Chapter 3
Case study: land cover of Uganda for T&T decision-making

Uganda is one of the six African countries that were identified as priority countries for T&T intervention in the framework of the African Union-led PATTEC (Pan African Tsetse and Trypanosomiasis Eradication Campaign) initiative, which aims at the creation and subsequent expansion of tsetse-free zones. Baseline data collection is one of the key activities carried out during the preliminary phase of implementation of the national projects. Land cover maps rank high in the list of necessary data and they are considered essential for planning the baseline entomological surveys, for implementing control actions and for monitoring environmental impacts on reclaimed areas. The Programme Against African Trypanosomiasis and the Coordinating Office for Control of Trypanosomiasis in Uganda (COCTU) identified the Africover database as the best available land cover record for the country. This chapter describes the process of customization of the original land cover database with a view to producing a map capable of depicting habitats in relation to their suitability for tsetse.

The number of classes was reduced from 67 of the original database to 18, through a process of class aggregation compliant with LCCS rules. For each class a value of suitability for the three tsetse groups was assigned, mainly by means of a review of the available literature but also by considering the outcomes of the analysis at continental level described in Chapter 1. When assigning the suitability classes, the specific situation in Uganda was taken into account; for instance, FAO Statistical Database (FAOSTAT) data on crop production were used to estimate the relative abundance of different crops grown in the country (FAOSTAT, 2005). Because of such specificities, direct application of the suitability classes in different countries should be avoided. Future entomological datasets collected in Uganda for the implementation of the PATTEC initiative could be used to validate the assumption of tsetse suitability based on the literature and the analysis at continental level.

It is worth noting that by the end of 2007, the National Forestry Authority of Uganda should complete the production of an updated land cover map of the country for the reference year 2005, which will also be characterized by a higher spatial accuracy (scale 1:50 000). Africover products are available for nine sub-Saharan countries and ongoing projects are addressing the production of land cover maps for several more countries (see Figure 6, p. 18). By virtue of the standardization, it will be easy to take advantage of such future products as they become available and it will be possible to harmonize the activities of neighbouring countries.

THEMATIC AGGREGATION OF THE AFRICOVER DATABASE OF UGANDA FOR TSETSE HABITAT MAPPING

As already mentioned in the introduction to this chapter, the aggregation of the land cover classes of the original Africover map has the objective of simplifying the

map interpretation, discarding unessential information and highlighting all features relevant for tsetse habitat description. The proposed map provides a consistent and accurate description of important tsetse habitats: 'Woodland', 'Forest', 'Savannah', etc. Nonetheless, for some specific applications the full richness of information of the original database or different types of aggregation might prove more useful.

Even though the proposed legend is similar to the general one defined in Chapter 2 (see Table 7, p. 21), fewer classes were needed to describe the land cover in the country (see Table 13). In was also possible to define categories with a higher degree of specificity (i.e. containing more detailed information). The greater specificity is also demonstrated by the higher number of classifiers used for Uganda, 47, as compared with those used for the general legend, 36 (see Annexes 6 and 2).

For each aggregated class the authors defined a class name (user defined description) and a label (LCC user defined label). The abbreviations in the column 'LCC user defined label' were defined by the Africover project in East Africa and their meaning can be found in Annex 4. In the following paragraphs, the standard LCC label for each class is given (see also Annexes 5 and 7). An 'Additional description' gives further details on the class and provides some information on the specific characteristics of that class in Uganda. Last, 'Tsetse suitability' describes what can be inferred from the land cover about tsetse habitat suitability (information summarized in Table 14). For some classes a graphic representation of the land cover is provided. The images were extracted from 'LCCS – Classification concepts and user manual – Software version 2'

TABLE 13
Legend of the land cover map of Uganda for T&T decision-making (derived from the Africover map of Uganda)

	Class name (user defined description)	LCC user defined label
	Forest plantations and tree plantations	T47PL
	Rainfed shrub crop	S47V
	Herbaceous crops	H
	Vegetated urban areas	5UV
	Forest	2TC
	Woodland	2TP
	Woody vegetation	2W
	Thicket	2SCJ
	Shrubland with herbaceous	2SP6
	Grassland	2G(CP)
	Savannah	2G(CP)78
	Fields rice	GZ-r
	Freshwater swamp	4T(CP)
	Shrubs on flooded land	4S(CP)
	Herbaceous vegetation on flooded land (fresh water)	4H(CP)
	Urban areas, airports	5
	Bare soil	6S
	Lakes and rivers	8WP

(FAO, 2005). The footnotes in the following pages provide the definitions of the basic nomenclature used in the LCCS. Further information on the aggregated classes, such as standard definition, LCCS classifiers used and table of classes aggregation, can be found in Annexes 5, 6 and 7. The main reference for the definition of tsetse suitability of land cover was the FAO 'Training Manual for Tsetse Control Personnel, Volume 2: Ecology and behaviour of tsetse' (FAO, 1982). Additional main references were 'Trypanosomiasis Control and African Rural Development' (Jordan, 1986) and 'Tsetse Distribution', in 'The Trypanosomiases'. (Rogers and Robinson, 2004).

1. Forest plantations and tree plantations

LCC Label

Permanently[11] cropped area with rainfed[12] tree[13] crop(s). Crop cover: plantation(s).

Additional description

The class includes fruit trees (e.g. citrus, mango, palm, etc.), conifers (e.g. *pinus* spp., *cupressus* spp.) and hedging and shade plants.

Tsetse suitability

Among the less typical habitats of tsetse flies, man-made ones are particularly important from the point of view of disease transmission, in particular for Human African Trypanosomiasis (HAT). Tree plantations are arguably the most suitable man-created habitat for some tsetse species. Plantations of mango are breeding sites for some species of the *palpalis* group (e.g. *G. tachinoides* and *G. palpalis*); many mango plantations are grown along riversides, which provide tsetse flies with suitable shelter, particularly so in the case of old trees with low branches. Examples of other semi-artificial habitats of this class are plantations of oil palms and cola nuts and tree hedges. Untrimmed hedges and tree crops can also provide a suitable habitat for *G. pallidipes* (*morsitans* group).

2. Rainfed shrub crop

LCC Label

Permanently cropped area with rainfed shrub[14] crop(s). Crop cover: orchard(s).

Additional description

The class includes shrub crops such as plantains, coffee, cotton, bananas, tea, cocoa and pineapple. In Uganda, the largest portion of this class consists of permanently cropped

[11] This applies to the growing of crops that are not replanted for several years after each harvest (e.g. trees and shrubs). The crop should cover the land for at least two years. The first harvest takes usually place after one year or later. Under this cultivation system the land is cultivated for more than 66 percent of the years (Ruthenberg *et al.*, 1980).

[12] Crop establishment and development is completely determined by rainfall.

[13] Woody plants higher than 5 m are classified as trees (a woody plant with a clear physiognomic aspect of tree can be classified as a tree even if the height is lower than 5 m but more than 3 m)

[14] A shrub is a woody perennial plant with persistent and woody stems and without any defined main stem (Ford-Robertson, 1971).

continuous[15] small size[16] fields. In terms of harvested area (see Annex 8), the most widespread crops of this class in Uganda are plantains, coffee, cotton and bananas (FAO, 2005).

Tsetse suitability
Semi-artificial habitats consisting of various kinds of orchards or other type of plantations (such as bananas, cacao, coffee) can be atypical habitats for some species of the *palpalis* group (e.g. *G. tachinoides*). On the contrary, other crops of this class are unsuitable for all tsetse species (e.g. cotton fields).

3. Herbaceous crops
LCC Label
Herbaceous[17] crops.

Additional description
Among the crops of this class are cereals, roots and tubers, sugar cane, pulses and vegetables.

In Uganda, the staple crops of these classes are beans, maize, sweet potatoes, millet, cassava and sorghum. Most of the areas in this class consist of permanently cropped, continuous, rainfed small fields (smaller than 2 ha) with one additional herbaceous crop growing in sequence in the same field within one growing season and sparse (between 1 percent and 10–20 percent) tree crops.

Tsetse suitability
Herbaceous crops are unsuitable for tsetse flies. Locally, intercropping with sparse tree crops can provide a limited suitability for species of the *palpalis* group.

4. Vegetated urban areas
LCC Label
Vegetated urban areas.

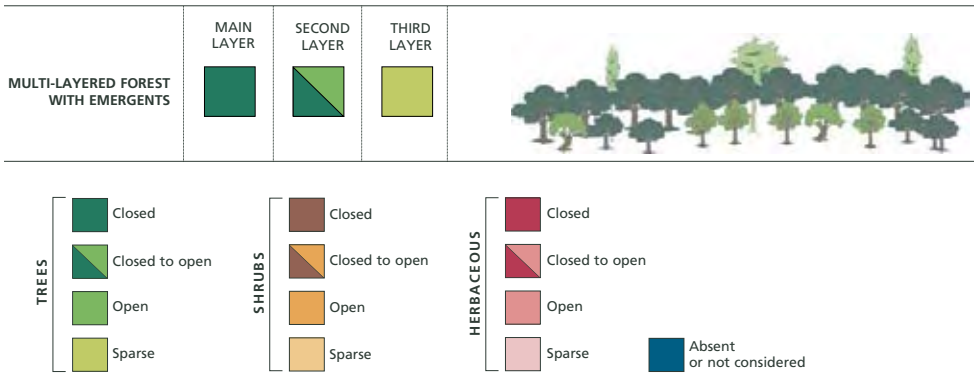
Additional description
Vegetated urban areas are dominated by clumps of trees and/or shrubs.

Tsetse suitability
Peri-domestic habitats with tree and shrub vegetation can be suitable for species of the *palpalis* group and, to a lesser extent, of the *morsitans* group.

5. Forest
LCC Label
Continuous closed[18] trees.

[15] Inside the MMA, the class covers more than 80 percent of the area.
[16] Smaller than 2 ha.
[17] Plants without persistent stem or shoots above ground and lacking definite firm structure.
[18] Within the class, one 'Life form' (in this case 'Trees') covers more than 60–70 percent of the defined area.

FIGURE 18
'Multilayered forest with emergents' in the Land Cover Classification System



Source: 'LCCS – Classification concepts and user manual – Software version 2' (FAO, 2005)

Additional description

The main layer consists of closed trees (crown cover is more than 60–70 percent). The height is in the range of 3–30 m or more. The vegetation is spread over the area without intervals or breaks. In Uganda, most of the areas in this class are covered by broad-leaved evergreen trees with a second layer of trees that form a different stratum due to a difference in height and a third layer of emergent trees higher than the main stratum (Figure 18).

Tsetse suitability

Forests provide favourable habitats to several tsetse fly species of the *fusca* and *palpalis* groups and, to a lesser extent, of *morsitans* group. With one exception (*G. longipennis*), the species of the *fusca* group are forest flies inhabiting either rain forest or isolated patches of forest, along with riverine forest in the savannah zones. Gallery forests are the typical habitat for the flies of the *palpalis* group. Species of the *morsitans* group can be found in forest edges, forest islands and in riverine forests. (Vegetation areas not used by *G. morsitans* include very high rainfall areas such as rain forests.)

6. Woodland

LCC Label

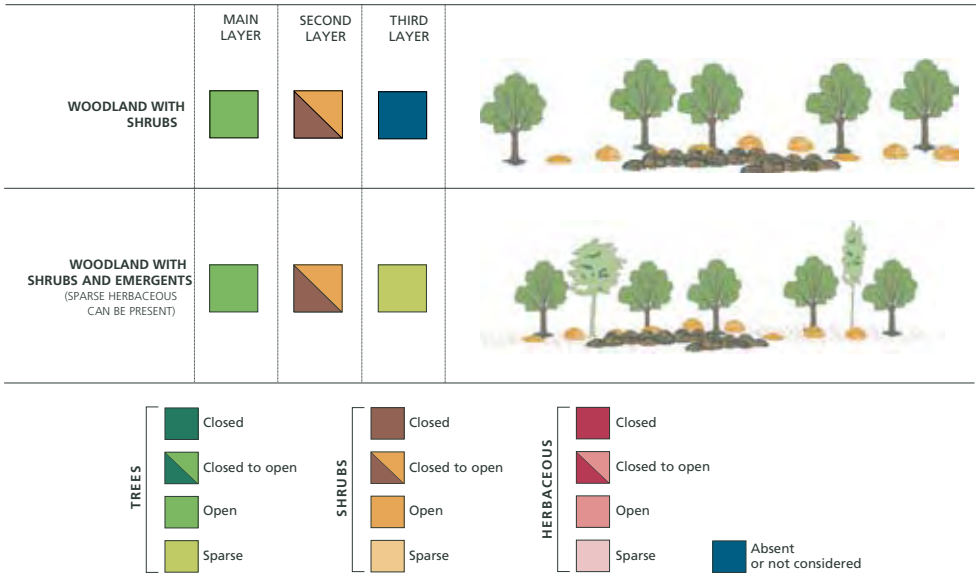
Continuous open[19] trees (Woodland).

Additional description

The main layer consists of open trees (crown cover between 10–20 and 60–70 percent). The height is in the range of 3–30 m or more. The vegetation is spread over the area without intervals or breaks. In Uganda, in most of the areas of this class there is a second

[19] Between 10–20 and 60–70 percent of a defined area is covered by one' Life form' (in this case 'Trees').

FIGURE 19
'Woodland with shrubs' in the Land Cover Classification System



Source: 'LCCS – Classification concepts and user manual – Software version 2' (FAO, 2005)

layer of closed to open shrubs; this subclass can be defined as 'Woodland with shrubs' (Figure 19) and it covers an area of around 14 000 km² (6 percent of the total surface of the country)[20]. In a less abundant subclass (1 percent of the total surface of the country), the second layer consists of emergent trees higher than the main stratum and there is a third layer of sparse shrubs ('Woodland with shrubs and emergents') (Figure 19).

Tsetse suitability

Woodlands are typical habitats of tsetse flies. Open woodland and woodland savannah are favourite habitats of the *morsitans* group; woodlands are also suitable for the *palpalis* and, to a lesser extent, for the *fusca* group, but those two groups tend to prefer somewhat thicker vegetation.

7. Woody vegetation

LCC Label

Continuous closed to open woody vegetation.

Additional description

The main layer consists of woody vegetation and the height is in the range of 2–7 m. In Uganda, most of the areas of this class have an open cover (between 10–20 and

[20] FAO, Reports on Uganda Africover, 'Mosaic codes (Area)'.

60–70 percent), a second layer of closed to open herbaceous vegetation and a third layer of emergent trees; this subclass is defined by LCCS as 'Open woody vegetation with medium to tall herbaceous layer with emergents' and it covers an area of around 9 500 km² (4 percent of the total surface of the country).

Tsetse suitability

This type of land cover class is rarely described as such in the literature related to tsetse flies. We can assume that it is alternatively included in other classes such as 'Shrubland', 'Thicket' and 'Woodland savannah'. On these grounds, we can affirm that it is moderately suitable for the species of the *morsitans* and *palpalis* groups and less so for the *fusca* group.

8. Thicket

LCC Label

Continuous closed medium to high shrubland (thicket).

Additional description

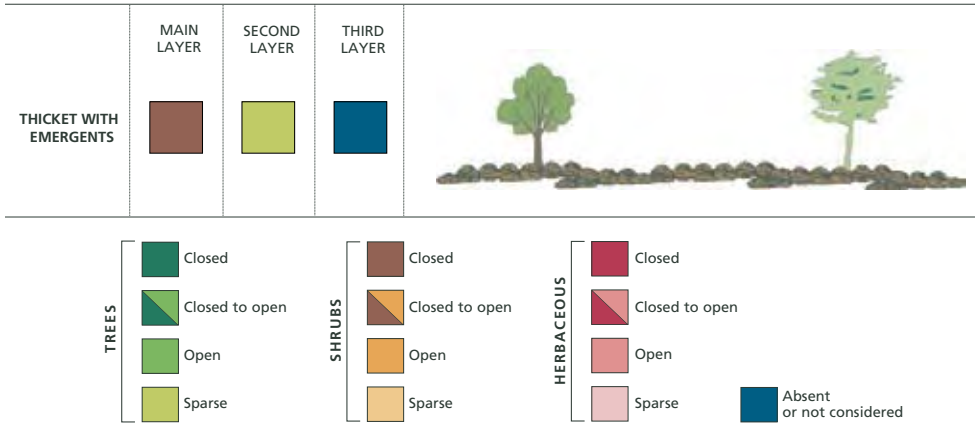
The main layer consists of closed shrubland (crown cover more than 60–70 percent); the height is in the range of 0.5–5 m. The vegetation is spread over the area without intervals or breaks. In Uganda, most of the areas of this class have a second layer of emergent trees (Figure 20); which covers an area of around 550 km² (0.23 percent of the total surface of the country).

Tsetse suitability

This class represents an extremely suitable habitat for tsetse species of the *morsitans* group and, to a lesser extent, of the *palpalis* and *fusca* groups.

FIGURE 20

'Medium to high thicket with emergents' in the Land Cover Classification System



Source: 'LCCS – Classification concepts and user manual – Software version 2' (FAO, 2005)

9. Shrubland with herbaceous

LCC Label

Closed to open shrubs.

Additional description

The main layer consists of shrubs (crown cover is between 15 and 100 percent). The height is in the range of 0.3–5 m. In Uganda, most of the areas of this class have an open cover (between 10–20 and 60–70 percent), a second layer of closed to open herbaceous vegetation and a third layer of emergent trees; this subclass is defined by LCCS as 'Open shrubland with herbaceous and emergents' (Figure 21) and it covers an area of around 35 000 km^2 (16 percent of the total surface of the country).

Tsetse suitability

This habitat differs from the classic savannah only for the presence of the main shrub layer. Thus, we can assume that it is moderately suitable for the *morsitans* group and less so for the *palpalis* group. This class is deemed unsuitable for the *fusca* group.

10. Grassland

LCC Label

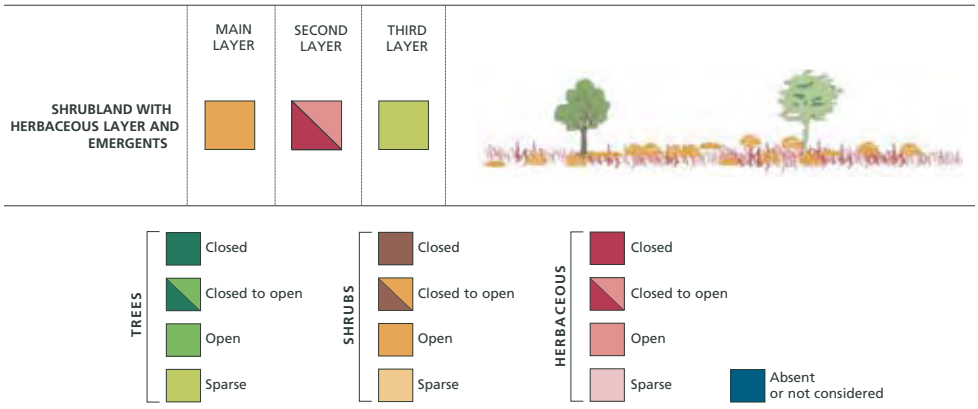
Continuous closed to open grassland.

Additional description

The main layer consists of grassland (crown cover is more than 15–100 percent); the height is in the range of 0.03–3 m, the vegetation is spread over the area without intervals or breaks. In Uganda this class covers around 6 000 km^2 (2.5 percent of the total surface of the country).

FIGURE 21

'Shrubland with herbaceous and emergents' in the Land Cover Classification System



Source: 'LCCS – Classification concepts and user manual – Software version 2' (FAO, 2005)

Tsetse suitability
This land cover is unsuitable for tsetse flies.

11. Savannah

LCC Label
Closed to open grassland with trees and shrubs.

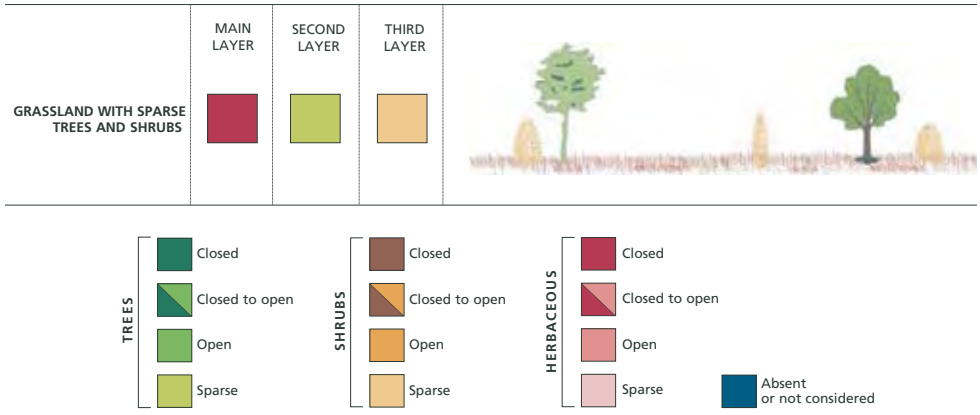
Additional description
The main layer consists of grassland (crown cover is between 15 and 100 percent); the height is in the range of 0.03–3 m. The vegetation is spread over the area without intervals or breaks. The second layer consists of sparse trees. The third layer consists of sparse shrubs (Figure 22). In Uganda this class covers more than 20 000 km² (8.5 percent of the total surface of the country).

Tsetse suitability
Savannah offers moderately suitable habitats for species of the *morsitans* group and for some of the *palpalis* group, much less so for the *fusca* group. The limited tree and shrub cover of this class can be sufficient for many species during the wet season, but it is usually unable to support flies populations during the dry season.

12. Fields rice

LCC Label
Continuous field(s) of graminoid crops on permanently flooded land. Dominant crop: cereals – rice (*Oryza* spp.).

FIGURE 22
'Savannah' in the Land Cover Classification System



Source: 'LCCS – Classification concepts and user manual – Software version 2' (FAO, 2005)

Additional description
Field(s) are covered with graminoid crops. The crops are growing on permanently flooded land.

Tsetse suitability
This land cover is not suitable for tsetse flies.

13. Freshwater swamp
LCC Label
Closed to open trees. Water quality: fresh water.

Additional description
The main layer consists of tree vegetation on permanently or temporarily[21] flooded land (crown cover is between 15 and 100 percent); the height is in the range of 3–30 m or more. There is a second layer of shrubs or herbaceous vegetation. In Uganda this class occupies less than 2 000 km^2 (less than 1 percent of the total surface of the country) and it is mainly represented by open trees (crown cover is between 15 percent and 60–70 percent) on seasonally flooded land. This type of class, and others belonging to the group 'Natural and semi-natural aquatic or regularly flooded vegetation (A24)', are strictly related to the hydrological network, as it is shown clearly in Figure 23.

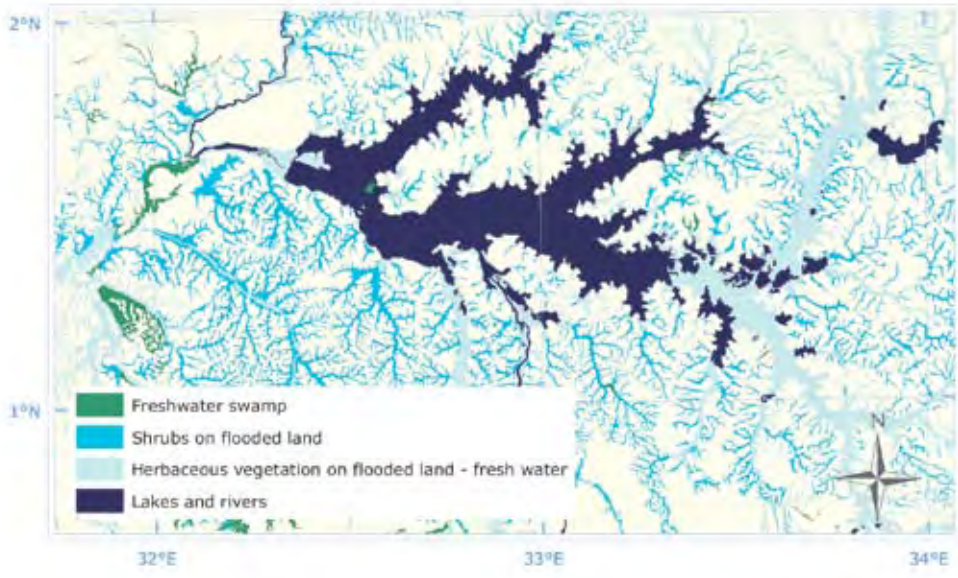
Tsetse suitability
This class describes the vegetation of riverine forests and woodlands, which are among the most suitable habitats for a wide range of tsetse species, first and foremost for the *palpalis* group (riverine flies). Forest swamps areas are also extremely suitable for the *fusca* group and, seasonally, for the *morsitans* group.

14 Shrubs on flooded land
LCC Label
Closed to open shrubs.

Additional description
The main layer consists of shrub vegetation on permanently or temporarily flooded land (crown cover between 15 and 100 percent); the height is in the range of 0.3 – 5m.

[21] For 'aquatic or regularly flooded natural and semi-natural vegetation (A24)', one classifier consists of water seasonality. This classifier type can be described as the persistence of the water at or near the surface. There are three subdivisions:
- (Semi-)Permanent (three months a year or more than a specific season): in this class, areas are considered to be covered by water for a substantial period, which is not directly linked to a specific season).
- Temporary or Seasonal (less than three months a year or during a specific season): this class covers areas that are regularly flooded, but where the water cover does not remain for a substantial period of time or other than in a particular season.
- Waterlogged: the water table is very high and at or near the surface; these areas could be occasionally flooded, but the main characteristic is the high level of the water table (e.g. bogs).

FIGURE 23
'Natural and semi-natural aquatic or regularly flooded vegetation' in the area of the Lake Kyoga in Uganda



In Uganda, this class occupies over 10 000 km² (more than 4 percent of the total surface of the country); almost all of this area consists of open shrubs (crown cover between 10–20 and 60–70 percent) on temporarily flooded land with a second layer consisting of herbaceous vegetation.

Tsetse suitability
The humid environment and the shading provided by the shrub vegetation can provide a suitable habitat for many tsetse species, especially of the *palpalis* group. Nonetheless, the lack of tree vegetation is such that this class cannot be considered a primary habitat.

15. Herbaceous vegetation on flooded land (fresh water)

LCC Label
Closed to open herbaceous vegetation.

Additional description
The main layer consists of herbaceous vegetation on permanently or temporarily flooded land (cover is between 15 and 100 percent, the height is in the range of 0.03–3 m).

In Uganda, this class covers approximately 12 000 km² (more than 5 percent of the total surface of the country); on around half of this area a second layer of sparse shrubs is present.

Tsetse suitability
Though it is by definition associated with humid environments, this class cannot be considered a major habitat for tsetse flies because of the very limited presence of woody (shrub or tree) vegetation. Sparse shrubs occasionally present in these areas can provide atypical habitats to some species, particularly of the *palpalis* group.

16. Urban areas, airports
LCC Label
Non-linear built-up area(s).

Additional description
Built-up areas are characterized by the substitution of the original (semi-)natural cover or water surface with an artificial, often impervious, cover. This artificial cover is usually of long duration. In the Africover map of Uganda, this class occupies 300 km² only and consist of urban areas and airports.

Tsetse suitability
This land cover is not suitable for tsetse flies.

17. Bare soil
LCC Label
Bare soil and/or other unconsolidated material(s).

Additional description
The surface aspect of bare areas describes the land rather than the land cover, because the land is not covered by (semi-)natural or artificial cover. In the Africover map of Uganda, this class occupies 4 km² only. The surface can be stony (5–40 percent) or very stony (40–80 percent).

Tsetse suitability
This land cover is not suitable for tsetse flies.

18. Lakes and rivers
LCC Label
Perennial natural water bodies. Salinity: fresh (<1 000 parts per million [ppm] of total dissolved solids [TDS]).

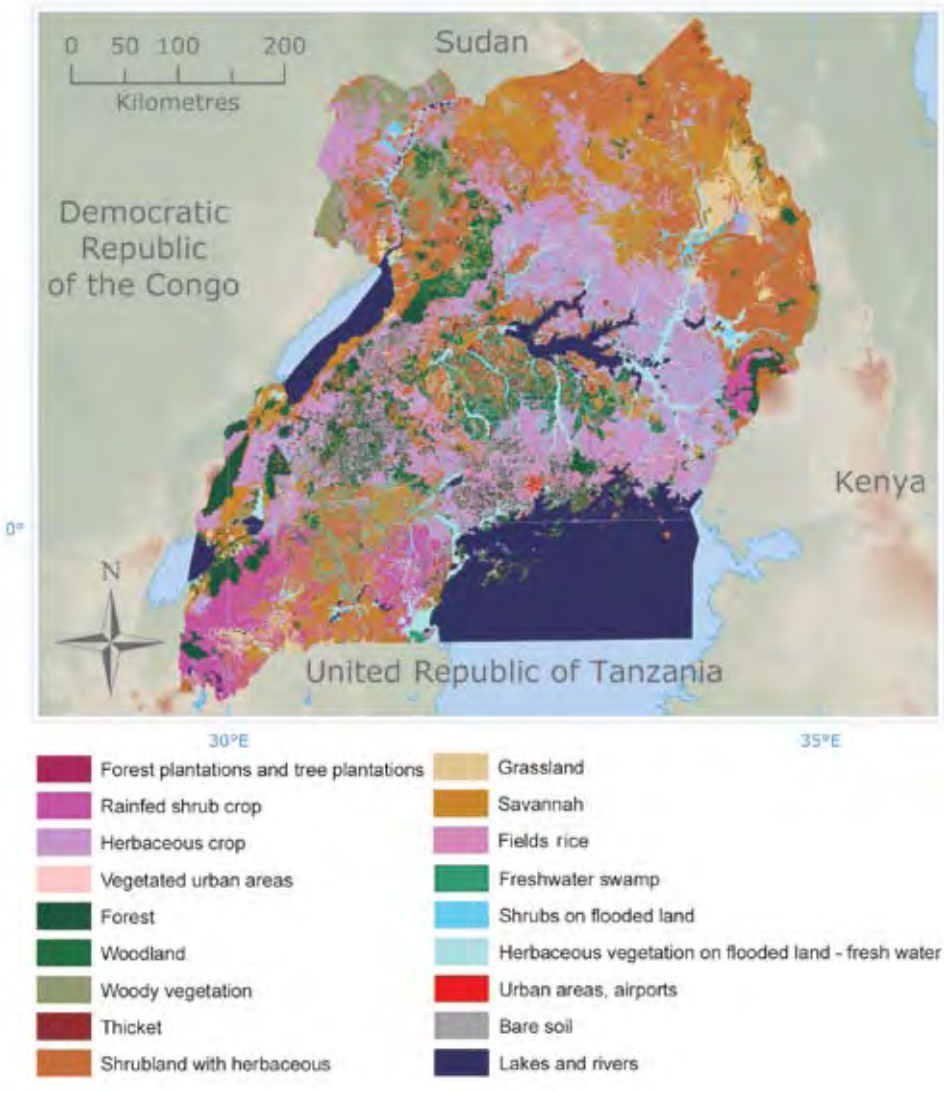
Additional description
The land cover consists of perennial natural water bodies (including flowing or standing water). In the Africover map of Uganda, this class occupies 36 000 km² (more than 15 percent of the total surface of the country), including the vast expanses of lakes Victoria, Albert and Kyoga.

Tsetse suitability
This land cover is not suitable for tsetse flies.

LAND COVER MAP OF UGANDA FOR T&T

The 18 classes described in the previous section and the aggregation table in Annex 7 were used to reclassify the Africover map of Uganda and the result is displayed in Figure 24. For the sake of clarity, in this graphic representation each polygon was given the colour of the main class only (i.e. in this map, areas characterized by mixed codes cannot be distinguished from pure polygons). In contrast, in the underlying database the information related to mixed polygons was retained and it was duly weighed to estimate the degree of tsetse suitability of each area (e.g. Figure 26).

FIGURE 24
Land cover of Uganda for tsetse and trypanosomiasis decision-making



LAND COVER SUITABILITY FOR TSETSE FLIES IN UGANDA

The tsetse suitability for each one of the aggregated land cover classes identified for Uganda is described in the section 'Thematic aggregation of the Africover database of Uganda for tsetse habitat mapping' (p. 41) and the information is summarized in Table 14. It is worth noting that the degree of suitability was assigned according to the inherent features of the land cover class only. No assumption is made on host availability, climatic conditions, size and distribution of habitat patches, vicinity of water bodies, etc. It is also important to mention that the peculiarities of a given land cover class as it occurs in Uganda were taken into account. For instance, most of the areas belonging to the class 'Shrubland with herbaceous' in Uganda are in fact 'Shrubs with herbaceous and sparse trees'. The presence of trees has some relevance for tsetse suitability that has not been neglected. Therefore, the values in Table 14 should be exported to other countries with care. One limitation of the method consists in the analysis of tsetse suitability at group (*subgenus*) level. At this stage of investigation, existing differences in the habitat preferences of various fly species within the same group have been averaged.

TABLE 14
Tsetse suitability for land cover classes in Uganda

User defined label	User defined description	Suitability for tsetse groups		
		fusca	*palpalis*	*morsitans*
T47PL	Forest plantations and tree plantations	1	2	1
S47V	Rainfed shrub crop	1	2	1
H	Herbaceous crop	0	1	0
5UV	Vegetated urban areas	1	2	1
2TC	Forest	3	3	2
2TP	Woodland	1	2	3
2W	Woody vegetation	1	1	2
2SCJ	Thicket	1	2	3
2SP6	Shrubland with herbaceous	0	1	2
2G(CP)	Grassland	0	0	0
2G(CP)78	Savannah	0	1	2
GZ-r	Fields rice	0	0	0
4T(CP)	Freshwater swamp	3	3	2
4S(CP)	Shrubs on flooded land	1	2	1
4H(CP)	Herbaceous vegetation on flooded land - fresh water	0	1	0
5	Urban areas, airports	0	0	0
6S	Bare soil	0	0	0
8WP	Lakes and rivers	0	0	0

Tsetse suitability

3 - High
2 - Moderate
1 - Low
0 - Unsuitable

The considerations on which the estimate is made are similar to the ones described in Chapter 2 for the general classes. Some of the minor differences are caused by:

- difference in the definition of the classes (e.g. for Uganda one single 'Woody vegetation' was defined, while the general legend makes a distinction between 'Closed' and 'Open' woody vegetation); and
- specific features of the class in Uganda (e.g. most of the class 'Thicket' in Uganda is characterized by a second layer of emergent trees that are expected to provide a better habitat for flies of the *morsitans* group; in the general legend no assumption can be made on the presence or absence of emergent trees in the class 'Thicket', therefore the suitability was estimated 'moderate' and not 'high').

Figure 25 shows the land cover for the area around Kampala, and Figure 26 represents one possible graphic representation of land cover suitability for the *palpalis* group.

For the sake of simplicity, the maps in Figure 25 and Figure 26 are both drawn using the main land cover class of each polygon of the Africover dataset. We have to remember that LCCS, on which Africover maps are based, allows spatially mixed coding to be defined (i.e. polygons characterized by a maximum of three separate land cover classes). In Figure 25 the mixed classes pose an imaging problem only. In contrast, in Figure 26 and Figure 27, it is interesting to measure the influence of secondary and tertiary land cover classes on suitability.

FIGURE 25
Land cover of the area around Kampala (Uganda) for tsetse and trypanosomiasis decision-making

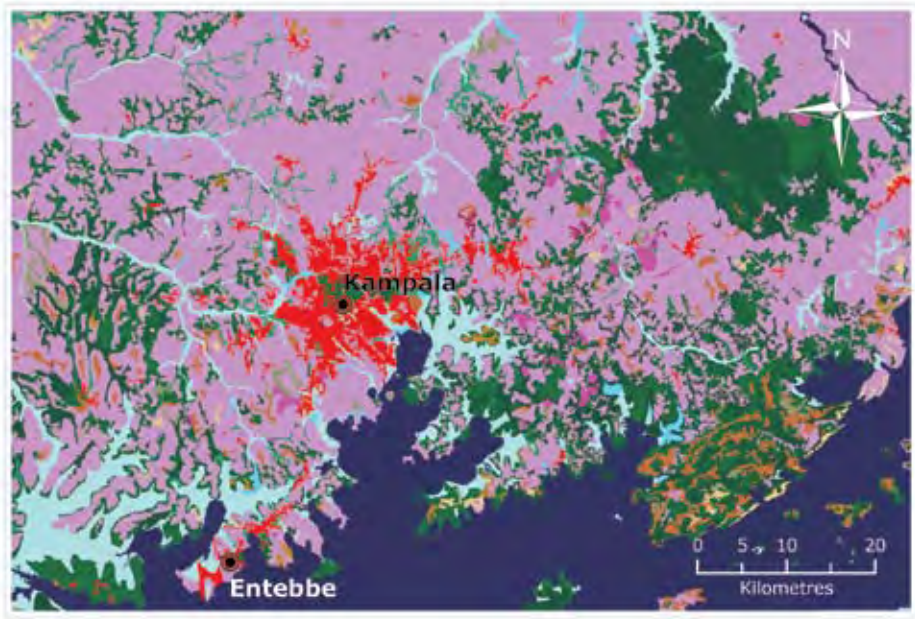
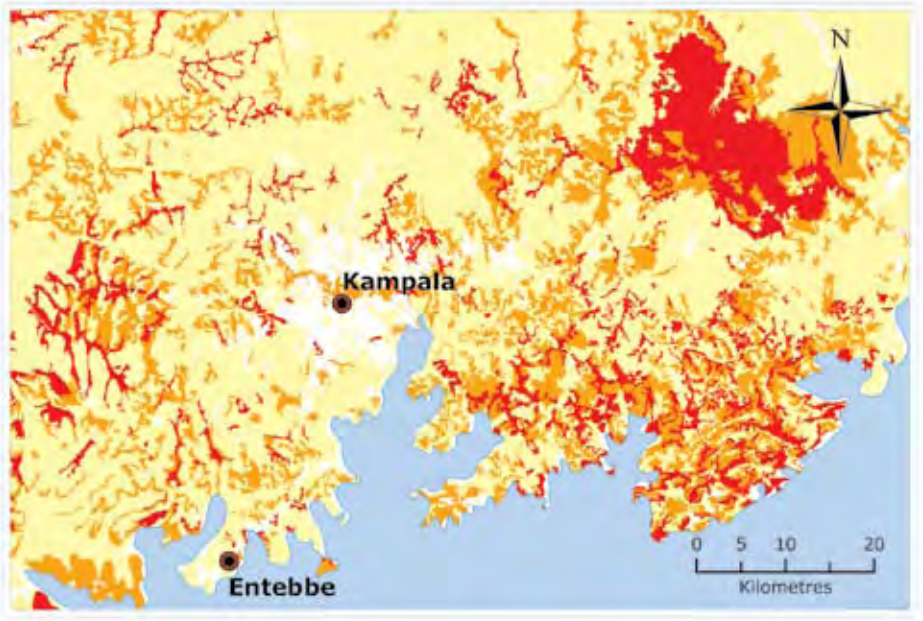


FIGURE 26
Land cover suitability for tsetse flies of the *palpalis* (riverine) group in the area around Kampala (Uganda), based for each polygon on the main land cover class of the Africover map



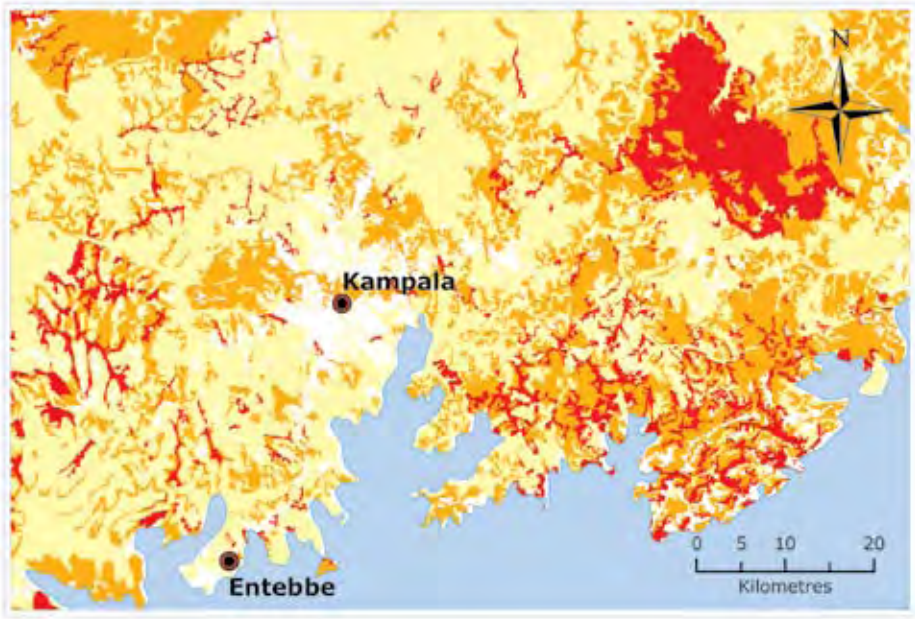
An analysis for the whole Uganda was carried out to confirm the hypothesis that considering or not considering mixed coding (i.e. for each polygon either using only the main land cover class or using the full encoding) leads to comparable results. If the full encoding is considered in the evaluation of suitability for tsetse (*palpalis* group in this case), only 4 percent of the polygons will fall in a different class when compared with the suitability of the main land cover[22]. Given the qualitative nature of the suitability estimates, this kind of error can be considered negligible.

[22] According to LCCS, spatially mixed coding can be characterized by a maximum of three separate land cover classes. The general criterion is that each class must be more than 20 percent of the mapping unit. On average, it is assumed that in a mixed class the like of A/B, A accounts for 60 percent of the area within the unit while B accounts for 40 percent, whereas in a mixed class the like of A/B/C, A accounts for 40 percent while B and C for 30 percent each. Tsetse suitability of mixed mapping units was weighted accordingly.

Figure 27 depicts the land cover suitability for the *palpalis* group of the area around Kampala, as it results from the analysis of the full encoding of the Africover map (i.e. including for each polygon the contribution of secondary and tertiary land cover classes). Comparison of Figure 26 and Figure 27 confirms that the main land cover class represents the global suitability of each patch well. This sensitivity analysis is important because it allows us to further simplify the complexity inherent in the Africover datasets, at least as far as this type of application is concerned.

FIGURE 27

Land cover suitability for tsetse flies of the *palpalis* (riverine) group in the area around Kampala (Uganda), based on the analysis of the full encoding of the Africover map



Conclusions

Land cover maps can be used in several stages of T&T intervention: mapping vector habitat, planning baseline entomological surveys, monitoring the efficacy of tsetse suppression, land-use planning of reclaimed areas and monitoring the environmental impacts of intervention strategies.

This paper highlights the availability of several land cover datasets produced by international organizations and research institutes, which can prove useful in supporting T&T decision-making. A growing number of land cover datasets are being produced in compliance with the FAO/UNEP LCCS and the time has come to adopt this classification system within T&T research and control activities. The Land Cover Classification System is a powerful and flexible system designed to map any type of land cover in the world, no matter which mapping technique is used (direct field survey, classification of remotely sensed images, etc.). In this paper the authors showed how to use existing land cover datasets (e.g. Africover maps) to create informative baseline layers for area-wide integrated pest management programmes. The transboundary nature of the trypanosomiasis problem calls for a multinational approach that will greatly benefit from the use of standardized methodologies and high quality baseline datasets. This methodological approach can potentially be used for vectors and vector-borne diseases other than tsetse and trypanosomiasis.

The Programme Against African Trypanosomiasis is presently focusing part of its efforts in support of the six countries that are implementing the first phase of the PATTEC initiative, which aims at the creation and subsequent expansion of tsetse-free areas in sub-Saharan Africa. Among these countries, Africover land cover databases are presently available for Uganda and Kenya, while Burkina Faso, Ghana and Mali should be mapped within an ongoing project (GLCN West Africa). Discussions with authorized Ethiopian institutions are still in progress. Work is underway within PATTEC to start project implementation in several countries (Angola, Benin, Botswana, Cameroon, The Central African Republic, Chad, Guinea, Namibia, Niger, Nigeria, Rwanda, Senegal, Sudan, United Republic of Tanzania, Togo, Zambia) in 2007 to 2008. The final chapter of the paper proposes a common customization of all existing land cover databases of the Africover project that provide valuable harmonized layers at regional level. The proposed customization can also be applied to land cover datasets that will progressively become available (e.g. the GLCN initiative).

Further research in the field of land cover and tsetse habitat should address the problems of landscape dynamics as related to anthropogenic factors, such as habitat fragmentation and agriculture and urban encroachment of natural areas.

This paper was produced in accordance with PAAT's strategy and mandate to enhance and facilitate policy and technical dialogue, and coordination and harmonization among T&T stakeholders, aiming at the development of common standardized strategies and approaches to improve health, animal production and income derived from livestock-agricultural activities.

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