Cambisol	341	
		Clayey Ferralsol (29a)	368	
		Loamy Ferralsol (29a)	391	
		Strongly leached Ferralsol/Acrisol (29b)	473	
		Strongly leached Ferralsol/Acrisol	477	
		Arenosol (29a)	506	
	Associated	Lithosol	106	
		Clayey Ferralsol	364	
		Moderately leached Luvi/Acri/Cambisol	421	
		Moderately leached Luvi/Acri/Cambisol (29a)	424	
		Moderately leached Gleysol	686	
		Humic/Dystric Gleysol (29a)	704	
		Histosol (29a)	784	
	Inclusion	Lithosol (29a)	108	
		Better drained Fluvisol (29b)	210	
		Poorly drained Fluvisol (29b)	651	
		Moderately leached Gleysol (29b)	686	

Lacustrine (La)

Lacustrine sediments (group La-I), B-E climate, temp. regime 2, Rice-livestock-cotton-sorghum-pastoralism

Soil group	Occurrence	Soil name	Number	Verification
8	Dominant	Luvic Phaeozem	238	
		Hardpan soil	602	
	Associated	Strongly leached Paleosol	462	
		Vertisol	728	
		Solonetz/Solonchak	771	

Lacustrine sediments (group La-II), C-E climate, temp. regime 2, Tobacco-maize-sorghum-rice-pastoralism

Soil group	Occurrence	Soil name	Number	Verification
11	Dominant	Lithosol/Regosol	109	
		Better drained Fluvisol	204	
		Moderately leached, sandy, sometimes salty/sodic Luvi/Acri/Cambisol	335b	
		Poorly drained Fluvisol (on old alluvium)	634	
		Poorly drained Fluvisol (depressions)	647b	
		Solonetz/Solonchak	767	
	Associated	Moderately leached, sandy, sometimes salty/sodic Luvi/Acri/Cambisol	343	
		Moderately leached, clayey, sometimes salty/sodic Luvi/Acri/Cambisol	414	
		Moderately leached, loamy, sometimes salty/sodic Luvi/Acri/Cambisol	425	
		Arenosol	509	
		Hardpan soil	605	
		Vertisol	730	
	Inclusion	Moderately leached Gleysol	672	

Sandstone (Sa)

Sandstone (group Sa-I), A-D climates, temp. regime 2-3, Cashew-maize-sesame-bean-park

Soil group	Occurrence	Soil name	Number	Verification
14	Dominant	Ferric Cambisol	340	
		Vertisol	725	
	Associated	Lithosol	110	
		Arenosol with more clayey subsoil	527	
	Inclusion	Poorly drained Fluvisol	650	
		Moderately leached Gleysol	692	

Sandstone (group Sa-II), B-C climates, temp. regime 3, Coconut-cassava-cashew-maize-sorghum-sisal

Soil group	Occurrence	Soil name	Number	Verification
15a-b	Dominant	Moderately well drained Vertisol	541	
	Associated	Lithosol	107	
		Phaeozem/cambisol	236	
		Moderately leached Gleysol	674	
		Poorly drained Vertisol	722	

Various rocks and sediments (Lake and Western zone)(Lw)

Various rocks and sediments (group Lw-I), B-D climates, temp. regime 1-2, Coffee-maize-bean-livestock(Dairy)-ranching

Soil group	Occurrence	Soil name	Number	Verification
17	Dominant	Ferralsol	366	
	Associated	Lithosol	115	
		Lithosol	116	
	Inclusion	Moderately leached Gleysol	685	
		Histosol	785	

Various rocks and sediments (group Lw-II), B-D climates, temp. regime 2, maize-cotton-sorghum-groundnut-livestock-rice-sweet potato

Soil group	Occurrence	Soil name	Number	Verification
10	Dominant	Better drained Fluvisol	203	
		Poorly drained Fluvisol	652	
		Histosol	783	
	Associated	Strongly leached Gleysol, B-climate	701	
13	Dominant	Moderately leached Gleysol, B-climate	671	
		Vertisol, B-climate (Mbuga)	737	
	Associated	Strongly leached Gleysol, B-climate	701	
		Histosol	783	
18	Dominant	Moderately leached, sandy Luvi/Acri/Cambisol	336	
		Strongly leached Acrisol	454	
		Hardpan soil (Itogolo)	602	
		Vertisol, D-climate	740	
	Associated	Ferralsol	382	
		Moderately leached, loamy, Luvi/Acri/Cambisol	423	
		Arenosol (Lusei)	502	
		Moderately leached Gleysol, D-climate	691	
		Strongly leached Gleysol, D-climate	702	
	Inclusion	Lithosol	111	
		Moderately leached Gleysol	678	

Various sediments (Se)

Various sediments group (Se), B-E climates, temp. regime 2, Maize-cassava-cotton-rice-sorghum-millet-pastoralism

Soil group	Occurrence	Soil name	Number	Verification
22a-b	Dominant	Hardpan soil	604	
		Poorly drained Vertisol (22b)	738	
		Solonetz/Solonchak (22a)	764	
	Associated	Phaeozem/Cambisol (22b)	239	
	Inclusion	Arenosol (22a)	508	
		Moderately well drained Vertisol (22a)	726	
		Moderately well drained Vertisol (22b)	727	

Gneiss, granite, schist (Me)

Gneiss, granite, schist (group Me-I), A-E climates, temp. regime 1-3, maize-fingermillet-cassava-bean-cotton-rice-sorghum-groundnut-tobacco-sunflower-pastoralism

Soil group	Occurrence	Soil name	Number	Verification
9	Dominant	Poorly drained Fluvisol	647a	
	Associated	Better drained Fluvisol	206	
21a-b	Dominant	Lithosol	111	
		Sandy Ferric Cambisol, A-D climate	335b	
		Sandy moderately leached Luvi/Acri/Cambisol, E-climate	343	
		Moderately leached, loamy Luvi/Acri/Cambisol	421	
		Vertisol	735	
		Vertisol (21a)	738	
		Solonetz/Solonchak, E-climate (21b)	766	
		Solonetz/Solonchak, E-climate (21a)	772	
	Associated	Moderately leached, loamy Luvi/Acri/Cambisol (21a)	425	
		Strongly leached Paleosol, E-climate (21b)	455	
		Arenosol, E-climate(21b)	507	
		Arenosol (21a)	509	
		Hardpan soil (21a)	605	
		Moderately leached Gleysol, E-climate (21b)	679	
	Inclusion	Shallow Phaeozem	131	
		Arenosol, B-D climate	501	
		Hardpan soil (21a)	604	
		Moderately leached Gleysol, B-climate	691	
		Vertisol (21a)	734	
25a-e	Dominant	Lithosol	111	
		Moderately leached, sandy Ferric Cambisol, A-D climate (25 c,d,e)	335a	
		Ferric Cambisol, B-climate (25a)	339	
		Moderately leached, loamy Luvi/Acri/cambisol (25e)	421	
		Strongly leached Paleosol, D-climate (25e)	461	
		Strongly leached ferralsol/Acrisol, A-D climate (25a,c,e)	473	
		Strongly leached ferralsol/Acrisol, B-climate (25a,b)	475	
		Arenosol, B-D climate (25d)	501	
		Arenosol, B-climate (25a)	504	
		Arenosol (25c)	506	
		Moderately leached Gleysol (25e)	691	
		Vertisol (25e)	735	

	Associated	Shallow Phaeozem (25e)	131	
		Better drained Fluvisol (25a,c,d)	210	
		Rhodic Ferralsol (25c)	364	
		Rhodic ferralsol, more fertile, better structured (Nitosol?) (25e)	381	
		Moderately leached, loamy Luvi/Acri/Cambisol (25a)	422	
		Strongly leached Ferralsol/Acrisol, B-D climate (25d)	477	
		Poorly drained Fluvisols, B-D climate (25a,c,d)	651	
		Strongly leached Gleysol (25e)	701	
	Inclusion	Lithosol (25b)	106	
		Lithosol (25e)	108	
		Lithosol (25a)	115	
		Humic Nitosol (25e)	274	
		Hardpan soil (25e)	604	
		Moderately leached Gleysol (25a,e)	685	
		Solonetz/Solonchak (25e)	763	

Gneiss, granite, schist (group Me-II), B-D climates, temp. regime 2-3, Rice-maize-cassava-cotton-sorghum-millet-bambara groundnut-sesame-grain legumes-sugarcane-sisal-ranching-pastoralism

Soil group	Occurrence	Soil name	Number	Verification
12	Dominant	Better drained Fluvisol	205	
		Ferric/Cambic Arenosol with ironstone	611	
	Associated	Poorly drained Fluvisol	633	
		Poorly drained Fluvisol	648	
26	Dominant	Moderately leached, sandy Luvi/Acri/Cambisol	334	
		Moderately leached, sandy Luvi/Acri/Cambisol	335a	
		Moderately leached, clayey Luvi/Acri/cambisol	412	
		Strongly leached, loamy to clayey Paleosol, D-climate (Xerosol/Luvisol	461	
		Strongly leached Ferralsol/Acrisol, A-D climate	476	
	Associated	Ferralsol	362	
		Strongly leached Paleosol, B-C climate	452	
		Strongly leached Ferralsol/Acrisol, A-D climate	473	
		Arenosol	503	
	Inclusion	Lithosol	111	
		Arenosol	501	
		Moderately leached Gleysol	688	
		Vertisol	735	

Gneiss, granite, schist (group Me-III), B-C climates, temp. regime 3, rice-maize-sweet potato-cassava-cotton-sisal

Soil	Occurrence	Soil name	Number	Verification

group				
23	Dominant	Poorly drained Fluvisol	632	
	Associated	Moderately leached Luvi/Acri/Cambisol	332	
		Arenosol with more clayey subsoil	521	
		Vertisol	723	
		Vertisol	724	
		Histosol	781	
	Inclusion	Hardpan soil	601	
		Moderately drained Gleysol	677	
28	Dominant/ associated	Better drained Fluvisol	201	
		Poorly drained Fluvisol	641	
		Acid sulphate soil (Thionic Fluvisol)	751	
		Solonetz/Solonchak	761	
	Inclusion	Poorly drained Fluvisol	621	

Volcanic ash (Vo)

Volcanic ash (group Vo-I), A-C climates, temp. regime 1, Maize-potato-coffee-banana-bean

Soil group	Occurrence	Soil name	Number	Verification
1a-b	Dominant	Shallow Humic Andosol	133	
		Humic/Mollic Andosol	261b	
		Humic/Mollic Andosol	265	
		Ferric Acrisol (1a)	473	
	Associated	Humic Nitisol	275	
		Ferralsol	364	
	Inclusion	very shallow Andosol? (1b)	103	
		very shallow Andosol? (1a)	105	
		Very shallow Andosol?	111	
		Humic Nitisol	272	
		Arenosol (1a)	501	
2	Dominant	Humic/Mollic Andosol	264	
	Inclusion	Humic Nitisol	275	
		Ferric Acrisol	478	
		Moderately leached Gleysol	681	

Volcanic ash (group Vo-II), A-E climates, temp. regime 1-2, Coffee-banana-maize-ban-potato-wheat-barley-pigeon pea-pastoralism-park

Soil group	Occurrence	Soil name	Number	Verification
4a-b	Dominant	Very shallow Andosol?	102	
		Shallow Humic Andosol?	142	
		Luvic Phaeozem	231	
		Luvic Phaeozem (4b)	232	
		Mollic Solonetz (4b)	251	
		Humic/Mollic Andosol	262	
		Humic Nitisol	271	
		Sandy Eutric Nitosol	321	
	Associated	Shallow Humic Andosol (4a)	132	
		Humic/Mollic Andosol (4b)	261a	
		Vertisol (4b)	732	
		Vertisol	734	
		Solonetz/Solonchak (4b)	772	
		Histosol	782	
	Inclusion	Lithosol, very shallow Andosol? (4b)	105	
		Lithosol, very shallow Andosol? (4a)	111	
		Volcanic sand dunes (4b)	311	
		Ferralsol (4a)	362	
		Arenosol (4a)	501	
		Moderately well drained Vertisol (4a)	543	
		Moderately well drained Vertisol (4b)	544	

Annex 1. Database on soil groups as related to agro-eccological zones, farming systems and mapping units

2 pages

Annex 2. Soil groups and farming systems for climatic zone

2 pages

Annex 3. Soil groups and the main soil types

Sorted on soil groups in order of diminishing soil fertility										
Soil group	AEZ	FSgroup	FSZ	Unit		Soil group	AEZ	FSgroup	FSZ	Unit
1a	Vo-1a	1a1	MP1a	A1a1		14	Sa-1	2i1	C1	A2f
1a	Vo-1a	1a1	MP1a	A1a2		14	Sa-1	2i1	MFo1a	A2g
1a	Vo-1a	1a1	MP1a	A1g1		14	Sa-2a	2i1	C1, C2	B3f
1a	Vo-1a	1a1	MP1a	A1g2		14	Sa-3a	2i1	MB4b	C2d1
1a,1b	Vo-1a	1a1 (2a2)	MP1a	A1c		14	Sa-3a	2i1	C2	C2d2
1b	Vo-1a	2a2	MP1a	A1b		14	Sa-3a	2i1	MSe1b	C2f
1b	Vo-1b	2a2	CB1	A1h1		14	Sa-3a	2i1	C2, C1	C3g
1b	Vo-1b	2a2	CB1	A1h2		14	Sa-4	2i1	MB4b	D2i
1b	Vo-4a	2a2	MB4c	C1c		14	Sa-5	2i1	Park1b	D3c
2	Vo-2	1d2	CMB1, coffee	B1d		15a	Sa-2b	1g1	CCC	B3g2
3	Gn-1a	2a1	CB2	A1h3		15a	Sa-2b	1g1	CCC	B3g3
3	Gn-5a	2a1	MFo1b	C1b		15b	Sa-2b	2n1	C1, CCC	B3g1
4a	Vo-1c	2c1	CB1	A1k1		15b	Sa-3b	2n1	MS2a, CCC, sisal	C3d
4a	Vo-1c	2c1	CB1	A1k2		16	Vo-5c	1j1	RMSp	D2p2
4a	Vo-3	2c1	MP1b	B1a1		17	Lw-2a	2d1	CMB2, ML1d	B2h
4a	Vo-3	2c1	MB1b	B1a2		17	Lw-3a	2d1	ML1d	D1c
4a	Vo-3	2c1	MB1a	B2b1		17	Lw-3a	2d1	ML1d	D2d
4a	Vo-3	2c1	MB1a	B2b2		18	Lw-2c	2h2	CM1a	B2l1
4a	Vo-5b	2c1	MBP	D2h2		18	Lw-2c	2h2	MSP2	B2l3
4a	Vo-5b	2c1	WBMBP	D2k1		18	Lw-3b	2h2	MGL	D2r2
4a	Vo-5b	2c1	MBP	D2k3		18	Lw-3b	2h2	MGL	D2r3
4a	Vo-5b	2c1	MBP, s/cane	D2l		18	Lw-3b	2h2 (2l2)	S	D2r1
4a	Vo-5b	none, (2c1)	Bare	D2k2		19	Co-1a	2e1	CT	A3c
4b	Vo-4c	2k1	P1a	C2e		19	Co-2a	2e1	MS2a, sisal	B3m1
4b	Vo-5a	2k1	Park1a, P1a	D1e		19	Co-2a	2e1	RCC, sisal	B3m2
4b	Vo-5a	2k1	Park1a, P1a	D2h1		20	Lw-1a	1f2	CRO	B2s
4b	Vo-5a	2k1	Park1a	D2h3		21a	Se-3b	1k2	P2a	Ea2
4b	Vo-6	2k1	Park1a, P1b	Ef1		21a	Se-3b	1k2	P2a	Ed2
4b	Vo-6	2k1	P1b	Ef2		21a	Se-3b	1k2	P2a	Eg1
4b	Vo-6	2k1	Park1a	Ef3		21a	Se-3b	1k2 (1k1,2g1)	MGL, MSP5, P2a	Ec1
4b	Vo-6	2k1	P1b	Ef4a		21b	Se-3b	1k1	MSP5	Eb3
4b	Vo-6	2k1	P1b	Ef4c		21b	Se-3b	1k1	RP1	Eb4
4b	Vo-6	2k1	P1b	Ef5		22a	Se-2	1j2	RSM	D2s
4b	Vo-6	none	Bare	Ef4b		22b	Se-1	2l1	MCCR	B2m
5a	Gn-1b	2c2	MFo1a	A1d1		22b	Se-2	2l1	CSP	D2p1
5a	Gn-1b	2c2	MFo1a	A1d2		22b	Se-3a	2l1	RP2	Ea1
5a	Gn-1b	2c2	MP2	A1d3		23	Me-5d	1h1	RMC, sisal	B3j1
5a	Gn-1b	2c2	MB2	A1d4		23	Me-5d	1h1	RMSp	B3j2
5a	Gn-1b	2c2	MB2	A1d5		23	Me-5d	1h1	RMSp	C3h
5a	Gn-1b	2c2	MB2, tea	A1d6		24	Co-3a	1h2	MSP2, citrus	B3k
5a	Gn-1b	2c2	MB2	A1d7		24	Co-3a	1h2	MSP2	C3e
5a	Gn-1b	2c2	CMB3a	A1j1		25a	Me-3	1e1	MFm1a	B1c
5a	Gn-1b	2c2	MB2	A1j2		25a	Me-4a	1e1	MFm1a	B2a1
5a	Gn-1b	2c2	MP2	A1j3		25a	Me-4a	1e1	MFm1a	B2a2
5a	Gn-2	2c2	MB2	A2d1		25b	Me-2a	1b1	CR	A2e
5a	Gn-2	2c2	MP2	A2d2		25b?	Me-2a	1b1	CR	A2d4
5a	Gn-2	2c2	MB2	A2d3		25c	Me-1	2b3	MB2	A1i
5a	Gn-2	2c2	MFo1a	A2d5		25c	Me-2a	2b3	MB2	A2c
5a	Gn-2	2c2	MB2	A2d7		25c	Me-4a	2b3	MB2	B2d3
5a	Gn-2	2c2 (2i1)	MB2,C1	A2d6		25c	Me-4a	2b3	MS2	B2d4
5a	Gn-3	2c2	MB2,MP2	B1b1		25d	Me-4a	2d2	MFm1b	B2d2
5a	Gn-3	2c2	MP2,tea,wattle	B1b2		25d	Me-5a	2d2	MFm1b	C2a2
5a	Gn-3	2c2	CB2,MB2	B1b3		25d	Me-6a	2d2	MFm2	D1a
5a	Gn-3	2c2	MP2	B1b4		25e	Me-2b	2g1	MCCR	A2b
5a	Gn-3	2c2	MB2	B1b5		25e	Me-4a	2g1	TP1a	B2d1
5a	Gn-3	2c2	MB2	B1b6		25e	Me-4a	2g1	MGTP	B2j1
5a	Gn-3	2c2	MB2	B2c		25e	Me-4a	2g1	MGTP	B2j2
5a	Gn-5b	2c2	MB4a	C1d1		25e	Me-4a	2g1	MGTP	B2j3
5a	Gn-5b	2c2	MB4a,SF1	C1d2		25e	Me-4a	2g1	MGTP	B2j4
5a	Gn-5b	2c2	SF1	C1d3		25e	Me-4a	2g1	MGTP	B2k
5a	Gn-6a	2c2	MB4a,SF1	D1b1		25e	Me-5a	2g1	TP1a	C2a1
5a	Gn-6a	2c2	MB4a,SF1	D1b2		25e	Me-6b	2g1	MSP3	D2b1
5a	Gn-6b	2c2	WBMBP,MB5a	D1d1		25e	Me-6b	2g1	MSP3	D2b2
5a?	Gn-3	2c2?	MFo1a	B2i		25e	Me-6b	2g1	MSP3	D2c

Soil group	AEZ	FSgroup	FSZ	Unit		Soil group	AEZ	FSgroup	FSZ	Unit
5b	Gn-4	2f1	CMB3b	B2p2		25e	Me-6b	2g1	MSP3	D2f
5b	Gn-5c	2f1	MSP1a	C2b		25e	Me-6b	2g1	CSP	D2n
5b	Gn-6b	2f1	WBMBP	D1d2		25e	Me-6b	2g1	MGL	D2q1
5b	Gn-6b	2f1	MB5b	D2a1		25e	Me-6b	2g1	MGL	D2q2
5b	Gn-6b	2f1	MB5b	D2m1		25e	Me-6b	2g1	MGL	D2q3
5b	Gn-6b	2f1	MB5b,sisal	D2m2		25e	Me-6b	2g1	MGL	D2q4
5b	Gn-6b	2f1 (2g1)	MB5b, MSP3	D2e		26	Me-4b	2m1	MSP1b	B2p1
5b	Gn-7	2f1	P2b	Eb1		26	Me-4b	2m1	CM1b	B2r
5b	Gn-7	2f1	P2b	Eb2		26	Me-4b	2m1	CM1b	B3c1
5b	Gn-7	2f1	Park1c	Ec2		26	Me-4b	2m1	CM1b	B3c2
5b	Gn-7	2f1	P2b	Ed1		26	Me-4b	2m1	SML1a	B3c3
5b,(4a?)	Gn-6b	2f1 (2c1)	WBMBP	D2k4		26	Me-4b	2m1	MSe1a	B3d1
5b,(4a?)	Gn-6b	2f1 (2c1)	MBP, bean	D2g		26	Me-4b	2m1	MSe1a	B3d2
6	Vo-4b	1i1	MS1	C1a		26	Me-4b	2m1	CM1b	B3h1
7a	Ka-1	1a2	CMB2	A1e		26	Me-4b	2m1	MS2a, sisal	B3h2
7b	Ka-3a	1d1	MB3	B1e		26	Me-5c	2m1	MS2a, sisal	C3a1
7c	Ka-1	2b2	CMB2	A1f		26	Me-5c	2m1	CM1b	C3a2
7c	Ka-4a	2b2	CB3	B2g1		26	Me-5c	2m1	MSe1a	C3b
7c	Ka-4a	2b2	B	B2g2		26	Me-5c	2m1	MSe1a	C3c
8	La-1	2l2	RL	B2l2		26	Me-7	2m1	MB5b, MSP4	D2a2
8	La-3	2l2	CS	D2o1		26	Me-7	2m1	SML1b, ranching	D3a
8	La-3	2l2	P2b	D2o2		26	Me-7	2m1	MSP4	D3b1
8	La-3	2l2	CSP	D2o3		26	Me-7	2m1	MSP4	D3b2
8	La-4a	2l2	P2b	Eg2		27	Co-1b	2j1	CT	A3b
9	Me-2c	1c1	RC	A3a		27	Co-2b	2j1	C1	B3l1
10	Ka-4b	2h1	ML1a, s/cane	B2e1		27	Co-2b	2j1	MS2a	B3l2
10	Ka-4b	2h1	ML1c	D2p3		27	Co-3b	2j1	RCC	C3f
10	Lw-2b	2h1	ML1b	B2e2		28	Me-5b	1h3	RMC	B3b
11	La-2	2o1	TP1b	C2c1		28	Me-5b	1h3	RMC	B3i
11	La-2	2o1	TP1b	C2c2		28	Me-5d	1h3	RMC	C3i
11	La-2	2o1	MSP5	C2c3		29a	Ka-2	2b1	CB3, tea	A2a1
11	La-4b	2o1	RP1, rice	Ee2		29a	Ka-2	2b1	CB3	A2a2
11	La-4b	2o1	MSP5	Ee3		29a	Ka-3b	2b1	CR	B1f
11	La-4b	2o1	MSP5	Ee4		29a	Ka-4c	2b1	TP1a	B2f1
11	La-4b	2o1 (1k2)	MSP5, P2a	Ee1		29a	Ka-4c	2b1	B	B2f2
12	Sa-2c	1g2	RMC, s/cane	B3a		29a	Ka-4c	2b1	TP1a	B2f3
13	Lw-1b	1f1	RSp	B2o		29a	Ka-4c	2b1	CB3	B2f4
						29b	Ka-4c	1f3	CRO	B2t

Soil group	FSgroup	Rain	Temp	Geology	CMU	Mapping units	Farming systems per climatic zone								
							A	A-B	B	B-C	C	C-D	D	D-E	E
Soil group 1 on volcanic ash, basalt with coffee, banana, maize, potato, bean, cool temperature, A-C climatic zone															
1a	1a1	A	1	PP7v	C6v,D5v,E1(h)	A1a1-2,A1c,A1g1-2	MP1a								
1b	2a2	A-C	1	Pl4v	E3,E3h	A1b,A1c,A1h1-2,C1c	CB1,MP1a				MB4c				
Soil group 2 on granite, gneiss and volcanic ash with coffee, maize, bean, (coffee estates), cool temperature, B climatic zone															
2	1d2	B	1	PP8v/Uben	D6v	B1d			CMB1						
Soil group 3 on gneiss with coffee, banana, maize, cool temperature, A-C climatic zones															
3	2a1	A-C	1	Uben	D6d	A1h3,C1b	CB2				MFo1b				
Soil group 4 on volcanic ash with coffee, banana, maize, bean, potato, wheat, barley, pigeon pea, pastoralism, intermediate to cool temperature, all climatic zones															
4a	2c1	A-D	1-2	SR3v,PP8v	E2(h),E4,E4h,H2v,H4v	A1k1-2,B1a1-2,B2b1-2,D2g,D2h2, D2k1,D2k3,D2k4?,D2l	CB1		MB1a,1b,MP1b				WBMBP,MBP		
4b	2k1	C-E	1-2	R2,SR3v,Plio,PP7v,8v	C6v,D5v,E1(h),E4(h),E5,(H2)	C2e,D1e,D2h1,D2h3,Ef1-3,Ef4a,Ef4c,Ef5						P1a,Park1a			P1b
Soil group 5 on gneiss and granite with coffee, maize, bean, potato, tea, wattle, sorghum, fingermillet, wheat, barley, pigeon pea, sisal, pastoralism, intermediate to cool temperature, all climatic zones															
5a	2c2	A-D	1-2	Moc,Uben	B5(h),D4,D5(d)	A1d1-7,A1j1,A1j3,A2d1-3,A2d5-7, B1b1-6,B2c,C1d1-3,D1b1-2,D1d1	CMB3a,MP2,MFo1a		MB2		SF1	MB4a	MB5a		
5b	2f1	B-E	(1-)2	BC,Moc,Dod,SR2	C4,C4(d,h),C6h,H5h	B2p2,C2b,D1d2,D2a1,D2e, D2m1-2,D2k4,Eb1-2,Ec2,Ed1			CMB3b		MSP1a		WBMBP,MB5b		P2a,P2b,Park1c
Soil group 6 on volcanic phonolites (Tarime) with maize, sorghum, banana, cassava, bean, cool temperature, C climatic zone															
6	1i1	C	1	Mio	E6	C1a					MS1				
Soil group 7 on sandstone, limestone, basalt, phyllite and quartzite with coffee, maize, bean, banana, (intermediate to) cool temperature, A-B climatic zones															
7a	1a2	A	1	Buk2	D1	A1e	CMB2								
7b	1d1	B	1	Buk1	C1h	B1e			MB3						
7c	2b2	A-B	1-2	K/A2	D3(d)	A1f,B2g1-2	CMB2		B,CB3						
Soil group 8 on wash, lake and stream cover over marl, sand, clay (Itogolo-Ibushi) with rice, cotton, sorghum, pastoralism, intermediate temperature, B-E climatic zones															
8	2l2	B-E	2	PP3,(Pl3)	H3,H4	B2l2,D2o1-3,Eg2,(D2r1)			RL				CS,CSP	P2b	
Soil group 9 on lake deposits with rice, cocoa, banana, maize, cassava, warm temperature, A climatic zone															
9	1c1	A	3	R2	F1	A3a	RC								
Soil group 10 on stream deposits with maize, dairy, sugarcane (N-Kagera, N-Mara floodplain), intermediate temperature, B-D climatic zones															
10	2h1	B-D	2	SR2	H1,H2	B2e1-2,D2p3			ML1a,b				Ml1c		
Soil group 11 on lake and stream deposits with tobacco, maize, sorghum, rice, pastoralism, intermediate temperature, C-E climatic zones															
11	2o1	C-E	2	R2	G2	C2c1-3,Ee1-4							C-E: TP1b+MSP5+RP1		
Soil group 12 on stream deposits with rice, maize, cassava, cotton, sugarcane, warm temperature, B climatic zone															
12	1g2	B	3	Pl1	B2	B3a			RMC						
Soil group 13 on lake and stream deposits with rice, sweet potato, intermediate temperature, B climatic zone															
13	1f1	B	2	R2	G1	B2o			RSp						

Soil group 14 on sandstone and shale with cashew, maize, sesame, bean, intermediate to warm temperature, A-D climatic zones													
14	2i1	A-D	2-3	Kar,PP4	B3(d),F2d	A2d6,A2f,A2g,B3e,B3f,C2d1-2, C2f,C3g,D2i,D2j,D3c		C1		MSe1b	MB4b,C2	Park1c	
Soil group 15 on sandstone, limestone, shale with coconut, cassava, cashew, maize, sorghum, sisal, warm temperature, B-C climatic zones													
15a	1g1	B	3	JP	A5(d)	B3g2-3		CCC					
15b	2n1	B-C	3	JP	A5	B3g1,C3d		C1		MS2a			
Soil group 16 on stream deposits with rice, maize, sweet potato, intermediate temperature, D climatic zone													
16	1j1	D	2	SR1	H2	D2p2						RMSp	
Soil group 17 on schist and granite with coffee, maize, bean, livestock and ranches (Karagwe), intermediate to cool temperature, B-D climatic zones													
17	2d1	B-D	1-2	K/A1	C3h	B2h,D1c,D2d		CMB2				ML1d	
Soil group 18 on granite, gneiss and wash deposits with cotton, maize, sorghum, groundnut, pastoralism, intermediate temperature, B-D climatic zones													
18	2h2	B-D	2	Pl3	G7,H4,H6	B2l1,B2l3,D2r2-3		CM1a,MSP2				MGL,S	
Soil group 19 on limestone, marl, clay with cassava, trees, maize, sorghum, rice, coconut, sisal, warm temperature, A-B climatic zones													
19	2e1	A-B	3	Pl2	A3	A3c,B3m1-2	CT	MS2a,RCC					
Soil group 20 on limestone and basalt with cassava, rice, oilpalm, intermediate temperature, B climatic zone													
20	1f2	B	2	Buk1	G3	B2s		CROa					
Soil group 21 on granite, gneiss and lake, stream and wash deposits with maize, sorghum, sunflower, rice, pastoralism, intermediate temperature, E climatic zone													
21a	1k2	E	2	SR2,Dod,R2	C6,C6h,G2,H2	Ea2,Ec1,Ed2,Ee1,Eg1							P2a
21b	1k1	E	2	PP6,Dod	C6h,G8	Eb3-4,Ec1							MSP5+RP1
Soil group 22 on stream and lake deposits with maize, cassava, cotton, rice, sorghum, millet, pastoralism, intermediate temperature, B-E climatic zones													
22a	1j2	D	2	SR2	H2	D2s						RSM	
22b	2l1	B-E	2	SR2	H2	B2m,D2p1,Ea1		MCCR				CSP	RP2
Soil group 23 on stream deposits with rice, maize, sweet potato, cassava, cotton, sisal, warm temperature, B-C climatic zones													
23	1h1	B-C	3	SR1	A2,B1	B3j1-2,C3h				RMSp+RMC			
Soil group 24 on coastal sand cover over limestone, shale and marl with maize, sorghum, citrus, pastoralism, warm temperature, B-C climatic zones													
24	1h2	B-C	3	PP2	A4d	B3k,C3e				MSP2			
Soil group 25 on gneiss, granite, schist, limestone, basalt with cassava, rice, maize, bean, fingermillet, cotton, sorghum, tobacco, groundnuts, pastoralism, intermediate to cool temperature, all climatic zones													
25a	1e1	B	1-2	K/A1, Uben (schist,granite,gneiss)	D3a,D6	B1c,B2a1-2		MFm1a					
25b	1b1	A	2	K/A1,Moc? (schist,granite,gneiss)	D4?,G5	A2d4,A2e	CR						
25c	2b3	A-B	1-2	Uben (gneiss)	G6,G6h	A1i,A2c,B2d3,B2d4		MB2	MS2b				
25d	2d2	B-D	1-2	Uben (gneiss)	D6	B2d2,C2a2,D1a D2c,D2e,D2f,D2n,D2q1-4,Ec1				MFm1b		MFm2	
25e	2g1	A-E	2	Uben,Dod,Moc,BC (gneiss, granite)	B5hC4(h),C5(d,h),C6(h),H5h	A2b,B2d1,B2j1-4,B2k,C2a1,D2b1-2,	MCCR		MGTP	TP1a		CSP,MSP3 MGL	
Soil group 26 on gneiss with maize, sorghum, millet, grain legumes, cotton, sesame, sisal, pastoralism, intermediate to warm temperature, B-D climatic zones													
26	2m1	B-D	2-3	Moc,PP5	B4,B5,B5d,B5h	B2p1,B2r,B3c1-3,B3d1-2,B3h1-2,C3a1-2,	B:P1b,SML1a,MSP1b			B-C:CM1b,MS2a,MSe1a		MSP4,MB5b,SML1b	

						C3b,C3c,D2a2,D3a,D3b1-2		
Soil group 27 on coastal sand and clay with cassava, trees, maize, sorghum, cashew, rice, coconut, warm temperature, A-C climatic zones								
27	2j1	A-C	3	PP1	A4	A3b,B3l1-2,C3f	CT	MS2a,RCC,C1
Soil group 28 on stream deposits with rice, maize, cassava, cotton (?), warm temperature, B-C climatic zones								
28	1h3	B-C	3	R1	A1	B3b,B3i,C3i		RMC
Soil group 29 on sandstone and shale with coffee, banana, tea, cassava, rice, oilpalm, maize, bean, tobacco, agro-pastoralism, intermediate (to cool) temperature, A-B climatic zones								
29a	2b1	A-B	1-2	Buk2	C2(h),D2,G4(h)	A2a1-2,B1f,B2f1-4	CB3	CR,TP1a,B,CB3
29b	1f3	B	2	Buk2 (+Uben)	G4h	B2t		CROb

			Very shallow	Well drained (fertile) soils	Well drained (moderately	Well drained (infertile) soils	Mod. to imperfectly	Str. leached	Imp.-poorly drained	Salty/sodic
FSG	Rain	Temp	and shallow soils	Phaeozem/Cambi/Ando/Nitisol	fertile) soils (Sandy	(strongly leached soils and	drained, moderately	Gleysol	Vertisol/Fluvisol	soils or peat
					Cambi/Nitosol)/Ferralsol)	Arenosols)	leached soils (Gley/			
VOLCANIC ASH							Vertisols/Hardpan)			
Volcanic ash group 1										
Soil group 1 developed on volcanic ash and basalt (Rungwe/Mbeya, (west Njombe)										
Dominant: Shallow Humic Andosol, Humic/Mollic Andosol, Ferric Acrisol. Common: Humic Nitisol, Ferralsol										
1a1, 2a2	A-C	1	(103,105, 111), **133**	**261b, 265,** (272), 275	364	**473**, (501)				
Soil group 2 developed on granite, gneiss and volcanic ash (Mbozi plateau)										
Dominant: Humic/Mollic Andosol										
1d2	B	1		**264**, (275)		(478)	(681)			
Volcanic ash group 2										
Soil group 4, developed on volcanic ash (Meru/Kili,Karatu,Hanang,Babati,Serengeti)										
Dominant: Very shallow Phaeozem/Vitric Andosol, Shallow Vitric Andosol, Luvic Phaeozem, Mollic Solonetz, Vitric Andosol, Sandy Humic Nitisol, sandy Eutric Nitosol, Vertisol.										
Common: Solonetz/Solonchak, Histosol (high altitude)										
2c1, 2k1	A-E	1-2	**102**, (105, 111), 132, **142**	**231, 232, 251,** 261a**, 262, 271**	(311)**, 321,** (362)	(501)	(543, 544)		732, 734	772, 782
GNEISS										
Soil group 3 developed on gneiss (Rungwe highlands and N-Mbeya and Mbozi rocky terrain)										
Dominant: Lithosol, Humic Nitisol, RhodicFerralsol, strongly leached Ferralsol/Ferric Acrisol. Common: moderately leached Gleysol										
2a1	A-C	1	**111**	**275**	**364**	**473**	682			
Soil group 5 developed on gneiss and granite (many areas SH,E,N,C)										
Dominant: Lithosol, Shallow Phaeozem/Calcisol, Phaeozem/Cambisol, Humic Nitisol, sandy Luvisol, Rhodic Ferralsol, moderately leached Luvi/Acri/Cambisol,										
strongly leached Paleosol, strongly leached Ferralsol/Acrisol, Vertisol										
2c2, 2f1	A-E	1-2	**111**, 131, **146**	(208), **237**, **272**	(332), **335b**, 338, **362, 412, 421**	**461**, **473,** (501)	(691)		(649), **735**	(763)
Soil group 6 developed on volcanic phonolites (Tarime highlands)										
Common: Humic Nitisol, Rhodic Ferralsol, moderately leached Luvi/Acri/Cambisol										
1i1	C	1	(104)	(209), 273	361, 411				(648)	
Soil group 16 developed on stream deposits (Pangani river valley)										
Dominant: Solonetz/Solonchak. Common: Vertisol										
1j1	D	2				(461)			724	**762**
KAGERA/KIGOMA METAMORPHIC AND SEDIMENTARY ROCKS										
Metamorphic and sedimentary rocks group 1										
Soil group 7 developed on sandstone, limestone, basalt, phyllite and quartzite (Kigoma highlands, Kasuli-Kibombo, Karagwe)										
Dominant: Humic Nitisol, Ferralsol, strongly leached Ferralsol/Acrisol. Common: Lithosols										
1a2, 1d1, 2b2	A-B	1-2	106, 108, (113, 114), 116	276	**365, 367**	**479**	(684-7)			(786)
Soil group 10 developed on stream deposits (Northern Kagera floodplain)										
Dominant: Fluvisol, Peat. Common: Humic/Dystric Gleysol										
2h1	B-D	2		**203**				704	**652**	**787**
Metamorphic and sedimentary rocks group 2										
Soil group 20 developed on limestone and basalt (Kigoma lakeshore)										
Dominant: Moderately leached sandy Luvi/Acri/Cambisol, strongly leached Ferralsol/Acrisol										
1f2	B	2	(113)		**337**	**474,** (505)	(687)			
Soil group 29 developed on sandstone and shale (Kigoma lakeshore (G4h), Bukoba/E-Kagera, + SH)										
Dominant: Moderately leached sandy Luvi/Acri/Cambisol, clayey and loamy Ferralsol, strongly leached Ferralsol/Acrisol or Ferric Acrisol, Ferric Arenosol.										
Common: Lithosol, moderately leached Luvi/Acri/Cambisol, moderately leached Gleysol, Humic/Dystric Gleysol, Histosol										
2b1, 1f3	A-B	1-2	106, (108)	(210)	**341,** 364**, 368, 391,** 421**,** 424	**473, 477, 506**	686	704	(651)	784
LACUSTRINE SEDIMENTS										
Lacustrine sediments group 1										
Soil group 8 developed on wash, lake and stream cover over marl, sand, clay (Itogolo-Ibushi)										
Dominant: Luvic Phaeozem, imperfectly drained hardpan (Itogolo) soil. Common: strongly leached Paleosol, Vertisol, Solonetz										
2l2	B-E	2		**238**		462	**602**		728	771

Lacustrine sediments group 2										
Soil group 11 developed on lake and stream deposits (Rukwa,Songwe, Nduli-Ismani, Ruaha)										
Dominant: Lithosol/Regosol, moderately leached Luvi/Acri/Cambisol, Fluvisol, Solonchak/Solonetz.										
Common: Cambic Arenosol, moderately leached, sometimes salty/sodic Luvi/Acrisol, Hardpan soil (Solonetz/Gleysol), Vertisol										
2o1	C-E	2	**109**	**204**	**335b,** 343, 414, 425	509	605, (672)		**634, 647b**, 730	**767**
SANDSTONE										
Sandstone group 1										
Soil group 14 developed on sandstone and shale (SE Songea, sedimentary plateaux (S,E), Gumbiro)										
Dominant: Ferric Cambisol, Vertisol. Common: Lithosol, Cambic Arenosol										
2i1	A-D	2-3	110		**340**	527	(692)		(650)**, 725**	
Sandstone group 2										
Soil group 15 developed on sandstone, limestone, shale (S+E sed. hinterland, Makonde)										
Dominant: Moderately well drained Vertisols. Common: Lithosol, Phaeozem/Cambisol, moderately leached Gleysol, Poorly drained Vertisol										
1g1, 2n1	B-C	3	107	236			**541**, 674		722	
VARIOUS ROCKS AND SEDIMENTS										
Various rocks and sediments group 1										
Soil group 17 developed on schist and granite (Central/Northern Kagera (Karagwe, Ngara))										
Dominant: Ferralsol. Common: Lithosol										
2d1	B-D	1-2	115, 116		**366**		(685)			(785)
Various rocks and sediments group 2										
Soil group 10 developed on stream deposits (Mara floodplain)										
Dominant: Fluvisol, Histosol. Common: strongly leached (Humic/Dystric?) Gleysol										
2h1	B	2		**203**				701	**652**	**783**
Soil group 13, developed on lake and stream deposits (Western swamps)										
Dominant: moderately leached Eutric Gleysol, Vertisol. Common: strongly leached Humic Gleysol, Histosol										
1f1	B	2					**671**	701	**737**	783
Soil group 18, developed on granite, gneiss and wash deposits (L/I Sukuma, C/W plains)										
Dominant: moderately leached Luvi/AcriCambisol, strongly leached Acrisol/Paleosol, imperfectly drained (Itogolo) hardpan soil, Vertisol (Mbuga).										
Common: Ferralsol, moderately leached Luvi/Acri/Cambisol, Arenosol (Luseni), moderately leached Gleysol, strongly leached Dystric Gleysol										
2h2	B-D	2	(111)		**336**, 382, 423	**454,** 502	**602**, (678), 691	702	**740**	
VARIOUS SEDIMENTS										
Soil group 22 developed on stream and lake deposits (C-irrigated area, Mbuga areas in Sukumaland)										
Dominant: Eutric Gleysol/Gleyic Solonetz (Planosol?) hardpan soil, Vertisol, Solonetz/Solonchak. Common: Phaeozem/Cambisol										
1j2, 2l1	B-E	2		239		(508)	**604**		(726, 727), **738**	**764**
GNEISS, GRANITE, SCHIST										
Gneiss, granite, schist group 1										
Soil group 9 developed on lake deposits (Kyela plain)										
Dominant: Poorlier drained Fluvisol. Common: Better drained Fluvisol										
1c1	A	3		206					**647a**	
Soil group 21 developed on granite, gneiss and lake, stream and wash deposits (Ruaha, Eyasi, D-Dodoma,W-Mbulu)										
Dominant: Lithosol, sandy Ferric Cambisol, moderately leached Luvi/Acri/Cambisol, Vertisol, Solonetz/Solonchak.										
Common: strongly leached Paleosol, Arenosol, Hardpan soil, moderately leached Eutric Gleysol										
1k1, 1k2	E	2	**111**, (131)		**335b, 343, 421,** 425	455, (501), 507, 509	(604), 605, 679, (691)		(734), **735, 738**	**766, 772**
Soil group 25 developed on gneiss, granite and schist (many areas (SH,W,L,C))										
Dominant soils: Lithosol, sandy Ferric Cambisol, moderately leached Luvi/Acri/Cambisol, strongly leached Ferralsol/Acrisol, strongly leached Paleosol, Arenosol, moderately leached Gleysol, Vertisol.										
Common: Shallow Phaeozem, Rhodic Ferralsol, Fluvisol, strongly leached Gleysol										
1b1,1e1,2b3,2d2,2g1	A-D	1-2	(106, 108), **111**, (115), 131	210, (274)	**335a, 339,** 364, 381**, 421**, 422	**461, 473, 475,** 477, **501, 504, 506**	(604, 685), **691**	701	651, **735**	(763)
Gneiss, granite, schist group 2										
Soil group 12 developed on stream deposits (Kilombero valley)										
Dominant: Better drained Fluvisol, Hardpan soil (Ferric/Cambic) Arenosol?). Common: Poorlier drained Fluvisol										

1g2	B	3		**205**			**611**		633, 648	
Soil group 26 developed on gneiss (highland E, footslopes, S-plains)										
Dominant: moderately leached sandy Luvi/Acri/Cambisol, Rhodic Ferralsol, moderately leached Luvi/Acri/Cambisol, strongly leached Paleosol (Xerosol/Luvisol), strongly leached Ferralsol/Ferric Acrisol.										
Common: Arenosol										
2m1	B-D	2-3	(111)		**334, 335, 362, 412**	452**, 461,** 473**, 476,** (501), 503	(688)		(735)	
Gneiss, granite, schist group 3										
Soil group 23 developed on stream deposits (Eastern alluvial plains)										
Dominant: poorlier drained Fluvisol. Common: Moderately leached sandy Luvi/Acri/Cambisol, Cambic/Ferric Arenosol, Vertisol, Histosol										
1h1	B-C	3			332	521	(601, 677)		**632**, 723, 724	781
Soil group 28 developed on stream deposits (Rufiji valley, coastal floodplains and deltas)										
Common: Fluvisol, Acid sulphate soil, Solonchak										
1h3	B-C	3		201				751	(621), 641, 751	761
COASTAL SEDIMENTS										
Coastal sediments group 1										
Soil group 19 developed on limestone, marl, clay (E-Z/P/M, S+E coastal plains)(A3)										
Dominant: Shallow soil on coral limestone, Cambic Arenosol. Common: Chromic Luvisol, moderately leached Gleysol or Gleyic Luvisol, Vertisol										
2e1	A-B	3	**144**		(301, 333), 401	**522**	(542), 675		721	
Coastal sediments group 2										
Soil group 24 developed on coastal sand cover over limestone, shale and marl (S+E hinterland/coastal sand cover)(A4d)										
Dominant: strongly leached Ferralsol/Ferric Acrisol										
1h2	B-C	3				**471**, (524)			(644)	
Soil group 27 developed on coastal sand and clay (W-Z/P, E+S coastal sand hinterland (A4)										
Dominant: Sandy Cambi/Luvi/Acrisol, strongly leached Paleosol										
2j1	A-C	3			**331**	**451,** (523)	(676)		(643)	