

LCCS GLOSSARY – Tanzania

CULTIVATED AND MANAGED TERRESTRIAL AREAS

Trees (A11 only)

A tree is defined as a woody perennial plant with a single, well-defined stem carrying a more-or-less-defined crown (Ford-Robertson, 1971). The plants often form a distinct block and are often planted in a regular spacing or pattern (e.g., orchards, and nursery stock). The duration of the crop cover usually lasts many years.

Guidelines

This category includes:

- *Broadleaved trees which are used for harvesting part(s) of the trees (e.g., fruits or nuts).*
- *Any kind of nursery stock, ornamental trees, fruit trees, hedging plants, conifers, etc.*
- *Regularly planted shade trees.*

Shrubs (A12 and A24)

These are woody perennial plants with persistent and woody stems and without any defined main stem (Ford-Robertson, 1971), being less than 5 m tall. The growth habit can be erect, spreading or prostrate.

Guidelines

Life Form of a plant is defined by its physiognomic aspect. This is the case when Woody plants, subdivided into Trees and Shrubs, are distinguished from Herbaceous plants, subdivided into Forbs and Graminoids, and Lichens/Mosses.

A condition of Height is applied to separate Trees from Shrubs: woody plants higher than 5 m are classified as Trees. In contrast, woody plants lower than 5 m are classified as Shrubs.

This general rule is subject to the following exception: a woody plant with a clear physiognomic aspect of trees can be classified as Trees even if the Height is lower than 5 m but more than 3 m. In this case, a subcondition of physiognomic aspect is added to the Height condition.

These are the recommended thresholds for Life Form characterization, but exceptions are allowed:

- *Plants essentially herbaceous but with a woody appearance (e.g., bamboos and ferns) are classified as Trees if the height is more than 5 m, and as Shrubs if the height is less than 5 m.*
- *For the classifier Woody (indistinct and/or intricate mixture of trees and shrubs), the higher limit is set at 7 m and the lower one at 2 m.*

This category in A12 includes: other Woody plants which are not ‘shrublike’ (e.g., ground lianas), Welwitschia and plants which are definitely not herbaceous (e.g., Agave and cactoids).

Herbaceous

Plants without persistent stem or shoots above ground and lacking definite firm structure (Scoggan, 1978). There are two categories depending on the physiognomy (Kuechler and Zonneveld, 1988; UNESCO, 1973): *Forbs* and *Graminoids*.

Guidelines

The life forms composing Herbaceous vegetation can be Forbs or Graminoids, but, due to their scattered distribution, it may be difficult to distinguish one from the other.

Continuous

A given crop cover extends over an area without interval or break.

Guidelines

Continuous describes a continuum of more than 50 percent of cultivated fields. In this case the land cover mapping unit may be single (inside the mapping unit the fields take up more than 80 percent) or mixed (the fields occupy 51-80 percent of the mapping unit). Generally, when the fields occupy 51-80 percent of the mapping unit, the area in between the fields can be considered as part of the cultivated area by the user or the user can decide to make a mixed mapping unit depending upon which land cover features the user wants to highlight.

Scattered Clustered and Scattered Isolated

The Spatial Distribution is *Scattered Clustered* or *Scattered Isolated* when, within the cultivated fields' area, other land cover types are present.

Guidelines

- *Where the percentage of fields is more than 20 percent but less than 50 percent, it is **Scattered Clustered**; this means that the resulting mapping unit is a mixed land cover class of a cultivated area with another land cover class. If the unit is composed of two land cover classes the cultivated area class is always the secondary class in the mixed unit, and both components need to be defined in the legend (e.g., 60 percent of semi-natural vegetation and 40 percent of fields).*
- *Where the percentage of fields is more than 10 percent and less than 20 percent, it is **Scattered Isolated**; this means that the resulting mapping unit is a mixed land cover class where the dominant class is not "scattered isolated". It is the only case where a class comprising less than 20 percent is present in a mixed mapping unit.*

Simultaneously

More than one crop is cultivated at the same time in a defined area. This is often indicated as mixed cropping. Therefore the different crops can be intermingled or they grow in distinct patterns on the same field.

Guidelines

Mixed annual crops are cultivated on one piece of land. For example: Legumes are often combined with Non-Legumes.

In the case of perennial crops (trees and shrubs), cash crops are interplanted during the period of establishment of the main crop. At a later stage the interplanted crops might be replaced by cover crops (Euroconsult, 1989).

Multiple Crop (Intercropped)

Cultivation of two or three crops which are growing simultaneously or with a period of overlap or sequentially on the same field. Crop intensification is both in time and spatially (vertical and horizontal). No horizontal spatial arrangement of the crops (e.g., rows, strips or no arrangement) is considered.

Guidelines

The Multiple Crop system can be further subdivided into One Additional Crop and More Than One Additional Crop. They can be specified by Life Form and coincidence of their planting time with the main crop.

Rainfed Cultivation

Crop establishment and development is completely determined by rainfall.

Post-Flooding Cultivation

After rainwater has flooded the field, the water infiltrated into the soil is used intentionally as a water reserve for crop cultivation. The crop(s) use(s) this water reserve for establishment.

Irrigated

Any of several means of providing an artificial regular supply of water, in addition to rain, to the crop(s).

This category is further subdivided into the main irrigation methods:

- *surface irrigation;*
- *sprinkler irrigation;*
- *drip irrigation.*

Guidelines

Under Irrigated, systems are also included in which an additional watergift depends on the actual rains and in which this watergift is essential for establishment and/or flowering of the crop. The aim of the additional watergift is to help the plants through a period of drought-stress (examples of this practice can be found in (semi-)arid climates).

Surface Irrigation

Water is supplied to the field(s) to form a water layer that infiltrates slowly into the soil. The field may be wetted completely (borders, basins) or partly (furrows, corrugations). The water layer may be moving during irrigation (flow irrigation) or it may be mainly stagnant (check irrigation).

NATURAL OR SEMI-NATURAL TERRESTRIAL VEGETATION

Woody (A12 and A24)

Defined as perennial plants with stem(s) and branches from which buds and shoots develop (Ford-Robertson, 1971). Semi-woody plants are included here (Eiten, 1968). Depending on the branching symmetry, a distinction is made between *Trees* and *Shrubs* (Strasburger *et al.*, 1983). With reference to the International Classification and Mapping of Vegetation (UNESCO, 1973), bamboos and tuft plants (palms, tree ferns, etc.) belong to this category. Depending on their height, they are classified as *Trees* or *Shrubs*.

Guidelines

The classifier Woody can be applied in two cases:

· The vegetation is an intricate mixture of different Life Forms (e.g., trees and shrubs form a closed cover where its upper surface is so uneven that neither one nor more distinct separate layers of cover can be distinguished).

· The level of detail of the description of the class does not require a separation between Trees and Shrubs. In this case, the class indicates that woody vegetation is present without further specification into trees or shrubs.

The first case is related to a specific structural aspect of vegetation, whereas the second one is related to the detail of information, which the user is able to define.

Closed (more than 70-60 percent)

A layer of a certain *Life Form* covers more than (70-60) percent of a defined area. A closed cover composed of *Trees* or *Shrubs* has crowns interlocking, touching, or very slightly separated. In the last named case, the distance between two perimeters is no more than 1/6 of the crown average diameter (Eiten, 1968). The crowns can form an even or uneven closed canopy layer.

Guidelines

If plants are growing in a defined area with the crowns touching each other, presuming that the crowns of a Woody Life Form are round, the cover of the canopy will be approximately 78 percent. However, crowns are in reality often interlocking and small open spaces in the canopy are frequent. Therefore, in a closed canopy layer, the lower limit of closed vegetation is set at 60 percent. Because of the great variability of the horizontal character of closed vegetation, in particular the different crown shapes of the plant species, the range of values can vary from 60 to 70 percent.

Open ((70-60) to (20-10) percent)

Between (70-60) and (20-10) percent of a defined area is covered by a certain *Life Form*. In the case of *Trees* and *Shrubs*, the crowns are usually not interlocking. The distance between the perimeters can range from very small up to twice the average diameter (Eiten, 1968).

This category is further subdivided into *Open* ((70-60) to 40 percent) and *Very Open* (40 to (20- 10) percent).

Guidelines

In the case of woody vegetation with a cover of between (70-60) and 40 percent, the plants are standing rather close together and, from a distance, they may appear to grow continuously (Kuechler and Zonneveld, 1988). To separate the two subclasses, the limit is set at 40 percent. The practical reason behind this is that at 40 percent coverage with Trees the distance between two perimeters equals the mean radius of a tree crown (UNESCO, 1973).

Sparse ((20-10) to 1 percent)

Between (20-10) and 1 percent of a defined area is covered by a certain layer of plants. The distance between two perimeters of a *Life Form* is more than twice the average perimeter diameter (Eiten, 1968). In many cases, a sparse *Life Form* might be associated with another *Life Form* of greater cover continuity, e.g., savannahs are characterized by sparse trees standing out from a herbaceous closed or open layer. Subdivision is made into *Sparse* ((20-10) to 4 percent) and *Scattered* (4 to 1 percent).

Guidelines

There are two reasons for the application of the range of 20 to 10 percent:

- *There is a great variability in the horizontal character of closed vegetation, namely different crown densities or crown shapes of the plant species (see also closed).*
- *Sparse cover is rarely homogenous but grows in clumps, and therefore cannot easily be defined as one single value.*

The classifier *Scattered* is only applicable if the total cover of all vegetation (that is all *Life Forms*) in the area equals or exceeds 4 percent.

Herbaceous (A12 and A24) Defined as plants without persistent stem or shoots above ground and lacking definite firm structure (Scoggan, 1978). There are two categories, depending on the physiognomy (Kuechler and Zonneveld, 1988; UNESCO, 1973), namely *Graminoids* and *Forbs*.

Guidelines

The classifier Herbaceous can be applied in two cases:

- *The vegetation is an intricate mixture of different Life Forms (e.g., Forbs and Graminoids) forming a continuous layer of the two elements.*
- *The level of detail of the description of the class does not require a separation between Forbs and Graminoids.*

Trees (A12 and A24) A tree is defined as a woody perennial plant with a single, well-defined stem carrying a more-or-less- defined crown (Ford-Robertson, 1971) and being at least 3 m tall.

Guidelines

A condition of Height is applied to separate Trees from Shrubs: woody plants higher than 5 m are classified as Trees. In contrast, woody plants lower than 5 m are classified as Shrubs. This general rule is subject to the following exception: a woody plant with a clear physiognomic aspect of trees can be classified as Trees even if the Height is lower than 5 m but more than 3 m. In this case, a subcondition of physiognomic aspect is added to the Height condition.

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This category in A12 includes: other Woody plants which are not ‘shrublike’ (e.g., ground lianas), Welwitschia and plants which are definitely not herbaceous (e.g., Agave and cactoids).

Height (30-3m, 5-0.3m, 3-0.03m)

Height subdivisions are: more than 30 m down to 3 m for *Trees*; 5 m to 0.3 m for *Shrubs*; and 3 m to 0.03 m for *Herbaceous*. Each class is further subdivided.

Guidelines

There is an overlap between the lower height limit for trees and the upper limit for shrubs, and also between the minimum height for shrubs and the maximum height for herbaceous.

Height classes are directly related to Life Forms as height plays a complementary role in the definition of the structural classes. When a specific Height class is chosen, the user deliberately decides to give more emphasis to Height in the classification.

Continuous

A given cover can be *Open* or *Closed* but to be considered *Continuous*, the vegetation has to be spread over the area with regularity and without interval or break.

Guidelines

A certain structural vegetation type has a Continuous Macropattern if inside the minimum mappable area it covers more than 80 percent of the area.

Parklike Patches

In the case of woody vegetation, *Parklike Patches* signifies that trees and shrubs grow singly or in small groups as in parklands and in savannahs. When herbaceous vegetation is present, it signifies disconnected patches (Kuechler and Zonneveld, 1988).

Guidelines

The Macropattern Parklike Patches is directly linked with the cover Sparse. This is simply redundant information. When the user defines the cover of a certain life form to be Sparse, the only Macropattern available for this structural vegetation type is Parklike Patches.

Broadleaved

This refers to trees and shrubs of the botanical group Angiospermae, with Gingko (*Gingko biloba*) as an exception, as it taxonomically belongs to the Gymnospermae. Both *Evergreen* and *Deciduous* species belong to this category.

Aphyllous

This category includes plants without any leaves and plants that apparently do not have leaves in the common sense. In the first case, photosynthesis takes place through other organs, like stems, branches and twigs; in the latter case, the leaves are very short-lived or extremely reduced to scales and thorns.

Guidelines

Characteristic genera in A12 are: Casuarina, Euphorbia, Tamarix and many others mostly found in arid and semi-arid regions (Kuechler and Zonneveld, 1988).

Evergreen

This term as such describes the phenology of perennial plants that are never entirely without green foliage (Ford-Robertson, 1971).

Guidelines

For this class to be applicable, there must be a whole layer that is more than 75 percent evergreen vegetation.

Deciduous

This applies to the phenology of perennial plants which are leafless for a certain period during the year (Ford-Robertson, 1971). The leaf shedding usually takes place simultaneously in connection with the unfavourable season (UNESCO, 1973).

Guidelines:

For this class to be applicable, there must be a whole layer that is more than 75 percent deciduous vegetation.

CULTIVATED AQUATIC OR REGULARLY FLOODED AREAS**Graminoids**

All herbaceous grasses and other narrow-leaved grass-like plants that are not grasses according to the taxonomic definition (Kuechler and Zonneveld, 1988). Bamboos are technically grasses but they are Woody in form and therefore classed with Shrubs or Trees.

Guidelines

Graminoid vegetation is defined by the presence of more than 75 percent Graminoids in the herbaceous coverage. There is no upper limit of height: the only condition is the physiognomy of the plant

ARTIFICIAL SURFACES AND ASSOCIATED AREA(S)**Industrial and/or other Areas**

Non-linear impervious surfaces are included in this class, which are related to trade, manufacturing, distribution and commerce (e.g., airports, ports, factories). The *density* of the artificial constructions in relation to the surrounding area can be described separately.

Urban Area

Urban areas are non-linear built up areas covered by impervious structures adjacent to or connected by streets. This cover is related to centres of population. *Linear* elements like (main) roads, railways and communication lines/pipelines occur but are not a dominant

feature. The *density* of the artificial constructions in relation to the surrounding area can be described separately.

Guidelines

This class usually occurs in combination with:

- *Vegetated areas that are connected to buildings that show a regular pattern, such as vegetated courtyards, gardens, etc.*
- *Industrial and/or other areas*

Non Built-Up

This class is defined by absence of the original (semi-) natural cover or water surface.

It is subdivided into:

- *Waste Dump Deposits* in which the existing land or land cover is covered by materials coming from an outside source (artefacts and materials transported by humans).
- *Extraction Sites* in which land cover, rock or earthy materials are removed by human activity or machinery.

The user should note that these areas are considered as “soils” in various soils classification systems (e.g., *Anthrosols* in the FAO Revised Soil Legend (FAO/UNESCO, 1988) and *Anthropogenic Soils*).

Non Linear

This category describes built up areas where non-linear artificial constructions cover the surface and which have an impervious (e.g., concrete, thatch) surface. Subdivision is made into *industrial and/or other areas* and *urban areas*. This subdivision is based on the elements making up this land cover.

BARE AREA(S)

Bare Rock and/or Coarse Fragments

This class contains areas which are either dominated by a continuous rock surface or covered by coarse rock fragments with a subdivision into *Bare Rock* and *Gravel, Stones and Boulders*.

Bare Soil and/or Other Unconsolidated Materials

Unconsolidated materials cover the earth’s surface, resulting from weathering of parent material (including the effects of moisture and temperature) and/or macro- and micro-organisms. A *Stony* or *Very Stony* surface can be further specified.

Bare Rock

The rock surface is continuous except perhaps for a few cracks in the material. The remainder of the area may be covered by shallow layers of soil or by isolated pockets of soil or a mixture of both.

NATURAL AND ARTIFICIAL WATERBODIES, SNOW AND ICE

Perennial

The water covers the surface for more than 9 months each year in all years.

Non-Perennial

The water covers the surface for less than 9 months each year in all years. The surface cover in the absence of water can be further specified.

Tidal (only for B28)

A regular rise and fall in the level of the sea, caused by the attraction of the moon leads to various combinations of water cover and substrate exposure (Cowardin *et al.*, 1979). The four combinations are:

- The substrate is permanently flooded with tidal water (subtidal).
- The land surface is exposed by tides less often than daily (irregularly exposed).
- Tidal water alternately floods and exposes the land surface at least once daily (regularly flooded).
- Tidal water floods the land surface less often than daily (irregularly flooded).

Bare Soil

The substrate surface exposed when water is not persistent.

Bare Sand

The substrate surface exposed when water is not persistent.

ENVIRONMENTAL ATTRIBUTES

Brackish Water:

Between 1 000 – 10 000 ppm TDS.

Fresh Water:

Less than 1 000 ppm TDS.