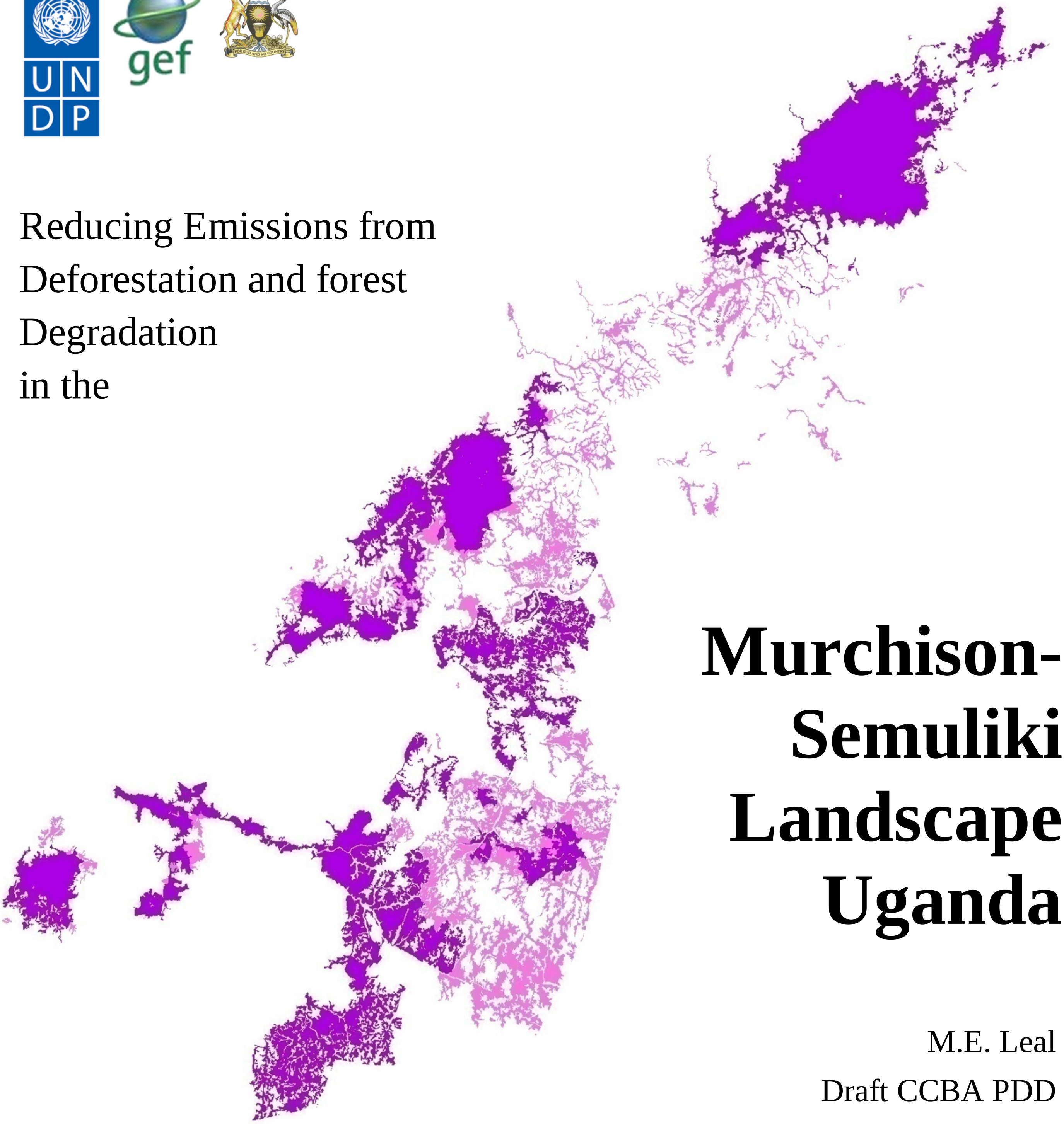
Reducing Emissions from Deforestation and forest Degradation
in the



Murchison-Semuliki Landscape Uganda

M.E. Leal

Draft CCBA PDD

January 2012

Northern Albertine Rift Conservation Group

Executive Summary

Albertine Rift is home to over 1100 endemic plant and animal species, and has more registered species of birds and amphibians than any other part of Africa. At the northern tip of the rift, east of Lake Albert, lies Murchison-Semuliki Landscape, one of the last remaining forested regions of Uganda. The Murchison-Semuliki archipelago of forests shelter populations of endangered species such as the chimpanzee, crowned eagle, and small forest carnivores such as the golden cat and black-backed jackal.

The Murchison-Semuliki Landscape is also home to an estimated 3.7 million people who depend on these natural resources. 58% of these forests (113,466 ha) are privately owned by small holders and form essential wildlife corridors between the public forests (forest reserves). Between 2006 and 2010 over 8000 hectares have been cleared each year for agriculture, fuel wood and timber. Food scarcity is already a permanent phenomenon in the Landscape and most of these smallholders risk reaching a poverty trap over the next 10 year when they run out of forest to clear for cultivation.

This project helps to mitigate global climate change and conserve the forests and wildlife of the Murchison-Semuliki Landscape by strengthening the management capacity of the farmers and providing access to more profitable markets. The Northern Albertine Rift Conservation Group (NARCG) and the government of Uganda (GOU) are carrying out activities designed to address the main drivers of deforestation and forest degradation in the Landscape. Small holders receive 80% of carbon revenue and in return monitor the forest on their land.

The Project will be managed through a “co-determination committee” representing members of NARCG, the private forest owners and the government. Project activities include: 1) *clarifying property rights* by registering the land and forest of small holders at local government level, 2) *providing households a stable income* by offering them carbon revenue in return for forest monitoring activities, 3) *improving agricultural practices and introducing agroforestry* by teaching them new farming techniques and cultivating forest friendly cash crops.

The Project will prevent an emission of 41.2 million tonnes of CO2e going into the atmosphere from privately owned forests and an additional 20.8 million tonnes of CO2e from public forests over a project life time of 30 years, improve the livelihoods of rural communities and reduce their risk of reaching a poverty trap, and saving threatened wildlife.

Table of Contents

List of Figures

List of Tables

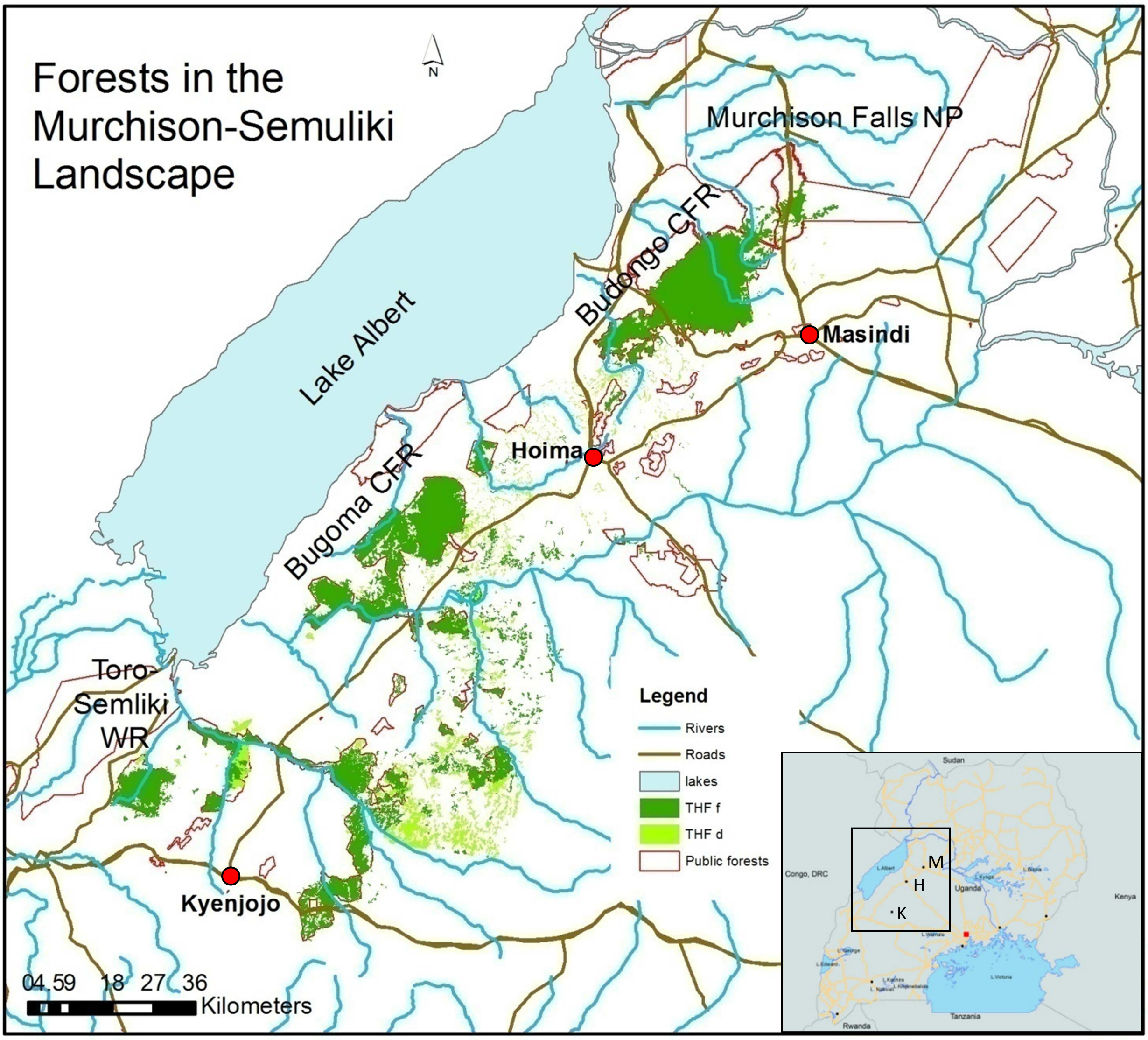


Figure 1. **The Murchison-Semuliki Landscape** situated east of Lake Albert in western Uganda in between Murchison Falls NP in the north and Toro Semliki Wildlife Reserve in the south. The three major towns are **Masindi** (M) and **Hoima** (H) and **Kyenjojo** (K) and an estimated **3.7 million people** live in this Landscape. The forest is a mosaic surrounded by cultivated land (dark green: primary forest=tropical high forest (THF) fully stocked; light green: THF depleted). **Most** of the **forest** is **privately owned** (113,466 ha; 58%) and the remainder are so-called local or central forest reserves or public forests, e.g. *Bugoma* (outlined in red). These forests are home to **threatened species** such as **chimpanzee**, and the **golden cat**. With the current **deforestation** rate all privately owned forests are predicted to have been **cleared** by **2030**.

G1. Original Conditions in the Project Area

General Information

1. *The location of the project and basic physical parameters (e.g., soil, geology, climate).*

Geographical position and area: The Semliki-Murchison Landscape (Landscape) is situated in NW Uganda east of Lake Albert in between the national parks of Toro-Semliki and Murchison Fall (Area: 1,387 km^2; Fig. 1.).

Geology and physiography: The Landscape is part of the Lake Victoria Basin and lays adjacent to the Albertine Rift Valley. The Lake Victoria Basin was uplifted during the middle of the Pleistocene by tectonic movements associated with the evolution of the western arm of the Great Rift Valley (Koehn *et al*. 2010). Elevation of the Landscape ranges between 750-1100m with isolated hill formations reaching up to 1452m. The underlying metamorphic granulate rock formations date back to the Precambrian (2.9 Byrs) and associated soils form catenas or series from predominantly highly to moderately leached Ferralsols and more occasionally Lithosols (van Staaten 1979).

Climate: The Landscape experiences a "tropical wet and dry or savanna climate" (*Aw*) according to the Köppen climate classification (e.g. Peel et al. 2007). The distinct dry season characteristic for this class of climate is less pronounced in the Landscape and daily maximum temperatures remain relatively low because of its average elevation above a thousand meter which has cooling effect. Mean annual rainfall ranges between 1350-1600 mm distributed over two distinct rainy seasons from April to May and from October to December. Mean annual temperature ranges between 23-29 (max. 31) C^0 (see climate diagram above). Evapotranspiration (moisture loss from evaporation and transpiration from plants) is relatively low for an *Aw* climate due to moderate maximum daily temperatures in the dry season (<30 C^0). The favorable climatic conditions allow two growing seasons.

Figure 2. The Eastern Chimpanzee (*Pan troglodytes* subsp. *schweinfurthii*) is one of the four subspecies and it reaches its most easterly distribution in western Uganda.

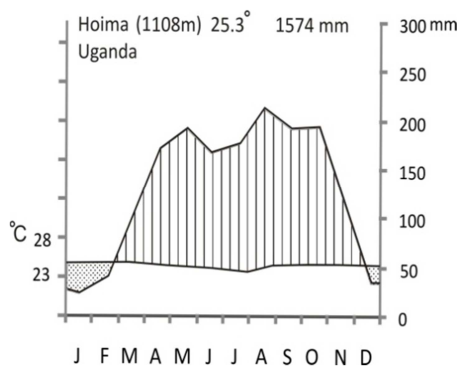


Figure 3. Climate diagram for Hoima: mean annual rainfall is 1547mm and distributed over two wet seasons (March-May; October-November) with a minor dry season in June-July and a stronger dry season from December until March.

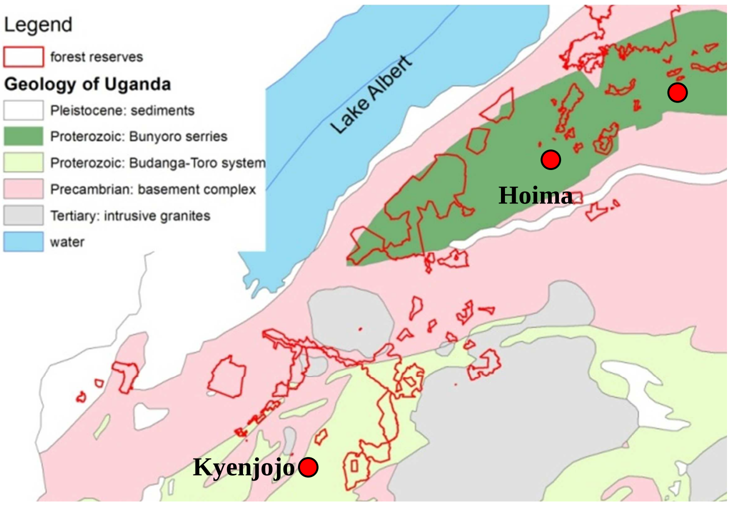


Figure 4. Geology of the Landscape,

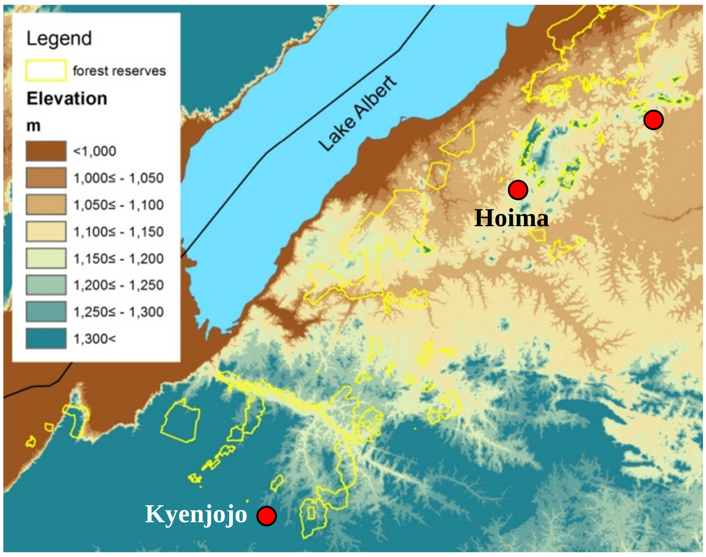


Figure 5. Topography of the Landscape

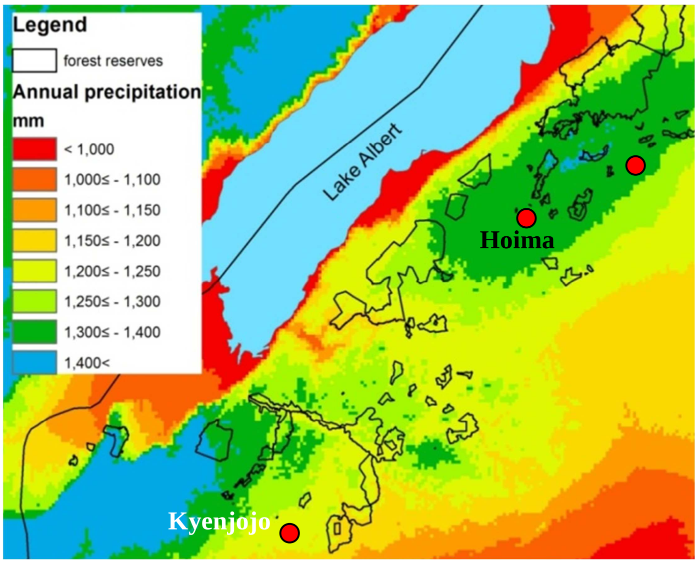


Figure 6. Mean annual rainfall in the Landscape

2. *The types and condition of vegetation within the project area.*

Flora and biogeography: The flora of the Landscape is part of the Lake Victoria Regional Mosaic which is a combination of the common species from the five different floras surrounding this region, i.e. Guineo-Congolian, Sudanian, Zambezian, Somalia-Masai and Afromontane (White 1983). Floristically, the Landscape has the strongest affinity with the Guineo-Congolian and Afromontane floras, because of its close vicinity to the Congo Basin and the Ruwenzori Mountains.

Vegetation and ecology: The natural vegetation formations covering the Landscape form a forest-woodland-savannah mosaic with gallery forest along streams and rivers and papyrus swamps in flat valley bottoms. Grassland dominants much of the Landscape with several larger forest blocks (e.g. Budongo and Bugoma). Woodland generally borders the forest formations, extents out into the grassland and occasionally forms isolated patches. Boundaries between the main three vegetation formations are generally sharp in a cultivated setting, but much more transitional in protected areas.

The spatial heterogeneity, boundaries and dynamics between forest, woodland and grassland is partially determined by environmental factors such as fertility, depth and moisture of the soil and partially by fire intensity and frequency (ref. Grace et al.). In general forest and woodland retreat when climatic conditions become dryer or the fire regimen intensifies whereas grassland expands and vice versa when climatic conditions become wetter.

Species composition of the forest varies between the major forest blocks (Budongo vs Bugoma) and between the gallery forests. The Budongo and largest forest block resembles most the forest in the Congo Basin with climax species such as *Chrysophyllum* spp, *Cynometra* spp, *Khaya* and *Trichilia* spp. Transitional species associated with forest colonization are *Acanthus arboreus* an early pioneer species and *Maesopsis eminii* a late colonizer. Bugoma forest differs from the other forests by the abundance of *Celtis mildbraedii* and absence of *Khaya* spp.

The gallery forest differs from the larger forest blocks in species composition by the dominance of *Blighia unijugata* and the absence of *Cynometra alexandrii.* Some of the gallery forest has a stronger affinity with the forest blocks because of the presence or higher abundance of forest indicator species like *Diospyros abyssinica*, *Funtumia elastica* and *Teclea nobilis*. Other gallery forests are characterized by the higher abundance of woodland species like *Albizia grandibracteata* and *Spathodea campanulata* and forest species like *Markhamia platycalyx* and *Sapium ellipticum.*

The woodland is characteristically dominated by *Terminalia velutina* and *Albizia grandibracteata* and the wooded grassland by *Lonchocarpus laxiflorus* and several species of the genera *Grewia* and *Combretum.*

Natural vegetation formations have been converted and cleared through slash and burn deforestation for agriculture for both subsistence farming and cash crop production, including plantations for tea and sugar, on a large scale, and tobacco, on a smaller scale. Abandoned fields are chacterized by secondary vegetation formations. Extraction of timber, such as logs and other biomass to produce charcoal has transformed woodlands and forests into bushlands (Nakakaawa *et al.* 2011). Grassland has been used for cattle grazing, converted into farmland for maize and upland rice production or occasionally converted into commercial pine tree plantations.

3. *The boundaries of the project area and the project zone.*

Project zone: The boundaries of the project zone were determined using the land cover map of Africa for 2000 (Mayaux et al. 2004). The map documents the location and distribution of 27 land cover categories for vegetated and non-vegetated land surface formations in Africa. According to this classification the Landscape is classified as "mosaic forest/savanna" (light green) with patches of "closed evergreen lowland forest" (dark green), "montane evergreen forest" (purple) and "deciduous woodland" (brown) – note: the classification have not been verified for the Landscape and are partially incorrect. The region surrounding the Landscape is classified as "croplands >50%" with patches of "closed deciduous woodland (miombo)", "deciduous woodland" , "closed grassland" and in the south "deciduous shrubland with sparse trees". Socio-economically the communities in the Landscape are bound by the same boundaries as their activities e.g. agriculture and resource extraction are determined by the natural carrying capacity of the vegetation formations present only in the Landscape.

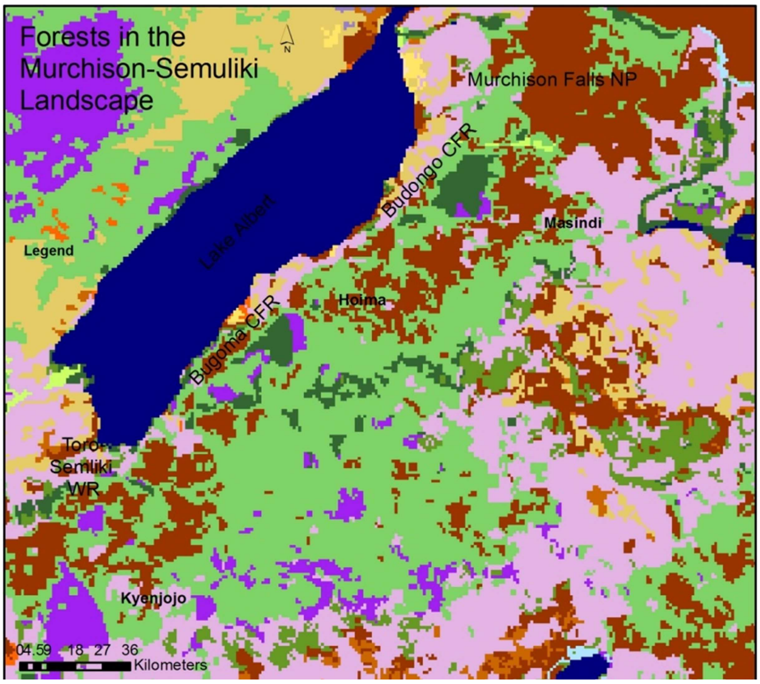


Figure 7. Section of the 2000 land cover map of Africa (Mayaux *et al.* 2004) showing the Landscape with in pink "cropland (50%>), purple "montane forest", dark green "closed evergreen lowland forest", brown "deciduous woodland" and in light green " mosaic forest/savannah" which is actually farmland.

Project areas: The project areas within the project zone are defined as the forest and woodland in blocks and galleries. Detailed boundaries between forest and woodland with the grassland were obtained from interpreting LANDSAT images with a 30m resolution. The selection of forest and woodland as project areas was based on creating wildlife corridors between the two national parks and the larger forest blocks. Twenty one corridors were identified and numbered accordingly (see for maps G3.3)

Climate Information

4. *Current carbon stocks within the project area(s), methods of carbon calculation (such as biomass plots, formulae, default values) from the Intergovernmental Panel on Climate Change's 2006 Guidelines for National GHG Inventories for Agriculture, Forestry and Other Land Use5 (IPCC 2006 GL for AFOLU) or a more robust and detailed methodology:*

IPPC guidelines distinguish three "approaches", or formal methodologies for calculating activity data and three "tiers" for calculating emission factors. The level of complexity of data and analytical approaches increases with each tier. "Tier 3" represents the most accurate approach and tier to calculate green house gas emissions, i.e. based on geographically explicit data and local biomass measurements. Current carbon stocks were calculated following the tier 3 approach.

Table 1. Remote sensing images used to classify land-cover of the Project zone

Image ID	Year	season	bands	
[number]	1995			LANDSAT
[number]	2006			Aster
[number]	2010			LANDSAT

Land cover classification: LANDSAT and Aster images were chosen for the remote sensing analysis (table 1). The images were analyzed based on parameters of brightness, greenness, and wetness according to Crist and Cicone (1984), and Collins and Woodcock (2003). It was not possible to use an automated analysis because the images were not taken during the same season and the difference in phenology caused an additional difference in brightness, greenness and wetness of the vegetation.

Table 2. Surface area (ha) of the land cover classes in the Landscape on private and public land

Land cover classes	**private**	**public**	**total**
THF, fully stocked	85,518	82,354	167,872
THF, depleted	27,948	316	28,265
Colonizing forest	2,093	1,145	3,238
Planted forest	2,476	4	2,480
Others, including woodland	2,537,786	32,854	2,570,640

The National Biomass Map classification was followed[1]. Five land cover classes could be recognized in sufficient detail with a minimum of error: 1) Tropical High Forest (THF) fully stock and 2) THF depleted, 3) planted forest, 4) colonizing forest and 5) "Other". The class of "Other" also includes woodland which was difficult to distinguish from other land cover units such as shrubland and fallowing fields. Recognizing woodland as a separate class would have resulted in a biased coverage, without the necessary ground truding for the images of 2010. Therefore, the Project is only accounting the "THF fully

[1] Drichi P., (2003) National Biomass Study, Technical Report. Forestry Department, Ministry of Water, Lands & Environment; PO Box 1613, Kampala, Uganda.

stocked" and "THF depleted". Surface area for each of land cover classes was determined by converting the total amount of pixels with a pixel size of 900m^2 (30 x 30m) for each class to hectares (ha).

Table 3. Biomass pools considered in the carbon stocks calculation		
Above ground tree biomass	Included	Trees with a diameter at breast height (DBH) above 10cm and the most conservative algorithm Djomo *et al.* 2010*
Below ground tree biomass	Included	Estimated based on shoot root ration according to Cairn et al. 1997** and used as buffer credits
Non tree biomass	Excluded	Trees with a DBH below < 10cm, palms, shrubs and herbaceous plants.
Leaf litter biomass	Excluded	This pool is considered a carbon flux transferring ultimately to the soil carbon pool
Dead wood biomass	Excluded	This pool is considered a slow releasing emission factor
Soil biomass	Excluded	To be determined
Long lived wood product	Excluded	This pool is considered a net source of carbon emissions and not a net sink due to the associated emissions from logging techniques, including sustainable harvesting

* Djomo A.N., Ibrahima, A. Saborowski, J. Gravenhorst, G. (2010) Allometric equations for biomass estimations in Cameroon and pan moist tropical equations including biomass data from Africa. *Forest Ecology and Management* 260:1873–1885
**Cairns M.A, M Brown, S., Helmer E. H. and Baumgarder G.A. (1997) Root biomass allocation in the world's upland forests. *Oecologia* 111:1-11.

Biomass: Biomass data was recorded in circular plots (20m radius). The biomass plot data was converted to tCO2e and extrapolated to one hectare. Total amount of carbon stock for each land cover unit was obtained by multiplying its total surface in hectares with its specific carbon density per hectare.

Sampling: Carbon densities were determined using the methodology of nested sampling. The location and number of the plots for a representative sampling of the landscape was determined using the software program DISTANCE 6.2 (Thomas *et al.* 2009).

Plot layout and tree measurements: In each circular plot all trees with a DBH >30cm were recorded in a 20m radius, and trees with between 30> DBH>10cm were recorded in a nested subplot of 10m radius plots. Trees with a DBH<10cm were not recorded. The height of each tree was measured and each tree was identified to species.

Table 4. Tested algorithms for the biomass calculations		
Djomo *et al.* 2010 (site specific)	D;H	Y=EXP(-2.9946+0.9317*LN(D^2*H))
Djomo et al. 2010 (site specific)	D;H;WD	Y=EXP(-2.436+0.1399*LN(D)^2 +0.7373*LN(D^2*H)+0.279*LN(WD))
Brown 1989	D;H	Y=EXP(-3.1141+0.9719*LN(D^2*H))
Brown 1989	D;H;WD	Y=EXP(-2.409+0.9522*LN(D^2*H*WD))
Brown 1997	D	Y=EXP(-2.134+2.53*LN(D))
Velle 1995	D;H;CR	Y=EXP(1.75891+1.943912*LN(D)+0.473731*LN(H)+0.245776*LN(CR))
Chave 2005	D;H;WD	Y=EXP(-2.977+LN(D^2*H*WD))
Djomo et al. 2010 (pan tropical)	D;H;WD	Y=EXP(-2.3778+0.2893*(LN(D)^2-0.0372*(LN(D))^3+0.7415*LN(D^2*H)+0.2843*LN(WD)))
Djomo et al. 2010 (pan tropical)	D;H	Y=EXP(-3.1268+0.9885*LN(D^2*H))
Djomo *et al.* 2010 (pan tropical)	D;WD	Y=EXP(-1.2665+1.3919*LN(D)+0.5477*LN(D)^2-0.0725*LN(D)^3+0.3529*LN(WD))
Djomo *et al.* 2010 (pan tropical)	D	Y= EXP(-2.0815+2.5624*LN(D))

Y = above ground dry biomass, Kg (tree)-1
DBH = Diameter at breast height, cm.
H= tree height
WD= wood density
CR= radius
LN = natural logarithm
EXP = e to the x power

Table 5. Comparison of the algorithms for the most conservation carbon estimation for the land cover class "tropical high forest-fully stocked".			
algorithms	Djomo (site)	Brown (1997)	Djomo (pan)
Carbon density (tCO2e/ha)	473	661	788

Table 6. Carbon density (tCO2e/ha) above and below ground for the land cover classes accounted for by the Project			
Land cover classes	**Above ground**	**Below ground**	**Total**
THF, fully stocked	473	101	574
THF, depleted	164	38	202
Non-forest/ agricultural field	34	5	39

Carbon calculation: The tree DBH data of 172 plots was used to calculate above and below ground biomass and converted into metric tonnes carbon dioxide (tCO2e). The only local algorithm to calculate above ground biomass Velle (1995) was compared to 10 other algorithms. In addition, algorithms with and without a parameter for wood density were compared, since wood density is unknown for 56% all recorded tree species. From the 11 algorithms the Djomo *et al.* 2010 site specific algorithm was chosen since it gave to most conservative biomass values (Y) using only diameter and height (table 5).

Biomass was converted to Carbon (C) by multiplying it by the carbon fraction 0.5, carbon to carbon dioxide (CO2) multiplying it by the ration of the molecular weights, 12 and 44 respectively (44/12). The standard formula was used:

1) tCO2e= (Biomass kg/1000 kg) x 0.5 x (44/12)

Table 7. Current (2010) carbon stocks (tCO2e) above and below ground on private and public land				
	ABOVE GROUND		BELOW GROUND	
Classes	**private**	**public**	**private**	**public**
THF, fully stocked	40,449,971	38,953,338	8,643,687	8323874
THF, depleted	4,583,511	51,867	2,824,856	11992.07
Total	45,033,483	39,005,205	11,468,544	8,335,866

Current carbon stock: For each land cover class carbon density was calculated by multiplying the average carbon density of the land cover (table 6) by its surface area (table 2).

The total above and below ground carbon stock for private and public forests is 56.1M and 47.3M tCO2e, respectively. Above and below ground carbon stock on private land is 45M and 11.5M tCO2e and on public land 39M and 8.3M tCO2e (table 7).

Community Information

5. *Description of the communities located in the project zone, including basic socio-economic and cultural information that describes the social, economic and cultural diversity within communities (wealth, gender, age, ethnicity etc.), identifies specific groups such as Indigenous Peoples and describes any community characteristics*:

National: Uganda is one of the 33 Least Developed Countries (LDC) in Africa in terms of socio-economic and human development. It ranks on the international Human Development Index at a 143th position out of the 169 countries with a HDI value of 0.442 (compare Norway with 1st ranks and a value of 0.938). Life expectancy is 54 years, most inhabitants enjoyed close to 5 years of education; GNI per capita is $1,224 with an adjusted net savings of 3.3% of the GNI, and 35% of the population live below the poverty line (www.hdrstats.undp.org/). Uganda's economy is ambiguous in having a dominant primary sector producing, e.g. tea, coffee, and tobacco (82% of the work force) and a tertiary sector exporting electricity to its neighboring countries (www.cia.gov/library/ publications/the-world-factbook/geos/ug.html).

Demographics: Population characteristics for the region were derived from information available online at the Uganda Bureau of Statistical (www.ubos.org). Community characteristics in the corridors were obtained by interviewing 342 of households using the questionnaire appended as Appendix x.

Regional – Extrapolations from population growth over the last 20 years with the most recent census in 2002 showed that 7.9M people inhabit the Western region (one of the four regions in Uganda), 10.5 % in urban settings (836,500 inhabitants), and 89.5 % in rural areas (7.1M people) with an average rural population density of 129 people per km^2. The national average rural population density is 131 people per km^2 with a total population close to 32M (land surface area 205,318 km^2; rural population of 27M).

Local

Cultural diversity: The rural and urban population today is very heterogeneous in terms of culture, language and nationality as people from other parts of Uganda, Sudan and Congo settled in the region during the last 50 years (Langoya &Long 1977). The traditional inhabitants are the Banyoro and the only Indigenous Peoples. With the population growth of the resident community in the region and in-country immigration from the overpopulated Kibale region in the south of Uganda human pressure on the forest has increased significantly. All the agro-pastoral ethnic groups practice subsistence farming and to some husbandry. Cash crop production has become an increasingly important economic activity and bush meat provides supplementary source of protein (Obua et al. 1998, Howard 1991).

Project affected people

In 2010 a household survey was carried out in the Landscape documenting the socio-economic well-being of the project affected people in the Murchison-Semliki Landscape. The survey also recorded the economic value of the corridor forests either from extraction or conversion for agriculture in 2010.

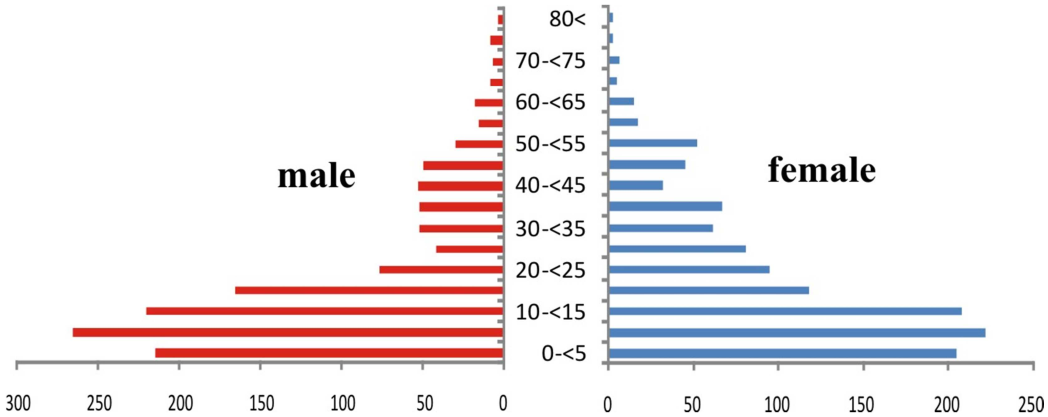


Figure 8. The demographic composition of the households interviewed (342) with a near classical pyramid age distribution for developing countries.

The socio-economic well-being of the Project affected people was evaluated using the three dimensions of the Human Development Index (HDI) and the Multidimensional Poverty Index (MPI) which is an elaboration on the HDI, focusing on the deprivations of basic needs. The three dimensions are: 1) long and healthy life, 2) access to knowledge and 3) a decent standard of living.

Long and healthy life - The demography of the project affect people for males and females was established separately from the questionnaire. The 342 households represented 2489 people, 1202 female and 1287 male. Female and male maximum ages were 90 and 83 years, respectively. The age class with the highest relative mortality rate for men was from 50 to 55 and for females from 55 to 60. The averaged mid age class value was used as the life expectancy at birth which is 53 and in line with the national figure of 54 years. The Life expectancy index is calculated using the following equation:

1) Life expectancy index= (actual-min) / (max-min) = (53-20) / (83-20) = 0.524

where minimum is 20 years (arbitrary) and 83 is the maximum recorded (Japan). The index value of 0.524 is slightly below the national figure of 0.538 and among the lowest in the world.

This dimension under the MPI has two deprivations: 1) at least one member is malnourished, and 2) one or more children have died. As a parameter of malnutrition households were asked in which months they experienced food scarcity. The survey showed that there are two main periods of food scarcity: 1) April to May and 2) October to November. 96% of all households experience food scarcity either once (63%), twice (28%) or more (4%) per year. Only 15 households (4%) had sufficient food whole the year round. Food security is an issue among the Project affected people and probably throughout the entire Landscape.

The second deprivation is linked to infant mortality rate. Households were not asked about child mortality and the national figure was used instead. Uganda's infant mortality rate is 62.47 births/1,000 births or 6.2%. In case of the project affected people this represents 155 births per 2489 or 311 households (average size of 8 members). 155 deaths per 328 households mean that in half of all households (49.8%) an infant dies per year.

Education – The survey recorded the age and level of education of each member of a household. Four levels were recognized: 1) no formal education, 2) primary and 3) secondary school and 4) higher education, e.g. college or university. Mean years of schooling is determined for people 25 year and older.

696 people (28%) among the 2489 project affected people were 25 and older and 211 people of this group between 25 and 90 had not received any formal education (30%), 391 had completed primary and 73 secondary school, 56% and 11% respectively. Only, 21 people received higher education (3%). On average they received 5.1 years of schooling which is slightly higher compared to the national value of 4.7.

The Expected Years of Schooling is the sum of the ratios of individuals continuing education. In this case 391 students went to primary school and 211 who had not received any education, i.e. 211/391 (no/primary), similarly 73 out of the 391 students continued with secondary school, i.e. 391/73 (primary/secondary) and 21 out the 73 students continued to higher education 73/21 (secondary /tertiary). These three rations add up to 10.7 years. The national figure of expected years of schooling is 10.8 years. Subsequently, the level of education of the project affected people is not significantly different from the national average.

Calculating the education index for this HDI dimension is determined first by calculating the mean years of shooling index (MYSI) and the expected years of shooling index (EYSI) and then the Education Index (EI) using the following formula:

1) MYSI = MYS / 13.2 = 5.1 / 13.2 = 0.386

2) EYSI = EYS / 20.6 = 10.7 / 20/6 = 0.519

3) EI = $(MYSI*EYSI)^{1/2}$ /0.951 = 0.471

The Education Index value is 0.471 and slightly lower than the national figure of 0.475

Under the MPI two deprivations are stated: 1) no one has completed five years of schooling 2) and at least one school-age child not enrolled in school on household level. The 211 people older than 24 who had not received any former education come from 154 households. Consequently, in 45% of all households one person had not completed 5 years of school. 192 children between age 5 and 13 had not enrolled into primary school which is 56% of the all 342 households.

Standard of living – The decent standard of living according to the HDI is expressed calculating the Income index value using Gross National Income per capita (GNIpc) at Purchasing Power Parity (PPP) per capita with the following formula:

1) Income Index = (ln(GNIpc)-ln(163))/(ln(108,211) - ln(163),

where $108,211 is the highest maximum ever recorded (United Arab Emirates 1980) and $163 the lowest (Zimbabwe 2008).

The survey showed that the 342 households earned on average 123 USD from forestry activities, 271 USD from agricultural activities and 150 USD from husbandry. The average income for 2010 was 545 USD per household. The total number of project affected people is 2489. Gross Domestic Product (GDP) of the projected affected people is all the final goods and services they produced. This is 545 USD times the 342 households divided by the 2489 group members. GDP is 75 USD per capita. These people live of 0.20 USD per day.

The Income Index is calculated using GNI or Gross National Income and according to this definition income from relatives of the Projected Affected People outside the Project area should also be included. However, in this case the GDP of the project affected people is considered equal to their GNI. Income Index value of the project affected people is -0.120. The value is negative because the minimum recorded GNI is 163 USD (Zimbabwe 2008). The national index value for Uganda is 0.347 and GNI is 1124 USD.

Standard of living conditions according to the MPI are evaluated recording basic deprivations, such as no electricity or clean water and appropriate sanitation (see table CM 3.3 for all indicators). Out of all 342 households only 3 households had a car, 48 households had clean water from a protected spring and 6 households had a generator and one a solar panel (electricity). These 58 households had 5 out of the 6 deprivations (17%) and all the remaining households had all 6 deprivations (83%). Based on the dimension of *living conditions* only 17% of the households are vulnerable (index value between 2 and 3) and 83% of the households are multidimensional poor (index value 3<). This percentage is higher than the national figure of 72%.

The socio-economic well-being of the project affected people according the HDI is not very different from the national average for life expectancy at birth (53 vs. 54 years), and education (MYS: 5.1 vs. 4.7, EYS: 10.7 vs. 10.8), except for income measured in GNI (75 vs. 1124 USD). According to the MPI 96% of all households are poor and 4% are vulnerable. Almost all households lacked electricity, clean water, and adequate sanitation, had a dirt floor, used fuelwood and experienced at least one period of food scarcity per year.

6. *Description of current land use and customary and legal property rights including community property in the project zone, identifying any ongoing or unresolved conflicts or disputes and identifying and describing any disputes over land tenure that were resolved during the last ten years (see also* ***G5****).*

General: According to the Land Act (1998), land is defined as:”land and all that grows on it”. Therefore a landowner is the tree owner except in situations where additional arrangements such as leases and licenses have been made. Landownership can be held under four basic tenure systems: customary, freehold, mailo, and leasehold. Customary tenure is the most common form of land tenure in the rural parts of Uganda, including in the Landscape. Under customary tenure, the use of forests and woodlands in a specific area is virtually open-access to a specific group of people, governed by generally accepted and binding rules. Land is owned at a tribal level held in trust for the people by a chief in this case in Masindi, and Hoima (see the RPP for Uganda for more detailed information available online at The Forest Carbon Facility Partnership www.forestcarbonpartnership.org/fcp/).

Corridors: The survey recorded the tenure rights of the households over their land including forest (table 8). 54% of all households had a strong title over their land and recognized at a local level (LC1), local free hold (43%) and gift (11%); 39% of the households have land under customary title, which may seem less strong but is recognized at a local level. 21 households refrained from answering and one households admitted to encroachment.

There has not been any dispute of land title over the last 10 years since there has not been any idle land to contest and all is arrangement and recorded at a Local Council 1 level.

Table 8. Land tenure in the Landscape

free hold	148	43%
customary	133	39%
encroachment	1	0%
gift	39	11%
no answer	21	6%
total	342	

Biodiversity Information

7. *Description of current biodiversity within the project zone (diversity of species and ecosystems) and*

1) **Diversity of ecosystems:**

General: Ecological richness or habitat diversity is high in the Landscape partly because of the mixture of forest, woodland and grassland (biotic) and partly because of its heterogeneous topography and hydrology (abiotic).

Abiotic - Most of the Landscape is characterized by gently rolling hills (Lowland) with several isolated higher hill formations (Hills). In geomorphological terms the topographical diversity in the Lowland ranges from broad summits, long transportational mid-slopes, narrow colluvial slopes and narrow to broad alluvial slopes, banks and river beds. Hills diversity described in slopes units ranges from narrow summits and ridges, steep upper slopes, shorter transportational and fall-face mid slopes, with broad colluvial slopes and narrow alluvial slopes, bank and stream beds.

The hydrological diversity in the Landscape is described in hydro-morphological terms. The Lowland is characterized by sinuous streams and one major river, i.e. the Kabi River. The upper rivulets and streams in both the Lowland and Hills are seasonal and become groundwater fed at a lower elevation depending on occurrence of impenetrable rock-formations. Closer to the Kabi River water flow is constant and alluvial banks experience regularly flooding in the rainy season. The Kabi River drains the southern part of the Landscape crossing from east to west. It transforms from a 1km wide slow flowing river into a 10m wide fast flowing river with rapids and cascading down the escarpment into Lake Albert. The other watersheds in the north are smaller and drain into the Lake.

Biotic - High ecological richness or habitat diversity is usually reflected by a high biological diversity, but it also depends on vegetation history in response to dry spells and periods in the past. Biodiversity can be low despite a high habitat diversity or ecological richness when in the past a dry spell occurred as a result of which only the more resilient species persisted. Depending from the time of the perturbation the ecosystems may not yet have reached their equilibrium and maximum species assembly.

2) **Diversity of species:**

Methodology: The biodiversity in the Landscape was assessed from existing literature and through inventories in the Landscape in 2010.

Existing information - The forest reserves of Budongo, Bugoma, Kagombe, Kitechura and the national parks of Semliki, Murchison Falls and Kibale are well documented and reviewed in Plumptre *et al.* (2007). Overall plant species diversity in the Landscape was determined by extracting species distribution data available from online data bases TROPICOS (www.tropicos.org) and JSTOR plant science (plants.jstor.org).

Inventories - Botanical data collected to calculate the carbon density was also used to determine tree species diversity in the Landscape (for sampling methodology see under section 4). This data was used to measure local or alpha-diversity and calculate species turnover with distance or beta-diversity. As a measure of species turnover a cluster analysis was performed calculating the Sorensen co-efficient between plots using the Unweighted Pair Group Average (UPGA) algoritme (software program MVPS 3.1).

Inventorying animal biodiversity in the Landscape focused on the key taxa: i.e. Aves (birds) and Mammalia (mammals). These two animal classes are well-studied, they are indicative for niche-diversity, representative for overall biodiversity and they can be monitored accurately. In the forest blocks transects were used to determine presence and abundance of mammal and bird species, whereas in the corridors forests point counts for birds and reckie walks with camera traps for mammals.

2a) Plant biodiversity:

GAMMA-diversity - A total number of 750 species, 452 genera and 121 families were recorded. The most genus and species rich plant families are: Leguminosae (Fabaceae) with 43 genera and 96 species, Graminae (Poaceae) with 40 genera and 89 species and the Rubiaceae with 33 genera and 68 species. These three dominant families are typical for a mosaic of forest, woodland (Rubiciaceae, Fabaceae) and grassland (Poaceae).

Note: The actual number of plant species in the Landscape is probable lower than the figures presented here. The two online data bases do not distinguish between the southern and northern part (= the Landscape) of the Western Province of Uganda. Among others the Ruwenzori Mountains are included and these montane species will not likely be present in the adjacent the Landscape.

ALPHA-diversity - Tree species diversity in the plots in terms of alpha-diversity ranged from mono-dominant stands (e.g. Cynometra) to 27 species per plot. Average tree species diversity in term of Fisher Alpha diversity is 8.6 which is relatively low compared with other values for Central Africa.

BETA-diversity - The turnover of species diversity with distance as a measure of homogeneity is also high in the Landscape. The forest in the Landscape is very heterogeneous with similarities index values ranging between 0.64 and 0.4 (Sorensen's index; UGPMA). The forest of Bugoma splits off from all the other forests in the Landscape (Bugoma 1-5). Similarity between the remaining forests created disjunctions over distance: the Muhangi-Kagombe and Kasota are most similar, but separated by other forest patches like Muhunga-Rukara and Kijuna-Nakuyazo (see graph 7.1).

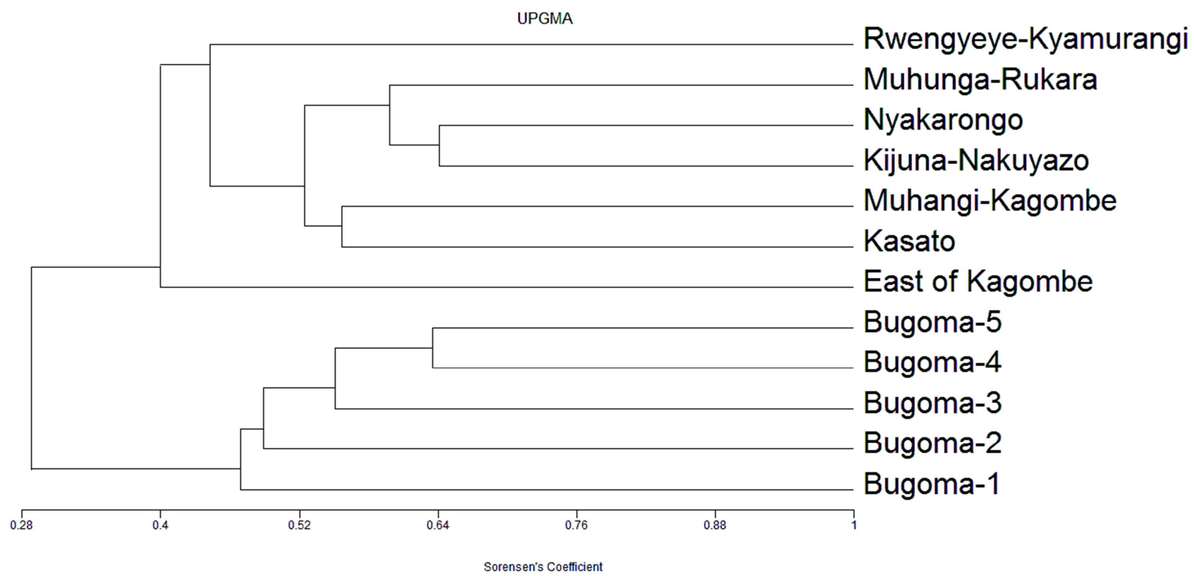


Figure 9. The regional differences in species composition of the forests of the Landscape

2b) Animal biodiversity

The biodiversity surveys from 2010[2] showed that the corridor forests are still relatively rich in bird and mammal species and that these forests still maintain connectivity throughout the landscape, but viable populations of corridor species are being eroded especially in the northern forests.

Mammals - Mammal species still occurring in the corridor forests are:

- chimpanzee (*Pan troglodytes*),
- redtail monkey (*Cercopithecus ascanius*),
- baboon (*Papio anubis*),
- vervet (*Chlorocebus pygerythrus*)
- black and white colobus (*Colobus guereza*),
- golden cat (*Profelis aurata*),
- side-striped jackal (*Canis adustus*),
- bushbuck (*Tragelaphus scriptus*),
- Weyn's duiker (*Cephalophus weynsi*),
- blue duiker (*Philantomba monticola*),
- bushpig (*Potamochoerus larvatus*),
- African civet (*Civettictis civetta*)
- elephants (*Loxodonta africana*)
- hippo (*Hippopotamus amphibius*).

Birds - A total of 194 bird species (nearly 20% of Uganda's total species number) were observed, but compared to observations from 2003 many more common species have declined significantly in density.

[2] Andrew Plumptre, Simon Akwetaireho, Daniel C. Hänni, Miguel Leal, Nabert Mutungire, Julius Kyamanywa, Dennis Tumuhamye, Johnson Ayebale and Sam Isoke. (2010) Biodiversity sureys of Bugoma forest reserve smaller forest reserves and corridor forests south of Bugoma project report.

[continued] *threats to that biodiversity, using appropriate methodologies, substantiated where possible with appropriate reference material:*

The main drivers of deforestation are agriculture, charcoal production and to a lesser extent logging. These deforestation drivers are also the main threats to biodiversity, because all the above mentioned animal biodiversity depends on intact rain forest habitat and connectivity between the different patches of forest across the Landscape.

The rules of Island biogeography[3] are applicable to the Landscape as the forest in this forest-farmland mosaic can be considered an archipelago of forest in a sea of farmland. The theory of Island biogeography shows that the number of species inhabiting an insular or isolated habitat is a dynamic equilibrium between immigration and (local) extinction determined by the distance from the nearest similar habitat across a barrier (distance effect) and the size or surface area of the " island" (the area effect).

In the business as usual scenario the forest continues to be cleared for agriculture over the next 30 to 40 years. Consequently, connectivity decreases as distances between remaining forest patches become increasingly longer, and the size of the remaining patches becomes increasingly smaller. This means that over time the migration rate between forest patches decreases, and extinction in the remaining patches as increases. Consequently, as deforestation continues animal species will go (locally) extinct.

Population dynamics and geneflow (the exchange of genes across a population) are also important factors determining the survival of animal species[4], especially in the case of a meta-population (a group of sub-populations) and even more so when the species is not-dynamic or static (migrates only over short distances). A temporary bottleneck as during a drought spell can cause a species with such a demographic or ecology to go extinct even when its habitat is not seriously threatened.

When a species or subpopulation of species reaches a size below its minimum viable population size the absence of enough genetic diversity can cause an irreversible down ward spiral and cause the population and species to go extinct[5]. Therefore, connectivity to maintain geneflow within the meta-population is essential for the survival of a species.

---

[3] MacArthur, R.H. and E.O. Wilson (1967), the theory of island biogeography, Princeton University Press, New Jersey, USA.

[4] Shaffer, Mark L. (1981), Minimum Population Sizes for Species Conservation *BioScience*: 31: 131-134.

[5] Nunney, L. and K. A. Campbell, (1993), Assessing minimum viable population size: Demography meets population genetics, *Trends in Ecology & Evolution*, 8 (7): 234-239.

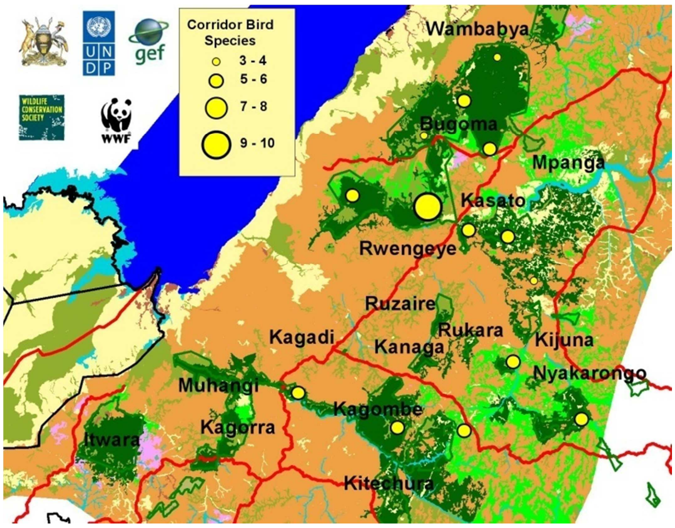


Figure 10. The Southern half of the Landscape showing the corridor or forest specialists.

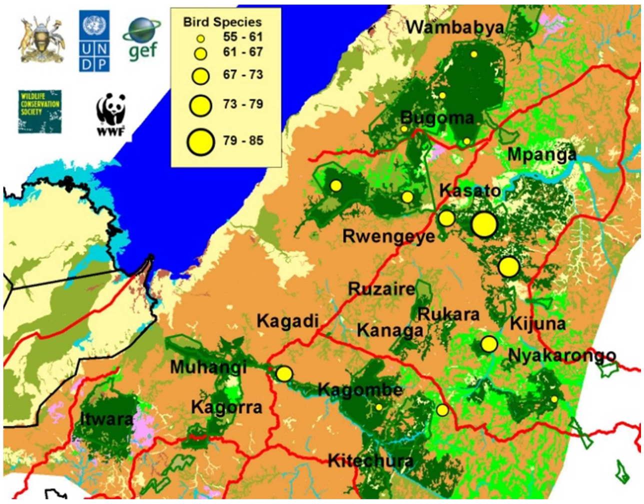


Figure 11. Bird species richness in the southern half of the Landscape.

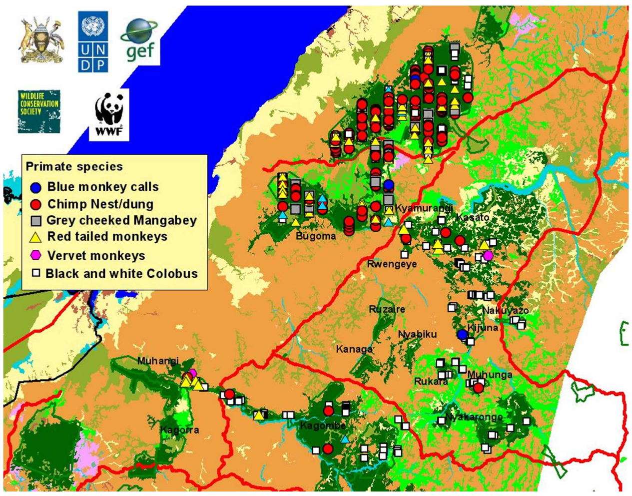


Figure 12 Primate absence and presence in the southern half of the Landscape

8. *Evaluation of whether the project zone includes any of the following High Conservation Values (HCVs) and a description of the qualifying attributes:*

8.1. Globally, regionally or nationally significant **concentrations of biodiversity values**:
The Landscape is part of the larger Albertine Rift, which stretches from the south of Lake Tanganyika to north of Lake Albert and is considered a priority region for global conservation by international conservation NGOs like WWF, Wildlife Conservation Society and Conservation International (Olson & Dinerstein 1998, Brooks *et al.* 2004, Burgess *et al.* 2004, Plumptre *et al.* 2003). The Landscape was identified as one of the six landscapes deserving conservation priority (Plumptre *et al.* 2007). Plumptre et al. (2007) compiled and reviewed existing information and data on species distributions from 38 sites in the Albertine Rift, listing endemic and globally threatened species.

a. *protected areas*: The Landscape is contiguous with the national parks of Semliki, Kibale and Murchison Falls which receive maximum protection and their conservation is safeguarded from any human activity. Within the Landscape there are public forests so-called local and central forest reserves of Budongo, Bugoma, Kagombe, Kitechura, and Matiri. Animals in these reserves are fully protected, but timber and non-timber forest products are allowed to be harvested sustainably and the extraction is governed by the Forest Department (Forest Policy 2001).

b. threatened species: In the five forest reserves 31 species of mammals, 26 species of birds, 4 species of reptiles, 16 species of amphibians and 21 plant species were recorded having a globally threatened status according to the IUCN criteria (see Plumptre et al. 2007).

c. endemic species: In the same five forest reserves there were 19 endemic species of mammals, 21 endemic species of birds, 14 endemic species of reptiles, 14 endemic species of amphibians and 20 endemic plant species recorded (see Plumptre *et al.* 2007).

d. *areas that support significant concentrations of a species during any time in their lifecycle* (e.g. migrations, feeding grounds, breeding areas): The forests in the Landscape are “home” to 12 to 95 species of mammals, 90 to 221 species of birds, 9 to 48 species of reptiles and 13 to 29 species of amphibians (Plumptre *et al.* 2007). These species depend on these forests for any time of their life cycle.

8.2. *Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance*: None of the species recorded in the Landscape is a narrow (near-) endemic, i.e. unique and not recorded outside the Landscape.

8.3. *Threatened or rare ecosystems*: The Landscape is a forest-woodland-savannah mosaic which as a whole is a threatened ecosystem. These systems received little attention from specialists because they were considered either mismanaged and degraded forests gradually turning into secondary savannas (Clayton, 1958; Eriksson et al., 2002). Consequently, conservation efforts focused mainly and only on forests and savannas.

8.4. *Areas that provide critical ecosystem services* (e.g., hydrological services, erosion control, fire control): In the north of the Landscape west of Hoima there is a hydrological dam providing electricity to the region.

8.5. *Areas that are fundamental for meeting the basic needs of local communities (e.g., for essential food, fuel, fodder, medicines or building materials without readily available alternatives)*:

Most of the forest under is under license with a private landowner or privately owned. Access to the forest is only restricted in the local and central forest reserves, with the exception for the local communities to harvest non-timber forest protects for their domestic use only.

8.6. *Areas that are critical for the traditional cultural identity of communities (e.g., areas of cultural, ecological, economic or religious significance identified in collaboration with the communities)*: The Banyoro people are the only traditional people in the Landscape and their cultural sites include a palace and burial grounds in and around to Hoima.

G2. Baseline Projections

A baseline projection is a description of expected conditions in the project zone in the absence of project activities. The project impacts will be measured against this 'without-project' reference scenario.

The project proponents must develop a defensible and well-documented 'without-project' reference scenario that must:

1. *Describe the most likely land-use scenario in the absence of the project following IPCC 2006 GL for AFOLU or a more robust and detailed methodology, describing the range of potential land use scenarios and the associated drivers of GHG emissions and justifying why the land-use scenario selected is most likely:*

The most likely land-use scenario was determined following IPCC 2006 GL tier 3 approach using IDRISI taiga[6] land use change modeling soft ware calibrated with historic periods spanning 1995 to 2006 and 2006 to 2010 after having collected socio-economic data on the deforestation driving factors of change.

Land Use Land Cover maps for 1995, 2006 and 2010 were overlapped in ArcMap 10 to quantify major land use and land cover (LULC) change patterns and to determine whether these transitions were random or systematic. The analysis reveals that the most dominant systematic land use change processes were deforestation, and forest degradation for conversion to cropland. Drivers of this land use change were determined by a socio-economic study interviewing 314 households.

The socio-economic study showed that subsistence farming and small- to medium-scale farming for commercial production are the **primary proximate drivers** of deforestation. Most of the households combine substance farming with planting cash crops. Tobacco and upland rice are the main cash crops accounting for 15% of the households each, followed by groundnuts (9%), cassava (8%) and sweet potatoes (8%) (table 9).

Table 9. Main cash crop contributing to the household annual income and dependence on forest land

produce	Households (%)	Forest cleared
upland rice	45 (15)	**yes**
tobacco	45 (15)	**yes**
groundnuts	28 (9)	**yes**
cassava	23 (8)	no
sweet potatoes	23 (8)	no
maize	20 (7)	**yes**
bananas	18 (6)	no
beans	18 (6)	no
timber	11 (4)	**yes**
sugarcane	10 (3)	**yes**

[6] http://www.clarklabs.org/products/idrisi-taiga.cfm

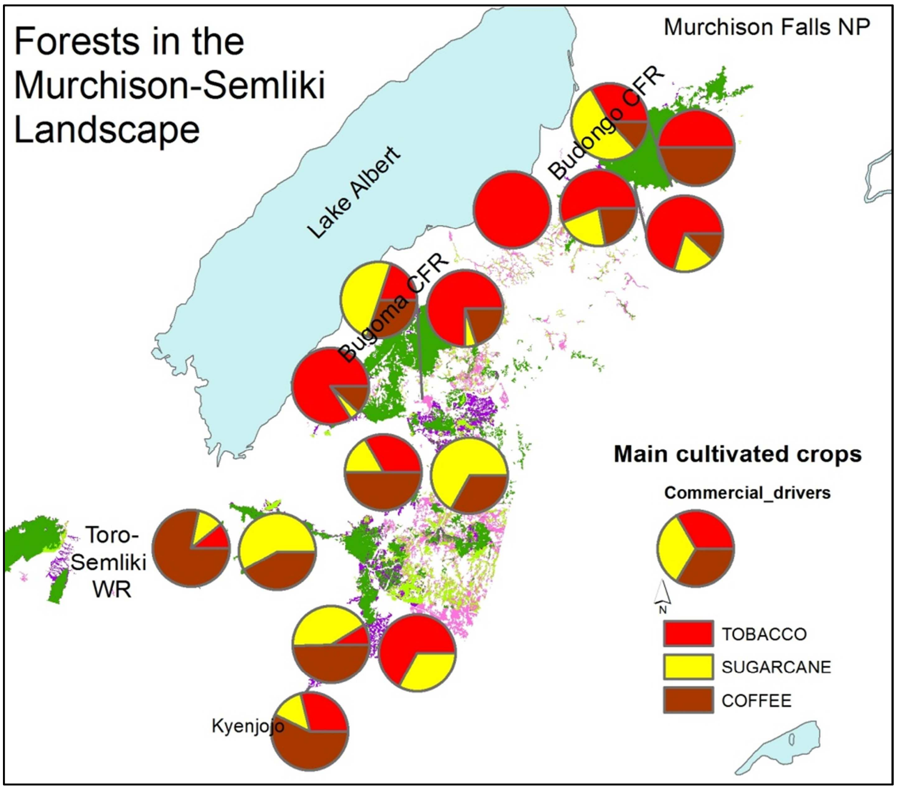


Figure 13. Regional differences in the commercial divers of deforestation; in the north mainly tobacco and in the south coffee.

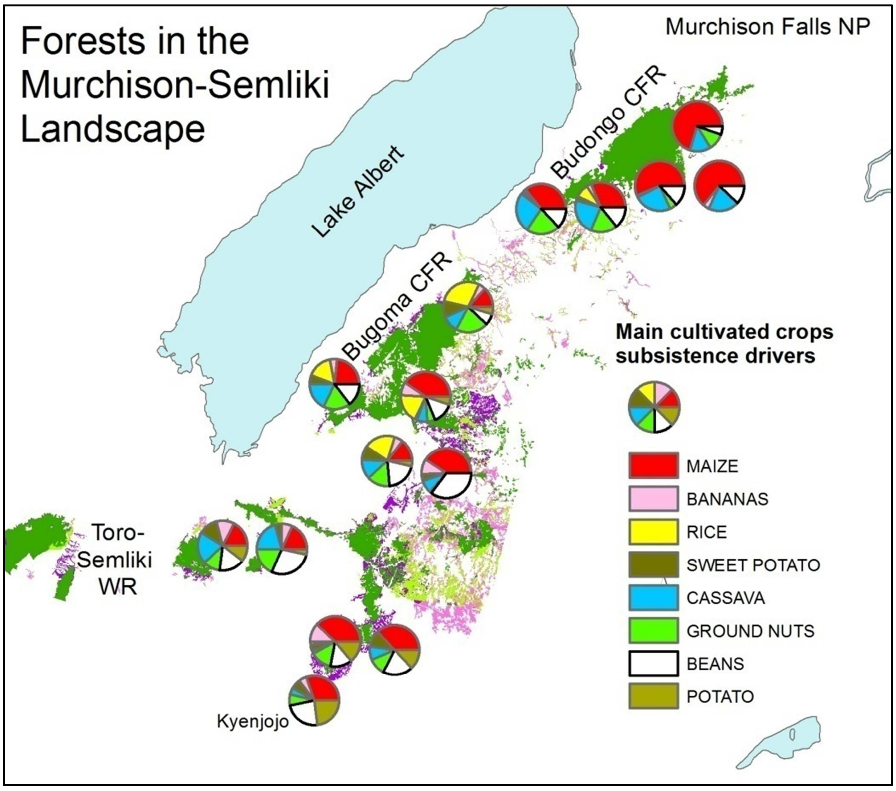


Figure 14. Regional differences of subsistence drivers of deforestation

Simulations (5,000 reiterations) were run using different combination of deforestation predictors. To separate random from systematic land use changes the transition maps were tested using a neutral network and regression model. The simulations show that the significant predictors for the period 1995 to 2006 are slightly different from those for the period 2006 to 2010 and the latter combination was better suited to generate and test the future scenario over the Project life time (table 10). The simulations also showed that the deforestation rate is also higher for the period 2006 to 2010.

Table 10. Significant predictors of deforestation in the Murchison-Semliki Landscape and Uganda

Murchison-Semliki Landscape		*Uganda*	
This study		Nakakaawa (2011)	
1995 to 2006	**2006 to 2010**	**1990 to 2005**	
DEM (slope)		Slope	Constant
Distance to the forest	Distance to the forest		increase
Distance to protected areas	Distance to protected areas	Protection status	
big rivers	big rivers	Stream network	
tarmac road		Market access	
villages	villages	Population	increase
		Poverty	Increase
		Soil quality	

For the 2006 to 2010 period, the drivers combination that produces the best accuracy and a potential change map were: distance to forest (Nonforest_distance), distance to protected area (Protect distance), big rivers and villages (Training RMS - 0.3671, Testing RMS - 0.3671, Accuracy % - 82.24). Using the same combination of drivers for 1995 to 2006 period resulted in an accuracy of only 50.01%. Accuracy improved to 74.9% including the layer of tarmac roads and excluding DEM (Digital Elevation Model) (Training RMS - 0.4264, Testing RMS - 0.4260, Accuracy % - 74.94)

Nakakaawa *et al.* (2011)[7] also analyzed key drivers of LULC change for Uganda by applying an inductive approach based on logistic regression and trend analyses of observed changes. Significant predictors of forest land use change were:1) protection status, 2) market access, 3) poverty, 4) slope, 5) soil quality and 6) presence/absence of a stream network. Market access, poverty and population density decreased the log odds of retaining forests. In addition, poverty also increased the likelihood of degradation. An increase in slope decreased the likelihood of deforestation.

[7] Charlotte Anne Nakakaawa & Paul O. Vedeld & Jens B. Aune; Spatial and temporal land use and carbon stock changes in Uganda: implications for a future REDD strategy Mitigation Adaption Strategy Global Change (2011) 16:25–62 DOI 10.1007/s11027-010-9251-0

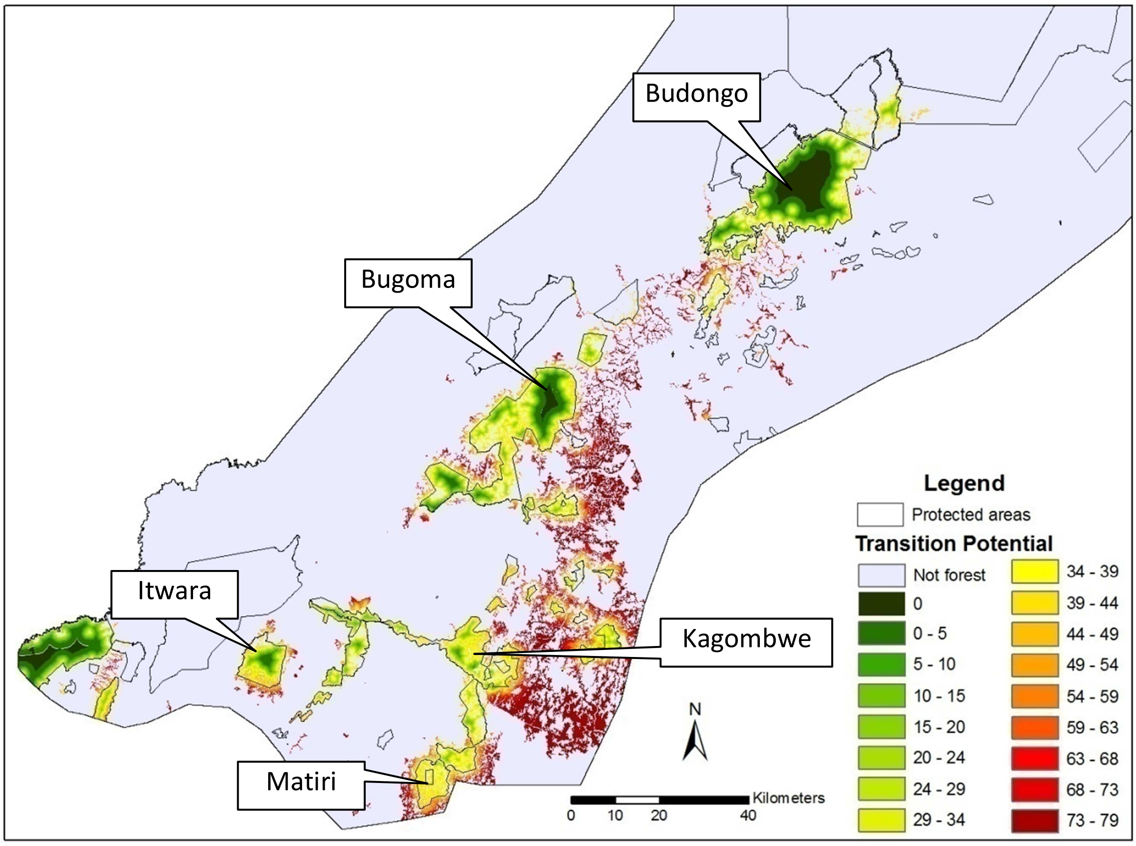


Figure 15. Probability of deforestation over the project life time based on current deforestation rates.

Deforestation in the Landscape and at a National scale is driven by similar drivers (table [x]). Some of these drivers such as population/villages, and poverty will increase in the future; similarly soil quality and distance to forest. The projection of these drivers over the Project life time shows already that with a constant historical rate of deforestation of 8000ha per year 99% privately owned forests will have been cut down and converted to land use for agriculture by 2030. Some of the drivers mentioned above will increase over time and speed up the deforestation process. After 2030 encroachment into the remaining public forests will increase as there is no forest left to clear for agricultural fields and when after a few years the existing fields will have become increasingly infertile and food security for the rural households has become a structural problem.

Table 11. Annual cumulative GHG emissions (tCO2e) over the project life time on private and public land

year	on private land	on public land
2012	3,034,167	0
2013	6,068,333	0
2014	9,102,500	0
2015	12,136,667	0
2016	15,170,834	0
2017	18,205,000	0
2018	21,239,167	0
2019	24,273,334	0
2020	27,307,500	0
2021	30,341,667	0
2022	33,766,453	1,386,836
2023	37,533,753	2,773,672
2024	39,388,764	4,160,508
2025	40,302,168	5,547,344
2026	40,450,678	6,934,180
2027	40,574,296	8,321,016
2028	40,677,194	9,707,852
2029	40,762,846	11,094,688
2030	40,834,142	12,481,524
2031	40,893,488	13,868,360
2032	40,942,886	15,255,196
2033	40,984,005	16,642,032
2034	41,018,233	18,028,868
2035	41,046,723	19,415,704
2036	41,070,438	20,802,540
2037	41,090,178	20,802,540
2038	41,106,610	20,802,540
2039	41,120,287	20,802,540
2040	41,131,672	20,802,540
2041	41,141,149	20,802,540
2042	41,188,212	20,802,540

2. *Document that project benefits would not have occurred in the absence of the project.*

A significant part of the forests in the corridors stretches along streams and rivers. According to law the rural population has to leave a 30m wide stretch of forest intact. But this law has not been enforced over the last 20 years due to the lack of capacity and financing of the Forest District Services. Enforcement is not likely to be improved without the project, because the project is the only potential source of finance and capacity building for the National Forest Authority.

3. *Calculate the estimated carbon stock changes associated with the 'without project' reference scenario described above.*

The without project carbon stocks changes were calculated by determining the historical deforestation rate over 1995-2006 and 2006-2010. Since model simulations (G2.1) showed that the period 2006 to 2010 was more appropriate for future projections in terms of deforestation drivers, the annual historical deforestation rate between 2006 and 2010 was projected linearly until the 25% threshold level deforestation was reached and a log normal deforestation rate was projected reaching an arbitrarily set asymptotic value of 100 hectares privately owned forest left in the Landscape. This asymptotic value is based on the presence of private forest south of the Landscape which experienced a similar deforestation process prior the Landscape.

Greenhouse gasses other than CO2 were excluded from the without project carbon stocks changes estimation because they are not accounted for by the Project. In addition, the Project activities to avoid and reduce deforestation do not intend to cause emissions from non-CO2 gasses as encroaching into marshes for agriculture will not be allowed nor the use of fertilizers to improve agriculture. Notwithstanding current and future emissions of methane (CH_4) from draining marshes for agriculture and fossil fuel based fertilizers (N_2O) to increase soil fertility exist in the without project scenario.

The historic changes in carbon stocks over 1995, 2006 and 2010 were calculated by generating land cover maps for each point in time from LANSAT imagery (table 1) following the same 3 tier IPPC approach mentioned under G1.7., and using the same land cover classes definitions. The same overlapping procedure in ArcMap mentioned under G2.1 was used to identify and calculate land use changes between the period 1995 to 2006 and the period 2006 to 2010 for the Landscape (table [x] and on private land (table [x]). The gain loss methodology was used to calculate the deforestation rate for native forest (i.e. Tropical High Forest fully stocked and depleted) between 2006 and 2010 (table [x]).

A total 113,466 ha of forest will be reduced to 100 ha over a Project life time of 30 years which represents a forest reduction of 99% (113,366 ha). Deforestation of THF fully stocked and THF depleted represents a net carbon stock change of 439 and 130 tCO2 per ha above and 92 and 29 tCO2 per ha below ground respectively when accounting for carbon crops residue on cultivated land, 34 and 9 tCO2e per hectare above and below ground respectively.

99% of all the native forest on private land will have been cleared by 2030 at a historic rate of 8,359 ha per year (table [x]) in a linear trajectory until the threshold level of 25% deforestation and a subsequently log normal deforestation rate with a 100 ha asymptotic value (graph [x]). This represent a total carbon stock change of 52.6 million tCO2e based on a net carbon density of 439 tCO2 per hectare for THF fully stocked and a 130 tCO2 per hectare for THF depleted above ground biomass and a 92 and 29 tCO2 per hectare for below ground biomass, respectively.

Table 12. Land cover change (ha) between 1995 and 2010 for the Landscape						
land cover classes	**1995**	**2006**	change	**2006**	**2010**	change
THF, fully stocked	239,800	184,806	-54,994	184,806	167,872	-16,934
THF, depleted	59,776	65,861	6,085	65,861	28,265	-37,597
Colonizing forest	0	2,475	2,475	2,475	3,238	763
Plantation forest	3,601	3,324	-277	3,324	2,480	-844
Other	2,467,419	2,516,028	48,609	2,516,028	2,570,640	54,613

Table 13. Deforestation of native forest (THF fully stocked and depleted) between 2006 and 2010	
Loss (ha)	-75,904
Gain (ha)	34,111
Net (ha)	-41,793
Annual (ha/yr)	-8,359

Table 14. Above and below ground carbon density (tCO2/ha) corrected for farmland residue				
land cover class	gross		net	
	above ground	below ground	above ground	below ground
THF, fully stocked	473	101	439	92
THF, depleted	164	38	130	29
Agricultural field	34	9		

Table 16. Carbon stocks changes (tCO2e) above and below ground on private land in the without project scenario		
land cover classes	above ground	below ground
THF, fully stocked	37,542,362	7,887,926
THF, depleted	3,633,271	812,761
Subtotal	41,175,634	11,468,544
Grand total	52,644,178	

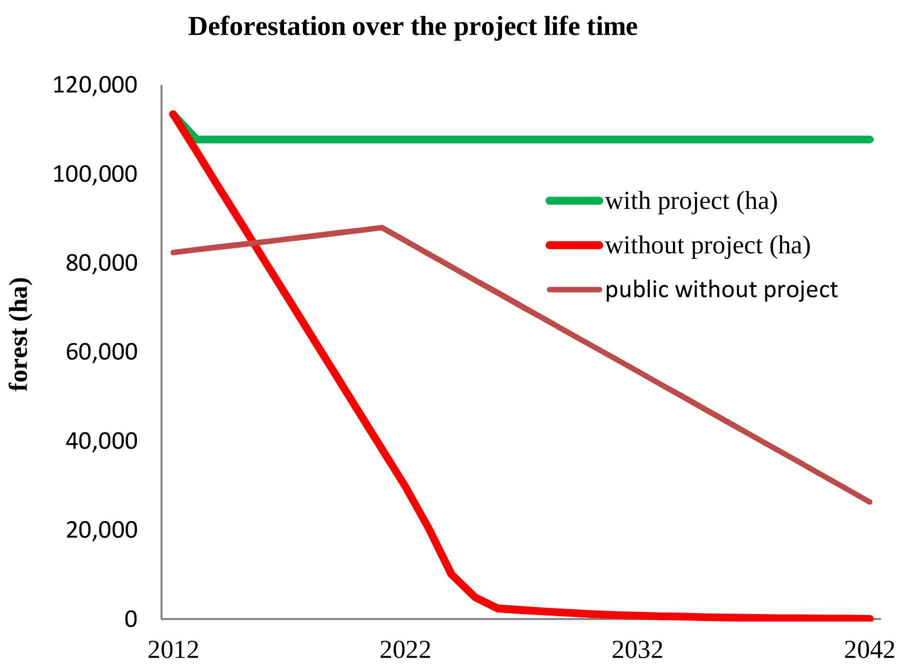


Figure 16. Deforestation with and without project over the project life time on private and public land

Table 15. Land cover change between 1995 and 2010 for the privately owned land

	1995-2005(10 yrs)		2006-2010 (5 yrs)	
land-cover change	Surface area (ha)	annual rate (ha/yr)	Surface area (ha)	annual rate (ha/yr)
Stable				
THF, fully stocked (THF)	102,571		73,262	
THF, depleted (THFd)	36,326		10,325	
Other, incl. woodland (stable)	2,412,016		2,436,687	
Planted Forest (PF)	1,843		895	
Deforestation				
THF, fully stocked to Other	-35,386	-3,539	**-34,676**	-6,935
THF, depleted to Other	-15,715	-1,572	**-41,228**	-8,246
Planted Forest to Other	-1,256	-126	-2348	-470
Degradation				
THF, fully stocked to THF, depleted	-25,113	-2,511	-5,179	-1,036
Deforestation -Regeneration				
THF, fully stocked to Planted Forest	-7	-1	0	0
THF, depleted to Planted Forest	-2	0	-41	-8
Regeneration				
THF, depleted to THF, fully stocked	5,066	507	**16,394**	3,279
Other to THF, fully stocked	4,818	482	**17,717**	3,543
Other to Planted Forest	1,458	146	948	190
Other to Colonizing Forest	0	0	3	1

4. *Describe how the 'without project' reference scenario would affect communities in the project zone, including the impact of likely changes in water, soil and other locally important ecosystem services*

The communities will be affected when they have exceeded the carrying capacity of the forest ecosystem. This point is reached in 2048 when all the privately owned forest will have been converted to land use for agriculture in a "without project" reference scenario (also G2. Section 1, 2 and 3). Land in production will only be able to provide food for a limited time before the soils become unfertile and expensive fertilizers are needed to maintain productivity. The use for these fertilizers will reduce the income of households, which in turn will reduce their cash flow and ability to cope with years of bad-harvests.

The occurrence of bad harvest will increase with less forest cover in the Landscape and climate becoming more extreme. Forest cover buffers climatic extremes by absorbing extreme rainfall and acting as moisture reservoir under drought (ref.). Model simulations have shown that climate in the Albertine Rift will become more extreme and changes from a bimodal to a single monsoon-like rainfall regime. This means a longer and more intense dry season. Rainfall will no longer be buffered and absorbed by tall vegetation like forest and woodland, most of the rain will runoff into streams and river causing erosion and floods. Soil replenished less with rain water will dry out faster leading to bad harvests.

5. *Describe how the 'without project' reference scenario would affect biodiversity in the project zone (e.g., habitat availability, landscape connectivity and threatened species):*

Biodiversity in the Landscape is already divided in forest blocks and patches surrounded by agricultural land. The "without project" scenario predicts that all the privately owned forests will have been converted to land use for agriculture before 2030. Consequently, the forests in the central forest reserves will have become completely insular and isolated from neighboring forest blocks. This only remaining forest habitat in the Landscape will also have become increasingly smaller due to encroachment over the years. Collapsed connectivity and constantly reducing insular habitat will lead to the local extinction of species according to the Theory of Island Biogeography and even more so for threatened species.

G3. Project Design and Goals

The project must be described in sufficient detail so that a third-party can adequately evaluate it. Projects must be designed to minimize risks to the expected climate, community and biodiversity benefits and to maintain those benefits beyond the life of the project. Effective local participation in project design and implementation is key to optimizing multiple benefits, equitably and sustainably. Projects that operate in a transparent manner build confidence with stakeholders and outside parties and enable them to contribute more effectively to the project.

The project proponents must:

1. Provide a summary of the project's major climate, community and biodiversity objectives.

Climate benefits: the Project aims to contribute to climate change mitigation and avoid a global mean temperature increase above 2 degrees Celsius by	
Reduction emissions:	• avoiding the complete deforestation of all privately owned and communal forests (113,466 ha) by 2027 representing an avoided emission of 41.2 M tCO2e, • the subsequently encroachment into the central forest reserves (43,979 ha) after 2022 until 2042 representing an additional emission of 20.8 M tCO2e
Removal emissions:	• reforesting 40,000 ha, replacing the forest lost between 2006 and 2010 representing a removal of 24 M tCO2e to 2042

Community benefits: the Project aims to improve the livelihoods of 4500 households, and maintain and restore the ecosystem services they dependent on for subsistence and cash	
REDD:	• reforming and clarifying property rights and helping them obtain formal tenure rights at Local Counsel level, • providing them with a stable income from Monitoring Reporting Verification (MRV) activities based on the number and size of trees in their existing forest
Donor:	• improving their agricultural practices to reduce food scarcity and insecurity • adapting them to climate change impacts • improving living conditions *sensu* the Multidimentional Poverty Index

Biodiversity benefits: the project aims to ensure the survival of wildlife (> 200 species) and plants (> 500 species) in general and the 14 mammal species currently threatened in the Landscape in particular	
Protection:	• conserving and restoring 113,466 ha of forest habitat between the central forest reserves • protecting the central forest reserves from encroachment (82,354 ha)
Expansion:	• adding 40.000 ha of forest habitat

2. *Describe each project activity with expected climate, community and biodiversity impacts and its relevance to achieving the project's objectives.*

Project activities target the 4500 households identified as the main drivers of deforestation in the forest corridors

Activity 1: reform/clarify tenure rights at Local Council 1 (LC1) where each household outlines their land in the presence of their neighbors and the LC1 administrator, and signs a document recognized by LC1.	
Climate benefits:	clear tenure rights will increase the performance of the project and reduce the risk of exterior actors reaping the project's benefits
Community benefits:	documented tenure rights will allow forest owners and communities to receive payment from MRV activities, promote equitable REDD implementation and protect them from eviction and exclusion in the REDD project
Biodiversity benefits:	Clear ownership of the forest will allow fining the owners when illegal activities have been committed.

Activity 2: establish a MRV system based on tagging and measuring all trees in the forest of each household	
Climate benefits:	the MRV system will allow tracing documented trees and accurately measure and monitor avoided emissions of GHGs
Community benefits:	documented trees will allow each household receiving payment from MRV activities according to the number and size of their trees
Biodiversity benefits:	documented trees will allow identifying and monitoring rare and valuable tree species and tree species important for wildlife survival such as key stone species

Activity 3: improving their agricultural practices to reduce existing food scarcity	
Climate benefits:	Improving farming practices will mitigate the risk of so-called "reversals", i.e. the clearing of forests later in the project life time in this case in response to agricultural needs
Community benefits:	Food scarcity is a now a permanent phenomenon in the Landscape and improving their farming practices will reduce and curve this negative trend and future food insecurity
Biodiversity benefits:	This activity will stop the need to clear forest habitat in the future

Activity 4: adapting households to climate change impacts	
Climate benefits:	Adaptation requires moving away from slash and burn farming practices and less burning will lower the risk of escaped wildfires destroying forest, i.e. GHG emissions
Community benefits:	Regional climate is becoming increasingly drier and the dry season will become a bottleneck for household survival without proper rainfall water collection and storage, terracing and food storage facilities
Biodiversity benefits:	Households adapted to climate change and a higher water retention capacity in the Landscape will lower the risk of forest destruction

Activity 5: improving living conditions *sensu* Multidimensional Poverty Index	
Climate benefits:	Poor households are more vulnerable to emergencies and rely more on the forest as safety net, improving their living conditions will lower the risk of reversals
Community benefits:	These household are poor and improving their living conditions will reduce the risk of them reaching a irreversible poverty trap
Biodiversity benefits:	Lowing the risk of reversals due to emergencies will also lower the risk of forest habitat destruction

3. *Provide a map identifying the project location and boundaries of the project area(s), where the project activities will occur, of the project zone and of additional surrounding locations that are predicted to be impacted by project activities (e.g. through leakage).*

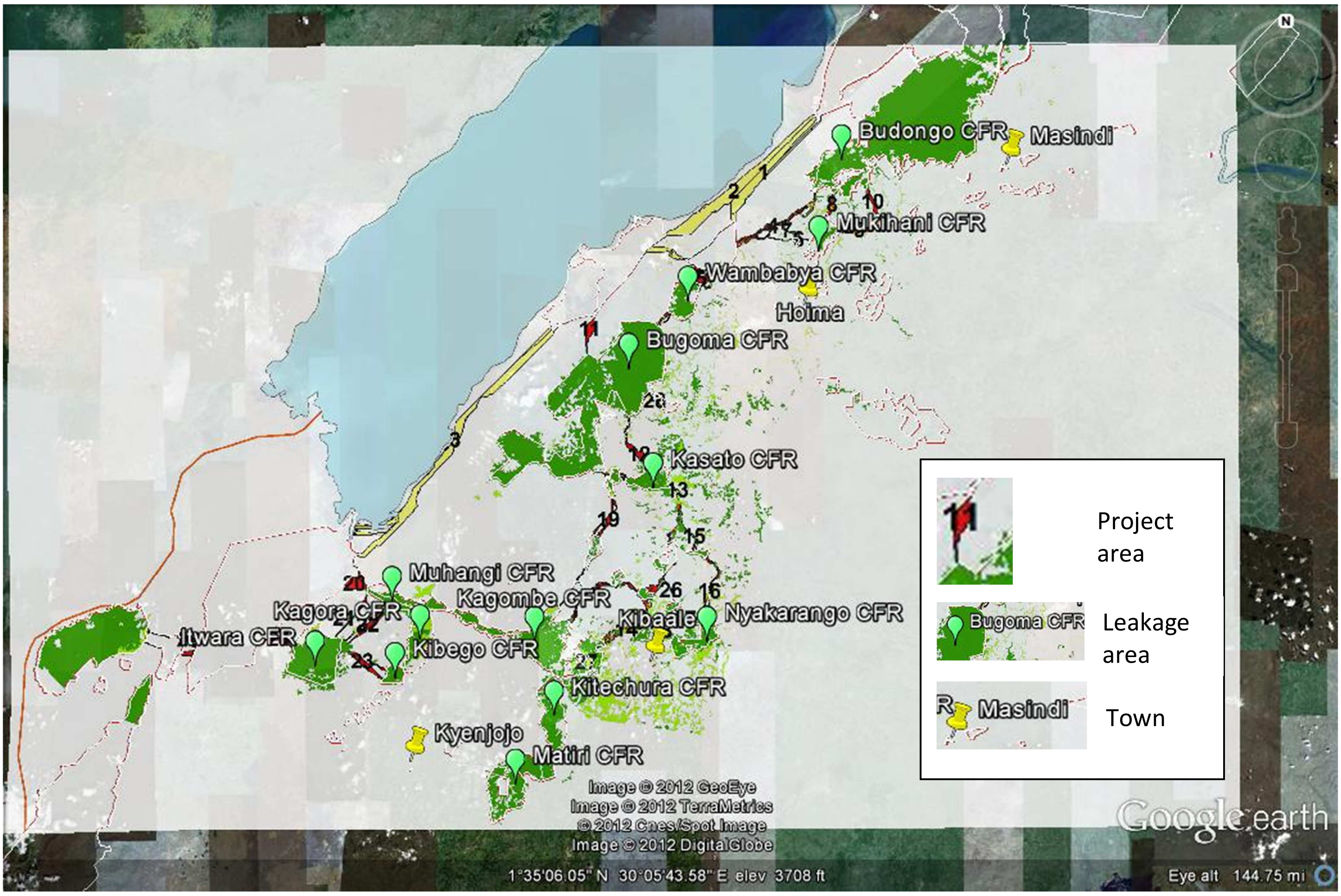


Figure 17. Project and leakage areas in the Landscape; the project areas are referred to as corridors (red lines with numbers) and the so-called central forest reserves (e.g. Bugoma CFR) are the forests on public land and the leakage areas (green balloons and outlined in white).

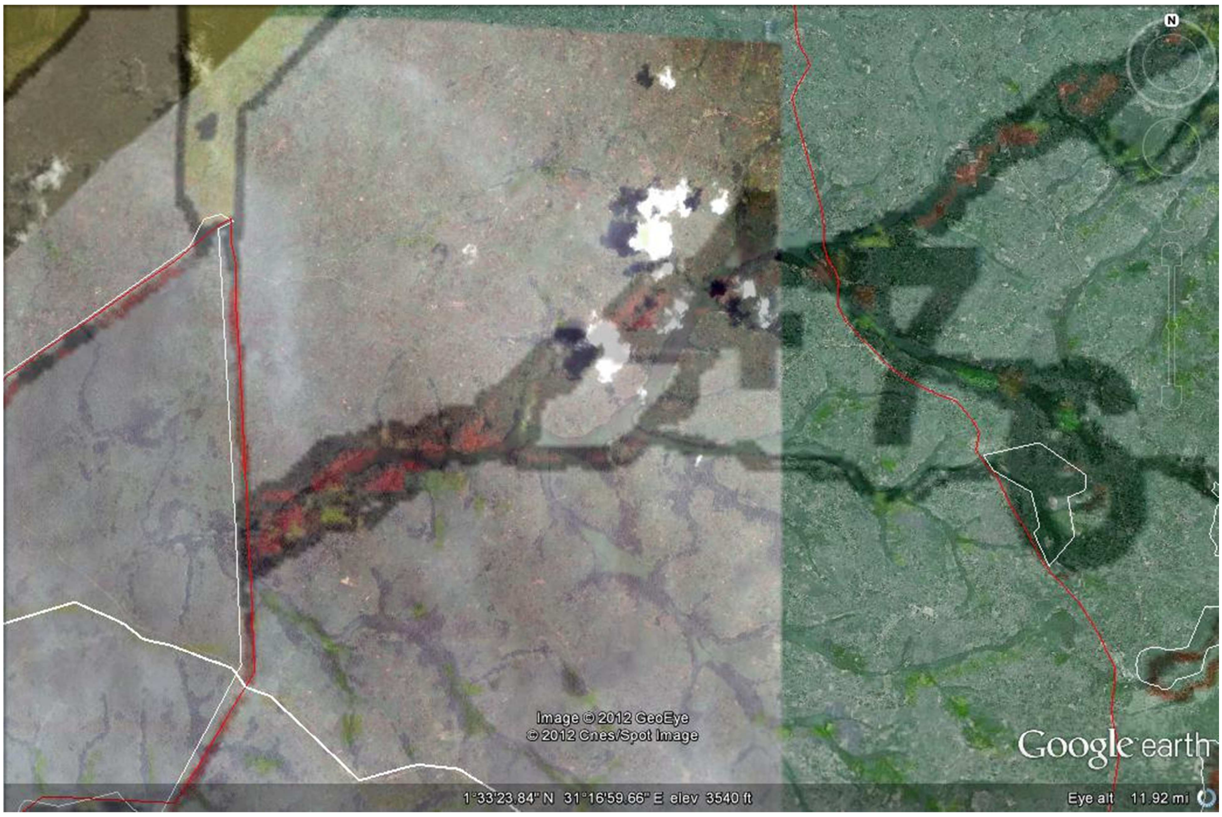


Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
1°33'23.84" N 31°16'59.66" E elev 3540 ft
Eye alt 11.92 mi

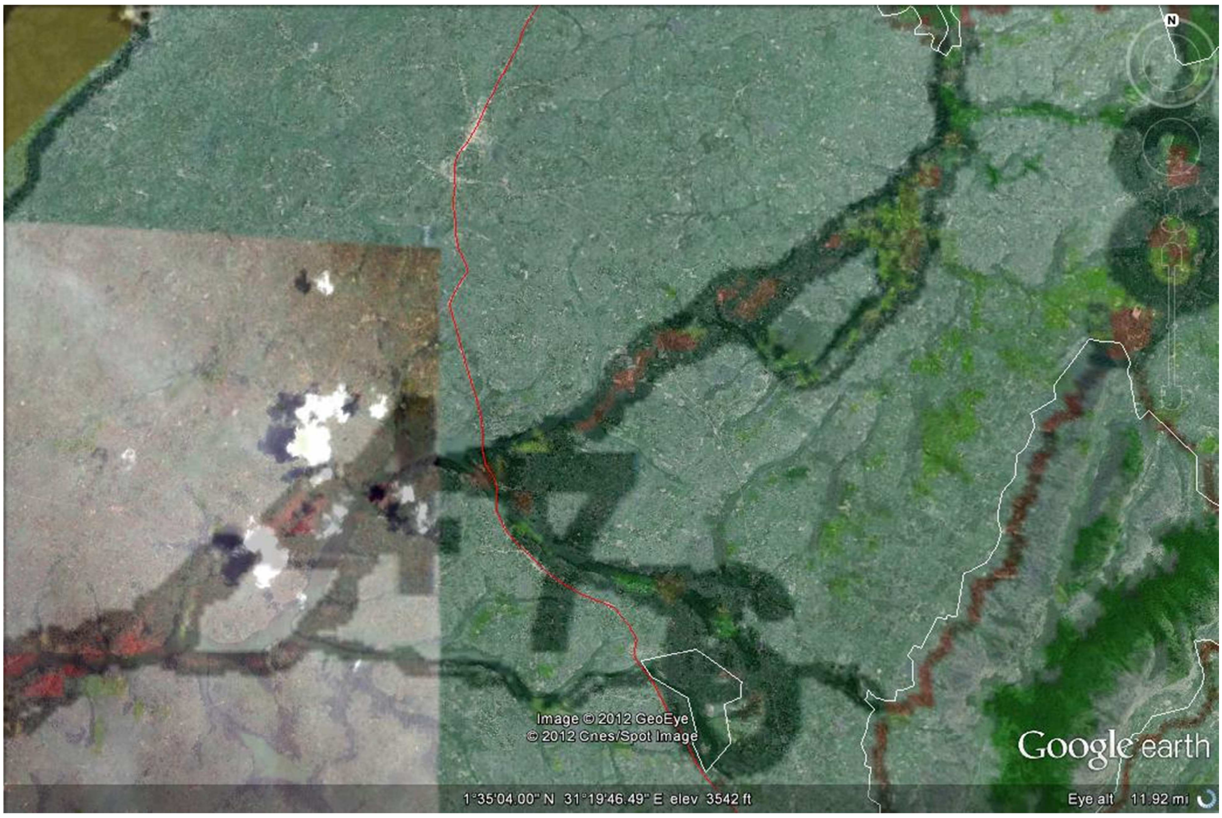


Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
1°35'04.00" N 31°19'46.49" E elev 3542 ft
Eye alt 11.92 mi


Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
2007
1°27'51.76" N 31°11'45.81" E elev 3544 ft
Eye alt 37918 ft


© 2012 Cnes/Spot Image
Google earth
2009
1°24'32.67" N 31°06'06.16" E elev 3739 ft
Eye alt 34004 ft


© 2012 Cnes/Spot Image
Google earth
2007
1°35'17.87" N 31°22'19.93" E elev 3510 ft
Eye alt 40842 ft


© 2012 Cnes/Spot Image
Google earth
2007
1°34'00.48" N 31°27'26.67" E elev 4019 ft
Eye alt 40842 ft


© 2012 Cnes/Spot Image
Google earth
2007
1°36'50.84" N 31°28'51.84" E elev 3629 ft
Eye alt 39503 ft

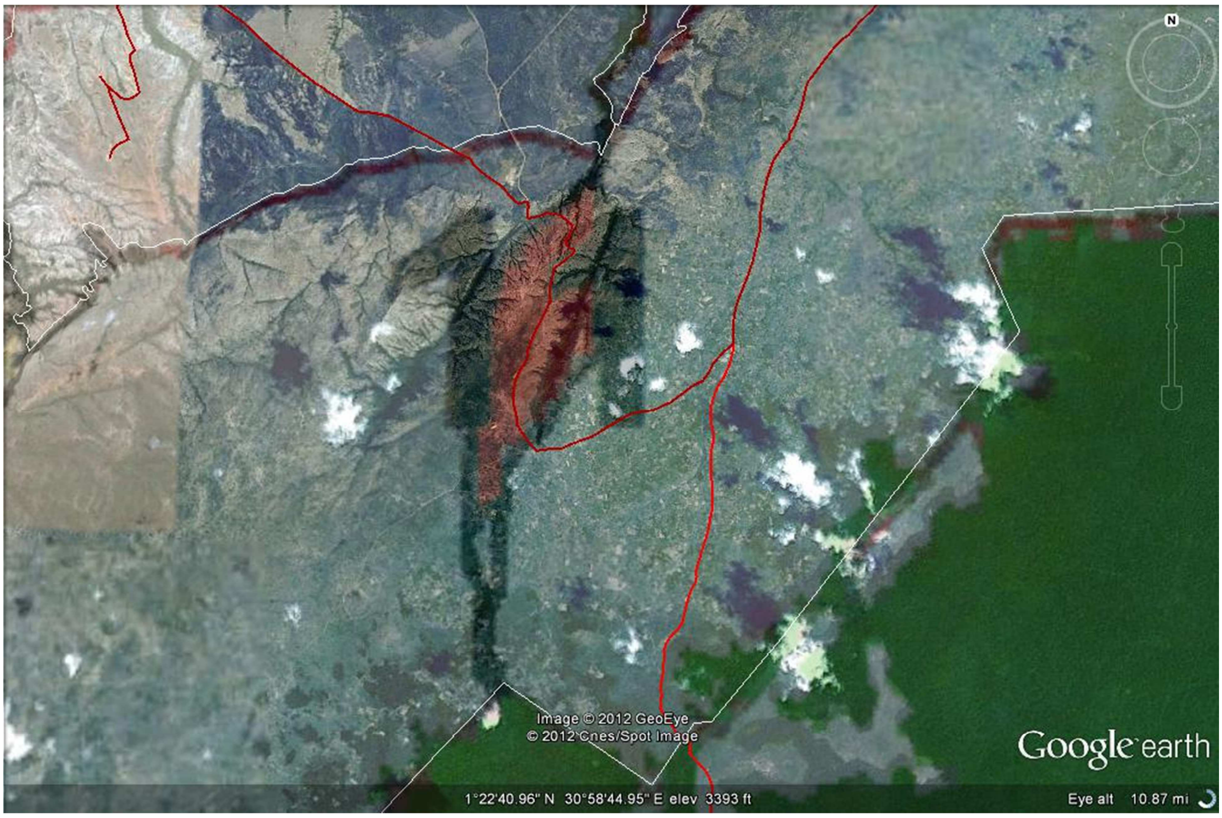


Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
1°22'40.96" N 30°58'44.95" E elev 3393 ft
Eye alt 10.87 mi


12
Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
1°11'18.50" N 31°02'45.53" E elev 3777 ft
Eye alt 10.87 mi


12
Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
1°07'09.35" N 31°01'02.35" E elev 3676 ft
Eye alt 10.87 mi

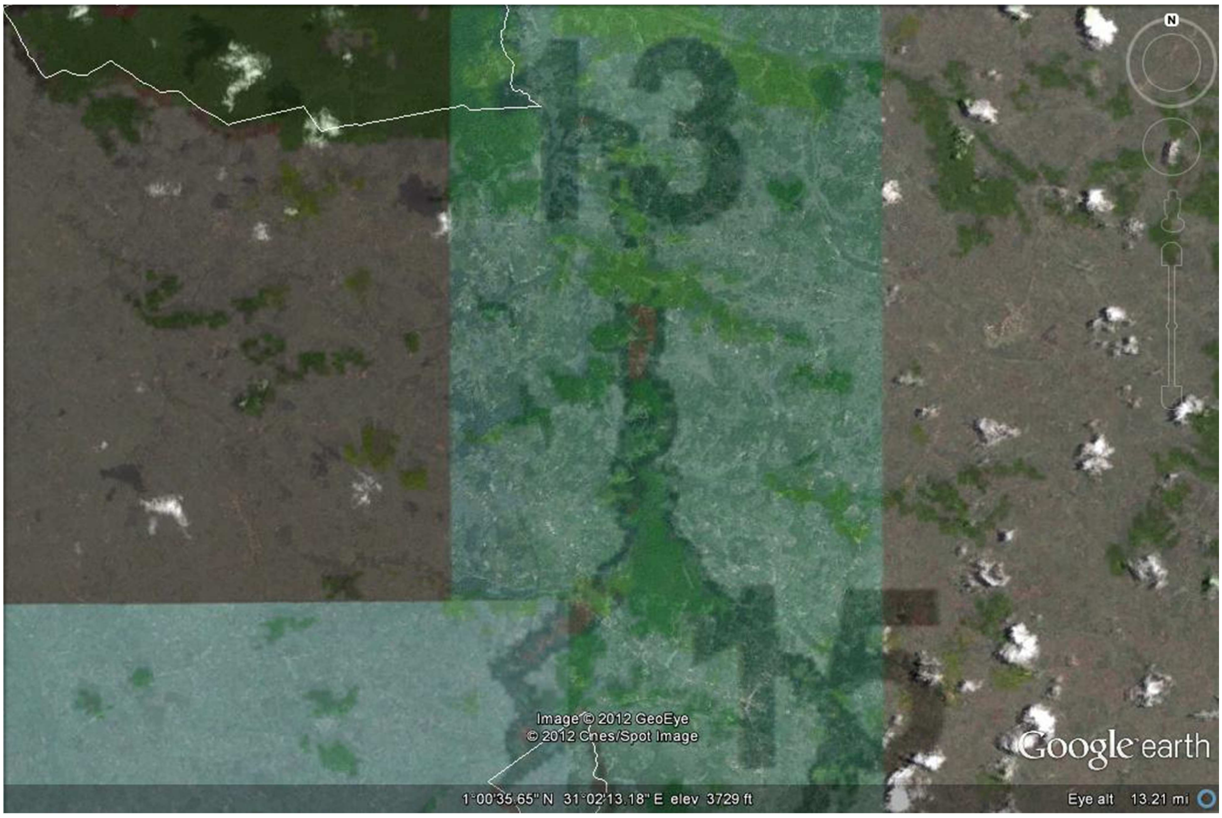
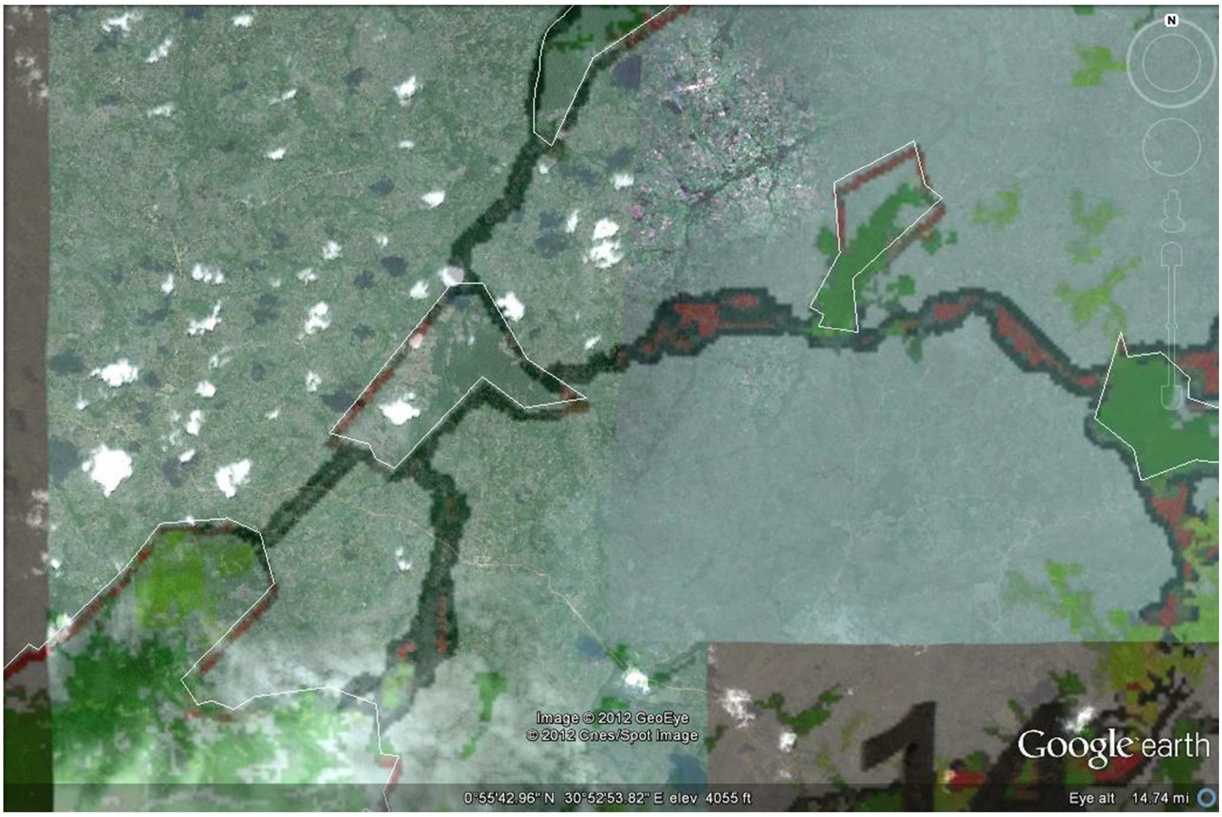
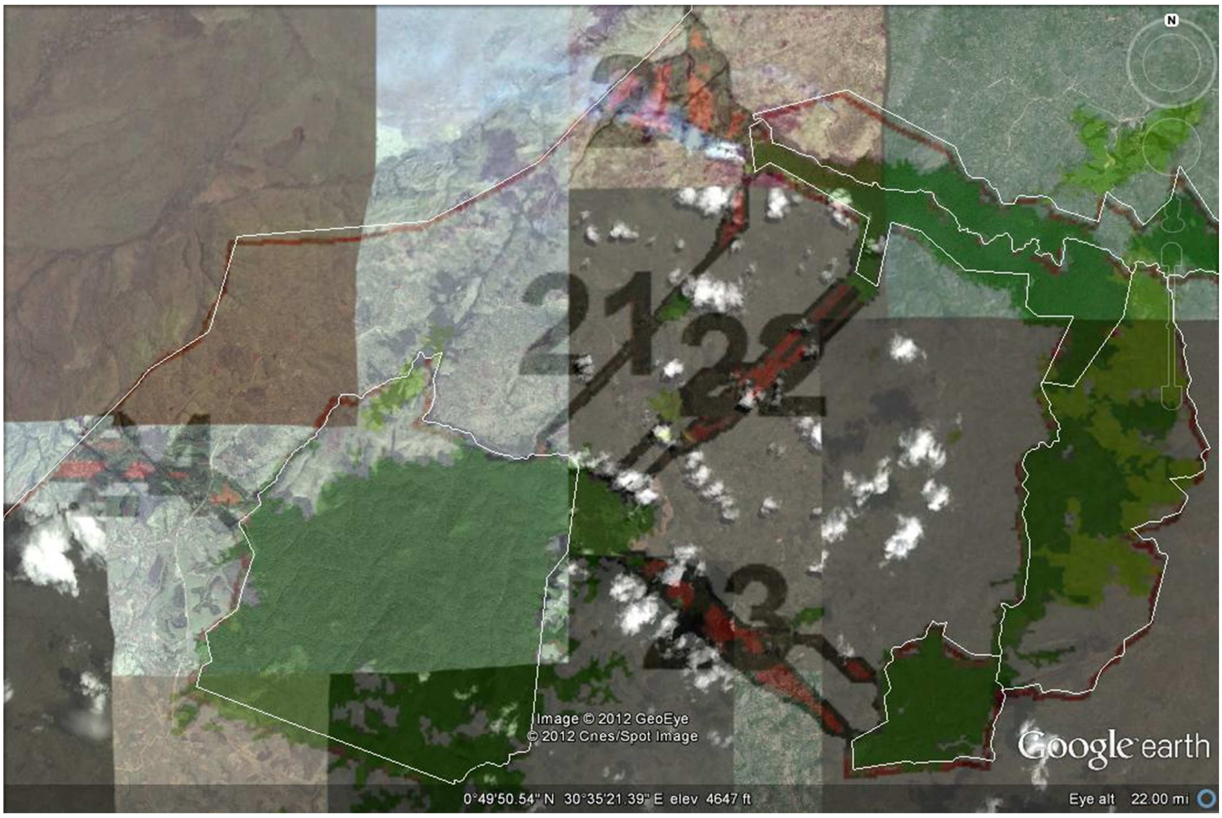

13
Image © 2012 GeoEye
© 2012 Cnes/Spot Image
1°00'35.65" N 31°02'13.18" E elev 3729 ft
Eye alt 13.21 mi
Google earth


Image © 2012 GeoEye
© 2012 Cnes/Spot Image
0°59'40.57" N 31°08'13.97" E elev 3680 ft
Eye alt 13.21 mi
Google earth


Kibaale
Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
0°49'51.26" N 31°03'56.98" E elev 3844 ft
Eye alt 14.25 mi


Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
1°02'56.31" N 30°59'22.15" E elev 3754 ft
Eye alt 10.87 mi


14
Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
0°55'42.96" N 30°52'53.82" E elev 4055 ft
Eye alt 14.74 mi


21
22
23
Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
0°49'50.54" N 30°35'21.39" E elev 4647 ft
Eye alt 22.00 mi

26
16
Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
0°55'24.45" N 31°08'23.02" E elev 3690 ft
Eye alt 13.21 mi

26
Image © 2012 GeoEye
© 2012 Cnes/Spot Image
Google earth
0°56'36.52" N 30°57'36.68" E elev 3966 ft
Eye alt 14.25 mi

4. *Define the project lifetime and GHG accounting period and explain and justify any differences between them. Define an implementation schedule, indicating key dates and milestones in the project's development.*

Project implementation schedule with an accounting period of *30 years*, milestones and key dates	
Milestones	Key dates
Start date	1st [month] 2014
End date	31 [month] 2043
Validation	before 1 [month] 2014
Forward sale of pre-verified credits	before 1 [month] 2014
First verification	1st [month] 2016
Verification period	5 years

5. *Identify likely natural and human-induced risks to the expected climate, community and biodiversity benefits during the project lifetime and outline measures adopted to mitigate these risks.*

The most recent VCS guidelines were followed to assess the risk level of the project and associated buffer discount. The AFOLU Non-permanence Risk tool (VCS Version 3) thoroughly deals with risks and classified them into three categories: internal risks, external risks and natural risks, and further into sub-categories such as project management, financial viability and community engagement.

The assessment tool contains tables with statements like "Project cash flow breakeven point is greater than 10 years from the current risk assessment" and a score. Statements which correspond with the project have to be chosen and which results in a total score. The total score is translated to a percentage for the buffer pool. The lower the total scores the lower the risk discount. In some sub-categories having a mitigation plan helps to lower the score.

Internal risks
Internal risks comprise the following sub-categories: project management, financial viability, opportunity costs and project longevity.

"Project Management" deals with the tree species planted, enforcement to avoid encroachment, expert knowledge and presence on the ground of the project proponents. Mitigation plans have to consist of "adaptive management plans in place" and individuals with "significant" experience in all aspects of a REDD project.

In this project the plus part of the REDD+ project is more easily implemented by expending the Plan Vivo activities of ECOTRUST. Therefore, the risk associated with the tree species planted does not apply.

Also encroachment is unlikely to happen since all of the forest is private and relatively small. Expert knowledge is present or could be incorporated by associating expertise within the NGOs from outside Uganda. Proponents of this project have been active for some years in this landscape. The overall score is at least 0 and including mitigation -4.

“Financial Viability” deals the number of years in reaching the breakeven point of the project cash flow, and the percentage of funding secured for the project. Mitigation deals with the availability of “callable financial resources of the 50%< of total cash out before the project reaches breakeven”. “Cash flow in” is defined as: a) commercial revenue streams assessed for the project, b) secured revenue, c) projected revenue of sale credits and d) secured donor/upfront/pre-payments/ equity or loans. “Cash flow out”: a) project implementation costs, b) validation/verification/registration, c) interest expenses/ repayment loans/ forward purchase agreements and equity distributions.

In this subcategory it is more tentative to choose a statement which corresponds with the project. The breakeven point depends on the project activities to be implemented. Therefore, for this project the statement of reaching the breakeven point between 4 and 7 years was chosen with a score of 1 and the percentage of secured funding between 15% and 40% with a score of 2. These two statements were chosen since partners have a potential carbon buyer for the carbon credits. Mitigation could come from donors like NORAD or corporations willing to invest in activities[8]. The total score was 3 or in the worst case 6.

“Opportunity costs” deals with the net present value (NPV) of the most profitable alternative land-use activity. NPV or “discounted cash flow” analysis is a commercial method to calculate the viability of an investment. Other aspects included are a net positive community impact and the subsistence as the biggest driver. Mitigation comes from “project proponent is a non-profit organization”, and “project is protected by a legally binding commitment to continue management practices […] over the […] project crediting period” or longer.

This requirement of the risk assessment is new and was published after the socio-economic surveys were completed. Therefore, to accurately compare this project with the most profitable alternative land-use alternative additional information has to be collected from the households. A chose from the statements is furthermore complicated because they include costs for the project activities which have not been decided yet. An intermediary statement chosen based from the currently available data on the opportunity costs, the net positive community impact and subsistence as the main drive. Total score was 2.

“Project Longevity” deals with the continuation of the project activities to maintain GHG reduction during and beyond the project life time and a legal agreement to support this. It also sets a newly published crediting period or project life time of 30 years. In absence of a like legal agreement, the statement “without legal agreement or requirement to continue the management practice” was chosen to be conservative. The total score of this sub-category is 18, which is high (formula: 24 – (project longevity/5).

External risks:
External risks comprise the following sub-categories: Land ownership and resource tenure, community engagement and political risk.

“Land ownership and resource tenure” deals with the discrepancy between ownership and resource access/use rights and dispute. Mitigation comes from a legally binding commitment to continue practices over the project life time or a plan solve disputes. In the case of this project ownership and resource

[8] Project proponents are soliciting corporations willing to contribute to activities

access/use rights are held by the same entity and there is very little dispute over land tenure due to the high population density. The mitigation does not apply. The total score was 0.

"Community engagement" deals with the dependence of communities on the project area (within 20 km), their participatory engagement and net positive benefits for the communities following CCBA[9] standards. Mitigation comes from a net positive impact on social and economic well being of the communities. In this case the statement "less than 20% of the households […] have been consulted with a score of 5 and a mitigation score of -5 for net positive impacts on the well-being of the communities. Total score was 0.

"Political risk" deals with "governance score" according to the World Bank's six indicators governance indicators, with mitigation among others from participation in REDD initiative funded by the World Bank Forest Carbon Partership Facility, registered CDM afforestation/reforestation, and national FSC body. The mean of Governance Score mentioned in the World Bank Report for Uganda in 2008 was positive. Current developments may have turned it down. Including the R-PP submitted by Uganda, the total score is 0.

Natural risks:
Natural risks comprise the occurrence and frequency of natural event which could harm the carbon benefits. The likelihood of occurrence is defined as the historical average events over the last 100 years and significance as the percentage of the project areas affected by fire, disease and extreme weather. Likelihood ranges between events less than every 10 years to once every 100 years and significance between 70% of carbon stocks lost and less than 5%.

Fire is part of the natural ecology of this landscape and it is assumed the highest natural risk in the project area. Historically, fire has not been strong force affecting the distribution of the forests. Therefore, from table the likelihood of an event happening "every 25 years to less than 50 years" and a significance of only "minor or less than 5% to less than 25% loss of carbon stocks" were chosen.

The overall total of scores was 25 which is the equivalent of a discount of 25%. To lower this discount is best achieved by lowering the score for project longevity which was 18.

6. *Demonstrate that the project design includes specific measures to ensure the maintenance or enhancement of the high conservation value attributes identified in* ***G1*** *consistent with the precautionary principle*

The Project has been designed with the objective to protect the important forest corridors to ensure the survival of the existing wildlife in the Landscape. The combined privately owned forests create a corridor area with maximum protection, ideally flanked with a buffer forest which only allows collecting non-timber forest products for subsistence and or a zone of agro-forestry with shade coffee and cocoa. Along the existing forests permanent new forest is planted in combination with woodlots for fuel consumptions. Certain corridors areas have eroded and priority is to restore and plant new permanent forests. The design includes avoiding leakage in the central and local forest reserves or public forests the main repositories of threatened animal diversity by frequent patrolling of household members supervised by the district forest services in return of community benefits. All these efforts are focused on maintaining connectivity within the Landscape important for species survival over the project life time.

[9] Climate Community and Biodiversity Alliance

7. *Describe the measures that will be taken to maintain and enhance the climate, community and biodiversity benefits beyond the project lifetime.*

The Project proponents envision implementing the principles of ecological economics over the project life and pass them to future generations of the rural households in the Landscape. The value of conserving forests beyond the project lifetime will only be possible when the forest owners are convinced of the valuable ecosystems services these forests provide.

8. *Document and defend how communities and other stakeholders potentially affected by the project activities have been identified and have been involved in project design through: 1) effective consultation particularly with a view to optimizing community and stakeholder benefits, 2) respecting local customs and values and maintaining high conservation values.*

The project affected people have been identified based on the presence of native forest on their land. Project proponents have been working with the 4500 households over the last 5 years and the Project is the most recent intervention to conserve their forest and provide community benefits. These households have been organized into Private Forest Owners Associations prior to the Project. The project affected people have been informed about the Project and their rights following the guidelines of Free Prior and Informed Consent (FPIC). They are informed and have the mandate to veto the Project at any time.

[continued] *Project developers must document stakeholder dialogues and indicate if and how the project proposal was revised based on such input.*

The initial PDD draft was altered on several aspects of the Project after [x] consultations with the PFOAs. Following the guidelines of FPIC the project affected people agreed with the final version of the PDD.

[continued] *A plan must be developed to continue communication and consultation between project managers and all community groups about the project and its impacts to facilitate adaptive management throughout the life of the project.*

The PDD is a guiding document which in response to bottom-up and top-down experiences, concerns, suggestions and changing priorities can be altered according to mutual agreement between the stakeholders represented in the Co-determination committee.

9. *Describe what specific steps have been taken, and communications methods used, to publicize the CCBA public comment period to communities and other stakeholders and to facilitate their submission of comments to CCBA. Project proponents must play an active role in distributing key project documents to affected communities and stakeholders and hold widely publicized information meetings in relevant local or regional languages.*

The Project Design Document will be presented to the PFOAs, the District Authorities and Central Government following the latest guidelines of Free Prior and Informed Consent (Anderson 2011[10]) to come to a mutual agreement. The Project design document will be posted on the CCBA website (http://www.climatestandards.org), distributed within the REDD networks of WCS, WWF and JGI and presented on scientific fora for peer review.

[10] Anderson, P. (2011) Free Prior and Informed Consent , Principles and Approaches for Policy and Project Development, Bangkok, February 2011 RECOFTC and GIZ

10. *Formalize a clear process for handling unresolved conflicts and grievances that arise during project planning and implementation. The project design must include a process for hearing, responding to and resolving community and other stakeholder grievances within a reasonable time period.*

The Project proponents will use the *Thomas-Kilmann Conflict Mode Instrument* (TKI)[11] to resolve any grievances. TKI recognizes five different "styles" of dealing with conflict (competitive, collaborative, compromising, accommodating and avoiding). Different styles are used in different situations and understanding these styles and knowing when to apply them will help the process of conflict resolution. At the same time dealing with conflict the so-called "Interest-Based Relational (IBR) Approach" will be followed which respects individual differences while helping people avoid becoming too entrenched in a fixed position. This approach uses five rules and follows a five-step process to better understand the position of both parties, and create a mutually satisfactory solution (see for validity of this approach e.g. Ben-Yoav and Banai 1992[12]).

[continued] *This grievance process must be publicized to communities and other stakeholders and must be managed by a third party or mediator to prevent any conflict of interest. Project management must attempt to resolve all reasonable grievances raised, and provide a written response to grievances within 30 days. Grievances and project responses must be documented.*

All Project proponent's staff and stakeholders representatives will be trained in applying TKI to resolve conflict and if needed adapted to community customs and protocol. The project affected people will be informed about the grievance handling protocol and independent confidential counselor will be identified with special attention for women and underrepresented groups. All this information will be available in a training manual. Each conflict will be documented, guided by an independent mediator with the intent to resolve within 30 days.

11. *Demonstrate that financial mechanisms adopted, including projected revenues from emissions reductions and other sources, are likely to provide an adequate flow of funds for project implementation and to achieve the anticipated climate, community and biodiversity benefits.*

[11] http://www.kilmann.com/conflict.html

[12] Ben-Yoav, O., & Banai, M. (1992). Measuring conflict management styles: A comparison between MODE and ROCI-II instruments using self and peer ratings. International Journal of Conflict Management, 3 (3), 237-247.

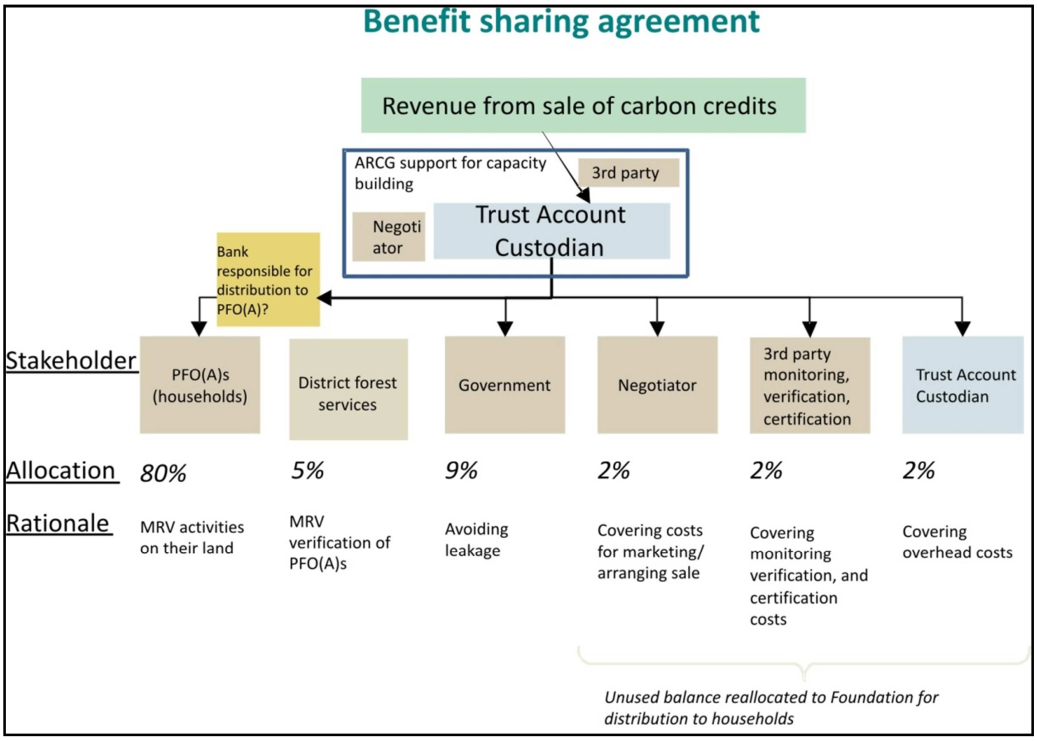


Figure 18. Benefit sharing agreement

G4. Management Capacity and Best Practices

The success of a project depends upon the competence of the implementing management team. Projects that include a significant capacity-building (training, skill building, etc.) component are more likely to sustain the positive outcomes generated by the project and have them replicated elsewhere.
Best practices for project management include: local stakeholder employment, worker rights, worker safety and a clear process for handling grievances.

The project proponents must:

1. *Identify a single project proponent which is responsible for the project's design and implementation. If multiple organizations or individuals are involved in the project's development and implementation the governance structure, roles and responsibilities of each of the organizations or individuals involved must also be described.*

Single project proponent

Wildlife Conservation Society (example):

Dr Miguel E. Leal
REDD project manager
Wildlife Conservation Society
BP 7487, Plot 802
Kampala, Uganda
mleal@wcs.org

The single project proponent represents the (Ugandan) Albertine Rift Conservation Group (ARCG), which is the collaborative effort of seven conservation organizations to develop and implement a REDD+ project and pursue the protection in the Murchison-Semliki Landscape in general by applying the principles of ecological economics through sustainable natural resources management and equitable distribution of well- being.

ECOTRUST –

Jane Goodall Institute (JGI) –

Nature Harness Initiative (NAHI) –

Wildlife Conservation Society (WCS) –

WWF –

Governance structure

Governance encompasses the processes that shape social priorities, how conflicts are acknowledged and possibly resolved, and how human coordination is facilitated. A core aspect of governance is its legitimacy, specifically how different groups are included in the decision-making and implementation processes, and how decision-makers are accountable to those whom the decisions concern.

The governance structure consists of a *co-determination committee* representing each member of the NARCG (7), the Private Forest Owners Associations (10) and the government (4) with the mandate to make strategic decisions on project management to optimize the Project performance. Committee will meet on a quarterly basis to make decisions on pending issues and activities, and provide guidance on project management to maintain performance.

The existing management structure between each NARCG member and their corresponding PFOAs will be maintained and used to implement the project activities. Each of the 6 project proponents will be responsible for the project performance at their site. A *site project manager* will be responsible for the implementation of the project activities (see G3.2) and the decisions made by the committee, verifying the monitoring data and collecting the socio-economic data.

2. *Document key technical skills that will be required to implement the project successfully, including community engagement, biodiversity assessment and carbon measurement and monitoring skills.*

[in prep.]

[continued] *Document the management team's expertise and prior experience implementing land management projects at the scale of this project. If relevant experience is lacking, the proponents must either demonstrate how other organizations will be partnered with to support the project or have a recruitment strategy to fill the gaps.*

REDD+ project coordinator (1)

[name]

General description: Overall project coordinator of Project operations

Role Specific Responsibilities: The Project coordinator is responsible for overseeing the management of implementing the Project activities, committee decisions, the focal point between the members and responsible for all day-to-day operations of NARCG.

Functional Responsibilities: Managing

- organizing meetings,

Job skills:

-

Roles & Responsibilities:

Role		Stakeholder	Responsibilities
Steering committee		NARCG GOU PFOAs	• determines revenue streams and the priorities and allocation of activities • monitors permanence of the project and effectiveness of the activities • decides on marketing strategies and sales of carbon credits
Financial manager		ECOTRUST	• receives and distributes payments from buyer in accordance with agreed distribution percentages and data from the monitoring unit to the stakeholders and PFOs
Carbon credit dealer		WCS	• markets carbon offset credits on behalf of PFOAs • enters into non-binding Letter Of Intent (LOI) with buyers for credit sale activities • registers the Verified Emission Reductions (VERs) on independent registry • will be a party to definitive agreement(s) along with buyer and GOU
Monitor	carbon	CSWCT/NAHI	• Community based monitors will monitor with the PFO his forest and report to monitoring unit, which in return ensure correct upload of data on carbon conservation milestones for both forestry and farming
	social	NARCG	• NARCG will collect data on the socio-economic well-being of the site households using a standard questionnaire, WCS will analyze the data to monitor community benefits over the project life time.
	biodiversity	WCS	• surveys every 5 years the biodiversity in the Landscape to monitor the biodiversity benefits over the project life time.

REDD+ specialist (1)

Miguel E. Leal, Ph.D.
General description:

Role Specific Responsibilities:

Functional Responsibilities:

Job skills:

Experience:

Site project manager (7)

[names]
General description:

Role Specific Responsibilities:

Functional Responsibilities:

Job skills:

Experience:

Extension workers (14)

[names]

General description:

Role Specific Responsibilities:

Functional Responsibilities:

Job skills:

Experience:

3. *Include a plan to provide orientation and training for the project's employees and relevant people from the communities with an objective of building locally useful skills and knowledge to increase local participation in project implementation. These capacity building efforts should target a wide range of people in the communities, including minority and underrepresented groups. Identify how training will be passed on to new workers when there is staff turnover, so that local capacity will not be lost.*

The Project has planned six workshops to train the 14 project's employees as extension officers in the techniques and skills to implement the project activities such as measuring trees, zero tillage farming and planting trees, and shade crops. These extension officers will train the relevant people from the 4500 households in the same skills and followed up with additional meetings to monitor progress and identify implement barriers. The representatives of each PFOA will monitor the need for extra trainings or when a gap in capacity has occurred. This grassroots approach and learning by doing has shown in other projects that the acquired knowledge and skills are being passed on within households, extended families and village communities safeguarding the permanence of local capacity.

4. *Show that people from the communities will be given an equal opportunity to fill all employment positions (including management) if the job requirements are met. Project proponents must explain how employees will be selected for positions and where relevant, must indicate how local community members, including women and other potentially underrepresented groups, will be given a fair chance to fill positions for which they can be trained.*

The Project proponents recognize that forest conservation and associated community benefits can only be sustainable over the Project life time and beyond when people from the communities can claim ownership and have the opportunity to run the Project in the long-term. The Project proponents envision recruiting people from the communities over the next ten years including management by providing them a curriculum from basic to specific skills. With ambition, community members will be able to increase their capacity to run certain aspects of the project and the best performing members will be selected for Project employment and more weight will be given to women and underrepresented groups.

5. *Submit a list of all relevant laws and regulations covering worker's rights in the host country. Describe how the project will inform workers about their rights. Provide assurance that the project meets or exceeds all applicable laws and/or regulations covering worker rights and, where relevant, demonstrate how compliance is achieved.*

The project proponents (i.e., the 7 NGOs identified in G4.1) employ Ugandan nationals to implement the Project. The rights of these workers are set forth in Employment Act, 2006 (Act. No 6) which can be accessed at International Labour Organization website[13].The project proponents comply in all material respects with the Act, including ensuring that employment contracts and internal staff rules and regulations conform to the Act's statutory requirements. Employees of the project proponents are informed of their rights under staff contracts in the regular course of each project proponents' human resource and recruitment practices.

6. *Comprehensively assess situations and occupations that pose a substantial risk to worker safety. A plan must be in place to inform workers of risks and to explain how to minimize such risks. Where worker safety cannot be guaranteed, project proponents must show how the risks will be minimized using best work practices.*

[13] The Employment Act can be accessed at (http://www.ilo.org/dyn/natlex/docs/SERIAL/74416/76582/F1768664138/UGA74416.pdf.)

Worker safety is considered here beyond the strict employment relationship between the NGOs and their employees as defined in the Employment Act and is extended to include household members implementing in the below mentioned project activities.

The following planned project activities will require physical labor in the field:

1) *clarifying property rights*: this activity will require a team of people to walk around the property of the household through forested terrain,

2) *monitoring and reporting activities:* this activity will require household members surveying their forest and tagging their trees,

3) *improving agricultural practices, planting trees and shade cash crops*: this activities will require household members digging pits, clearing secondary vegetation for planting.

These three activities may pose some risk to worker safety, such as clearing vegetation using machetes and walking through uneven terrain. As part of the extension services the household members participating in these activities will be made aware of potential risks, how to take appropriate safety precautions, and provided first aids skills in case of an accident. All this information will be available in the training manual.

7. *Document the financial health of the implementing organization(s) to demonstrate that financial resources budgeted will be adequate to implement the project.*

All implementing proponents are subjected to annual audits and inspections by independent auditing companies. Here below the financial health of the 7 implementing organizations is outlined. For further details on Project Finance see Section G3.11.

Chimpanzee Sanctuary and Wildlife Conservation Trust –

ECOTRUST –

Jane Goodall Institute –

Nature Harness Initiative –

Wildlife Conservation Society - The Wildlife Conservation Society (WCS) founded in 1895 as the New York Zoological Society, is an internationally recognized not-for profit conservation organization dedicated to preserving the Earth's wildlife and wild landscapes and seascapes. WCS currently oversees a portfolio of more than 500 conservation projects in 60 countries in Asia, Africa, Latin America, and North America demonstrating a financial stability of the organization with an operating revenue of USD$205.4 million and an operating surplus exceeding expenditures by USD$1.5 million (WCS Annual Report, 2010).

WWF–

G5. Legal Status and Property Rights

The project must be based on a solid legal framework (e.g., appropriate contracts are in place) and the project must satisfy applicable planning and regulatory requirements. During the project design phase, the project proponents should communicate early on with relevant local, regional and national authorities in order to allow adequate time to earn necessary approvals. The project design should be sufficiently flexible to accommodate potential modifications that may arise as a result of this process.
In the event of unresolved disputes over tenure or use rights to land or resources in the project zone, the project should demonstrate how it will help to bring them to resolution so that there are no unresolved disputes by the start of the project.

Based on information about current property rights provided in **G1**, the project proponents must:

1. *Submit a list of all relevant national and local laws and regulations in the host country and all applicable international treaties and agreements. Provide assurance that the project will comply with these and, where relevant, demonstrate how compliance is achieved.*
National government legislation:

- The National Environment Management Policy (NEMP; 1994) to promote sustainable management of forest resources in protected areas, and on private and public land.
- The National Forestry Policy (2001) to promote public participation and partnership between governments and private companies in forest management.
- The National Forestry and Tree Planting Act (2003) to promote registration of private forests with the local government District Forestry Services and the District Land Board.
- The Ugandan government Vision for 2035 (2008) references explicitly to carbon trading as a means of conserving forests for climate change mitigation.
- The Ugandan REDD readiness Preparatory Proposal (R-PP; 2011) submitted to the World Bank Forest Carbon Partnership Facility (FCPF) to accommodate future REDD+ projects

Local government legislation:
- The Hoima Environment and Natural Resources Management Bill (2011) to promote sustainable natural resources management.
- District ordinances (in prep.) in Kyenjojo, Kibaale, Hoima and Masindi Districts, clarifying the legal basis for managing forests on private land.

International treaties:
- The World Charter for Nature
- The African Convention on the Conservation of Nature and Natural Resources
- The Convention on Biological Diversity
- Convention in International Trade of Endangered Species
- The Convention Concerning the Protection of the World Cultural and Natural Heritage
- RAMSAR Convention
- Convention on the Conservation of Migratory Species of Wild Animals
- UN Convention to combat Desertification
- New York Convention on Climatic Change
- The Vienna Convention for the Protection of the Ozone Layer

- Montreal Protocol on Substances that deplete the Ozone Layer
- The UNEP declaration on Human Environment, Stockholm, 1972
- The United Nations Framework for Climate Change Convention
- Rio Declaration, 1992

2. *Document that the project has approval from the appropriate authorities, including the established formal and/or traditional authorities customarily required by the communities.*

National Authority - The Project has been endorsed as a demonstration project by the REDD+ focal point (Xavier Mugumya Nyindo) as a pilot project to advance the national R-PP process in order for Uganda to become a low-risk host country for REDD+ projects. The central government representative signed the benefit sharing agreement (Appendix G5.2a).

Local District Authorities – The local Authorities of the Districts of Kyenjojo, Kibaale, Hoima and Masindi have all signed the above mentioned benefit sharing agreement (G5.2a).

Local Community Authorities – The representatives of the 10 Private Forest Owners Associations have all signed the above mentioned benefit sharing agreement (G5.2a) and each household participating in the Project has signed a separate contract (see Appendix G5.2b for an example) which has been obtained through the process of Free, Prior and Informed Consent.

3. *Demonstrate with documented consultations and agreements that the project will not encroach uninvited on private property, community property, or government property and has obtained the free, prior, and informed consent of those whose rights will be affected by the project.*

The forest is either privately owned or communal. The property rights have been clarified by mapping the forests of “project affected people”, i.e., 4500 households and communities who also hold the legal carbon rights according to Ugandan law. The land and forest of each household or community were outlined with a GPS in the presence of its neighbors and a representative of the Local Counsel (level 1). A registration certificate was issued when there was not dispute over the land or after the dispute had been resolved.

The project affected people gave their consent to participate in the Project and registration of their land after the three months of consultations following the latest guidelines on “free, prior and informed consent” from Anderson (2011)[14]. The Project was mentioned for the first time a year before its planned start, and the consultations increased in frequency over the last three months before the start of the Project. Presentations were held to explain their rights, climate change, REDD+ and the Project self (full report is available upon request). Registration of their land was free and without the obligation to participate in the Project.

4. *Demonstrate that the project does not require the involuntary relocation of people or of the activities important for the livelihoods and culture of the communities. If any relocation of habitation or activities is undertaken within the terms of an agreement, the project proponents must demonstrate that the agreement was made with the free, prior, and informed consent of those concerned and includes provisions for just and fair compensation.*

[14] Anderson, P. (2011) Free, Prior and Informed Consent, Principles and Approaches for Policy and Project Development http://www.recoftc.org/site/uploads/content/pdf/FPICinREDDManual_127.pdf

The project affected people own their land and the forest on it. The process of clarifying property rights of each household entailed gathering all stakeholders to identify overlapping claims on land and usufruct rights. In this process no people were identified which had to be relocated involuntary, cultural activities important to communities were respected and important none timber forest products (NTFP) activities for were allowed where appropriate.

5. *Identify any illegal activities that could affect the project's climate, community or biodiversity impacts (e.g., logging) taking place in the project zone and describe how the project will help to reduce these activities so that project benefits are not derived from illegal activities.*

The main illegal activities will be logging and collecting fuelwood for charcoal burning and any non-timber forest products at a commercial scale.

To reduce non-performance of the Project as much as possible any activity by the households with forest participating in the Project and compromising the conservation of the forest in the project zone (not only in the project area) will be considered illegal.

All trees in the project area with a diameter above 10 cm will be tagged and recorded by the forest owner to be able to trace and discourage illegal logging. Monitoring and reporting activities will be checked by the District Forest Services who in turn will be checked by the Project proponents.

Also the package provided as compensation to conserve the forest is valuable consisting of monetary and non-monetary benefits such as direct payments for monitoring and reporting activities, improving agriculture practices and providing access to high-value markets and micro-financing.

The biggest threat of illegal activities will be coming from households without forest and who previously depended on households with forests for forest products, such as building poles, thatch material, etc. These households can participate in the Project by generating carbon credits by planting trees, and will receiving the same non-monetary benefits.

6. *Demonstrate that the project proponents have clear, uncontested title to the carbon rights, or provide legal documentation demonstrating that the project is undertaken on behalf of the carbon owners with their full consent. Where local or national conditions preclude clear title to the carbon rights at the time of validation against the Standards, the project proponents must provide evidence that their ownership of carbon rights is likely to be established before they enter into any transactions concerning the project's carbon assets.*

The project affected people are the legal holders of the carbon rights and the process to clarify their property rights will confirm their uncontested title. Through the process of free, prior and informed consent and signing an individual contract and a separate collective benefit sharing agreement by the representatives for the their PFOA with the Project the Project affected people will have granted the Project proponent to negotiate a sale of carbon credits representing their interests.

CL1. Net Positive Climate Impacts

The project must generate net positive impacts on atmospheric concentrations of greenhouse gases (GHGs) over the project lifetime from land use changes within the project boundaries.

The project proponents must:

1. *Estimate the net change in carbon stocks due to the project activities using the methods of calculation, formulae and default values of the IPCC 2006 GL for AFOLU or using a more robust and detailed methodology. The net change is equal to carbon stock changes with the project minus carbon stock changes without the project (the latter having been estimated in* ***G2****). This estimate must be based on clearly defined and defendable assumptions about how project activities will alter GHG emissions or carbon stocks over the duration of the project or the project GHG accounting period.*

Project activities as part of the "with project scenario" are designed to avoid future (gross) carbon stock changes from deforestation and forest degradation and considered non-performance when there is a change. To mitigate this risk a monitoring activity has been designed where every tree with a DBH > 10cm is marked and recorded by the forest owner. The average private forest owner has three hectares of forest which consist of 300 to 700 trees. One hectare of forest can be recorded in three days by an experienced team of four people. In principle recording the trees in a three hectare of forest should only take nine days. This rigorous monitoring system should limit non-performance at a minimum 5% of carbon stock changes for the first three years and 1% afterwards mainly due to natural forest dynamics, 151,405 and 30,342 tCO2e per year respectively.

2. *Estimate the net change in the emissions of non-CO_2 GHG emissions such as CH_4 and N_2O in the with and* ***without*** *project scenarios if those gases are likely to account for more than a 5% increase or decrease (in terms of CO_2-equivalent) of the project's overall GHG emissions reductions or removals over each monitoring period.*

The maximum allowed project emission are 4.99 % (<5%) of the annual carbon benefits (3M tCO2e) which is the equivalent of 151,405 tCO2 per year, or in terms of methane: 416,364 tCH4 per year and in terms of nitrogen dioxide: 302,810 tN2O per year. Project activities are designed to avoid any non-CO2 GHGs and unintentional emissions will below the allowed emissions. Nonetheless, net changes of these two GHGs will be deduced for a *with* and *without project* scenario.

Wetlands the sole reservoirs of methane (CH4) in the Landscape will be encroached in the *without project* scenario and drained for agriculture as less forest will be available for clearing and soil fertility of the exiting field decreases. There are no specific project activities in the *with project* scenario to reduce and avoid nor generate such emissions, but indirectly avoiding any further deforestation and introducing improved agricultural practices in the Landscape will reduce the need to drain marshes for agriculture. Consequently, there is a net reduction of methane emissions.

In the *without project* scenario synthetic fertilizers are mainly used at a limited scale in growing tobacco since they are expensive. In stet farmers prefer to clear forest as newly fresh forest soils are sufficiently fertile. The *with project* scenario has the objective to improve agricultural practices without synthetic fertilizers to increase yields of the existing fields and offer a forest friendly alternative cash crop to stop destructive tobacco and upland rice growing. Consequently, there is net reduction of N2O emissions.

3. *Estimate any other GHG emissions resulting from project activities. Emissions sources include, but are not limited to, emissions from biomass burning during site preparation, emissions from fossil fuel combustion, direct emissions from the use of synthetic fertilizers, and emissions from the decomposition of N-fixing species.*

Other GHG emissions from implementing project activities will come mainly from fossil fuel for transportation and purchasing materials with an associated carbon footprint. Guidelines of IPPC, state that the project emissions from fossil fuel do not have to be accounted for when they are less than 5% of the carbon benefits. The annual carbon benefits are 3M tCO2e. The maximum allowed project emissions from fossil fuel are 151,018 tCO2e. Subsequently, the maximum allowed annual emissions from fossil fuels are the equivalent of 1.8 billion km of driving based on an emission factor for diesel of 0.002672 tCO2e per liter and a fuel efficiency of 30km per liter.

No biomass will be burned setting up agroforestry in degraded forests as a project activity. Preparation may require some clearing of understory vegetation, but is only limited to secondary species with a DBH<10cm which is a carbon stock the Project is not accounting for. Notwithstanding the cleared secondary vegetation will be mulched and not cause any additional emissions from burning biomass.

Improving agricultural practices will not entail using synthetic fertilizers (see CL1.2) and Ground/Peanuts are the only N-fixing species which will be mulched and decomposition of one hectare of peanuts may potentially emit 1 N2O kg[15] which is the equivalent of 0.5 CO2 kg per ha or 0.0005 tCO2e per ha. The scale at which peanuts are currently produced are insignificant compared to the avoided emission of 3M tCO2 per year from deforestation. In the socio-economic survey 9% of 314 households grew maximum one acre of peanuts per year which is the equivalent of 405 households over the 4500 households growing in total 164 ha with a total emission of 0.08 tCO2e per year.

4. *Demonstrate that the net climate impact of the project is positive. The net climate impact of the project is the net change in carbon stocks plus net change in non-CO_2 GHGs where appropriate minus any other GHG emissions resulting from project activities minus any likely project-related unmitigated negative offsite climate impacts (see CL2.3).*

The net climate impact of the project is positive as non-performance in the first three year in the *with project* scenario is only 5% and 1% for the rest of the project lifetime (CL1.1).

5. *Specify how double counting of GHG emissions reductions or removals will be avoided, particularly for offsets sold on the voluntary market and generated in a country with an emissions cap.*

Carbon credits generated by the Project will be registered at the V-C-S registry to avoid double accounting and Uganda does not have emission cap.

[15] Xiong ZQ, Xing GX, Tsuruta H, Shen GY, Shi SL, Du LJ (2002) Field study on nitrous oxide emissions from upland cropping systems in China *Soil science and plant nutritional* 48: 539-546.

CL2. Offsite Climate Impacts ('Leakage')

The project proponents must quantify and mitigate increased GHG emissions that occur beyond the project area and are caused by project activities (commonly referred to as 'leakage').

The project proponents must:

1. *Determine the types of leakage that are expected and estimate potential offsite increases in GHGs (increases in emissions or decreases in sequestration) due to project activities. Where relevant, define and justify where leakage is most likely to take place.*

Forests on public land and wetlands are potential leakage areas despite their protected status. Forests on public land are a potential area of leakage in terms of decreased sequestration.
Wetlands are dealt with under CL2.4 since potential leakage is a source of non-CO2 gasses.

The only offsite forests left in the Landscape are the public forests or forest reserves and increases of GHGs may come from displaced activities such as: 1) agriculture, 2) timber harvesting and 3) fuel wood collecting for charcoal production. The carbon stocks changes of native forest on public land have been positive between 2006 and 2010 and growing at rate of 623 ha per year which represents a removal of 226,076 tCO2 per year (table [x]).

Table 17. Carbon stock changes in public forests subject to potential leakage

land cover class	2006	2010	change (ha/yr)
THF, fully stocked	76,029	82,354	6,325
THF, depleted	3,527	316	-3,211
total			3,114
annual change			623
tCO2e emission			226,076

2. *Document how any leakage will be mitigated and estimate the extent to which such impacts will be reduced by these mitigation activities.*

The risk of leakage into the forests on public lands and wetlands can be mitigated by law enforcement by the forest district services. Lack of an activity budget has allowed the forests and wetlands to become encroached. Therefore, in the benefits sharing agreement a percentage of the carbon revenue has reallocated to forest district services for law enforcement.

3. *Subtract any likely project-related unmitigated negative offsite climate impacts from the climate benefits being claimed by the project and demonstrate that this has been included in the evaluation of net climate impact of the project (as calculated in **CL1.4**).*

In case of an unmitigated negative offsite climate impact the maximum potential leakage from decreased sequestration on public lands is 226,076 tCO2 per year which is 7.5% of the 3M tCO2e avoided emissions per year.

4. *Non-CO_2 gases must be included if they are likely to account for more than a 5% increase or decrease (in terms of CO_2-equivalent) of the net change calculations (above) of the project's overall off-site GHG emissions reductions or removals over each monitoring period.*

Non-CO2 gases emissions from potentially unmitigated risk of wetland draining are not included because the maximum allowed emissions are unlike to occur. Wetland draining for agriculture will released methane at an equivalent rate of 5tCO2 per hectare per year[16]. The maximum allowed annual emission is 4.99 % which is 151,018 tCO2 per year, and the equivalent of draining 30,204 ha of wetland per year.

CL3. Climate Impact Monitoring

Before a project begins, the project proponents must have an initial monitoring plan in place to quantify and document changes (within and outside the project boundaries) in project-related carbon pools, project emissions, and non-CO_2 GHG emissions if appropriate. […] implement a monitoring plan.

The project proponents must:

1. *Develop an initial plan for selecting carbon pools and non-CO_2 GHGs to be monitored, and determine the frequency of monitoring.*

The same IPPC 3 tier approach will be applied to monitor 1) land-use land-cover change, 2) carbon stock changes of the above ground biomass and 3) leakage on public dry and wet lands.

Land use land cover changes - The changes in land use and land cover will be calculated at a 5 year interval from the start of the Project by generating land cover maps for each point in time over the Project life time from LANSAT imagery following the same 3 tier IPPC approach mentioned under G1.7., and using the same land cover classes definitions. The same overlapping procedure in ArcMap mentioned under G2.1 will be used to identify and calculate land use changes over each 5 year period on private and public land including wetlands (table [x]). The gain loss methodology will be used to calculate the deforestation rate for native forest i.e. Tropical High Forest fully stocked and depleted.
Carbon stock changes - As part of the project activities a rigorous monitoring system will put in place where forest owners will have to mark, and measure every tree with a DBH > 10cm and submit his carbon data on an annual basis. Both the forest district services and Projects proponents will regularly check the reported measurements in the field from the forest owners.

Leakage – Leakage on public dry and wet land will be monitored using data available from the land-use land cover changes and by patrolling in and around public lands on a quarterly basis.

2. *Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.*

A full monitoring plan is in place and part of the project activities.

[16] Maltby E, CP Immirzi. 1993 Carbon dynamics in peatlands and the other wetlands soils: regional and global perspectives. *Chemosphere*, 27: 999-1023.

CM1. Net Positive Community Impacts

The project must generate net positive impacts on the social and economic well-being of communities and ensure that costs and benefits are equitably shared among community members and constituent groups during the project lifetime. Projects must maintain or enhance the High Conservation Values (identified in **G1**) in the project zone that are of particular importance to the communities' well-being**.**

The project proponents must:

1. *Use appropriate methodologies to estimate the impacts on communities, including all constituent socio-economic or cultural groups such as indigenous peoples (defined in **G1**), resulting from planned project activities. A credible estimate of impacts must include changes in community well-being due to project activities and an evaluation of the impacts by the affected groups. This estimate must be based on clearly defined and defendable assumptions about how project activities will alter social and economic well-being, including potential impacts of changes in natural resources and ecosystem services identified as important by the communities (including water and soil resources), over the duration of the project. The 'with project' scenario must then be compared with the 'without project' scenario of social and economic well-being in the absence of the project (completed in **G2**). The difference (i.e., the community benefit) must be positive for all community groups.*

The project activities in principle have been set up to create a net positive impact on the social and economic well-being of the "project affected people". Any potential negative impact of the project on their livelihoods and well-being has been addressed through the process to obtain their Free Prior and Informed Consent and subsequently the initial project proposal has been modified to their wishes. The negative impact of project activities has either been mitigated, adapted or compensated.

With project
Project activities were set up not only to contribute towards lower or no greenhouse gas emissions, but also to improve the socio-economic well-being of the project affected people. The Project aims to improve their livelihoods, maintain and restore the ecosystem services they dependent on for subsistence and cash, and lower and avoid the risk of these households reaching a poverty trap in the near future (see "without project scenario").

Notwithstanding, reducing deforestation to reduce green house gas emissions will lead to food insecurity in the long term, when agricultural yields of the existing fields are not improved. Therefore, improving farming practices are crucial to the success of the Project and without which the risk of reversals is high. By teaching farmers well-established and practical best practices in agriculture the Project aims to curve current the need to clear forest for new fields. In addition, the introduction of more profitable and forest friendly cash crops such as shade coffee and cocoa will supplement their income from REDD.

The limited carbon revenue the project affected people would receive would in principle reduce their purchasing power because of government taxation without little or no public services in return. This negative impact is mitigated by the agreement the Project entered with the government to forgo the taxation in return for MRV activities by the forest owners. This *quid pro quo* arrangement is beneficial for the government as it would otherwise have to invest in setting up a MRV system in order to comply with international REDD regulations.

The intended net positive impact of the project activities are:

1) reforming and clarifying tenure and helping them obtain formal property rights at Local Counsel level,	
Positive impact	Recognition of their tenure and carbon rights at a local level is a first step to empower rural communities in decision making processes and political debates
Negative impact	In response elites might try to decouple carbon rights from ownership rights in an attempt to capture the carbon revenue.
Net positive impact	The risk of elites interfering is low, since the Project is a national demonstration project with a high profile providing experience and lessons learned to help get Uganda ready to accommodate REDD+ projects.

2) providing them with a stable income from Monitoring Reporting Verification (MRV) activities based on the number and size of trees in their existing forest,	
Positive impact	The MRV activity will replace the forest as a safety net and provide a long-term stable and sustainable alternative source of income.
Negative impact	The negative impact is that peak profits from logging or converting forest will no longer be possible.
Net positive impact	The peak profits are unsustainable and the forest as a natural resource is projected to be depleted in 15 to 20 years. The project lifetime exceed beyond the 30 years rendering income from MRV more sustainable on the long term.

3) improving their agricultural practices to reduce food insecurity adapting them to climate change impacts and	
Positive impact	This activity will improve yields of the existing fields which will reduce food insecurity, avoid the need to clear new forest and introduce new and profitable forest friendly cash crops such as coffee and cocoa.
Negative impact	Measures to adapt to climate change may be labor intensive such as creating terraces and irrigation system, and also certain cash crops will be less fit for production such as tobacco and sugar.
Net positive impact	Net impact of this activity is bigger yields, the production of more profitable cash crops, and farms adapted to ongoing climate change.

Without project
The project affected people will have a greater risk of reaching a poverty trap without the Project. This assumption is supported by research in the Kibale district south of the Landscape with similar household characteristics and socio-economic circumstances[17]. The study showed that as communal and private forests were converted economic welfare of most households improved over time until an emergency arose and the forest as their safety-net no longer exited. Under these circumstances a household's only resort was to sell their land and become landless. These landless households either emigrated elsewhere or started working for a bigger landowner which in both cases negatively impacted their socio-economic well-being.

This scenario is likely to occur in the Landscape. In particular because in the without project scenario all privately owned forests will have been cleared within the project lifetime. Households with no forest left on their land will have lost their traditional safety net. In addition agricultural practices are under-producing and depleting the soil of its nutrients at a higher rate than is necessary if best practices were applied. Consequently, yields will become increasingly lower creating food insecurity and a greater risk of emergencies. Finally, regional climate is predicted to become drier over the next 30 years[18] and with less forest cover to buffer these effects crop failures are more likely to occur. In the worst case scenario these households will become climate refugees by 2050.

2. *Demonstrate that no High Conservation Values identified in **G1.8.4-6** will be negatively affected by the project.*

There are no particular High Conservation Values (identified in **G1**) in the project zone that are of particular importance to the communities' well-being**.** Besides the project zone is the collective of privately owned and communal forests. The High Conservation Values identified in Gl.8.1-3 in the project zone depend on intact rain forest as habitat. Since the Project aims to protect the existing rain forest habitat and enhance more rain forest habitat by planting native species from the region, there is no negative effect of the Project on HCVs.

[17] Lisa Naughton-Trevesa, Jennifer Alix-Garcia, and Colin A. Chapman (2011) Lessons about parks and poverty from a decade of forest loss and economic growth around Kibale National Park, Uganda; www.pnas.org/cgi/doi/10.1073/pnas.1013332108
[18] http://programs.wcs.org/Default.aspx?alias=programs.wcs.org/albertineclimate

CM2. Offsite Stakeholder Impacts

The project proponents must evaluate and mitigate any possible social and economic impacts that could result in the decreased social and economic well-being of the main stakeholders living outside the project zone resulting from project activities. Project activities should at least 'do no harm' to the well-being of offsite stakeholders.

The project proponents must:

1. *Identify any potential negative offsite stakeholder impacts that the project activities are likely to cause.*

Offsite stakeholders consist for three different groups. There are two commercial groups of offsite stakeholders which trade either in forest-based products or agricultural produce, and a third group without their own forest who depends on forest-based construction material from their neighboring project affected people for subsistence.

Offsite stakeholders do not have free access to the privately owned forests of the project affected people. Only through commerce can they acquire access to forest-based products such as fuelwood, charcoal and particularly logs and to a lesser extent non timber forest products (NTFP). The supply of these forest based products will become much smaller which may negatively impact the income of these offsite stakeholders. The "middle man" either has to seek access to forest-based commodities elsewhere to maintain the same volume or increase their prices to maintain their level of income.

Offsite stakeholders trading in agricultural products will not have to experience a similar negatively impact on their livelihoods as the offsite stakeholders depending on the commerce forest-based products. The aim of the Project is to improve existing agricultural practices which would safeguard the existing supply of produce, except for those crops which heavily depended on the conversion of forest such as tobacco and sugar. However, a similar volume of tobacco and sugar could be produced when best agricultural practices are applied and existing fields produce more.

The offsite stakeholders who are an end user of forest-based products, such as neighbors of the project affected people may have to spend more money on purchasing certain products for subsistence. The extra expense will lower their purchasing power, but on the other hand construction material is not needed on a frequent basis.

2. *Describe how the project plans to mitigate these negative offsite social and economic impacts.*

It is beyond the scope and responsibility of the Project proponents to develop activities for the offsite stakeholders who depend on commerce of forest-based products for their livelihoods and who are the current drivers of deforestation and forest degradation; similarly, for the offsite stakeholders trading in cash crops which heavily depend on forest conversion.

The offsite stakeholders within the vicinity of the project affected people and who depend on access to building material from the forest of their neighbors are able to participate in the Project by planting trees on their land and generating carbon credits. Part of the planting scheme is planning for future fuelwood consumption and use of building material. In addition these offsite stakeholders without forest are welcome to participate and receive the same training in improving agricultural practices and establishing agro-forestry.

3. *Demonstrate that the project is not likely to result in net negative impacts on the well-being of other stakeholder groups.*

The only offsite stakeholders left which will be negatively affected by the Project's aim to reduce deforestation and forest degradation is the elite controlling the urban market for charcoal and wood. The Project is not concerned with the socio and economic well-being of their livelihoods.

All relevant stakeholder groups have been considered in the above sections CM2.1 and CM2.2

CM3. Community Impact Monitoring

The project proponents must have an initial monitoring plan to quantify and document changes in social and economic well-being resulting from the project activities (for communities and other stakeholders). The monitoring plan must indicate which communities and other stakeholders will be monitored, and identify the types of measurements, the sampling method, and the frequency of measurement.
Since developing a full community monitoring plan can be costly, it is accepted that some of the plan details may not be fully defined at the design stage, when projects are being validated against the Standards. This is acceptable as long as there is an explicit commitment to develop and implement a monitoring plan.

The project proponents must:

1. *Develop an initial plan for selecting community variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's community development objectives and to anticipated impacts (positive and negative).*

The socio-economic well-being of the project affected people has already been assessed and a baseline is available for future reference (see for information G1). The same methodology will used to monitor the same households over the project life time and detect trends of change every 5 years. The sampling design will be reviewed according to trends observed if needed or a new focus.

Human Development Index (HDI) and the Multidimensional Poverty index (MPI) will be used to have an objective measure of the socio-economic well-being of the project affected people. Both indexes measure the development of three so-called dimensions: 1) long and healthy life, 2) access to knowledge and 3) a decent standard of living. The Multi Dimensional Poverty Index is an elaboration of the HDI and high-lights deprivations within households. The Project impact will improve and contribute mostly to "a decent standard of living" as project activities will only indirectly contribute to "access to knowledge" and a "long and healthy life".

The Multidimensional Poverty Index is more practical in this context as it records basic deprivations of households such no electricity, no access to clean water. Each household is classified as poor or nonpoor depending on the number of deprivations. Each deprivation has a weight and the maximum core is 10. So, each dimension has a weight of 3 1/3 or 10/3. The two subdivisions under health and education are each 10/3 (half of 31/3) and the six living conditions each 5/9. If sum of these weights per household are more than 3 all the members are considered poor, between 2 and 3 they are vulnerable and below 2 are "nonpoor".

Under the dimension of health there are two deprivations, under education two and under living conditions (decent standard of living) six. In the table below are the deprivations mentioned under each dimension and which will be monitored over the project life time.

Table 18. Community characteristics of socio-economic well being according the Multidimensional Poverty index and used for future monitoring; maximum score is 10 (weight)	
Health (3 1/3)	At least one member is malnourished (5/3)
	One or more children have died (5/3)
Education (3 1/3)	No one has completed five years of schooling (5/3)
	At least one school-age child not enrolled in school (5/3)
Living conditions (3 1/3)	No electricity (5/9)
	No access to clean drinking water (5/9)
	No access to adequate sanitation (5/9)
	House has dirt floor (5/9)
	Household uses “dirty” cooking fuel (dung, firewood or charcoal) (5/9)
	Household has no car and owns at most one of: bicycle, motorcycle, radio, refrigerator, telephone or television (5/9)

2. *Develop an initial plan for how they will assess the effectiveness of measures used to maintain or enhance High Conservation Values related to community well-being (G1.8.4-6) present in the project zone.*

There are no particular High Conservation Values (identified in **G1**) in the project zone that are of particular importance to the communities’ well-being. Therefore, there is no need for an initial plan to assess and monitor High Conservation Values.

3. *Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.*

Not applicable, as the project proponents already have developed a monitoring plan which is mentioned above.

B1. Net Positive Biodiversity Impacts

The project must generate net positive impacts on biodiversity within the project zone and within the project lifetime, measured against the baseline conditions. The project should maintain or enhance any High Conservation Values (identified in **G1**) present in the project zone that are of importance in conserving globally, regionally or nationally significant biodiversity**.**

Invasive species populations must not increase as a result of the project, either through direct use or indirectly as a result of project activities. Projects may not use genetically modified organisms (GMOs) to generate GHG emissions reductions or removals. GMOs raise unresolved ethical, scientific and socio-economic issues. For example, some GMO attributes may result in invasive genes or species.

The project proponents must:

1. *Use appropriate methodologies to estimate changes in biodiversity as a result of the project in the project zone and in the project lifetime. This estimate must be based on clearly defined and defendable assumptions. The 'with project' scenario should then be compared with the baseline 'without project' biodiversity scenario completed in **G2**. The difference (i.e., the net biodiversity benefit) must be positive.*

In the baseline "without project" scenario the forest continues to be cleared for agriculture over the next 30 to 40 years. Consequently, connectivity decreases as distances become longer between the remaining forest patches, and the size of the remaining patches becomes smaller. This means that over time the migration rate between forest patches decreases, and extinction in the remaining patches increases. Consequently, as deforestation continues animal species will go (locally) extinct (see for a more details G1.7).

The "with project" scenario aims to conserve the remaining forest maintaining corridors for wildlife between the major public forests and restoring corridors by planting native trees species. As described in G1.7 the forest mosaic resembles an archipelago and the rules of island biogeography apply. According to this theory as distance between the insular forest habitats remain small or are bridged by planting forest connectivity between patches is maintained. Consequently, the migration rate is higher than in the without project scenario. Similarly, the surface area of the insular forest habitat patches will be higher in the with project scenario than the without project scenario.

There is no negative impact on biodiversity in with project scenario and the without project scenario predict the extinction of animal species to the forest habitat loss. Consequently, there is a positive net effect on biodiversity in the with project scenario.

2. *Demonstrate that no High Conservation Values identified in **G1.8.1-3** will be negatively affected by the project.*

The High Conservation Values identified in Gl.8.1-3 depend on intact rain forest as habitat. Since the Project aims to protect the existing rain forest habitat and enhance more rain forest habitat by planting native species from the region, there is no negative effect of the Project on HCVs.

3. *Identify all species to be used by the project and show that no known invasive species will be introduced into any area affected by the project and that the population of any invasive species will not increase as a result of the project.*

The Project intends to plant native tree species for emission removals and small-scale eucalyptus and pine woodlots for fuelwood and poles to accommodate wishes of the communities. The latter two species have been present in the Landscape for decades and shown not to be invasive. The two cash crops, cocoa and coffee, used in the agro-forestry activities are known not be invasive and pose any threat for the native flora.

4. *Describe possible adverse effects of non-native species used by the project on the region's environment, including impacts on native species and disease introduction or facilitation. Project proponents must justify any use of non-native species over native species.*

The Project will not use any non-native species at a large scale.

5. *Guarantee that no GMOs will be used to generate GHG emissions reductions or removals.*

The Project activities will not use any GMOs.

B2. Offsite Biodiversity Impacts

The project proponents must evaluate and mitigate likely negative impacts on biodiversity outside the project zone resulting from project activities.

The project proponents must:

1. *Identify potential negative offsite biodiversity impacts that the project is likely to cause.*

Currently, there is no (large scale) harvesting of animal or plant species for medicinal, narcotic, cultural or trophy purposes. Therefore, the increased and enhanced protection of the Landscape's biodiversity does not lead to displacement of activities. Consequently, there is no negative offsite biodiversity impact outside the Landscape.

2. *Document how the project plans to mitigate these negative offsite biodiversity impacts.*

There is no negative offsite biodiversity impact and hence no need to mitigate.

3. *Evaluate likely unmitigated negative offsite biodiversity impacts against the biodiversity benefits of the project within the project boundaries. Justify and demonstrate that the net effect of the project on biodiversity is positive.*

There is no negative offsite biodiversity impact and hence no need to justify and demonstrate a positive net effect of the project.

B3. Biodiversity Impact Monitoring

The project proponents must have an initial monitoring plan to quantify and document the changes in biodiversity resulting from the project activities (within and outside the project boundaries). The monitoring plan must identify the types of measurements, the sampling method, and the frequency of measurement.

Since developing a full biodiversity-monitoring plan can be costly, it is accepted that some of the plan details may not be fully defined at the design stage, when projects are being validated against the Standards. This is acceptable as long as there is an explicit commitment to develop and implement a monitoring plan.

The project proponents must:

1. *Develop an initial plan for selecting biodiversity variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's biodiversity objectives and to anticipated impacts (positive and negative).*

Baseline: Wildlife Conservation Society (WCS) has been the project proponent responsible for monitoring the state of wildlife in the Landscape before the start of the Project. WCS has done two inventories one in 1999 and the most recent one finished in October 2010 and results were published in December 2010 (Plumptre *et al.* 2010). This study will serve as the baseline to assess the impact of the Project and quantify the biodiversity benefits (see also G1.7).

Methods: Monitoring efforts will focus on the main taxa inventoried before: 1) large to medium-sized mammals, 2) birds, and 3) trees and shrubs. These five taxa correlate well with biodiversity in general (Howard *et al.* 1997) and further research showed that birds alone are already a good indicator of most other biodiversity in the Uganda's forests (Howard *et al.*, 2000).

The software DISTANCE 6.2 (Thomas *et al.,* 2009) will be used to generate a stratified systematic sampling design. Four habitat types will be inventoried separately: 1) closed canopy tropical forest, 2) degraded tropical forest, 3) woodland and 4) grassland. Regularly spaced points at a distance of about 1 km will be randomly allocated within each of four habitat types. A spacing of 1 km has proven to be a good tradeoff between number of survey points and travel distance between points.

In the smaller central forests reserves and corridors forests 1km at random survey points will be generated, whereas in the larger central forest reserves similar points will be tracked along transects using the same software. The sampling design covers project areas, i.e. corridor forests and potential leakage areas, i.e. the central forest reserves.

The data collected will allow establishing present/absence data of rare species and abundance data on the more common species. Comparison of the previous two inventories from 1999 and 2010 showed a negative trend for most of the taxa, in particular birds and the larger mammals. Any positive effect of the Project will be identified as a positive or stabilizing trend of biodiversity benefits. Every five years an animal inventory will take place before a verification event.

2. *Develop an initial plan for assessing the effectiveness of measures used to maintain or enhance High Conservation Values related to globally, regionally or nationally significant biodiversity* ***(G1.8.1-3)*** *present in the project zone.*

The monitoring activities described in section B3.1. include assessment of the maintenance of HCVs related to the globally significant biodiversity occurring within the Project areas and zone.

3. *Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.*

A well established and satisfactory monitoring plan already exits and results from previous inventories have been published (see under B3.1).