CLIMATE, COMMUNITY AND BIODIVERSITY STANDARDS PROJECT DESIGN DOCUMENT FORM FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CCB-AR-PDD) Version 2







Kachung Forest Project: Afforestation on Degraded Lands

Contents

I. Basic Data

II. General Section

G1. Original Conditions in the Project Area
G2. Baseline Projections
G3. Project Design Goals
G4. Management Capacity and Best Practices
G5. Legal Status and Property Rights

III. Climate Section

CL1. Net Positive Climate Impacts
CL2. Offsite Climate Impacts ('Leakage')
CL3. Climate Impact Monitoring

IV. Community Section

CM1. Net Positive Community Impacts
CM2. Offsite Stakeholder Impacts
CM3. Community Impact Monitoring

V. Biodiversity Section

B1. Net Positive Biodiversity Impacts
B2. Offsite Biodiversity Impacts
B3. Biodiversity Impact Monitoring

Basic Data

Green Resources AS (GRAS) is the leading plantation, carbon offset and renewable energy company in Eastern Africa. GRAS is conducting afforestation and reforestation activities in a number of locations in Uganda, Tanzania and Mozambique, with the purpose of deriving revenue streams from the sale of carbon offsets and timber, whilst simultaneously bringing community and environmental benefits. The Kachung Forest Project (KFP) is seeking certification under the UNFCCC's Clean Development Mechanism (CDM), applying the A/R methodology, AR-AM0004 version 04.

Version 4: 10th May 2011

General Section

G1. Original Conditions in the Project Area

G1.1. Location of the project and basic physical parameters

Location

The proposed A/R CDM project activity is located in East Africa, in the Republic of Uganda. The specific area of project activity is in the Kachung Central Forest Reserve in the administrative district and county of Dokolo and the sub-county of Agwata (see map G.1.1.1). The project activity will establish and manage exotic and indigenous plantations on approximately 2,099 ha of degraded grass and shrubland.

The CCBA project area is 2,669 ha confined within 3,500 ha of Reserve land, located between 1° 59' 0" N to 2º 2' 0" N and 32° 55' 0" E to 33° 00' 0" E. The 2,669 ha includes the A/R CDM project area as well as other areas under the licence held by LFC which are set aside for conservation or are not eligible for CDM.

The project zone is 5,243 ha of land, including the 2,669 CCBA project area as well as an additional 2,574 ha of land outside of this, which has been identified as potentially being affected by the project – see section G.1.3 for further information and a map.

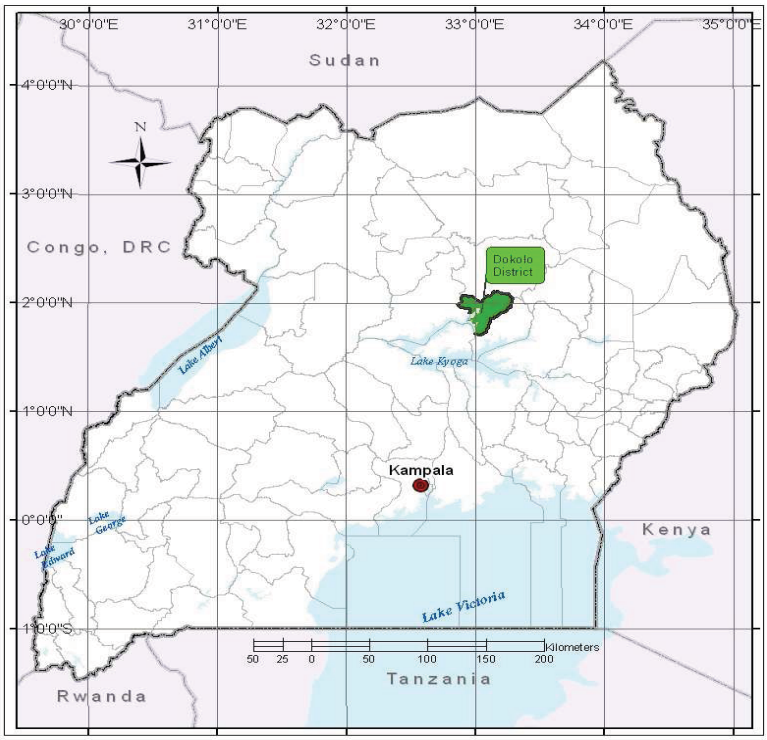


Figure G.1.1.1: Location of Dokolo district in Uganda

The physical baseline conditions of the project area are described below:

Climate

The average temperature in the Kachung area is 30 °C with an average minimum of 25.5 °C and an absolute maximum of 33.6 °C. The Reserve is located in a high rainfall belt of 1250- 1375mm, with two rainy seasons in March-May and August-October, and dry seasons in December-February and briefly in June-July. The rain is usually convectional, occurring later in the day. Wind speed is lower during the rainy season with 1-4 m/sec, compared to 4-8 m/sec in the dry season. With an evaporation of more than 1,800 mm/year, soils retain moisture for short periods during the rainy seasons.

Hydrology

About 10 percent of Uganda is covered by wetlands, of which about one-third is permanently flooded[1]. The hydrological condition of the project area at KFP is characterised by a wetland which runs through the western block area and which also extends into the project zone by linking up with the larger, broad flood plains to the south and east of the project area (Figure G.1.2.2 shows the wetlands within the project area and the project zone, respectively).

[1] http://www.fao.org/nr/water/aquastat/countries/uganda/index.stm

The wetlands comprises of two seasonal streams (Aminteng and Alwenyi), which will be protected according to the National Environment (Wetlands, Riverbanks and Lakeshore Management) regulations. The SEIA carried out at KFP involved the analysis of samples from each of the streams. The results showed that the early project operations had not negatively impacted the wetlands through chemical contamination; however, bacteriological characteristics of the water sources indicated that agricultural and cattle grazing activities were having a negative impact[2].

Topography, Geology and Soils

The topography is a flat plain at an altitude of 1051m to 1082 m above sea leave. The landscape has a low relief and is drained by seasonal streams. The terrain is even, flat and dry.

Dokolo district has two major geological formations characterized by basement complex and Kyoga series which include phylites, quartzites and pleistocene of resent sediments (NEMA, 1997). The Lango area is covered by deeply weathered soils of low cation exchange capacity virtually devoid of weathered minerals. The soils have good physical properties and their great depth, high permeability and stable microstructure make them less susceptible to soil erosion. The soil's main problem is the poor chemical properties, strong inactivation of phosphorous and deficiency of nitrogen, phosphorous, manganese and zinc, which are very soluble at low pH and often, reach toxic levels (LDPU, 2004).

G1.2. Types and condition of vegetation within the project area

The project area is a degraded savanna environment - principally grass and shrubland with herbaceous, shrubs and isolated trees - with the predominant vegetation being *Combretum*, characterized by lush growth of *Hyparrhenia* species. The reserve has been subjected to continued degradation, especially over the last few decades where a significant increase in subsistence activities, such as shifting cultivation and grazing activities, fuel-wood collection, and charcoal production have been witnessed, reducing a denser woodland savannah to a landscape with scarce pockets of trees.

A variety of grass species are present, including *Imperata cylindrical, Penicum maximum, Hypererrhenia filipendula, Setaria cephecelata, Setaria megaphylla, Pensetum spp., Afromamum spp., Sporobolus Africana, Eragrostis exasperate, Pasperlum, Parsperlum scrabilatum, Vigna lantiola, Cypress rotenus and bulbosa*. The shrub species that characterize the bushland vegetation are *Albizia Zygia*, *Combretum collinum*, *Borrossus aethiopium Erithrina, abbysinica Grewia molis, Acasia hockii,* and *Bridelia screnura* together with other shrub and tree spp. The grass and herbeous layer consist of *Ceteria megaphylla, Hyperenia phillipendula, Pankam maxima* and *Aphromamum spp*.

[2] Environmental and Socio-Economic Impact Statement Report for the proposed A/R – CDM project activities, Kachung Central Forest Reserve, March 2008

The forest area in the southern-central part of the reserve (shown in figure G.3.3) is remnants of a former government plantation of broadleaf species, mainly consisting of the exotic species *Gmelina arborea*, which has been seriously degraded over the years. This area is not eligible to be included in the CDM project, but will be enhanced as a conservation area through enrichment planting with indigenous species such as shea butter. *Gmelina arborea* trees are seen in other areas of the reserve, having spread from this old government plantation due to the species easy establishing and fast growing species nature. Despite this, even *Gmelina arborea* trees are being degraded at a faster rate then they can establish and grow; however, from a biodiversity perspective, it's important to note that exotic species – even though degrading – were present in the baseline before KFP implementation.

Natural regeneration of forest is prevented by the lack of seed sources, competing grass species which quickly colonize, the significant number of cattle grazing in the baseline and fires regimes used by local communities for charcoal production and to clear land for subsistence agriculture. The consequence of such combined activities is that the land has become degraded and thus reduces the likelihood of any natural regeneration.



Grassland with pockets of trees and shrubs



Cropland within grass and shrubland



Wetland area



Palm trees amongst the grass and shrubland

Figure G.1.2.1: Vegetation found in the areas planned for A/R CDM project

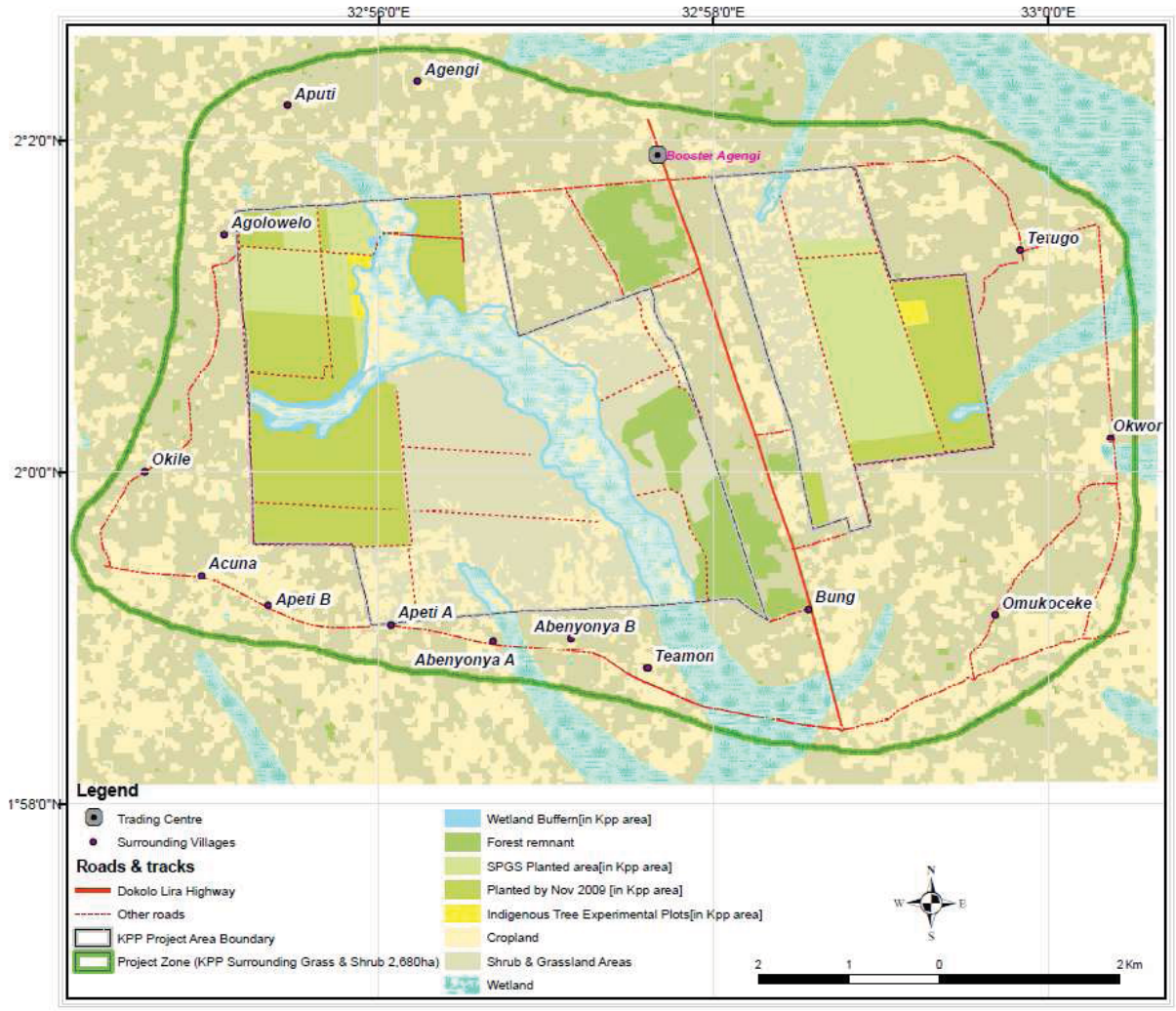


Figure G.1.2. 2: **Map showing the project area and the project zone of KFP**

G1.3. Boundaries of the project area and the project zone

The project boundary, geographical location and polygons of the discrete land parcels of the CDM A/R project activity are indicated below. The specific geographical coordinates/positions (longitude, latitude) of the polygons were determined using GIS and are shown in Table G.1.3.1.

The project boundary area of land is 2,099 ha confined within 3,500 ha of Reserve land, located between 1° 58' 56" N to 2° 2' 32" N and 32° 54' 55" E to 32° 59' 43" E.

Table G.1.3. 1: The unique identification of the polygons for the KFP AR CDM project area

CDM Block ID	Area (ha)	Grid coordinates (UTM)	
		Eastings	Northings

I	275.2	491,742	222,989
II	815.5	493,280	220,742
III	121.9	493,490	223,484
IV	228.1	495,325	222,157
V	658.2	497,792	222,592

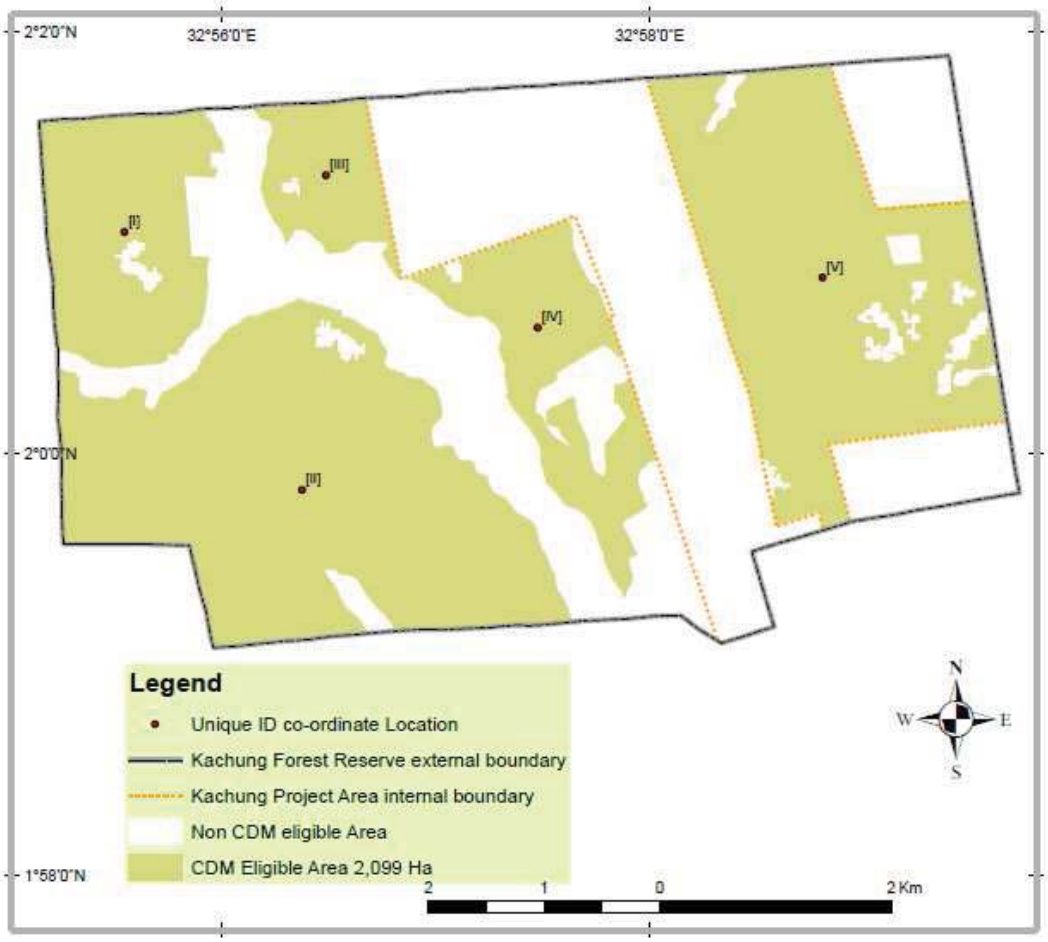


Figure G.1.3. 1: Map of the Kachung Forest Project area showing CDM and non-CDM eligible areas

The project zone is 5,243 ha as shown in Figure G.1.2.2 and covers the areas which could potentially be affected by the project, as well as the CCBA project area. The zone includes the 14 communities surrounding the forest reserve and their adjacent lands (the zone has been set to include 2,574 ha of shrub and grassland, which is the potential maximum area that could be affected by leakage activities), the CDM project area, as well as areas under the title of the license but not eligible for CDM (such as the conservation areas, such as wetlands and forest areas). Outside of the project area the land class is similar to that of the baseline vegetation within the forest reserve: a combination of grass and shrubland, and cropland. There are large wetlands in the region;

however, they are not expected to be impacted by the project and so are not included within the project zone.

G1.4. Current carbon stocks within the project area(s), using stratification by land-use or vegetation type and methods of carbon calculation from the Intergovernmental Panel on Climate Change's 2006 Guidelines for National GHG Inventories for Agriculture, Forestry and Other Land Use or a more robust and detailed methodology

Current carbon stocks were calculated following the CDM methodology, AR-AM004 Version 4, and the "Sourcebook for land use, land-use change and forestry projects", developed by Winrock International[3]. The project areas are characterised by uniform climatic, topography and geological conditions. Land-class cover was identified through extensive ground truthing, which showed the majority of the project area as being shrub and grassland with sparsely scattered trees; however, due to encroachment activities from local communities, specifically cultivation, there are also discrete parcels of cropland present in the project baseline. Satellite images from 1989 and 2000 were also used to determine the pre-existing conditions and the status of the reserve before the project started. As the entire project area is in a process of degradation – through depletion of woody vegetation due to fuel-wood collection, charcoal burning and clearing for shifting cultivation, and poor agricultural methods with no crop rotation – it was deemed necessary to map out two strata:

1. *Shrub and grassland*
2. *Cropland*

The baseline stratification described above was built into the GIS platform and used to draw a stratification map, as shown in Figure G.1.4.1. As the stratification map is developed based on project boundary maps, the strata boundary is consistent with the project boundary.

Mapping and delineation of the two strata was carried out through the analysis of satellite imagery (LandSat 7 SLC-off; image from February 2006) in combination with ground truthing.

[3] Sourcebook for land use, land-use change and forestry projects, Timothy Pearson, Sarah Walker and Sandra Brown, Winrock International, 2005

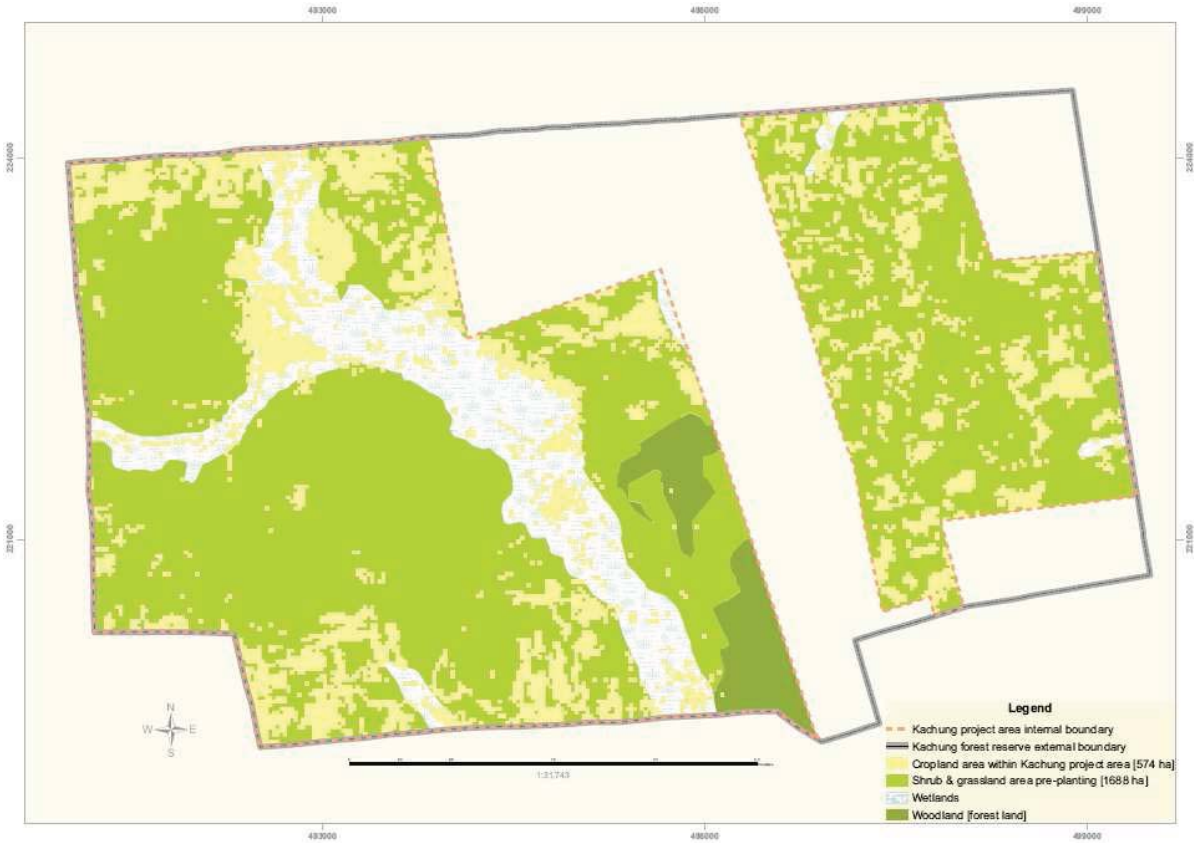


Figure G.1.4.1: Baseline stratification of KFP

Carbon stocks in the living biomass of land under agricultural uses have been estimated assuming maintenance of the agricultural land in its present state and were calculated from temporary sample plots.

In accordance with guidance contained in paragraph 35 of EB 42 meeting report, GHG emissions due to removal (loss) of herbaceous vegetation as a component of non-tree biomass can be neglected. As such herbaceous vegetation was not sampled or included in emissions. As both trees and shrubs are in a state of degradation in the baseline scenario, the baseline carbon stock is conservatively assumed to be in a steady-state. This is conservative given the land is actually in a state of continued degradation because of agricultural use and timber and wood extraction from remaining scattered trees and shrubs. This is evidenced by the fact that the land-class has significantly changed from a more dense woody savanna to a grass and shrubland area with an increasing amount of agricultural land.

Carbon stocks of trees and shrubs in the baseline strata were estimated through 128 nested sampling plots – 113 in the grass and shrubland strata and 15 in the cropland strata - of 0.15 hectares: 21.85m radius and 0.15 ha circular plot for trees with a DBH>5cm and a nested plot of radius 1m and area 0.0031 ha for shrubs and trees with a DBH<5cm. The

biomass of trees were determined using the Chave *et al*[4] equation for moist forests, as the climate in the region meets the criteria stated in the paper with two marked dry seasons of approximately two months. DBH and height parameters were measured for all trees with DBH>5cm. Destructive sampling was carried out to estimate the shrub and small tree biomass. A root-to-shoot ratio of 0.24 from Table 3A.1.8 of the IPCC's GPG for LULUCF (2003) for primary tropical/ sub-tropical dry forest was applied to the above-ground biomass estimate to determine how much biomass would be expected in the root systems. A wood density of 0.55 was used in the equation used from Chave *et al*. This was deemed a conservative value on the basis that the species *Vitex doniana* (0.4t/ m^3), *Albizia spp.* (0.52), *Bridelia micrantha* (0.47), all species present in the baseline, have a lower density than this. A carbon fraction of 0.5 was applied to convert from biomass to carbon.

Full details of the baseline survey can be found in Annex 3 of the A/R CDM PDD. Below are the carbon densities for the tree and shrub components of each strata of the baseline:

Table G.1.4.1: Grass and shrubland carbon density

Grass and shrubland	Number of samples	Carbon density t/C	tCO_2e
Trees	113	0.849	3.113
Shrubs	113	1.243	4.56
Total	113	2.092	7.67

Table G.1.4. 2: Cropland carbon density

Cropland	Number of samples	Carbon density /C	tCO_2e
Trees	15	0.903	3.31
Shrubs	15	0.146	0.54
Total	15	1.049	3.85

[4] Chave *et al*. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. Oecologia (2005) 145: 87–99.

G1.5. Description of communities in the project zone, including basic socio-economic and cultural information that describes the social, economic and cultural diversity within communities, identifies specific groups such as Indigenous Peoples and describes any community characteristics

KFP is located in Agwata sub-county (Dokolo district), in the parishes of Adok, Bardyang and Amuda. In 2002 the population of Agwata was approximately 27,900, with a near fifty-fifty ratio of males to females and an average household size of 5.1[5]. Similar male-to-female ratios were seen in Adok, Bardyang and Amuda, as well as average household sizes. Surrounding KFP are 14 villages (shown in Figure G.1.2.2) and all lie within close proximity to the boundary. The project zone only includes these 14 villages: Okile, Agengi, Acuna, Agolowelo, Tetugo, Okwor, Omukuceke, Bung, Teamon, Abenyonya A, Abenyonga B, Apeti A, Apeti B and Aputi villages, as shown in Figure G.3.3. The total estimated population in the 14 villages surrounding KFP is approximately 6,000 people.

Historically, the inhabitants of Agwata are Langi by tribe believed to have moved in the general migration of Nilo-Hamite between 1800 and1890 and settled in the present location where they took up agrarian life. The Langi are the dominant tribe in the district accounting for 92% of the total population; Kumam 6%, Itesot 1.7%, Acholi and Bakiga 0.1% and non-Ugandans of Indian origin accounts for 0.6%.

The areas surrounding the reserve have experienced in-migration of people from other parts of Lango sub-region where there has been insecurity and cattle rustling. Land disputes, the search for business opportunities and food insecurity/famine are other reasons given for in-migration and settlement of people from other places. Such migrations have resulted into disruption of social setting of the people, exerted pressure on forest resources, triggered conflicts and land disputes, all of which have consequences on the environment and forest resources.

The main socioeconomic activities in the villages of the project zone are subsistence agriculture, which employs approximately 90% of the rural population and is the major source of livelihood. Agricultural activities include crop production, animal rearing, fish farming and beekeeping. The communities in Agwata sub-county are predominantly subsistence farmers and like many other sub-counties, pulses (beans, pigeon peas, taper beans, grams, groundnuts), root crops (cassava, sweet potato), cereals (millet, maize, sorghum, rice) and oil crops (simsim, sunflower, soybeans) are the chief crops grown. Cotton remains a key traditional commercial crop in the district with the cash crop tobacco and increasingly shea butter grown. Sunflower has emerged as one of the non-traditional cash crops. The following crops double for both food security and income generation: simsim, cassava, maize, rice, sorghum and soybeans. Major livestock includes cattle, goats, sheep, pigs, ducks and chickens. Local communities also collect fuelwood for both household consumption and sale.

[5] Uganda Population and Housing Census 2002, as referenced in the EIA

In addition to the agricultural sector, there is also employment in the public sector and in sales and services, though to a much lesser extent. Table G.1.5 below indicates the source of livelihood by area across Dokolo district and clearly indicates that subsistence farming is prevalent.

Table G.1.5. 1: Source of livelihood for total population of Dokolo district

Source of Livelihood	Total people	Percentage of Dokolo population
Subsistence Farming	102,085	78.9
Earned Income	16,690	12.9
Property Income	1,213	0.8
Others	11,333	7.4
Total	**129,385**	**100**

Poverty is the main underlying cause of poor health in Dokolo District. Associated factors are low level of literacy especially among women, high prevalence of preventable diseases, emergence of diseases of lifestyles, inadequate provision and inequitable distribution of health services and other social services, e.g. safe water supply and sanitation facilities. These problems are also widespread in Adok, Bardyang and Amuda and in the surrounding communities of the project. Access to health services still remains poor in Dokolo district as a whole. Over 42% of the population still moves over a distance of 5kms in search of health services. There is only one Health centre IV, two health centre III and 4 health centre II. Despite government efforts to fully immunize the population against killer diseases, coverage is still poor.

G1.6. 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 over land tenure that were resolved during the last ten years

The Kachung Central Forest Reserve is a gazetted forest reserve owned by the Government of Uganda and managed by the National Forestry Authority. The government assumed full legal rights since the first gazzement back in 1948. Therefore local communities have no claim of legal ownership of the reserve. Forest reserves are held in trust of the citizens and in order to protect the customary interest of the local people, certain activities are prohibited under the national forestry and tree planting act; this includes grazing and agricultural activities. The project developer, Lango Forest Company, is the licensee of 2,669 ha of the central forest reserve for the purpose of growing trees.

The land use activities in nearby villages comprise of small scale farming at a subsistence level with livestock grazing a common activity. Originally the communities surrounding the reserve were practicing shifting cultivation and pastoralism both in the land surrounding their villages, and encroaching into the project area. Despite the reduction in cultivation and pastoralism in the 1980s, in 2002 the current livelihood of 78.9% of the

district population depended on subsistence farming (as shown in Table G.1.5.1). This agriculture is based on the Lango farming system, which relies mainly on human labour and simple hand tools (e.g., hoe, machetes and ox-ploughs). Other land use activities practiced by the local communities, both in the project zone and in the project area, are fuel-wood collection and charcoal burning. These are important to the local communities, providing a means of energy, in particular for cooking.

Table G.1.6.1 shows constraints and conflicts over natural resources management in areas surrounding the reserve:

Table G.1.6.1: Constraints and conflicts

Natural Resource	Constraints and conflicts
Water resources (Lakes, rivers, wells and springs)	- Restrictive policies on use of some resources - Illegal fishing activities - Ignorance of the law - Lack of cooperation on resource use - Poor sanitation at the landing sites - Silting of the water bodies
Forests and woodlands	- Illegal activities (encroachment and harvesting) - Unclear boundary/ demarcation of gazetted areas - Lack of cooperation by the local communities
Land resources (sand, clays, stones)	- Ignorance about land adjudication - Very few lands have been surveyed and demarcated - Increasing land degradation - Soil infertility - High population pressure on land resources - Ignorance of the Land Act

LFC hired a Community Development Officer (CDO) in 2008 to help facilitate interactions between the local communities and the project. The main task has been further sensitisation of the project activities and constraints and conflicts to the local communities, so that communities fully understand all developments. The project is helping the constraints and conflicts of water resources through the protection of springs, rehabilitation of boreholes and allowing access to water resources in the project area throughout the project life. Forests and woodland constraints will be met through the development of community woodlots and implementation of the alternative livelihoods programme.

There was a dispute over the original project area when the NFA opened up the boundaries of the reserve following issuance of the land permit to LFC (formerly NAG (U)). This stemmed from the delayed implementation of the project between 1999, when the permit was first issued, and 2006, when GRAS invested in the project. Because no implementation occurred before GRAS' investment, communities had used the land for activities such as shifting cultivation and cattle grazing. In this period some members of the NFA issued non authorized licences to a number of individuals that were using the

reserve. The NFA was then consulted in 2008 to open the boundaries of the project so that it was clear to all communities in the region where the reserve was. At this point the NFA realised that there were some areas of land with duplicated land use rights – LFC having the permit rights for the reserve and additional community members with unauthorized licences. Many of the unauthorised licences were revoked but a few villagers who had planted some small areas of land with scattered trees were allowed to retain their licences. The original permit issued to LFC was for 2,800 ha; however, this was reduced by 131 ha for community members that had proved to be using the land in line with the law. LFC supported NFA's resolution of the situation, and pushed to have the land use rights amended to reflect this. When the land licence was issued to LFC, the area was amended from 2,800 ha to 2,669 ha so that there was no duplication of land use rights.

G1.7. Current biodiversity within the project zone and threats to that biodiversity, using appropriate methodologies, substantiated where possible with appropriate reference material

Biodiversity was assessed in the project zone during the field work of the Ecological Survey. The Ecological Survey carried out at KFP indicated that the project area does not have a rich biodiversity due to the continued degradation of the land and increasing human population having out more pressure on the woodland resource. The method followed in the study was two pronged: a consultation with the local communities to hear what flora and fauna they had sighted in and around the project area, and a field assessment of flora and fauna through line transects and sample plots. Although the study was carried out in early July 2008, it is deemed sufficient to accurately reflect the biodiversity situation prior to project start in 2006 since only 178 hectares of the project area was planted between the project start and this date, which represents 6.7% of the total area under title, and thus, the majority of the reserve can be assumed to have remained in a similar state to of that in early 2006.

The following methodology was applied for the field assessment:

Tree inventory was conducted in the reserve to elucidate the existence and conservation status of flora and fauna. GPS positions of sample plots and selected prominent features were taken and used to develop maps showing habitat types, occurrence of rare, endangered or threatened species and Sites of Specific Conservation Importance (SSCI). Before conducting the ecological survey, key informant interviews with local community and transect walks were carried out to get an understanding of socio-cultural issues and sites to be identified as ecological importance during in-forest surveys.

In each parish, transects of up to 2 km length were established. Plant inventory was conducted in 10 sample plots each measuring 50 m by 40 m. The centre point for each of these plots were recorded and later used for demarcating sites of both socio-economic and ecological importance in KCFR. For the assessment of population structure, abundance and diversity of trees and other woody plants in the area, two transects lines of

between 1.8 to 2 km per parish were established running in either direction, both North-South and East-West to cover the study areas. In each transect line, 10 rectangular plots each of 50 m x 40 m were established systematically alternating at intervals of 200 m along the transect line. A total of 30 plots were established in the three parishes surrounding the project area. Each sample plot was stratified into strata of 50 m x 40 m (for mature trees), 20 m x 20 m (for saplings and poles) and 10 m x 10 m for assessment of seedlings of each encountered species (Okullo, 2004).

In each plot 5 sub-plots were established for seedling enumeration while diameter was measured for woody plants with a diameter at breast height of 10 cm and above. Each encountered species was counted by moving systematically along the stratum. Assessment of saplings and poles also followed the same procedure except they were considered at a height greater than one meter and less than 2 m respectively (Table G.1.7.1).

Table G.1.7. 1: Categorisation of age and diameter class of woodland tree species

Age class	**Diameter**
Seedlings	< 50cm in height
Saplings	Collar diameter < 5cm or 50cm to 1m height
Poles	Dbh/ Circumference 5<10cm or Over 1m aboveground
Mature trees	Dbh >10cm

Whilst carrying out the sampling, observations were made for fauna in the area. Animal tracks and droppings were searched for to assess fauna species; however, very little was observed in the area covered.

The results from the community consultations show a number of species, both flora and fauna, that locals have reported in and around the project area, and the species' abundance. Results from this component of the study are interesting to gauge past biodiversity in the region; however, it does not accurately reflect that of the project area or necessarily the point of time in question. Many locals may have been drawing on recollections from a long time ago and on areas further afield than of that of the project area. These community observations therefore have more significance from the perspective of the "project zone" (the project area and the surrounding areas), but there is still significant uncertainty with regard to timeframes when such observations were made. Local communities listed the following species as rare and endangered species in the region: plant species including Obia (*Imperata cylindrical*), Itek (*Albizia coriaria*), Odugu (*Combretum collinum*), Aputu (*Pseudso-cedrella kotschyi),* Olilimo (*Ximenia Americana*), Ioro (*Combretum molle*); animals including Aderi (anthlope spp), Amor (duiker), Kul (warthogs); and birds such as Okwir and Iwalu (Crested Crane).

The species that the communities listed (the general lists and the rare, endangered and threatened list) were screened against the IUCN's Redlist[6], nonetheless, to see if any of them were classed as endangered or threatened. The findings show that the species, *Milicia Excelsa*, is classed as "Least Concern" on the Redlist; Duiker species are also classed as "Least Concern", although the "Amor Duiker" is not specifically listed. Any *Milicia Excelsa* found in the project area will be conserved; however, as it was not found in the assessment of the baseline carbon stocks nor the Ecological Survey, it is unlikely that it is within the project area. The Common Duiker's habitat is typically savannah, and as large areas of grassland have been identified outside of the project area, the implementation of the project would not be expected to negatively impact the species.

The field work to assess the project biodiversity found an array of different plant and tree species; however, no animals or birds were recorded from the sample plots, showing that the area has poor fauna biodiversity. All species listed in the field inventory were screened against the IUCN's Redlist and were not listed. They are therefore not classed as rare or endangered.

(a) Apye Parish

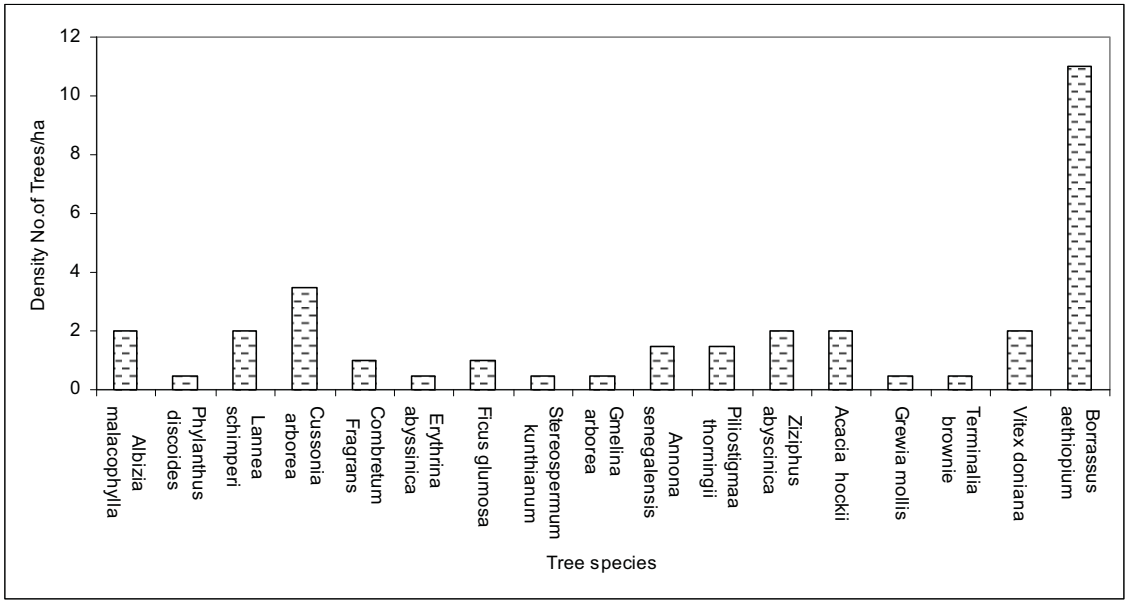


Figure G.1.7. 1 **Density of mature tree species in Apye parish**

[6] http://www.iucnredlist.org/ - a list of species that have been screened and the results have been presented to the DOE

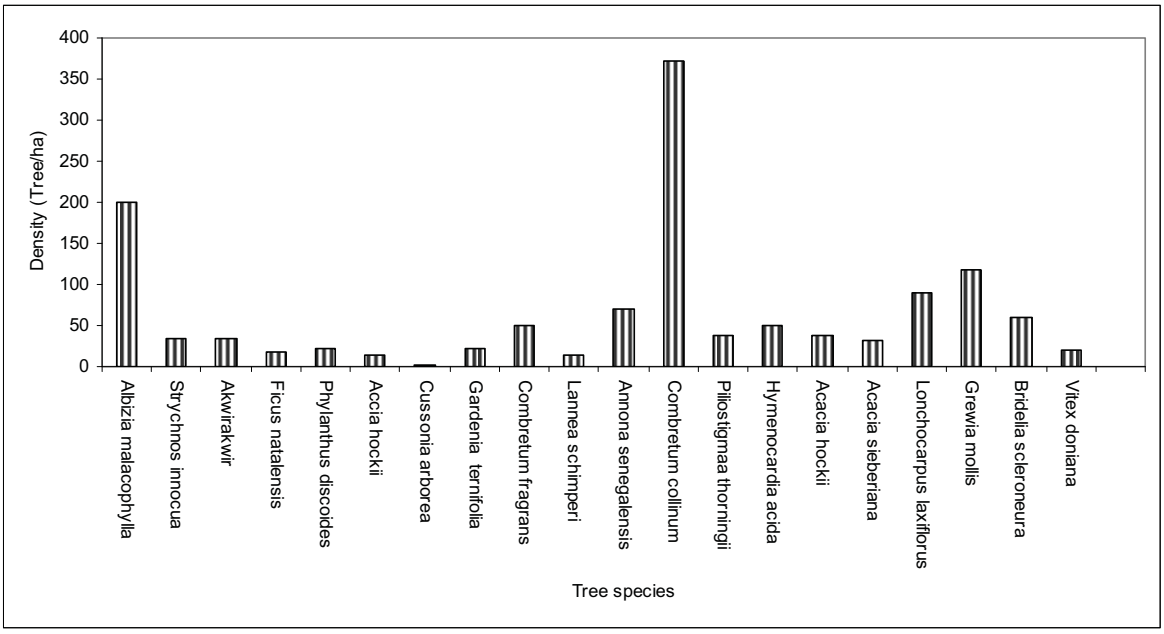


Figure G.1.7.2: Density saplings / poles tree species in Apye parish

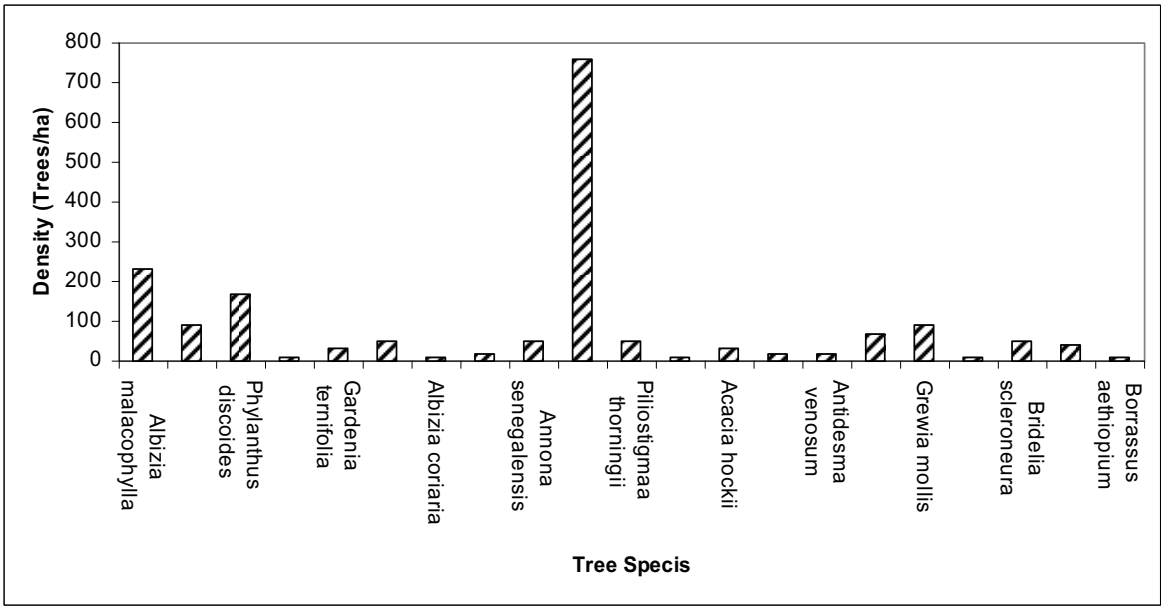


Figure G.1.7. 3: Density of regenerating species in Apye parish

(b) Abwong Parish

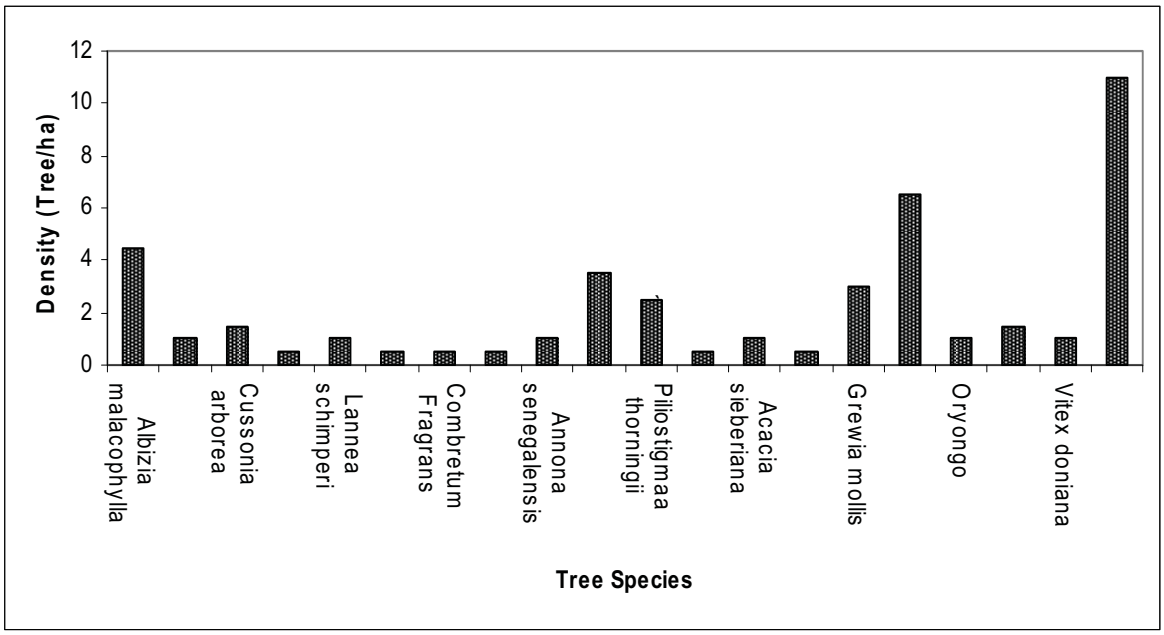


Figure G.1.7.4: Density of mature tree species in Abwong parish

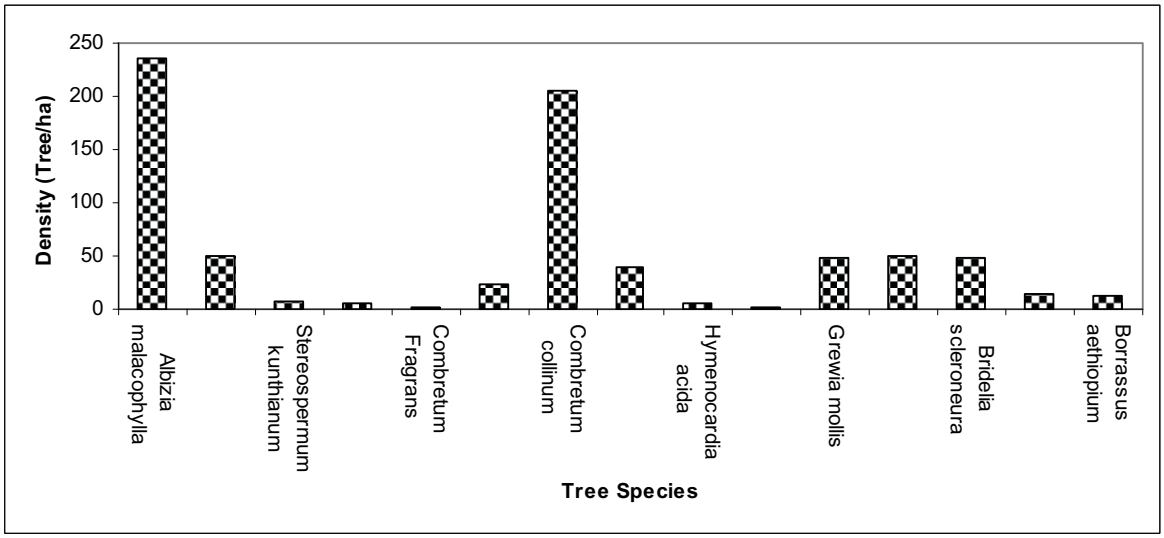


Figure G.1.7.5: Density of saplings/poles tree species in Abwong parish

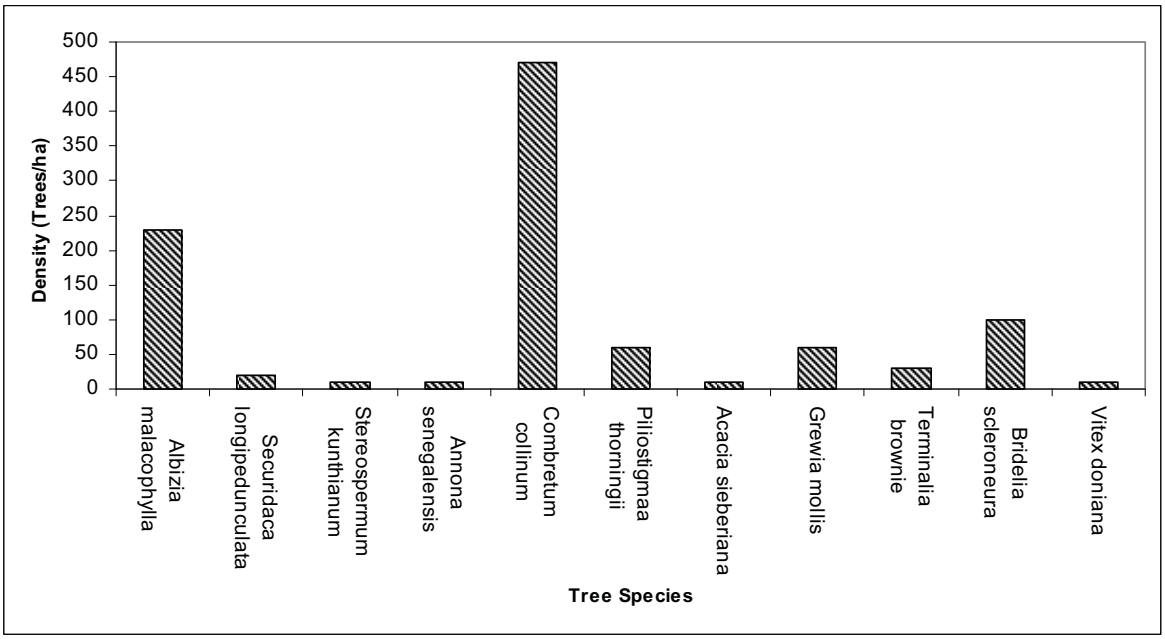


Figure G.1.7. 6: **Density of regenerating tree species in Abwong parish**

(c) Amuda Parish

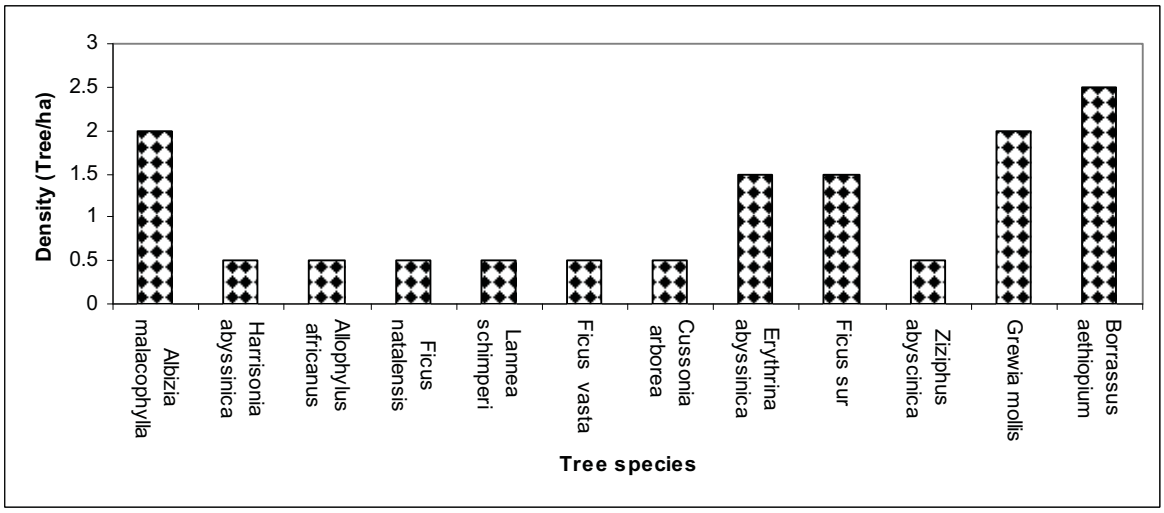


Figure G.1.7.7: Density of mature tree species in Amuda parish

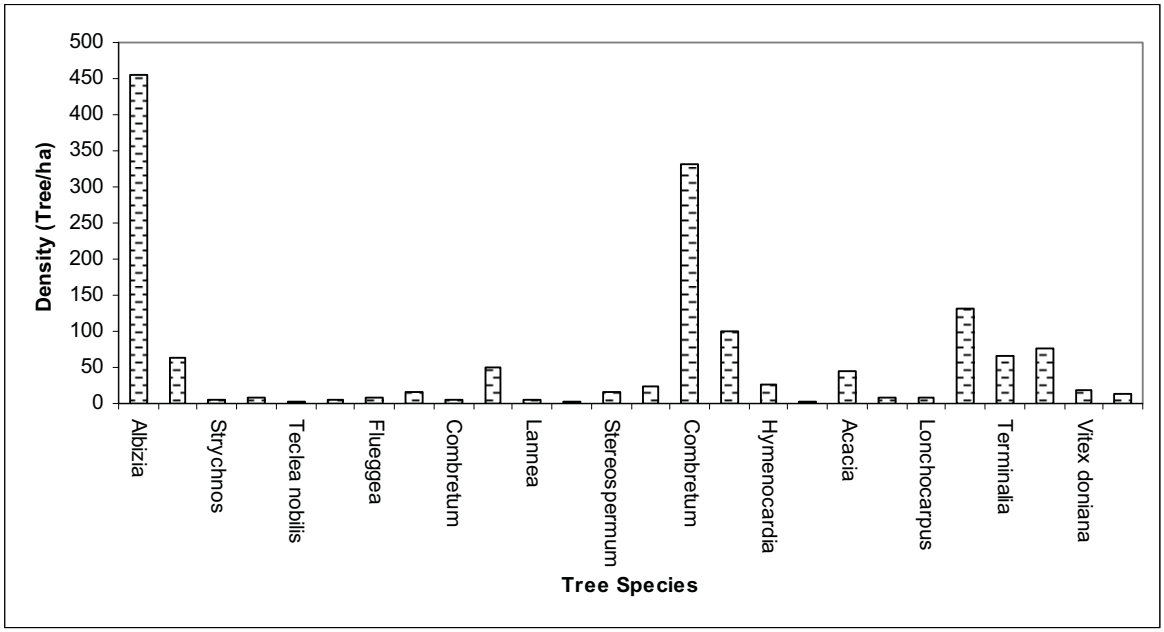


Figure G.1.7.8: Density of saplings / poles species in Amuda parish

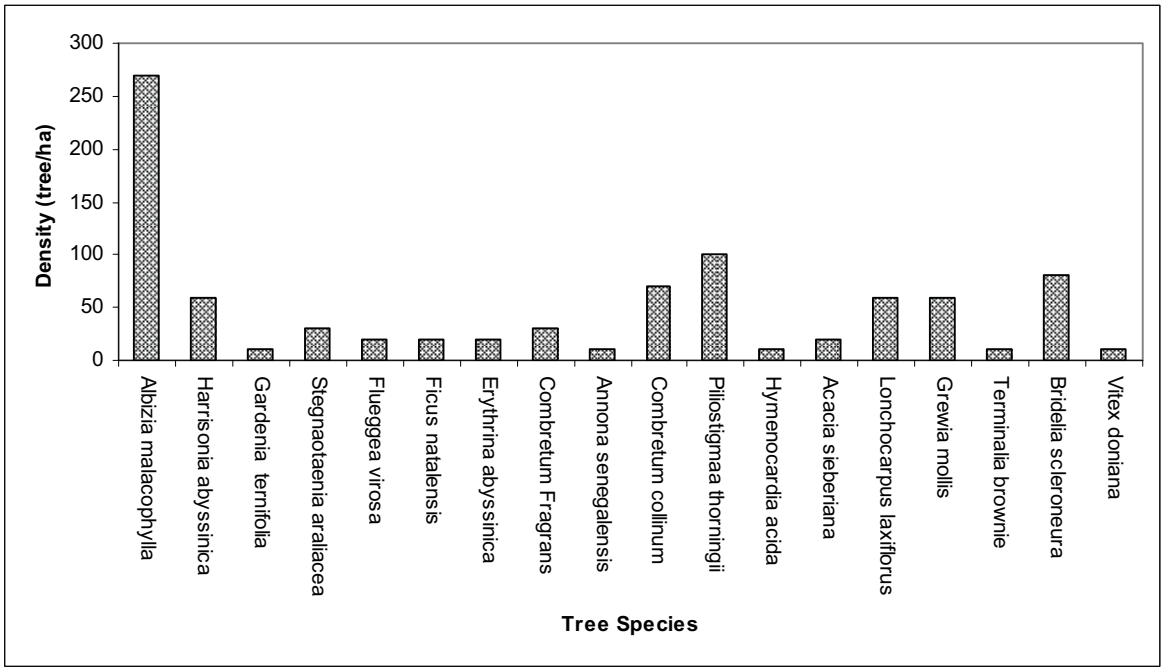


Figure G.1.7.9: Density of regenerating tree species in Amuda parish

As described in section G.1.2, former small-scale government plantations within the reserve used exotic species during planting in the 1970s. This led to *Gmelina arborea*

being apparent in the baseline scenario – though being degraded through clearing – and so demonstrates that the project area is *not* being subjected to exotic species for the first time from LFC activities.

G1.8. Evaluation of whether the project zone includes any of the following High Conservation Values (HCVs) and a description of the qualifying attributes:

G1.8.1. Globally, regionally or nationally significant concentrations of biodiversity values; protected areas; threatened species; endemic species; areas that support significant concentrations of a species during any time in their lifecycle

Protected areas equivalent to the six IUCN Protected Area Management Categories are: Ia. Strict nature reserve, Ib. Wilderness area, II. National park, III. Natural monument or feature, IV. Habitat/ species management area, V. Protected landscape/ seascape, VI. Protected area with sustainable use of natural resources[7].

The area is HCV in accordance to category 1V since there is a worship place considered a natural feature and VI because the area is forest reserve with a wetland and thus consists of sustainable use of natural resources features of the protected areas in Uganda, as defined by the IUCN, found within the project zone.[8].

As stated in section G.1.7, all species stated in the Ecological Survey by local communities as rare, endangered and threatened were screened against the IUCN's Red List to determine if any of the species were officially classed as threatened. Only species of "least concern" were identified, thus it was concluded that no threatened species were in the project zone. Furthermore, no endemic species are found within the project zone as substantiated from the Ecological Survey.

The wetlands within the project zone are an important function to the local ecosystem and are connected to the greater wetland system which extends beyond the project zone, as shown in figure G.1.2.2. They act as corridors for migratory species and contain greater biodiversity than strata such as grass and shrubland.

G1.8.2 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

[7] http://data.iucn.org/dbtw-wpd/edocs/PAPS-016.pdf

[8] WDPA (Content Source);Juan Pablo Arce (Topic Editor) "Protected areas of Uganda". In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth June 29, 2009; Last revised Date June 29, 2009; Retrieved January 12, 2011 http://www.eoearth.org/article/Protected_areas_of_Uganda

Due to the richer biodiversity seen in the wetland stratum of the project zone, the wetland areas are classed as regionally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance. Figure G.1.8.2 shows how vast the wetland system is in the region. Similar species are found within the wetland areas within the project zone and outside in the larger parts of the wetland system.



Figure G.1.8.1: Map of the boundary of the KFP and the regional wetland system

G1.8.3 Threatened or rare ecosystems

The ecosystems found within the project zone, namely degraded savannah woodland and wetland systems, and are not threatened or rare. As shown in Figure G.1.8.1 above, the wetland ecosystem extends far beyond the project zone. There are also many similar wetland ecosystems found all over Uganda[9] Therefore no threatened or rare ecosystems are within the project zone.

G1.8.4. Areas that provide critical ecosystem services

The project zone includes part of the wetlands system, which provides a critical ecosystem service to the local communities. The hydrological services from the wetlands provide local communities with water both for themselves and their cattle. LFC is aware of this important service and has implemented key measures to ensure that the service is not negatively impacted by the project and that the local communities sustain their access to it.

The local communities are still allowed to take their cattle into the wetland areas for water. The project will also ensure that cultivation activites do not take place in the wetlands, as this would lead to degradation. Furthermore, buffers will be left around the wetlands to ensure that the forest plantation does not interfere with the hydrology of the ecosystem. Fertilizers will also be managed to minimize any risk of contamination with the wetland system and monitoring of this will take place.

G1.8.5. Areas that are fundamental for meeting the basic needs of local communities

As described in G.1.8.4, the reserve contains wetland areas which the local communities use as watering points for their cattle. The wetlands are also play an important part in the more widely hydrological system, too. These areas are being conserved by the project proponents with local communities being given access to use them for this purpose throughout the project lifetime. Buffer zones around the wetlands are also kept free from planting to protect the water level for both its function as a cattle watering point and also as a water supply for the local communities themselves.

G1.8.6. Areas that are critical for the traditional cultural identity of communities

From the Ecological Survey that was carried out at KFP, a list of sites of specific conservation importance was identified through stakeholder consultations with the local communities, as shown in Table G.1.8.6.1 below. These sites will be protected and managed with local communities having access to these sites.

From the list of sites of specific conservation importance, one site is considered to be critical for the traditional cultural identity of the communities in the project zone, that is, the cultural worship place, which is an area where local people would gather for prayers when faced with natural disasters and calamities, like severe drought or epidemics. In

[9] How Spaital Analysis Can Benefit Wetlands and Reduce Poverty in Uganda - Mapping a Better Future. Wetland Characteristics and Uses – see Map 2, Distribution of Permanent and Seasonal Wetlands, 1996

order to preserve the local cultural and traditional history of the local people, KPP has protected these sites found within the reserve.

Table G.1.8.6. 1: Sites of Specific Conservation Importance

	Resource/Place	**Location (Extra GPS positions)**
1	*Borassus aethiopium* stands	36N 0492853; 0222802;
2	Protected spring	36N 0492503; 0223887;
3	Water point for livestock (Wetland/swamp point 1)	36N 0492 517; 0223890;
4	Cattle way from Apeti village to water source and back point 1	36N 0492395; 0223616;
5	Wetland (swamp) point 2	36N 0492399; 0223532;
6	Wetland (swamp) point 3	36N 0492411; 0223392;
7	Cattle track to water source point 2	036N 0492382; 0223436;
8	Area where guinea fowl were found	36N 0492275; 0223182;
9	Breeding place for hornbill 1	036N 0492267; 0223175;
10	Breeding place for hornbill 2	36N 0492233; 0223095;
11	Sand mining point	36N 0492367; 0223110;
12	Salt lick	36N 0492475; 0222981;
13	Fishing area (Swamp/wetland) point 4	36N 0492853; 0222802;
14	*Vitellaria paradoxa* stands	36N 0494150; 0220864;
15	*Vitellaria paradoxa* stands	36N 0493921; 0222075;
16	Cultural worship place	36N 0493921; 0222075;

G2. Baseline Projections

G2.1. 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 CDM Afforestation and Reforestation baseline and monitoring methodology, AR-AM0004, "Reforestation or afforestation of land currently under agricultural use", version 4, was applied to determine the most likely land-use scenario in the absence of the project[10].

In the absence of the project activity, the land is expected to be exposed to further encroachment from the local communities with more land-class change from shrub and grassland to degraded cropland, and depletion of remaining pockets of forest due to fuel-

[10]http://cdm.unfccc.int/EB/Meetings/038/eb42_repan08.pdf

wood collection and charcoal production, all resulting in further degradation of the land. The selected methodology therefore follows the baseline approach from paragraph 22(a) of the CDM A/R modalities and procedures – "*Existing or historical, as applicable, changes in carbon stocks in the carbon pools within the project boundary*." The proposed A/R CDM project activity complies with the applicability conditions provided in the methodology as follows:

- *Lands to be afforested or reforested are degraded and the lands are still degrading or remain in a low carbon steady state*

The project area has seen large changes in vegetation cover over the last three decades, as shown from the NFA maps and the Ecological Survey, with woodland vegetation being depleted to a land-class representing shurb and grassland – demonstrating a clear pattern of degradation. Much of the forest has been cleared illegally by local communities, who have encroached into the forest reserve, using fire to make space for cultivation and charcoal production. The lands would have continued to degrade at the historic rate in the absence of the project, with increased areas being subjected to cultivation. The Landsat image from 1989 together with the current land-use map shown in A.4.2 of the CDM PDD illustrates that the few remaining pockets of natural forest from 1989 were deforested within this interval.

- *Site preparation does not cause significant longer-term net decrease of soil carbon stocks or increases of non-CO_2 emissions from soil;*

Significant long-term net decreases of soil carbon stocks or increases of non-CO_2 emissions from soil will not occur due to site preparation as only small pits of diameter 20-30 cm and depth 30-40 cm are dug at a spacing of 2.5 x 2.5 m, 3 x 3 m or 5 x 5 m for planting. Ploughing will not be used for land preparation. Spot weeding is carried out 1m around the plant for 2 years, done manually by slashing, to protect the young trees from weed competition.

- *Carbon stocks in soil organic carbon, litter and deadwood can be expected to further decrease due to soil erosion and human intervention or increase less in the absence of the project activity, relative to the project scenario;*

In the absence of the project, the area would remain exposed to the detriment of the past pattern of human intervention: further degredation due to fire regimes for subsistence agriculture and charcoal production. The soil organic matter and deadwood would also be expected to increase less in the absence of the project activity, relative to the reforestation, as grass and shrublands under tropical conditions have less soil carbon compared to plantations[11]. Therefore, not accounting for soil organic carbon is a

[11] Annual cycles of fire reduced Soil Organic Carbon stock to about 5.5 and 10MgCha^{-1} for sand and clay soils, respectively, and resulted in about 20 per cent higher losses than where the savanna was burnt every five years: T.G. Vagen, R. Lal and B.R.Singh, Soil Carbon Sequestration in Sub-Saharan Africa: A Review, Land Degrad. Develop. 16: 53–71 (2005), John Wiley & Sons.

conservative approach for the project case as it is expected to increase less or decrease more in the absence of the project activity relative to the baseline because of reduced fire.

- *Flooding irrigation is not permitted*;

There will be no flooding irrigation used in the project activity.

- *Soil drainage and disturbance are insignificant, so that non CO_2-greenhouse gas emissions from these types of activities can be neglected;*

Mechanical site preparation through ploughing will not be used. Therefore, no non-CO_2 GHG emissions are expected. Soil drainage is not expected to occur since species are planted in appropriate locations where existing drainage is adequate.

- *The A/R CDM project activity is implemented on land where there are no other on-going or planned A/R activites (no afforestation/reforestation in the baseline)*

Due to the degraded feature of the land, economical unattractiveness, identifiable barriers (unavailable funds, inaccessible commercial bank loans, lack of capacity for successful planting and management, inadequate institutional arrangements) and market risks that prevent investors or local communities using the land in a manner that will lead to carbon sequestration, the lands to be reforested, without the proposed A/R CDM project activity, will continue under marginal agriculture as they have in the last decade. The land is currently under subsistence agriculture and would continue under agricultural use without A/R CDM project activity.

Step 1: Demonstrate that the proposed A/R CDM project activity meets the conditions under which the proposed methodology is applicable, and that baseline approach 22(a) can be used

As shown in section C.2 in the CDM PDD, the proposed A/R CDM project activity meets the conditions under which the proposed methodology is applicable, and baseline approach 22(a), *"Existing or historical, as applicable, changes in carbon stocks in the carbon pools within the project boundary"*, can be used.

Step 2: Define the project boundary, following "Procedures to define the eligibility of lands for afforestation and reforestation project activities"

Project participants demonstrate that the land within the project boundary is eligible for an A/R CDM project activity by following the steps outlined in the 'Procedures to define the eligibility of lands for afforestation and reforestation CDM project activities, version 1'.

(a) The land is not forest at the moment the project starts:

i. *The land is below the forest national thresholds (crown cover, tree height and minimum land area) for forest definition under decisions under decisions 11/CP.7 and 19/CP.9 as communicated by the respective DNA;*

The procedure to demonstrate eligibility of land requires that the lands or discrete areas of land to be forested must meet the definition of forest by the host country under decisions 11/CP.7 and 19/CP.9 as communicated by the respective DNA. At the time of preparing the PDD, the Climate Change Secretariat (DNA) for Uganda has defined and communicated the national forest thresholds as land which has:

- Minimum area of 1 hectare
- Minimum tree crown cover of 30 %; and
- A minimum height of 5 meters at maturity.

The assessment of land eligibility of the parcels of land under the proposed project activity is based on the above definition.

The CDM project area consists of grass and shrubland with scattered trees, and cropland areas. The plantable areas delineated on the basis of the above definitions are 'shrub and grasslands' and 'cropland', shown in figure A.4.2 of the CDM PDD, and both of which fall well below the national forest definition. The land eligibility is herein demonstrated using Landsat imagery of 1989, NFA maps from 2005, and GPS field based mapping undertaken to create a 2009 baseline map demonstrating land-class over the titled land to LFC.

The pre-1990 (1989) Landsat classification, shown in Figure G.2.1.1, indicates that there were some forest remnants in the reserve at this time, although these areas have been excluded from the A/R CDM project following the A/R CDM 1990 rule.

The government map produced by the NFA in 1995, shows that the majority of the project area was classified as "woodland", in line with their woodland definition of: "wooded areas where trees and shrubs are predominant"[12]. This definition creates a very broad characterization of the land-class, with no specification of the density or height of the trees. The woodland vegetation at KFP in 1995 was not at/ or above the forest definition, as although there is woody vegetation within the reserve, it was at a sparse density, like that of a savanna - as stated by the FAO and according to local community descriptions from the Ecological Survey. The reserve has been of a savanna land-class even before it was initially gazetted (FAO, 2009). At this time, the land was used for grazing activities, suggesting an absence of forest due to the prevalence of grass being used as fodder.

The time series from 1995 to 2005, based on the NFA maps, shows how that the land class changed from an area of woodland vegetation to bush (synonymous with shrubland)

[12] John Ayongyera, former employee of NFA

and subsistence agricultural land. This land-class change clearly demonstrates how the vegetation has been degraded over this time period.

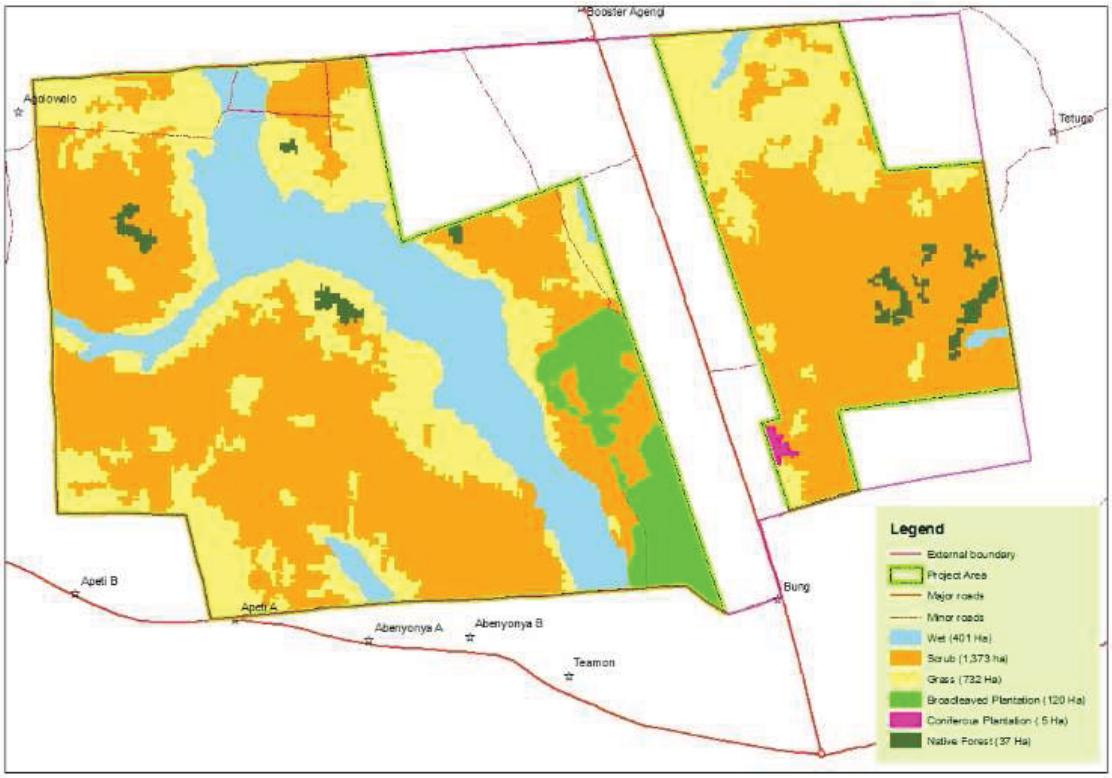


Figure G.2.1.1: Kachung stratification map of 1989 Landsat image

The project activity is carried out in areas defined as grass and shrubland, and cropland areas. Parcels of remaining forest and wetland vegetation are delineated and excluded as CDM eligible areas and managed for conservation.

ii) The land is not temporarily unstocked as a result of human intervention such as harvesting or natural causes or is not covered by young natural stands or plantations which have yet to reach a crown density or tree height in accordance with national thresholds and which have the potential to revert to forest without human intervention

Field surveys and locally available information indicate that the discrete areas of land are not temporarily unstocked as a result of human intervention. As demonstrated by NFA maps from 1995 and 2005, the land has been degraded through depletion of woody vegetation through fuel-wood collection, charcoal production and to clear land for shifting cultivation and grazing. This has resulted in a degraded state of the land and soils. Furthermore, the presence of grazing in the baseline meant that young seedlings would have little chance of regeneration into a forest.

(b) The project is an afforestation activity:

i. *For afforestation project activities, demonstrate that the land is below the forest national thresholds (crown cover, tree height and minimum land area) for forest definition under decision 11/CP.7 as communicated by the respective DNA, for a period of at least 50 years.*

On the basis of evidence from discussions with villagers who have lived in the project region for more than fifty years the A/R CDM project activity was classed as an afforestation project.

On 31 December 1957, approximately 50 years before the start of the A/R CDM project activity, the CDM plantable area was below the forest national threshold. A written testimony has been provided by Menya Nicholas who has lived in Agolowelo for more than 60 years, which can be provided to the DOE on request at validation. The testimony states that the project area was savannah woodland before the 1940s and that this land has been gradually degraded over the years since this.

The project boundary has been described following the *"Procedures to define the eligibility of lands for afforestation and reforestation project activities"* as shown in section A.7 of the CDM PDD.

Step 3: Analyze historical land use, local and sectoral land-use policies or regulations and land use alternatives

(a) Historical and existing land-use/land-cover changes in the context of the socio-economic conditions prevailing within the boundary of the proposed A/R CDM project activity and key factors that influence the land-use/land-cover changes over time

As shown in the FAO's Global Forest Resources Assessment 2005, since 1990 Uganda's forests and wooded lands have decreased from approximately 6.3 million to 4.7 million hectares, which presents one of the highest deforestation rates in the world over the last decade[13]. Furthermore, records from NEMA indicate that back in 1890 approximately 10.8 million hectares, equivalent to 45% of Uganda's land area, was forest and woodland[14]. In light of this, it is not surprising that deforestation, or more specifically degradation of savanna woodland, has been present at KFP over the last century, principally due to the prevailing land-use of subsistence agriculture, fuel-wood collection, charcoal production and grazing activities. Key policies, regulations and events have acted as precursors to this land-use change and thus driven the extent of the land-cover change.

[13] FAO, Global Forest Resources Assessment 2005

[14] Working Paper 3, *natural Resource Management and Policy in Uganda: Overview* Paper, Economic Policy Research Centre, February 2000, ftp://ftp.fao.org/agl/agll/kageradocs/08case_studies/ug_nrm_overview_paper.pdf

Contrary to the widespread land-use explained above, some attempts were made by the government to reforest a small part of the reserve in the 1970s using pine species, in particular *Pinus caribea* and *Pinus oocarpa*. The result of this is apparent in the northern-central area of the reserve where the mature plantations can be seen. However, the government was unable to continue with this programme due to financial constraints coupled with the political instability during the following years, which resulted in reforestation attempts ceasing. No attempts of tree planting have been made within the area of the A/R CDM project activity.

Uganda experienced a period of instability during the 1970s with the dictatorship of Idi Amin; a time characterized by political repression, corruption and human rights abuses, and culminating in the Liberation War between Uganda and Tanzania at the end of the decade. Further insecurities proceeded into the early 1980s after the return to power of Milton Obote, which led to an insurgency causing widespread conflict. This era of Uganda's history had strong repercussions for almost all aspects of the country's economy - including the land-use and forestry sector - and meant that people were forced to meet immediate livelihood needs as oppose to long-term needs.

In the early 1970s, the Government of Uganda encouraged the growing of agricultural crops in Central Forest Reserves (CFRs) in a campaign to increase agricultural output. Inevitably this resulted in mass encroachment of CFRs, and successive governments have struggled to reverse this action. This was also the first time that illegal logging by pit-sawing became common practice; another activity which became difficult to control.

Another important factor pertaining to the increased pressure on the land has been the rapid population increase, which almost doubled between 1980 and 2002 (see figure G.2.1.2 below). This vastly increased the demand of food and employment which could not be met by equivalent supply. Such a disparity meant many local communities had no other option but to resort to subsistence living in an unsustainable manner. Thickets and forests became degraded as people exerted them for firewood, charcoal production, timber and clearing virgin land for cultivation and grazing.

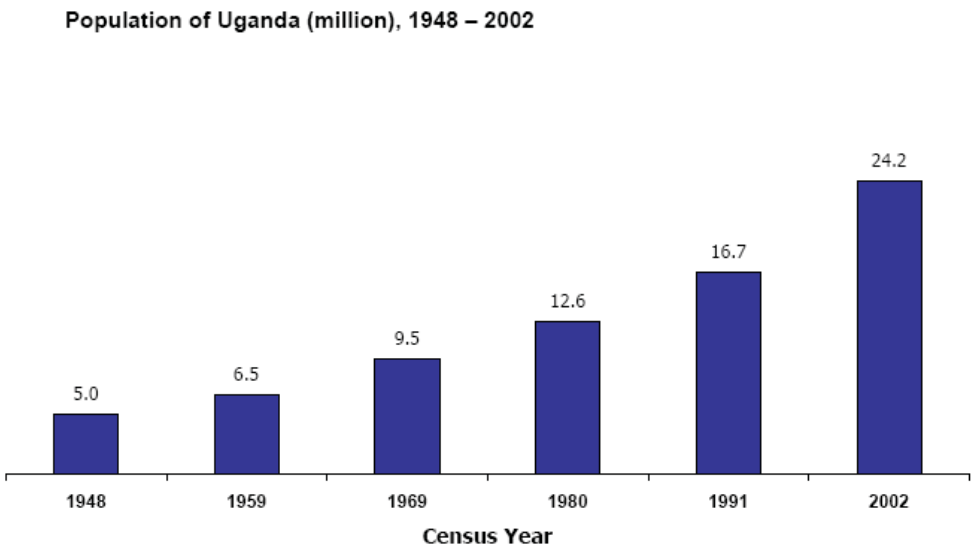


Figure G.2.1.2: Uganda population change[15]

Privately owned land has also continued to decrease since the 1980s due to the increasing population, owing to fragmentation and further subdivision among children of the next generation. Further exacerbation of the state of the land occurred when the forest department was taken over by the NFA in 1995. This transitional restructuring led to relaxed enforcement of forest law and regulations, which resulted in an increase of people using the reserve illegally. The reserve was subject to increased anthropogenic pressures compared to adjacent private and community land, the forest reserve has seen far worse anthropogenic pressures to private and community lands, as the clear tenure of individuals' lands means there's no ambiguity for encroachment.

Uganda's economy has developed steadily since 2000, showing how far the country has come since the troubled economic times of the 1970s. It is now one of the fastest growing economies in Africa[16], but, conversely, social indicators still point to an array of problems which are firmly rooted in that of a poor nation: low life expectancy, one of the highest population growth rates in the world etc. Such social problems are prevalent in the communities around the A/R CDM project activity and limit individuals' outlook perspectives to short term needs. Furthermore, the limited availability of jobs in local trading centres and restricted access to loans means that work is hard to find and implementing private initiatives, such as tree planting, is not a viable option currently. The maintenance of a short-term income stream from land use practices which lead to degradation has thus been imperative, even if unsustainable.

[15] Projections of demographic trends in Uganda 2007-2017, Uganda Bureau of Statistics, December 2007

[16] http://web.worldbank.org viewed 10/11/09

(b) Historical and current land-use/ land-cover change has led to progressive degradation of the land over time including a decrease or steady state at a reduced level of the carbon stocks in the carbon pools

The high prevailing rate of deforestation seen in Uganda over the last century has meant that many areas have been left in a state of degradation. This is highlighted in the work carried out by the FAO to map out the severity of human induced soil degradation (Figure G.2.1.3), which shows that the majority of Uganda's soils are either moderate or severe in degradation. As indicated by the map, KFP is in an area of severe soil degradation. The results from the Ecological Survey support a problem with the soil, identifying the main concern with them at KFP as being of "poor chemical properties" leading to soil infertility.

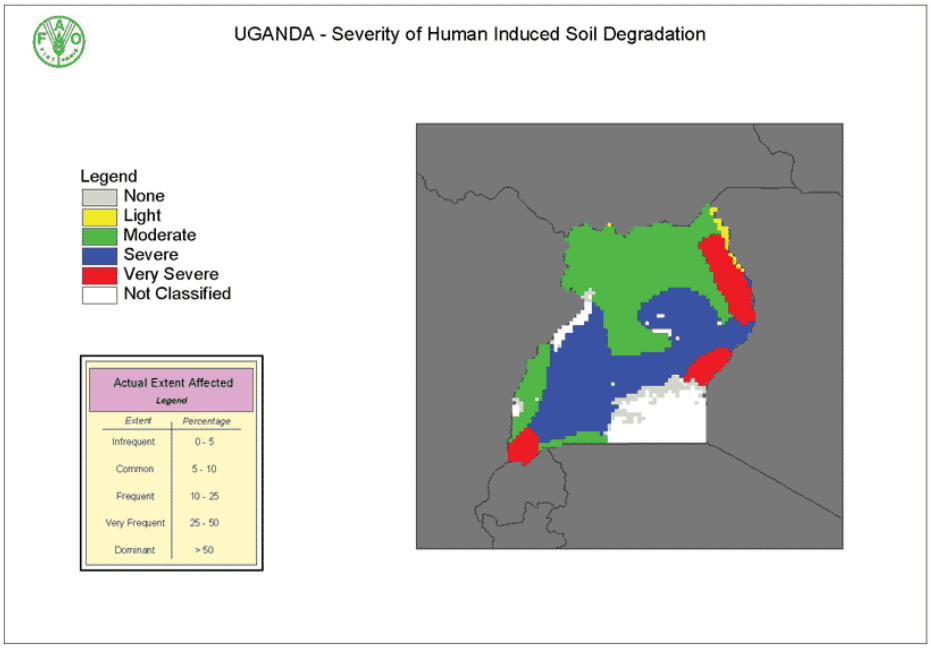


Figure G.2.1.3: Soil degradation map of Uganda[17]

Degradation is also evidenced by comparison of the NFA maps of the reserve from 1995 and 2005, changing from predominantly woodland vegetation below the forest definition to bush vegetation and a significant area of subsistence farmland over this ten year period. Moreover, the current land-use and stratification map that was produced from ground truthing the project area showed that the land was of a grass and shrubland classification.

[17] FAO (2008) National Soil Degradation Maps http://www.fao.org/landwater/agll/glasod/glasodmaps.jsp?country=UGA&search=Display+map+%21, last updated December 2005

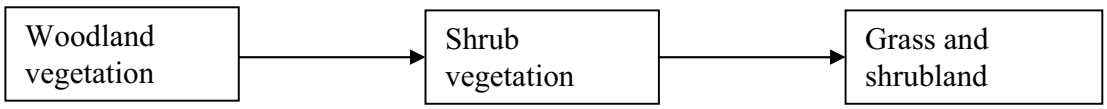


Figure G.2.1.4 Schematic of land-class change

Findings of the Ecological Survey also support the trend of vegetation clearance in the project area, leading to lower crown cover of tree and non-tree vegetation and a more degraded state of the land. Consequently, the carbon stocks in the carbon pools have also been reduced.

(c) National, local and sectoral land-use policies or regulations adopted before 11 November 2001

Local Government Act, 1997:

The Local Government Act was a key policy influencing land-use in Uganda as it effectively devolved management functions from central government to districts and lower-level councils[18].However, district councils took advantage of their new powers of control, which led to exploitation of the forest reserves.

Forest Reserves (Declaration) Order, 1998:

In response to concerns relating to the unsustainable management of the reserves due to the consequences of the Local Government Act, the government introduced the Forest Reserves (Declaration) Order (1998), which reversed decentralization of forest management for forests of 100 ha or more[19].

- Plan for Modernization of Agriculture, 2000:

[18] http://www.fao.org/docrep/005/Y7584E/Y7584E11.htm

[19] Competing jurisdictions: settling land claims in Africa, Sandra Evers, Marja Spierenburg and Harry Wels; can be viewed at: http://books.google.com/books?id=6iEFRNxiDtIC&pg=PA272&lpg=PA272&dq=The+Forest+Reserves+(Declaration)+Order&source=bl&ots=nKdlCzox6W&sig=I6vQKcy0OegJFFBnNRWEtqatnKw&hl=en&ei=s-n7SvD4NYad4Qbp8vDcAw&sa=X&oi=book_result&ct=result&resnum=3&ved=0CA4Q6AEwAg#v=onepage&q=The%20Forest%20Reserves%20(Declaration)%20Order&f=false

As part of the Poverty Eradication Action Programme (PEAP, 1997), the Plan for Modernization of Agriculture (PMA, 2000) provides a framework for eradicating poverty through helping subsistence farmers move towards becoming commercial farmers. Forestry is promoted as one such activity, along with agriculture, fisheries and livestock. Though the Plan seems like a positive step towards encouraging sustainable development, the emphasis of the strategy is on key reforms to legal and regulatory frameworks – such as decentralisation to lower levels of local government, removing direct government in commercial aspects of agriculture – and thus assumes the intended reforms will be achievable with just this[20]. In the region of KFP, this policy instrument has not been affective as the local communities have remained without financial resources to develop such activities. Nevertheless, such a credit scheme would be insufficient in establishing a reforestation project due to the large investment costs.

- The National Forestry Policy, March 2001:

As the main policy instrument for forest management in Uganda, it emphasises the importance of protection and sustainable management of Uganda's forests, along with identifying stakeholders that can help promote the development of forestry – including the private sector. However, the policy alone does not have the necessary instruments to develop the forest sector in the desired way, instead it attempts to create a more enabling environment for forestry development.

Other post-11 November 2001 policies/ regulations:

- The National Forest Plan, 2002:

Despite this policy being beyond the time frame of interest as specified in AR-AM0004, it provides evidence that the National Forestry Policy required strengthening to meet its objectives, as it was developed to implement the National Forestry Policy through establishing strategies addressing the policy statements.

- The National Forestry and Tree Planting Act, 2003 (NFTPA)

As the main principle legal instrument for forest management in Uganda, the NFTPA made reforms to accelerate the development of the sector. Key aspects of the Act include: introduction of the National Forestry Authority (NFA) replacing the Forest Department (FD); district forest offices established by district councils; and management and environmental safeguards put in place through requirements of forest management plans and EIAs for projects significantly impacting forests.
The policies adopted before 11 November 2001 do not influence the areas of the A/R CDM project.

(d) Identification of alternative land uses

[20] Will the Plan for Modernization of Agriculture Deliver? Samuel Bagabo: http://www.irdiuganda.org/pdf/pma.pdf

1. Maintaining the current land-use without the A/R project: The project lands remain as degraded grass and shrubland with increasing shifting cultivation from encroachers. This is the most likely land-use in the absence of the project. Although the encroachment of such activities is illegal according to Ugandan law, the mandatory legal requirements are not enforced by the local government. This is substantiated by the area of cropland which can be seen in the 2005 NFA map.

2. Establishment of government plantations: Talks between the plantation manager and NFA area managers revealed that due to limited government financing, only in 1972 a small share of the Reserve was planted (345 ha) and it is not realistic that there could be a government plantation on any more land due to the financial constraints.

3. Private plantation: Development of an A/R project without the supplementary revenue from CDM would not be feasible due to the low IRR – due to high implementation costs and delayed returns - and substantial risk associated with such an investment. The example of a private plantation without CDM certification in the northern central part of the reserve is an exception to this as the private investors were granted a concession right to harvest the standing government plantation on condition that it was replanted. The income stream from harvested timber would have provided significant financial support for replanting and therefore created a much more attractive project. This could not happen in the A/R CDM project area due to the shrub and grassland land-class.

4. Commercial agriculture: The A/R CDM project area being part of a Central Forest Reserve means that only forestry activities can be implemented. Commercial agriculture is therefore not an alternative land use

(e) Demonstrate that land-use/land-cover within the boundary of the proposed A/R CDM project activity would not change and/or lead to further degradation and carbon stock decease in absence of the proposed project activity

The plausible scenarios identified in *Step 3* have been evaluated to examine their suitability as the project scenario. The analysis indicated that Scenarios 2, 3 and 4 are not plausible in the near future, principally because of the large investment required and absence of near and significant benefits.

Scenario 1 is the continuation of the existing situation, which is identified as the baseline scenario. A lack of financial resources means that Scenario 2 is unlikely, whilst the financial unattractiveness of the project in the absence of carbon financing would stop scenario 3 going ahead. The implementation the agriculture scenario would not be a legal activity to develop at the site.

The analysis indicates that the plausible alternative land use scenario in the absence of the project activity is the continuation of the current status of the land (shrub-glassland with scattered trees currently under agricultural use).

Step 4: Stratify the A/R CDM project as explained in Section II.3

The A/R CDM project area was stratified as described in Section C.4 of the CDM PDD.

Step 5: Determine the baseline land-use/land-cover scenario for each stratum

The baseline land-use/ land-cover scenario is identified as continuation of the current land-use (baseline approach 22(a)): degradation of grass and shrubland vegetation through subsistence activities including, cultivation, fuel-wood collection, charcoal production and grazing activities. Both strata follow the same baseline, as stated above. The identified baseline means that no natural regeneration is possible to reach the forest definition.

G2.2 Document that project benefits would not have occurred in the absence of the project, explaining how existing laws or regulations would likely affect land use and justifying that the benefits being claimed by the project are truly 'additional' and would be unlikely to occur without the project

The steps as outlined in the A/R Methodological tool "Tool for the demonstration and assessment of additionaility in A/R CDM projects" are followed to demonstrate that the proposed A/R CDM project activity is additional.

Step 0: Preliminary screening based on the starting date of the A/R project activity

The A/R CDM project started on 27th April 2006. This is the date when the agreement between NAG and GRAS (formerly known as TreeFarms AS) was developed regarding the co-operation modalities about operations of NAG (Uganda) Ltd.[21] Following the development of the co-operation modalities, GRAS, then known as TreeFarms AS, formally bought out LFC, becoming the largest shareholder of the company and in doing so, facilitating financial capacity to implement KFP. No planting took place before GRAS' investment.

The concept that reforestation at Kachung would be financially viable through the inclusion of a revenue stream from the sale of CERs was a key component of the decision making to invest in NAG. Since start up, GRAS, formerly TreeFarms AS, has had carbon financing as an integral part of its business plan. This is sustained by a number of Board Meeting minutes of TreeFarms AS – the "mother" company of GRAS subsidiaries - from as early as 1999, which clearly show that carbon financing was considered prior to the start of KFP[22]. Although these documents were not directly made publically available at the time, the information relating to carbon financing was made available on the company's website prior to project start, clearly outlining that carbon financing is a core component of

[21] Agreement between Norwegian Afforestation Group AS (NAG AS) and TreeFarms AS, Regarding the co-operation modalities about operations of NAG (Uganda) Ltd. 27th April 2006

[22] TreeFarms AS, Board Meeting Minutes: January 1999, December 1999, March 2000

GRAS and its subsidiaries' business objectives. The company objective can also be sustained by NGO reports from 2000[23], which clearly state that TreeFarms AS is developing carbon forestry projects in Uganda; furthermore, this report references the old company website (www.tree-farm.com), where much of the information was obtained – this is how the data from the documentation provided was made available to third parties.

In addition, TreeFarms AS' 2006 Annual Report[24] has a section on its carbon offset business, which was made available to third parties.

Step 1: Identification of alternative land use scenarios to the proposed A/R CDM project activity

Sub-step 1a: Identify credible alternative land use scenarios to the proposed CDM project activity

As elaborated in section C.5.1, Step 3, part (d) of the CDM PDD, the only identified realistic and credible land-use scenario that would have occurred on the land within the proposed project boundary in the absence of the reforestation project under the CDM is a continuation of the current land-use: degradation of the grass and shrubland stratum of the reserve to cropland or degraded grazing/grassland.

Sub-step 1b: Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

The identified realistic and credible land-use scenario of further degradation of the land due to encroachment activities is not in compliance with all applicable legislation and regulations as encroachment of forest reserves for activities other than tree planting is illegal. However, the scenario is valid because of the systematic lack of enforcement of applicable laws and regulations, as described below:

In a Forest Reserve, settlements or activities such as charcoal making or pasture are not permitted. Only dry or dead wood may, in reasonable quantities, be cut and taken free of any charge by members of local communities (National Forest and Tree Planting Act Section 33, August 2003). Illegal encroachment for various small-scale land-uses has been a continuous practice of local communities until the start of the project activity, as the NFA has been without the resources to implement patrols or other methods to enforce these laws (NFA has just two officers for its administrative district unit). In light of this, continuations of the pre-project land use is not in compliance with applicable laws and regulation, but as the illegal activities have taken place on more than 30% of the Reserve, as an administrative unit, this is still in line with the A/R CDM methodology, unless it is specifically required by a permit holder paying fees etc.

[23] NGO reports shared with DOE

[24] TreeFarms AS, Green Resources, Annual Report 2006

The scenario of the local government reforesting the reserve would be consistent with enforced mandatory and applicable laws and regulations.

Step 2: Investment analysis

Step 2a: Determine appropriate analysis method

Option III, benchmark analysis is applied.

Step 2b – Option III. Apply benchmark analysis

The equity Internal Rate of Return (IRR) has been applied as the financial indicator for the A/R CDM project since the financing used for the development of KFP is from equity investment in GRAS.

Inline with the Additionality Tool, the benchmark is to represent standard returns in the market, considering the specific risk of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer.

The benchmark has been derived from option two of the Additionality Tool:

- Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers' views and private equity investors/ funds' required return on comparable projects

To obtain such a benchmark, the ideal method would be to analyze IRR expectations for private forestry operations in Uganda. However, this was not possible due to the very limited development of the sector, particularly for private investments on a scale similar to that of the A/R CDM project.

Although data for required returns on capital was not available for forestry within Uganda, it was possible to look more generally at equity investments within the country. IbbotsonAssociates (www.ibbotson.com), a leading provider of independent investment research in major international markets, annually determine the required return of capital for investments in 173 countries from the perspectives of foreign investors. The statistics represent the IRR-return that an investor would expect to receive if investing in a particular country. The report looks at perspectives from six different countries (UK, France, Germany, Canada, Japan and Australia) and applies both a linear and logarithmic scale of the Country Risk Rating Model to determine the according IRRs. In total, 12 IRR-values are provided covering all six countries and the two different model scales.

For 2005 investments in Uganda, the analysis shows a range of required IRRs of 27.07 – 34.67 %, with an average of 31.55% for all country perspectives with both models

(IbbotsonAssociates, 2005[25]). Taking the lower value of 27% from this range, an indication of the standard returns that an investor would expect to receive for investing in Uganda is determined.

GRAS' equity investors proceeded with investment in KFP due to its potential to provide an expected total return of 25% in the long term[26]. The benchmark was therefore conservatively assumed to be 25% based on GRAS' private equity investors' risk exposure and the 27% standard return on equity, as substantiated by IbbotsonAssociates' 2005 Cost of Capital report.

Benchmark = 25%

Step 2c: Calculation and comparison of financial indicators

The financial model to determine the IRR at KFP was developed using justified plantation assumptions and costs – the majority of which were substantiated through contract examples or government documentation. The costs were on a per hectare basis and linked to the planting schedule which scaled the costs up to the total project area. Beating up (replanting) for 10% of the plantable areas was conservatively assumed to account for any mortality that may occur. For second rotations, it was assumed that the eucalyptus stands will be coppiced (thus, no establishment costs – just maintenance costs assumed) and the pine and maesopsis stands would be replanted, assuming the same establishment and maintenance costs as initial planting.

Revenues from each timber species, the sale of tCERs and SPGS funding were accounted for in the model. Harvested timber volumes were inputted from the carbon model, which used the merchantable timber yield models by Alder (2004) and Buchholz (2003) to determine the amount of timber that will be available at the planned commercial thinning and harvesting years according to the schedule presented in Table A.5.4.3 in the CDM PDD. The assumed wood prices were as follows:

Table G.2.2.1: Assumed stumpage prices in IRR calculation

Species and timber type	Price, Ush
Pine	
First thinning	39,910,[27]
Second thinning	59,865[28]
Harvest	79,820[29]

[25] IbbotsonAssociates, 2005: International Cost of Capital Perspectives Report 2005. The report has been submitted to the DOE but cannot be published on the UNFCCC website due to copyright constraints

[26] Further evidence of the benchmark is provided by private equity investors – documentation available to DOE

[27] All first thinnings, including the thinning for Eucalyptus, assumed to be half the harvesting price

[28] All second thinnings assumed to be three quarters of harvested price

Eucalyptus	
Thinning	25,1205[30]
Harvest	50,240[32]
Maesopsis	
First thinning	39,910[30]
Second thinning	59,865[31]
Harvest	79,820[30]

A wood price increment of 2% for all wood prices was assumed for the first 10 years of the project. This is to factor in the increases in timber/ wood prices that have occurred recently in East Africa.[31] Wood prices have not been assumed to increase beyond 10 years due to the uncertainty linked to forecasting so far in the future and also due to the likely stabilisation of regional wood prices with global prices.

Table G.2.2.2: Assumed carbon prices in IRR calculations

tCER price range[32]
$3
$7.15

A corporate tax rate of 30% is assumed in the model, which is based on what the corporate tax rate was at the start of the project[33]. Figure G.2.2.1, shown below, outlines the structure of the financial model as presented in Excel. The timeframe of the model is from 2006 to 2033. This period is from first planting to final harvesting of the first rotation of maesopsis – the longest rotation species being planted at KFP. Although the time frame of the investment analysis was from 2006 to 2034, some of the planting within this period would have value beyond this time horizon. For example, pine planting costs which are incurred in 2030 would realise harvesting revenues in 2050. Carbon finance benefits would similarly reach beyond this time period. Residual values such as these were therefore included within the IRR calculation so that all the potential value derived from the 2006 – 2034 planting period was captured.

[29] Calculated as a weighted average of NFA harvesting license prices from the NFA website: http://www.nfa.org.ug/content.php?submenu_id=5

[30] Maesopsis timber prices assumed to be equal to pine prices

[31] GRAS Annual Report 2008, page 11

[32] Based on carbon price indications from State and Trends of the Carbon Market 2005, World Bank and IETA, Washington DC, May 2005

[33] http://data.worldbank.org/indicator/GB.TAX.CMAR.ZS

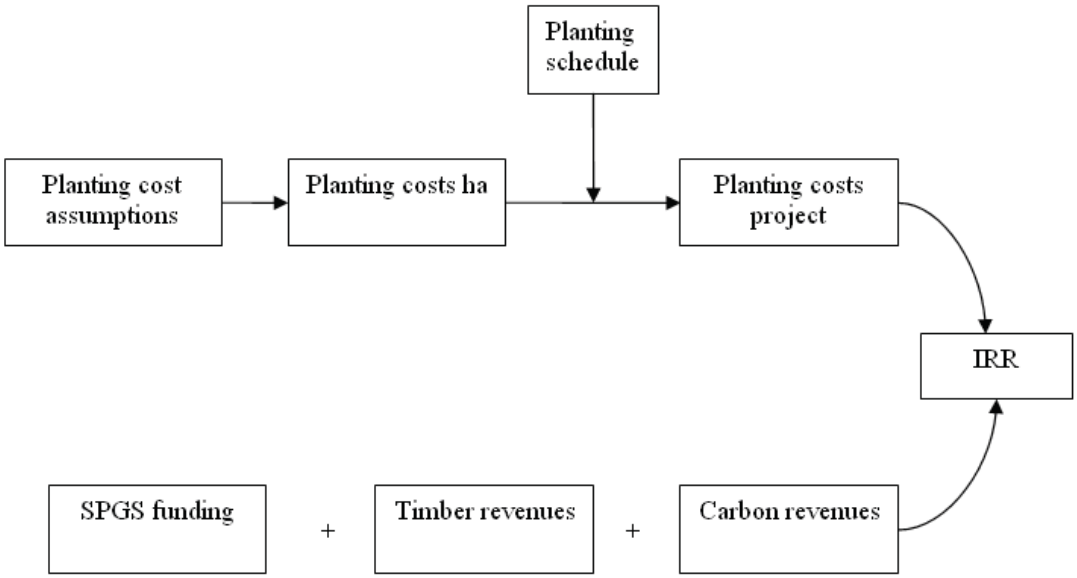


Figure G.2.2. 1: Schematic of financial model components

The IRR based on the above assumptions, without the sale of tCERs, has been calculated as 17.5%. The A/R CDM project activity has a less favourable indicator than the benchmark of 25% and is therefore not considered financially attractive without the benefits from the sale of tCERs. The project would therefore not have been viable without the potential of carbon financing.

Project scenario	IRR
Solely timber revenues	17.3%
Timber revenues + SPGS funding	18.5%
Timber revenues + SPGS funding + tCERs (price $3)	21.4%
Timber revenues + SPGS funding + tCERs (price $7.15)	25.4%

Step 2d: Sensitivity analysis

Sensitivity analysis was carried out to test whether the financial attractiveness was robust to reasonable variations in key parameters. The critical parameters were identified as timber prices, inflation, planting costs and carbon revenues. A price increase of 10% was assumed for timber - applied to thinnings and final harvestings for all species.

Table G.2.2.3: Sensitivity analysis of financial analysis

Parameter change	IRR, without tCER sale	IRR, without tCER sale but with SPGS	IRR, with tCER sale (price $3)	IRR, with tCER sale (price $7.15)
Standard assumptions	17.3%	18.5%	21.4%	25.4%
10% increase in timber prices	18.1%	19.4%	22.2%	25.9%
10% decrease in timber prices	16.4%	17.6%	20.7%	24.7%
10% increase in Capex	17.2%	18.4%	21.3%	25.2%
10% decrease in Capex	17.4%	18.7%	21.6%	25.6%

As shown in Table G.2.2.3, the sensitivity analysis demonstrates that the IRR of the A/R CDM project is robust to reasonable variations in the critical assumptions, remaining financially unattractive without revenues from the sale of tCERs.

Step 3: Barrier analysis

Barrier analysis has not been applied.

Step 4: Common practice analysis

Forestry plantations are rare in Uganda with private sector plantations even more so. No similar forestry activities have been implemented or are currently underway without the support of carbon financing, as although some government plantations were established in the central area of the reserve, these were on a much smaller scale to the A/R CDM project (345 ha). The government plantations were also implemented before the 31st December 1989. Small scale plantation forestry has also been done on small private forestland and as a means of protection against erosion in larger tea and coffee plantations, but similarly this doesn't class as the same activity.

The government plantations are now owned by a local saw-miller who was granted a concession for harvesting and converting the pine species previously planted by the government on condition that the concessionaire replanted the area. This scenario is unique, and even though it shows a private individual developing a forest plantation (though on a significantly smaller scale), it has only been facilitated due to the opportunity to sell the standing timber of the previous government plantation, reducing the principle barrier to the forestry sector of large front loaded costs.

See section C.5.1 part d) in the CDM PDD for further evidence of private forest plantations not being common practice. GRAS also has another reforestation project that is being developed in Uganda – the Bukaleba Forest Project. This project was also

developed considering carbon finance from the sale of emission reductions; however, the project is not eligible for CDM or VCS certification due to the early start date rules. GRAS is now pursuing development of the Bukaleba Forest Project under the American Carbon Registry (ACR).

With step 4 being satisfied, the proposed A/R CDM project activity is considered additional.

G.2.3a Calculate the estimated carbon stock changes associated with the 'without project' reference scenario described above. This requires estimation of carbon stocks for each of the land-use classes of concern and a definition of the carbon pools included, among the classes defined in the IPCC 2006 GL for AFOLU. The timeframe for this analysis can be either the project lifetime (see G3) or the project GHG accounting period, whichever is more appropriate

The land use under the baseline scenario as elaborated in Section G.1.4 and G.2.1 of the PDD falls under two strata; namely 'shrub-grassland' and 'cropland'. The carbon stock change in aboveground and belowground biomass for both of these strata was estimated based on vegetation data collected from temporary sample plots for trees and shrubs – as shown in G.1.4. In accordance with guidance contained in paragraph 35 of EB 42 meeting report, GHG emissions due to removal (loss) of herbaceous vegetation as a component of non-tree biomass can be neglected. As such herbaceous vegetation was not sampled or included in determining the the baseline net GHG removals.

The baseline assessment of the current carbon stocks shows that both strata contain significant tree biomass. The cropland areas are cleared of shrubs to make way for the agricultural land; however, it is apparent that some of the larger trees remain, which accounts for the similar tree biomass within this stratum.

Following methodology AR-AM0004/ Version 4, as both strata within the baseline scenario contain growing trees, the baseline net greenhouse gas removals by sinks is calculated using equation 2 as follows:

$$C_{BSL} = \Delta C_{BLB}$$

Where:

C_{BSL}	Baseline net greenhouse gas removals by sinks; tCO_2e
ΔC_{BLB}	Baseline sum of the changes in living biomass carbon stocks (above- and below-ground); tCO_2e

The estimate of changes in living biomass carbon stocks in the baseline is determined following equation 3:

$$\Delta C_{BLB} = \sum_{t=1}^{t^*} \sum_{i=1}^{m_{BL}} \Delta C_{B,ikt}$$

Where:

ΔC_{BLB}	Baseline sum of the changes in living biomass carbon stocks (above- and below-ground); tCO_2e
$\Delta C_{B,ikt}$	Baseline annual carbon stock change in living biomass for stratum *i*, stand model *k*, time *t*; $tCO_2e\ yr^{-1}$
i	1, 2, 3,…..m_{BL} baseline strata
k	1, 2, 3,…..*K* stand model
t	1, 2, 3,….t^* years elapsed since the start of the A/R CDM project activity

Due to a few growing trees in the baseline strata, $\Delta C_{B,ikt}$ can be estimated by applying the "stock change method", method 2 from the methodology. This method uses equations 8, 9, 10 and 11 from the methodology:

$$\Delta C_{ikt} = \frac{C_{ikt2} - C_{ikt1}}{T} \cdot \frac{44}{12}$$

$$C_{ikt} = C_{AB,ijt} + C_{BB,ijt}$$

$$C_{AB,ijt} = A_{ijt} \cdot V_{ijt} \cdot D_j \cdot BEF_{2,j}$$

$$C_{BB,ijt} = C_{AB,ijt} \cdot R_j$$

Where:

ΔC_{ikt}	Annual carbon stock change in living biomass for stratum *i*, for stand model *k*, time *t*; $tCO2e\ yr^{-1}$
C_{ikt}	Carbon stock in living biomass for stratum *i*, stand model *k*, time *t*; tC
C_{ikt2}	Total carbon stock in living biomass for stratum *i*, species *j*, calculated at time $t=t_2$; tC
C_{ikt2}	Total carbon stock in living biomass for stratum *i*, species *j*, calculated at time $t=t_1$; tC
T	Number of years between times t_2 and t_1 $(T = t_2 - t_1)$
A_{ikt}	Area of stratum *i*, for stand model *k*, at time *t*; hectare
$C_{AB,ijt}$	Carbon stock in above-ground biomass for stratum *i,* species *j*, at time *t*; tC
$C_{BB,ijt}$	Carbon stock in below-ground biomass for stratum *i*, species *j*, at time *t*; tC
V_{ijt}	Average merchantable volume of stratum *i*, species *j*, at time *t*; m
D_j	Basic wood density of species *j*; t d.m. m^{-3} merchantable volume
$BEF_{2,j}$	Biomass expansion factor for conversion of merchantable volume to above-ground tree biomass for species *j*; dimensionless
R_j	Root-shoot ratio for species *j*; dimensionless

Allometric equations can be used to estimate $C_{AB,ijt}$, as is shown by equation 12 from the methodology:

$$C_{AB,ijt} = A_{ikt} \cdot nTR_{ijt} \cdot CF_J \cdot f_j(DBH_t, H_t)$$

Where:

$C_{AB,ijt}$	Carbon stock in above-ground biomass for stratum *i*, species *j*, at time *t*; tC
$Aikt$	Area of stratum *i*, stand model *k*, at time *t*; hectare (ha)
nTR_{ijt}	Number of trees in stratum *i*, species *j*, at time *t*, dimensionless ha^{-1}
CF_j	Carbon fraction for species *j*, t C $(t\ d.m.)^{-1}$
$f_i(DBH_t,H_t)$	Allometric equation linking above-ground biomass of living trees (d.m. ha^{-1}) to mean diameter at breast height (*DBH*) and possibly mean tree height (*H*) for species *j*; dimensionless

The carbon stock in above-ground biomass of trees over time for each stratum was calculated using an allometric equation (Chave *et al*, 2005). The mean *DBH* increment over time was obtained from the yield model for the native timber species of Uganda, *Maesopsis Eminii* (Buchholtz *et al*). A low site index (SI 10) was selected to determine the mean *DBH* over time. This was deemed necessary as the yield model takes into account silvicultural management and general good practices used to maximize growth; however, this would not be the case in the baseline scenario, and thus the lower site index, which results in lower growth, accounts for this. It is still deemed conservative to use such *DBH* growth as the majority of the trees in the baseline are not timber trees and would not grow to such *DBH*s as the yield model suggests.

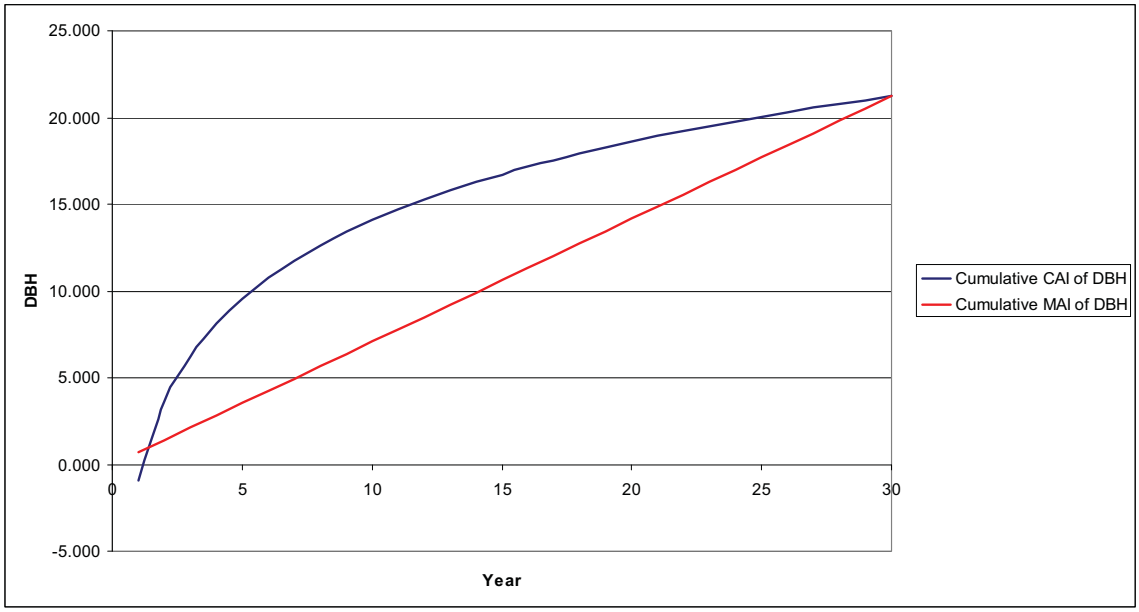
Shrubs were excluded from the baseline carbon stock assessment as they are not considered to be accumulating carbon due to their clearance by farmers to create agricultural land. This is clearly evidenced by the results from the baseline assessment of current tree and shrub carbon stocks, shown in Table G.2.3.a.1 and G.2.3.a.2. The baseline annual carbon stock change in living biomass for shrubs, $\Delta C_{B,ikt}$, was thus assumed to be zero.

Table G.2.3.a.1: below shows the mean *DBH* from the *Maesopsis Eminii* yield model.

Age	mean DBH	DBH, CAI	DBH, MAI	DBH, MAI cumulative
1	-0.892	0.000	0.708	0.708
2	3.618	3.618	0.708	1.416
3	6.256	2.638	0.708	2.124
4	8.127	1.872	0.708	2.831
5	9.579	1.452	0.708	3.539
6	10.765	1.186	0.708	4.247
7	11.768	1.003	0.708	4.955
8	12.637	0.869	0.708	5.663
9	13.403	0.766	0.708	6.371
10	14.088	0.685	0.708	7.079
11	14.708	0.620	0.708	7.786
12	15.275	0.566	0.708	8.494
13	15.795	0.521	0.708	9.202
14	16.277	0.482	0.708	9.910
15	16.726	0.449	0.708	10.618

16	17.146	0.420	0.708	11.326
17	17.541	0.394	0.708	12.034
18	17.912	0.372	0.708	12.741
19	18.264	0.352	0.708	13.449
20	18.598	0.334	0.708	14.157
21	18.915	0.317	0.708	14.865
22	19.218	0.303	0.708	15.573
23	19.507	0.289	0.708	16.281
24	19.784	0.277	0.708	16.989
25	20.050	0.266	0.708	17.696
26	20.305	0.255	0.708	18.404
27	20.550	0.246	0.708	19.112
28	20.787	0.237	0.708	19.820
29	21.015	0.228	0.708	20.528
30	21.236	0.221	0.708	21.236

Table G.2.3.a.2: Graph showing *DBH* growth over time



The allometric equation derived by *Chave et al* for dry forest was used to calculate the change in biomass for each individual tree over the first crediting period. The average *DBH* for all trees measured in the baseline sample of the corresponding stratum was calculated and used as the initial *DBH* for all trees within each baseline stratum.

Table G.2.3.a.3 shows the average DBH used as the current tree size for all species in each stratum.

Table G.2.3.a.3: Average tree *DBH* by stratum

Stratum	Average tree *DBH*, cm
Grass and shrubland	9.07
Cropland	25.56

The *DBH* was assumed to increase with the addition of the *DBH*, MAI, from Table G.2.3.a.2 – the total *DBH* assumed can be seen in the *DBH*, cm, column of Table G.2.3.a.5.

The allometric equation derived by Chave *et al* for dry forest stands, without using the tree height, *H*, was used in equation 12:

$$\langle AGB \rangle_{est} = \rho \times \exp\left(-0.667 + 1.784\ln(D) + 0.207(\ln(D))^2 - 0.0281(\ln(D))^{3)}\right)$$

The other parameters used in equation 12 are as follows:

Stratum	Area, Ha
Grass and shrubland	1,688
Cropland	574

The number of trees in each strata was calculated by taking the average at the plot level, followed by extrapolation to a per hectare level, nTR_{ijt}. The results are shown in Table G.2.3.a.4, below:

Table G.2.3.a.4: Average number of trees in each stratum

	Per plot	Per Ha
Average number of trees in grass and shrubland stratum, nTR_{ijt}	6.66	44.42
Average number of trees per plot in cropland stratum, nTR_{ijt}	2.07	13.78

A carbon fraction, CF_j, of 0.5 tC (t d.m.)$^{-1}$ was assumed for all tree species in both strata. For use in equation 11, a root-shoot ratio of 0.27 from the IPCC's GPG for LULUCF (2003) for primary tropical/ sub-tropical dry forest.

Table G.2.3.a.5: Step-wise results showing annual carbon stock change in living biomass for the grass and shrubland stratum, using equations 8, 9, 10, 11 and 12

Year	DBH, cm	Carbon stock in above-ground biomass, tC	Carbon stock in below-ground biomass, tC	Total carbon stock in living biomass, tC	Annual carbon stock change in living biomass, tCO2e
2006	9.78	1301	351	1653	957
2007	10.49	1527	412	1939	1052
2008	11.20	1774	479	2253	1148
2009	11.91	2041	551	2592	1246
2010	12.61	2330	629	2959	1345
2011	13.32	2641	713	3354	1446
2012	14.03	2973	803	3776	1548
2013	14.74	3328	898	4226	1651
2014	15.44	3704	1000	4705	1755
2015	16.15	4104	1108	5212	1860
2016	16.86	4526	1222	5748	1965
2017	17.57	4971	1342	6313	2071
2018	18.28	5438	1468	6907	2178
2019	18.98	5929	1601	7530	2285
2020	19.69	6443	1740	8183	2393
2021	20.40	6980	1885	8865	2501
2022	21.11	7541	2036	9577	2610
2023	21.82	8125	2194	10318	2719
2024	22.52	8732	2358	11089	2828
2025	23.23	9363	2528	11890	2937

Table G.2.3.a.6: Step-wise results showing annual carbon stock change in living biomass for the cropland stratum, using equations 8, 9, 10, 11 and 12

Year	DBH, cm	Carbon stock in above-ground biomass, tC	Carbon stock in below-ground biomass, tC	Total carbon stock in living biomass, tC	Annual carbon stock change in living biomass, tCO2e
2006	26.27	4194	1132	5326	316
2007	26.97	4451	1202	5652	326
2008	27.68	4716	1273	5989	336
2009	28.39	4988	1347	6335	346
2010	29.10	5269	1423	6692	357
2011	29.81	5558	1501	7059	367
2012	30.51	5855	1581	7435	377

2013	31.22	6159	1663	7822	387
2014	31.93	6472	1747	8219	397
2015	32.64	6793	1834	8627	407
2016	33.34	7121	1923	9044	417
2017	34.05	7457	2014	9471	427
2018	34.76	7802	2106	9908	437
2019	35.47	8154	2202	10355	447
2020	36.18	8514	2299	10812	457
2021	36.88	8881	2398	11280	467
2022	37.59	9257	2499	11756	477
2023	38.30	9640	2603	12243	487
2024	39.01	10031	2708	12740	497
2025	39.72	10430	2816	13246	506

Summing the annual carbon stock change in living biomass of each stratum, following equation 3, gives the baseline sum of the changes in living biomass carbon stocks. The results of this are shown in Table G.2.3.a.7 below:

Data and parameters that are available at **validation**:

Data / Parameter:	$DBH_{grass/shrubland}$
Description/unit:	cm
Value applied:	9.07
Source of data:	Estimated from field measurements of trees and calculated as an average
Justification of choice / Measurement procedures (if any):	
Any comment:	

Data / Parameter:	$DBH_{cropland}$
Description/unit:	cm
Value applied:	25.56
Source of data:	Estimated from field measurements of trees and calculated as an average
Justification of choice / Measurement procedures (if any):	
Any comment:	

Data / Parameter:	*DBH* increment
Description/unit:	cm yr^{-1}
Value applied:	0.708
Source of data:	Taken from maesopsis eminii yield model for site index 10 (Buchholtz *et al*)
Justification of choice / Measurement	

procedures (if any):	
Any comment:	

Data / Parameter:	*Wood density*
Description/unit:	t m^{-3}
Value applied:	0.55
Source of data:	Conservative estimate based on other species wood densities found in the baseline
Justification of choice / Measurement procedures (if any):	
Any comment:	

Data / Parameter:	Area of grass and shrubland stratum, A_{ikt}
Description/unit:	Ha
Value applied:	1,688
Source of data:	Calculated in GIS and based on ground thruthing, field assessments and analysis of satellite imagery
Justification of choice / Measurement procedures (if any):	
Any comment:	

Data / Parameter:	Area of cropland stratum, A_{ikt}
Description/unit:	Ha
Value applied:	574
Source of data:	Calculated in GIS and based on ground truthing, field assessments and analysis of satellite imagery
Justification of choice / Measurement procedures (if any):	
Any comment:	

Data / Parameter:	$nTR_{grass/shrubland}$
Description/unit:	ha^{-1}
Value applied:	44.42
Source of data:	Calculated from baseline sampling
Justification of choice / Measurement procedures (if any):	
Any comment:	

Data / Parameter:	$nTR_{cropland}$
Description/unit:	ha^{-1}
Value applied:	13.78
Source of data:	Calculated from baseline sampling

Justification of choice / Measurement procedures (if any):	
Any comment:	

Data / Parameter:	*Root-shoot ratio*
Description/unit:	Dimensionless
Value applied:	0.27
Source of data:	IPCC's GPG for LULUCF (2003) for primary tropical/ sub-tropical dry forest
Justification of choice / Measurement procedures (if any):	
Any comment:	

Data / Parameter:	Carbon fraction
Description/unit:	tC (t d.m.)$^{-1}$
Value applied:	0.5
Source of data:	Default
Justification of choice / Measurement procedures (if any):	
Any comment:	

Table G.2.3.a.7: Summing the annual carbon stock change in living biomass of each stratum, following equation 3, gives the baseline sum of the changes in living biomass carbon stocks

Year	Annual estimation of baseline net GHG removals by sinks; t CO_2-e
Year 1	1,273
Year 2	1,378
Year 3	1,484
Year 4	1,592
Year 5	1,702
Year 6	1,813
Year 7	1,925
Year 8	2,038
Year 9	2,152
Year 10	2,267
Year 11	2,382
Year 12	2,498
Year 13	2,615
Year 14	2,733
Year 15	2,850
Year 16	2,968

Year 17	3,087
Year 18	3,206
Year 19	3,324
Year 20	3,444
Total estimated baseline net GHG removals by sinks; t CO_2-e	46,732
Total number of crediting years	20
Annual average over the crediting period of estimated baseline net GHG removals by sinks; t CO_2-e	2,336

The baseline data was collected in May 2009.

Table G.2.3.a.8: Name of persons/entity determining the baseline

Name of the Person	Entity	Contact Information (email)
Mr Nicholas Embden	Green Resources AS, London	nicholas.embden@greenresources.no
Mr. Fred Lali	Busoga Forestry Co. Ltd.	fred.lali@greenresources.no
Mrs. Daphne Ayiekoh	Busoga Forestry Co. Ltd.	daphne.ayiekoh@greenresources.no
Ms Jennifer Henman	Green Resources AS, London	jenny.henman@greenresources.no
Ms Nina Lande	Green Resources Limited	nina.lande@greenresources.no
Mr. Jakob Sandven	Green Resources Ltd, Tanzania	jakob.sandven@greenresources.no

G.2.3b Estimate the net change in the emissions of non-CO2 GHG emissions such as CH4 and N2O in the 'without project' scenario. Non-CO2 gases must be included if they are likely to account for more than 5% (in terms of CO2-equivalent) of the project's overall GHG impact over each monitoring period

Emissions of non-CO2 GHG emissions such as CH4 and N2O would occur in the 'without project' where burning for site clearance for agricultural purposes and charcoal production takes place, and in the 'with project' scenario due to fossil fuel use in transportation and machinery, as well as from fertilizer application; however, these have conservatively been assumed to be zero in the 'without project' and deemed insignificant in the 'with project' scenario – see section CL.1.2 for further information.

G2.4. 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

Continued degradation through unsustainable subsistence livelihood activities coupled with increasing population in the region would have a negative impact on the quality of life for the vast majority of communities surrounding the project area. Deriving subsistence from the depleted natural resources would become more laborious with further increasing distances for a smaller reward. More time being spent on subsistence livelihoods would be at the detriment of essential activities which provide a long-term benefit, such as education.

In terms of ecosystem services, the continued degradation of the reserve would result in both loss of soil fertility and hydrology, consequently affecting communities that rely on these services. The wetland areas inside the reserve were being used for shifting cultivation as well as many parts of the A/R CDM project area – this would be expected to continue in the 'without project' scenario.

G2.5. Describe how the 'without project' reference scenario would affect biodiversity in the project zone

The continued baseline scenario of further degradation through unsustainable land practices such as shifting cultivation and fuel-wood collection in the reserve would lead to further depletion of biodiversity within the project area. It is estimated that biodiversity loss in Uganda occurs at a rate of around one per cent per year with the loss often associated with changes in land use. The increasing population is putting more strain on the natural resources of the country, and in 2006 it was estimated that Uganda lost 72,000 hectares of forest, and between 2005 and 2006 encroachments on forest reserves increased from 180,000 to 220,000. Loss of forest and land degradation such as this leads to increased rates of biodiversity loss[34]. The without project sscenario would be expected to follow such a trajectory.

As shown in Table G.2.5, all of the natural resources but the woodlots have been decreasing in abundance since the 1970s. The most detrimental effects have been inflicted on the wildlife resource, which is no longer present in the reserve. In the absence of the project it would be expected that this would remain. Natural woodlands and wetlands have also steadily been declining, though to a lesser extent to that of wildlife. Further decreases in these resources would occur without the project being implemented.

[34] Integrated Assessment of Trade-Related Policies and Biological Diversity in the Agricultural Sector in Uganda, The potential impacts of the EU-ACP Economic Partnership Agreement: A case study in the horticulture sector – see section 2.1.

Table G.2.5. 1: Resource trend matrix[35]

Resource	1970 – 1980	1981 – 1990	1991 – 2007
Protected forests	++++	++	+
Natural Woodlands	++++	+++	+
Wetland resources	++++	+++	++
Wildlife	+++	++	-
Woodlots	+	++	+++
Land	++++	++	+
Soil fertility	++++	++	+
Higher number of plus signs (+) the higher the availability of the resource.			

G3. Project Design Goals

G3.1. Summary of project's major climate, community and biodiversity objectives

The overall objective of the A/R CDM activity is to contribute to mitigating climate change while meeting the growing demand for quality wood products from well managed plantation forests and contributing to sustainable environmental management, community development and poverty alleviation in Uganda.

Specific objectives of the proposed A/R CDM project activity:

1) To establish and manage forest plantations to meet the growing demand for high quality wood products. With an annual loss of 2.2 percent in forest area, Uganda was among the ten countries globally with the highest deforestation rates between 2000 and 2005[36]. Uganda has to expand its wood resources substantially to meet the growing demand of wood products and to reduce the strong pressure on the remaining natural forests. The implementation of the proposed A/R CDM project activity will therefore benefit the forestry sector through an increase in the resource supply, management and overall sustainability of national resource base, and alleviating pressure on the country's natural forest.

2) To sequester carbon dioxide through forest planting, generating high quality emission reductions in greenhouse gases (GHG) that can be measured, monitored and verified. The project participants strive to demonstrate that carbon sequestration from forest plantations is a viable instrument to encourage private investment in the forestry sector especially on degraded lands.

3) To promote environmental conservation, such as soil conservation, protection of water sources and enhancement of biodiversity through the protection and

[35] Taken from Ecological Survey of Kachung Central Forest Project Area, Dokolo District – based on outcomes from PRAs with the local communities

[36] Forest Resources Assessment, FAO (2005)

management of existing indigenous flora and fauna and where possible enrichment planting with indigenous tree species.

4) To facilitate socio-economic development of the local communities through:
   - Promotion of tree planting/afforestation activities in the local communities;
   - Provision of employment opportunities;
   - Establishing of community woodlots in the villages around KFP on community owned land, with the objective of increasing fuel and timber supply within the communities;
   - Designating 10% of the carbon revenues generated by the project to community development initiatives in the villages surrounding KFP;

5) To develop local infrastructure including roads, health centers, water supply and communication systems.

G3.2. Describe each project activity with expected climate, community and biodiversity impacts and its relevance to achieving the project's objectives

- Planting of pine, eucalyptus and maesopsis – supply of sustainable timber products to help meet demand, and thus, reducing the pressure on natural forest; carbon sequestration; conservation of ecosystem services such as soil fertility; socio-economic development through employment opportunities

- Conservation of wetlands and forest areas within the reserve through the creation of 'buffer zones' and conservation areas – enhancement of biodiversity through protection and management of existing indigenous flora and fauna

- Supply of seedlings to communities and capacity building for woodlot management – community woodlots objective

- Protection of water sources: springs, bore hole rehabilitation, drilling of shallow wells

- Building of a health centre and dispensary

- Efficient cooking stoves initiative – increased energy efficiency will lead to a reduced demand of fuel-wood and subsequent alleviation of pressure on the country's natural forests

- Formation of farmer groups for apiary, fish farming and poultry – encouragement of alternative livelihoods so dependence on shifting cultivation is reduced – direct community benefits as well as indirectly benefiting environmental conservation

G3.3. 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

The project location, boundaries of the project area, where the project activities will occur, of the project zone and of additional surrounding locations that are predicted to be impacted by project activities are shown in section G.1.2 and G.1.3.

G3.4. Project lifetime and GHG accounting period

As an A/R CDM project, the planned lifetime in terms of carbon financing is 60 years, covering three 20 year crediting periods. However, the project proponents envisage a timeframe spanning beyond this limited period due to the nature of the sustainable activities and expected renewal of the land permit from the NFA.

LFC acquired a land license/ permit No. 4230 from the Forest Department on 15/11/1999, which is title granting a 50 year-contract for land development through tree planting. Although a limited contract of 50 years, the land permit is expected to be renewed, offering the potential of project activities beyond this current permit.

Figure G.3.4.1 below shows the implementation schedule of the project.

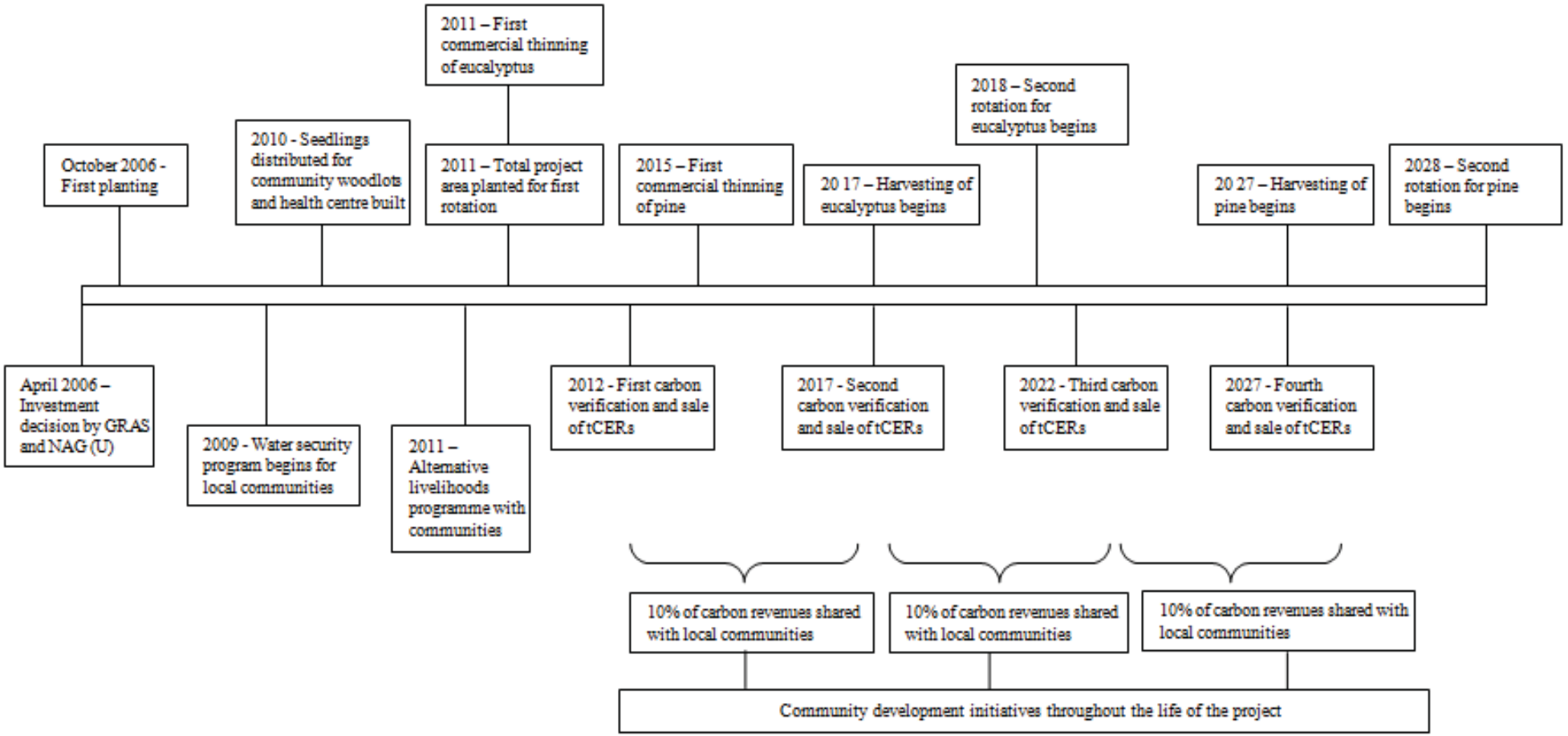


Figure G.3.4.1: Implementation schedule of the project

G3.5. 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

Fire

Fire has been assessed to be one of the threats to the KFP, but there are established strategies for preventing fire and fighting fire. These measures include the establishment of fire towers – one in the eastern and one in the western block - used for detection of fire; a standby fire crew during the main dry season and a general patrol team trained in fire measures all year round, to take care of any occurrence of fire within or outside project boundaries; and fire lines in place to stop the spread of fire into, out of and within the plantation. Internal fire lines around planted areas are 6 m wide whereas the external fire line around the edge of the property is 6-10 m.

Training on fire fighting has been conducted by SPGS through workshops taking place at various sites around Uganda since 2004. Fire fighter employees have attended such workshops, which typically lasted 2-3 days. SPGS' workshops are an on-going capacity building initiative which KFP intends to use in the future (the latest fire training workshop took place on the 17th and 18th December 2009)

Two approaches were used in the SPGS training:

1. Theoretical knowledge: workers were trained on issues including the effect of forest and buildings fires, types of forest fires, fire protective gears, etc

2. Practical implementation: workers were trained on forest and building fire suppression using modern technology and other items used in fire fighting. During the training, practical demonstrations to show the ways to attack forest fires were done. Training on the use of other fire fighting equipments was also carried out at the same time

Fire also poses a risk to community and biodiversity benefits. For example, community woodlots will be susceptible to fires similarly to the forest plantation. The mitigation measures mentioned above will therefore help mitigate risks to the community benefits, too. It is envisaged that fire protection of woodlots will be included in the capacity building that will take place between LFC and the communities as the community woodlot programme is deployed.

The risk of fire to the forest plantation and carbon stocks also means that there is a direct risk to the community benefits, since 10% of the revenues from the sale of tCERs will be shared will the local communities for community development initiatives.

Biodiversity benefits are also subject to fire risk. The conservation area in the south the reserve, which will receive enrichment planting with indigenous species to increase the biodiversity value of the area, could burn down should a fire break out. The above mentioned mitigation measures will help to reduce such a risk.

Disease outbreaks

A specialist from Makerere University visited KFP in July 2009 to provide training on out-break of disease and pests. Training is planned moving forward for once a year. Plantation workers were trained on the signs, prevention and control of diseases and pests outbreak. Over 10 people attended the training. Topics covered during the training included:

- Diseases and pest signs

Description of different disease and pest signs were made by displaying the common signs of diseases through the use of pictures of affected trees. This aimed to create awareness to plantation workers on disease signs at the plantation so as to report to the project manager to prevent further spread and treatment.

- Diseases and pest control

Methods used in controlling pests and diseases when they occur were described in detail in the training session. The workers acquire much information on ways of controlling pests and disease breakout and spread.

Due to the training, greater awareness has been created among local people and workers making them effective in detecting and reporting signs of diseases or pests immediately they are discovered. It has placed them in better position to be able to understand different diseases and pest that can affect their own trees in woodlots as well.

Similarly to fire risk, disease and pest outbreak to trees is a potential risk to both community and biodiversity benefits, since tree planting is a project activity on both of these aspects of the project – community woodlots and enrichment planting.

Climate change:

Climate change due to the anthropogenic release of GHG emissions is a risk to the climate, community and biodiversity benefits. One of the results of climatic change in Uganda is the increased frequency of droughts. As shown in figure G.3.5.1, this is significantly evident between 1991 and 2000. Such droughts could inhibit the growth of the forest plantation as survival rates of newly established areas could decrease, as well

as growth rates for already established areas slowing down. The impact of the droughts would depend on the severity and frequency of the droughts, but would affect the final volume of standing biomass; and thus, the revenues from both the sale of timber and of tCERs.

The same risks are therefore present for the communities in relation to the community woodlots, and for biodiversity with regard to the forest conservation area which will be enriched with indigenous species.

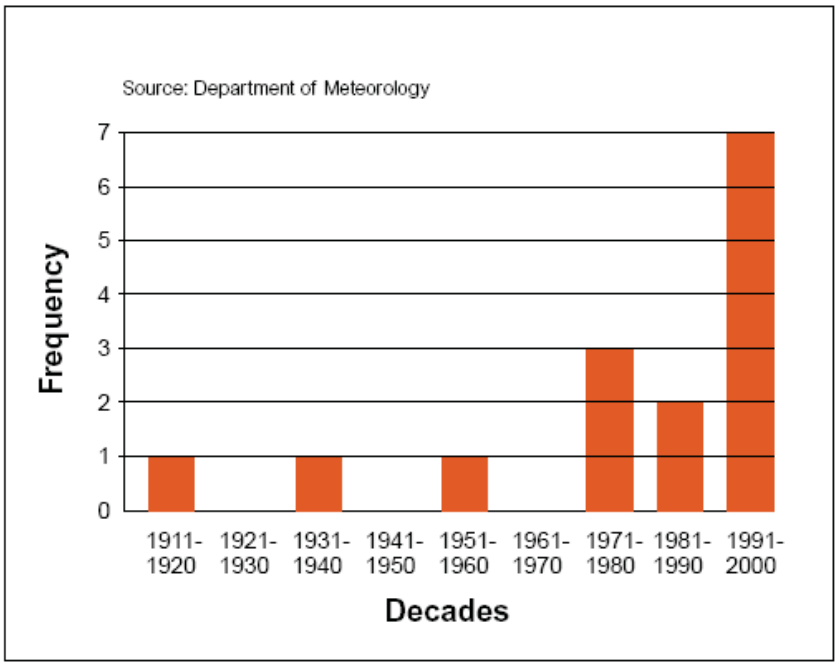


Figure G.3.5.1: Past frequency of droughts in Uganda

G3.6. Specific measures to ensure the maintenance or enhancement of the high conservation value attributes identified in G1 consistent with the precautionary principle

HCV areas have been identified in the project zone for meeting the needs of local communities (section G.1.8.5) and that are critical for the traditional cultural identity of communities. Measures have been taken to ensure the maintenance of these HCVs by conserving the wetlands area and having buffer zones round both the wetlands and SSCIs to the communities (see Table G.1.8.6). Communities will still have access to the wetland areas and to all of the SSCIs.

G3.7. Measures that will be taken to maintain and enhance the climate, community and biodiversity benefits beyond the project lifetime

Climate benefits will be enhanced beyond the project lifetime by the project proponent through helping the communities adapt to climate change – see section GL1. These benefits are expected to extend beyond the lifetime of the project through multiplier effects, which will show progressive socio-economic conditions in the region.

The longevity of community benefits will be enhanced through poverty alleviation from the development of alternative livelihood initiatives. LFC will provide local communities with seedlings and training on silvicultural management and other aspects of forestry so they can successfully establish community woodlots. Training would occur as the communities' plantations develop and reach a new stage of development. The woodlots would be a source of high value timber and a supply of fuel-wood for the communities. LFC will help facilitate community tree growers into associations for the commercial harvesting. Community woodlots have been a great success at other locations of GRAS projects and the same is expected for the villages surrounding the A/R CDM project area. The profits derived from the sale of the timber would help raise the communities out of poverty and enable sustainable development.

Other alternative livelihood initiatives which are being promoted by LFC are the implementation of efficient cooking stoves, and the formation of farmer grouops for apiary, fish farming and poultry. Similarly to the community woodlots, these alternative livelihoods will provide local members with more secure and significant sources of revenue, which in turn will provide multiplier effects towards other opportunities.

The most significant measure which will enhance the biodiversity benefits beyond the lifetime of the project is the supply of wood products to a country where demand is rife and resulting in the degradation of natural forests. The supply of a sustainable timber source to meet this demand will reduce the pressure exerted on the natural forests, and thus conserve biodiversity.

G3.8. Community and stakeholder identification and involvement in project design through effective consultation, particularly with a view to optimizing community and stakeholder benefits, respecting local customs and values and maintaining high conservation values

LFC commissioned both an Environmental and Socioeconomic Impact Assessment[37] and Ecological Survey[38], intended to bring out all issues of concern from the stakeholders. These studies formed the basis of the stakeholder consultation process and participation in the project design and implementation and were carried out by third parties. Project staff have also been conducting stakeholder consultations at different levels: primary and secondary levels of stakeholder consultations. Reports of stakeholder consultations have been produced and shared with stakeholders at various levels.

Methodology

The following methods were used to collect and compile stakeholders' comments:

i. Introduction of the company to stakeholders:

A short profile of KFP (BFC and GRAS) was given to the key stakeholders one month before any discussions so as to ensure greater awareness among participants regarding the company's objectives and activities. The profile comprised a description of the proposed A/R CDM activity, company objectives, operations, certification and achievements including existing contributions towards local community development efforts.

ii. Establishing PRA/ mobilization team:

The teams were set to conduct the PRA, which consists of a social expert and the community representatives. The mobilization team helped generate ideas to improve community support programmes; obtain a feed back on both positive and negative impacts of KFP activities on the surrounding communities.

iii. Village meetings:

To acquire comprehensive information regarding the historic and current situation and existing problems in local communities, as well as to understand the needs and wishes of local farmers, a meeting of farmer representatives was held for each selected village. The PRA team also used this chance to introduce the project objectives and specific CDM

[37] *Environmental and socio-economic impact statement report of Kachung Central Forest Reserve, Dokolo District, Eviro-Safety Consult Ltd, March 2008*

[38] Okullo et al, 2008, Ecological Survey of Kachung Central Forest Project Area, Dokolo District. Makerere University, Faculty of Forestry and Nature Conservation

A/R project requests, as well as collect the feedback from the farmers on the project design. To better use the village meeting, group interviews were also conducted**.** The PRA team interviewed village leaders, senior villagers, representatives of ethnic minorities group, representatives of women, farmer households.

iv. Questionnaires:

Questionnaire forms were developed and distributed to different stakeholders, including key informants like schools, farmers, village leaders, sub county governments and forestry authority. The questionnaires covered information and feedback on: the local socio-economic profiles, land use, land tenure and land management, farmer income and sources, farmers' preference in tree species selection and production arrangements, technical and financial barriers in A/R practice.

A copy of questionnaire is available for validation and verification as a supporting document.

v. National, Regional and District Level Discussions:

Following the questionnaires, the project proponent made formal discussions with key stakeholders from the National, Regional and District levels. These discussions were aimed at 1) examining the extent to which the stakeholders understand the activities of the project participant/promoter and the proposed A/R CDM project activity; 2) evaluating the performance of the project participants and its impacts to stakeholders and 3) collecting comments for improvement. The following key stakeholders were interviewed in the process: NEMA (National Environmental Management Authority), National Forestry Authority (NFA), Ministry of water and Environment (Meteorology department), National Social Security Fund (NSSF) – Lira District, Uganda Revenue Authority (URA) –Lira District, Uganda Carbon Bureau, Makerere University (MUK), and Natural Resources Office – Dokolo district and NGOs.

G3.9. Publicizing the CCBA public comment period to communities and other stakeholders and to facilitate their submission of comments to CCBA

The Community Development Officer (CDO) will hold a briefing meeting with the leaders of local communities to explain that the CCBA public comments period is open and to go through the final version of the CCBA PDD. Minutes will be taken from the meeting and any comments made to CCBA will be submitted on their behalf by the CDO.

LFC (formerly the Norwegian Afforestation Group (NAG)) had consultations with the local villages prior to project start. This is evidenced through meeting minutes from June 2006[39]. Issues raised by the communities included concerns of limited access to natural

[39] KFP Community Consultations June 2006

resources and land grabbing concerns beyond the forest reserve. In response to these points, LFC ensured the communities that the access to natural resources, such as the wetlands and fuel-wood, would remain available, and that the company would only plant in the government gazzetted forest reserve.

G3.10. Handling of unresolved conflicts and grievances that arise during project planning and implementation

The company's Standard Operating Procedure (SOP) manual (procedure 03) clarifies how any grievances, complaints and conflicts raised by stakeholders shall be handled. The procedure describes the methods of possible complaint and conflict resolution, raised about the work or any activities conducted by LFC and BFC, so as to guarantee the resolution. The procedure manual of conflict resolution states that every person, inside or outside LFC and BFC, can make a complaint against the organization's actions, behavior, documents, certification process, forest management, etc. Complaints, disputes and issues of contention must be submitted in writing to the attention of the Managing Director, either at the reception of the company, by mail or via complaint boxes at the plantation projects which are emptied monthly and delivered to the head office by the plantation managers. LFC is in the process of establishing a third party mediator to be involved in the handling unresolved conflicts[40]. The mediation process has been integrated into the company SOP at the appeals stage – see Step 10. The Managing Director of LFC will pass on the appeal to the mediator to resolve the issue. The inclusion of the mediator at the appeals stage of the SOP means the company still has the opportunity to resolve issues itself; however, should the individual making the complaint not be satisfied with the outcome of this, the mediator mechanism is available.

Suggestion boxes have been installed at three of the villages so that anyone who wants to can give their feedback on the project – more suggestion boxes are scheduled to be installed. Grievances and complaints can also be raised in village meetings. Green Resources believes it has put into place a transparent, timely and clear process for resolving any issues which arise. Project design is based on views from stakeholders. Stakeholders are communicated through meetings, semi-structured interviews, and focus group interviews to capture information pertaining to the project. Participatory Rural Appraisals are held in the villages to identify the problems, views and concerns for the local stakeholders and are to be incorporated in the management practices. All grievances raised by stakeholders shall be sorted out based on procedure 3 of the company Standard Operating Procedure. These shall be documented and the company shall let stakeholders know the output for their resolution.

If a complaint is made against the project, the person with the complaint is to put it in writing, and it is presented to the committee and the Managing Director of LFC/ BFC and a dossier for the case is opened. The Managing Director assigns the issue to be solved by

[40] Proposal for hiring a third party mediator

the relevant department, which then forms a responsible committee to solve the issue and documents the procedure of steps taken to solve it. The committee of the relevant department is responsible to inform the Documentation Manager of state of progress of solving the issue in 15 days time. The Documentation Manager informs the concerned person/s and/or organization/s of this progress or of potential extension of resolution because of the extent of the issue. The resolution is registered. If the concerned person/s and/or organisation/s have any complaint on the result an appeal has to be made.

G3.11. Demonstration of financial mechanisms adopted, including projected revenues from emission 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

The dual revenues from the sale of timber forest products and carbon emission reductions make the project financially attractive as an equity investment in Uganda, and thus should secure the financing of the lifetime of the project for consequent rotations beyond the crediting periods pertaining to the CDM. The expected carbon volumes of the first crediting period of the project are shown below:

Table G.3.11.1: Projected volume of tCERs

	2012	2017	2022
tCERs	64,521	374,324	337,337

The hypothetical carbon revenue stream is estimated below using a price range of $5-10:

Table G.3.11.2: Projected carbon revenue range

tCER price	2012	2017	2022
$5	322,605	1,871,620	1,686,685
$10	645,210	3,743,240	3,373,370

Community development initiatives will be implemented as the project develops using 10% of the revenues from the sale of emission reductions.

Table G.3.11.3: Community development budget

tCER price	2012	2017	2022
$5	32,261	187,162	168,669
$10	65,521	374,324	337,337

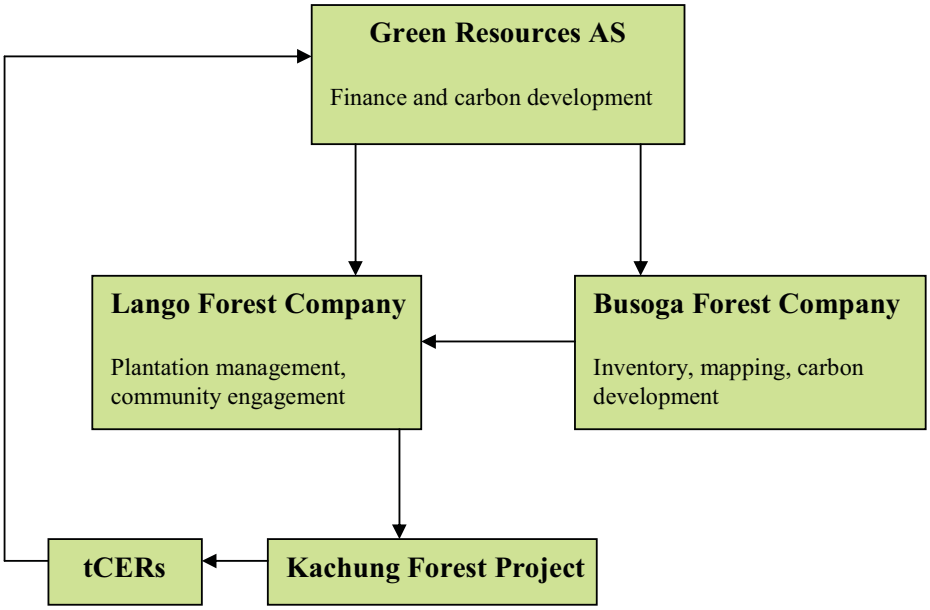
SPGS funding, covering approximately half of the establishment costs, has been received for 160 ha of the project. A further 500 ha is expected to receive funding in the

second phase of the scheme. The SPGS grants provide a valuable income stream at an early stage of project development. Furthermore, workshops and capacity building are promoted by SPGS to participants in the scheme.

G4. Management Capacity and Best Practices

G.4.1 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

KFP is developed, implemented and managed by Lango Forest Company (LFC); formerly known as the Norwegian Afforestation Group (Uganda). GRAS became the major shareholder of NAG (Uganda) in 2006, effectively buying NAG out. Prior to this, NAG had been unable to implement any tree planting within the reserve due to financial constraints. GRAS is providing the finance for implementation of the project. GRAS is funded through equity finance, with the shareholders providing primary financing to the development of LFC. The company is well capitalized to implement the project and as such the anticipated climate, community and biodiversity benefits should be achieved.



G.4.2 Document key technical skills that will be required to implement the project successfully, including community engagement, biodiversity assessment and carbon measurement and monitoring skills. 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

Plantation operations

The plantation operations are overseen by a plantation manager who understands and has experience in all the key aspects of operating an efficient forestry plantation. The plantation manager is based at the project site fulltime. A local workforce is employed to implement project activities including nursery operations, land preparation, planting, maintenance and fire patrol.

Community engagement

GRAS and LFC recognize the importance of the relationship between the local communities and the project proponents, and that the success of the project is inherently dependent on this. Community engagement is therefore a top priority and to facilitate this LFC is employing a Community Development Officer (CDO) to manage relations between the project and local communities. The CDO has lived in the region for the last 34 years and speaks the local language. Having graduated with a bachelor's of development studies with specialization in rural development, and pursuing a post graduate diploma in project planning and management, he has an excellent understanding of participatory appraisals, development planning, public relations and conflict management. Before Joining LFC as CDO in 2008, he had also worked for five years as Program Assistant with Northern Uganda Social Action Fund, a World Bank funded project.

Biodiversity assessment

The Ecological Survey was carried out by a team of ecologists from Makerere University as LFC does not have a dedicated ecologist. The Makerere ecologists can be called upon for any future ecological/ biodiversity work, and are planned to be hired to tailor the general, companywide biodiversity monitoring plan (which is being developed at one of GRAS' Tanzanian projects) to the specific environmental conditions at KFP. Once the monitoring plan is in place, staff from the inventory team at LFC and BFC will be able to carry out the periodic monitoring.

Professor Manishi, from Sokoine University of Agriculture, Tanzania, has been contracted to develop the general, company-wide biodiversity monitoring plan. This will be tailored to each of GRAS' individual projects.

Carbon measurement and monitoring

GRAS' inventory and mapping team in Uganda has advanced skills in GIS and remote sensing, which are key aspects for the monitoring of the project. GRAS' head of Uganda Inventory and Mapping has over 17 years of experience working on mapping tasks, including remote sensing, GIS and inventory, through 14 years with the National Biomass Survey (an operational unit under the Forest Department) and working for the NFA, before employment with GRAS.

GRAS' carbon team has significant experience developing A/R carbon projects, evidenced through the registration of the world's first VCS AFOLU project (Uchindile and Mapanda Forest Project) and another CDM project currently at the validation stage (Idete Forest Project).

Local and national institutions that the project can collaborate with include:

The project will cooperate or partners with a number of agencies, institutions and programs for advice pertaining to technical, ecological and social matters where necessary, including the National Forest Authority (NFA), The District Land Board, National Environment Management Authority (NEMA), The Directorate of Water Development (DWD), Makerere University Faculty of Forestry and the Soil Science Department, National Forestry Research Institute (KIFU), Public Health Institute Uganda Timber Growers Association, National Tree Seed Centre, EU Sawlog Production Grant Scheme (SPGS) and local NGOs.

These partner organizations are able to assist the LFC team through the provision of technical consultation and guidance as needed, including training courses, quality control checks and technical inputs for the preparation and implementation of the proposed project activity. Project participants will also seek advice from local, national, and international forestry and sustainable forest management experts where required.

G.4.3 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

Green Resources' employee handbook, which is applicable to all of its subsidiaries and employees companywide, stipulates in section 3.6.7 that all new employees shall undergo orientation and induction training when they join the company. The orientation/ induction programme will cover:

a) Organisation set up and structure
b) Organisation vision, mission, values and objectives
c) Company handbook
d) Health & Safety Policy
e) Disciplinary and Grievance Procedures
f) Job Description
g) Diversity &Respect Programme
h) Anti-Bullying and Harassment Programme

KFP plans to provide project employees and members of the local communities that wish to establish their own community woodlots with training on each key stage of woodlot establishment. This will also be facilitated by the Sawlog Production Grant Scheme (SPGS), an EU grant scheme supporting the private sector in Uganda to grow trees, which KFP is receiving funds for on some areas of the project. SPGS provide workshops cover: plantation planning and establishment; plantation management; fire protection. Employees and local community members will be able to attend such workshops and build capacity in relation to growing their own woodlots.

A successful community woodlots scheme is expected to increase awareness the benefits attainable from tree planting amongst local communities, and in turn encourage other community members to become involved with project activities.

First aid training has been carried out for LFC's employees. This was seen as an important area to provide training on, which could have vast transferable applications for employees and community members in and outside of the workplace. In addition, training of NAG workers and village health teams on HIV and AIDS has been carried out at the project by the Foundation for Integrated Rural Development (FIRD)[41]

G.4.4 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 offers employment to residents of the project zone. Community members will have a fair opportunity for working at KFP as outlined in the company's SOP 07, Employee Selection Procedure. Particular care is taken to ensure that selection criteria

[41] See "Training of NAG workers and village health teams on HIV/AIDS, Training Report, Conducted on August 17th-18th, 2009"

are not in any way directly or indirectly discriminatory on grounds of gender, race, disability, religion or belief. Local stakeholders with relevant skills are highly encouraged to fill higher positions; though there are many job opportunities for less skilled workers.

G.4.5 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

1. The Labour Union Act, 2006
2. The Employment Act, 2006
3. The Labour Disputes (Arbitration and Settlement) Act, 2006
4. The Occupational Safety and Health Act, 2006
5. National Social Security Fund Act

In accordance to the Labour Union Act (2006), employees of KPP have been informed about the benefits of organizing in labour unions. Currently, no one has showed interest in doing so at LFC. Part II (3) and (4) of the Act indicate that employees have the right to organise themselves in any labour union and employer shall not interfere with, restrain or coerce an employee in the exercise of his or her rights guaranteed under this act.

The Employment Act (2006) shall be the governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, management and compensation of workers. The Employment Act is based on the provisions of Article 40 of The Constitution of Uganda. The Act mandates labour officers to regularly inspect the working conditions of workers to ascertain that the rights of workers and basic provisions are provided and workers' welfare is attended to. The Act also provides for the freedom of association of workers permitting them to join labour organizations. This provision is also supported by the Labour Unions Act 7, 2006, which provides elaborate guideline and regulation for membership. LFC strives to improve the overall welfare at the workplace by facilitating meals, drinking water, first aid medical kits, shade for resting, notice board for displaying information, protective gear, toilet/pit latrine, hand washing facilities and tap water for bathing.

The Labour Disputes (Arbitration and Settlement) Act (2006) provides for collective bargaining, industrial action and sets procedure for reporting any labour dispute to the district labour officer. It also establishes the arbitration process in solving labour disputes. The Act also establishes industrial courts for handling any labour dispute which is not settled through arbitration process, as well as providing awards/compensation. KPP complies with the act by taking actions on any dispute reported within 2 weeks as required by the law.

The Occupational Safety and Health Act (2006), consolidated, harmonised and updated the law relating to occupational safety and health and repealed the Factories Act of 1964. It makes provisions for the health, safety, welfare and appropriate training of persons employed in work places. LFC employees are provided with personal protective gear equipment and are trained on how to use this depending on the risk of the activity undertaken. Section 19 (2) states that, it shall be the duty of an employer to ensure that personal protective equipment is adequate and suitable for the activity undertaken are provided. It is the employees own responsibility to use the protective gear and to determine the risk of the activity the employee is undertaking, and it is the employer that shall make sure the employees are properly trained on how to use and wear the personal protective gear.

The National Social Security Fund Act will be complied with by employees pay 5% of their basic salary to the National Social Security Fund Act. The employer contributes an additional 10% of the employees' salary to make a total monthly contribution of 15%, which is in compliance with this act.

New employees are informed of their rights covered by these Acts when they join the company.

G.4.6 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

LFC and BFC have health and safety risk assessment guidelines in place which outline the procedure required to affectively carry out a risk assessment at project sites. The objectives of having a risk assessment in place are as follows:

- Protect the safety and health of all stakeholders of LFC by preventing work related injury, illness, diseases and incident
- Ensure that Occupational Health and Safety (OH&S) management system comply with relevant national laws and regulation
- Ensure that all employees are encouraged to participate actively in all elements of the OH&S management system; and continually improving the performance of OH&S management system
- Use information, training and educational program to ensure that our employees are aware on their role and responsibility and appropriate skills and competences;
- Investigate all incidents and near misses at work that have or could have resulted in serious personal injuries, accidental loss and/ or property damage and take action to prevent recurrence.

A full risk assessment will be carried out at KFP following the risk assessment guidelines, with supplementary health and safety training for all new employees[42]. The risk assessment makes up part of the orientation/ induction programme – included in the health and safety policy. Therefore all staff will be informed of the risks involved in their role.

G.4.7 Document the financial health of the implementing organization(s) to demonstrate that financial resources budgeted will be adequate to implement the project

As shown in section in G.4.1, GRAS provides financing to LFC for implementation of KFP. GRAS is financed through equity investment, with group shareholders' equity at NOK 340mn (USD 49mn) at the end of 2008[43]. The company is therefore sufficiently capitalized to implement the project.

G5. Legal Status and Property Rights

G.5.1 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

1. The Uganda Gazette
2. The National Environment (management of Ozone Depleting Substances and Products) regulations, 2001
3. The National Environment (Minimum standards for management of soil quality) regulations, 2001
4. The National Environment (waste management) regulations
5. Localizing Global Environmental Conventions, NEMA, *volume 1* (RAMSA, CBD, UNFCCC)
6. The National Environment Management Policy for Uganda, 1994
7. The Land Act
8. The Water Act, 1995
9. National Forestry Plan 2001, 2002
10. Private Forest Sector in Uganda – Opportunities for greater involvement
11. National Forestry & Tree Planting Act, 2003
12. National Environment (Riverbanks, Lakeshores & Wetlands) Regulation, 2000
13. The Uganda Wildlife Statute, 1996

[42] See "Terms of Reference for Conducting a Health and Safety Risk Assessment at Kachung Plantation Project – Dokolo District"

[43] As evidenced in the Annual Report 2008, *Equity financing,* p43

14. Kyoto Protocol
15. Value Added Tax Statute 1996 and Amendments (2002-2008)
16. Workers' Compensation Act, 2000
17. The Employment Act, 2006
18. Trade Union Act, 2000
19. Labour Unions Act, 2006
20. The National Social Security Fund Act
21. The Labour Disputes (Arbitration & Settlement) Act, 2006
22. The Occupational Safety & Health Act, 2006
23. The Constitution of The Republic of Uganda, 2006
24. The Local Governments Act, 1997 and Amendment (1997-2008)

The National Environment Management Policy (1994) gives the overall policy framework, which calls for sustainable development that maintains and enhances environmental quality and resources productivity to meet human needs of the present generation without compromising ability of future generations to meet their own needs (commitment to social economic development of projects). The policy sets a guiding principle that an Environmental Impact Assessment (EIA) should be required for any activities which may cause significant impact on the environment. It also fosters integration of environmental concerns into development policies, plans and projects at national, district and local level, which is mainly achieved using the EIA tool.

For KFP, the project has carried out EIA and it has been approved by NEMA, in accordance with the policy.

The National Forestry Policy (2001) as a management instrument emphasizes the importance of protection and sustainable management of Uganda's forests. The instrument encourages private sector investment in forest development for purposes of improving people's livelihoods, contributing to poverty eradication, and providing biodiversity and environmental services through effective forest conservation strategies such as, promoting profitable and productive forestry plantation businesses; conservation and management of Uganda's biodiversity in support of local and national socio-economic development and international obligations and establishment, rehabilitation and conservation of watershed protection forests.

LFC's management objectives for the project address those strategies in their totality through modernized silviculture and protection of sensitive ecosystems. LFC set aside natural forest and areas that are rich in biodiversity (e.g. wetlands) for protection and conservation purposes. Around wetlands, KFP keeps a buffer of 60 meters (30 meters each side). For natural forest and high conservation value forest the buffer is 10 meters.

The National Forestry Plan (2001, 2002) was developed to put the Uganda Forestry Policy into practice. It sets out priority strategies for the sector and a new institutional framework linking the central government and local governments, recognizing the decentralization policy embraced in the Constitution of Uganda 1995 and the local government's Act 1997 as amended. The plan recognizes the importance, role and encourages private sector investment in the forest sector.

The National Wetland Conservation and Management Policy (1995), outlines the importance of the Environmental Impact Assessment and Audit procedures is a requirement for all activities to be carried out that will have an impact on wetlands. Furthermore, the policy aims at maintaining an optimum diversity of uses and users and consideration for other stakeholders when using a wetland. Mechanisms that have been recommended in the ecological survey also includes planting grass strips to stop silting of water bodies, enforcing laws and by-laws, sensitization of the people and formation of beach management units (BMUs) so as to avoid any conflict over open access natural resources. In addition, KPP collects soil and water samples every 3 years to detect any changes, both positive and negative, that might have impacted the conserved area (or other areas) as a result of the project activities.

The National Water Policy (1999) promotes an integrated approach to manage the water resources in ways that are sustainable and most beneficial to the people of Uganda. It stipulates that the quality of drainage water shall be such as not to pollute the receiving water or ground water and that all measures must be taken by the users to prevent increase in salinity levels in receiving waters, to prevent the accumulation of dangerous or toxic compounds in the subsoil, capable of contaminating groundwater aquifer.

The Poverty Eradication Action Plan (PEAP) and Plan for Modernization of Agriculture (PMA) recognizes sustainable natural resource management including forests as one of the key strategic intervention areas to achieve PEAP and PMA objectives.

KPP has one of its strategies to introduce modern farming practices to project adjacent villages as a way of contributing to poverty alleviation within the project area including the broader objectives of these two policy documents.

The National Forestry and Tree planting Act (2003) is the principle legal instrument for forest management in Uganda. Just as the mother policy, the Act stresses the importance of protection and sustainable management of Uganda's forests. It promotes private sector investment in forest development for purposes of improving people's livelihoods, contributing to poverty eradication, providing biodiversity and environmental services.

LFC/NAG aims to improve rural communities' livelihood by sustainable forest management. KPP provides employment to both men and women inside or adjacent to the project zone, as well as contribute to the community by supporting construction of a health centre, roads/infrastructure, improved access to clean water (spring protection and borehole rehabilitation), free seedlings and training on how to establish a woodlot etc.

The communities, with support from LFC/NAG, also participate in a HIV/Aids sensitization and control project. The villagers get a second income by working at the plantation as well as on their own cropland. This leads to poverty alleviation and environmental awareness around deforestation, climate change and the importance of conserving natural and indigenous species.

The main objective of the Uganda Wildlife Act, (Cap.200:2000) is to protect wildlife resources and enable derivation of benefits. Need for sustainable management is recognized within the framework of effective planning and stakeholder participation. The Act allows local community involvement and opens up wildlife management to the non-governmental/private sector by making it possible for the private sector to manage protected areas/wildlife and provide services. The Uganda Wildlife Act provides for, inter alia, the sustainable management of wildlife, and establishes the Uganda Wildlife Authority (UWA) as the body mandated with the co-ordination, monitoring and supervision of wildlife management. It does so in partnership with neighbouring communities and stakeholders.

The Water Act (1997) is an act to provide for the use, protection and management of water resources and supply. KPP supports the communities in protecting springs to secure safe water for domestic use and rehabilitation of boreholes for a sustained access to safe water supply.

LFC will comply with the above listed local, national and international laws, regulations and agreements.

G.5.2 Document that the project has approval from the appropriate authorities, including the established formal and/or traditional authorities customarily required by the communities

It is a legal requirement of the Government of Uganda that an EIA be conducted for proposed activities that are likely to have significant impacts on the environment. The National Environment Act is the legislative tool and imposes a mandatory duty on a project developer to carry out the EIA. The National Environment Management Authority (NEMA) provides EIA requirement guidelines for project developers and is also the government body which approves proposed activities. BFC/ LFC therefore conducted an EIA to gauge the impacts of the proposed KFP activities and to receive approval from NEMA. The EIA was carried out in accordance with the NEMA guidelines and EIA guidelines, assessing impacts on biodiversity and natural ecosystems based on meetings, interviews with key stakeholders, community consultations and field surveys. The EIA was further complemented by an independent Ecological Assessment, both of which, along with the approval letter, will be made available as supporting information to the DOE as required.

In regard to the project's CDM status, the project has been approved by the Ugandan DNA, the Ministry of Water and Environment, and a Letter of Approval has been issued to Lango Forestry Company and Green Resources AS.

No further approvals are required from formal and/or traditional authorities. Since the project is taking place in a Central Forest Reserve which has been gazetted for forestry, official authority is only required from the government. However, the community inputs and perception to the project are considered in the EIA process, as well as the CDM process with the DNA confirming that the project will provide sustainable development.

G.5.3 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 project is taking place in a government forest reserve. NAG, now LFC, was granted the land permit at KCFR - land license/ permit No. 4230 - from the Forest Department on 15/11/1999, granting title of a 50 year-contract for land development through tree planting. The project does not take place on private or community property.

There were some disputes regarding borders of the forest reserve and community land when the demarcation was carried out – some community members felt they lost land. Unsurprisingly, some of the communities' had negative perceptions of the NFA as a result of this, and were cautious of initial LFC consultations, labelling both as NFA. Through a significant consultative effort, the attitude between LFC and the communities has improved. Local members now understand that LFC has not directly played a part in where the reserve border lies, and is offering development directly through the afforestation and also with its community development initiatives.

G.5.4 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

Local communities have been using the KCFR for subsistence activities such as cultivating and cattle grazing for decades, leading to degradation of the area. However, these activities are illegal as land gazetted as a forest reserve, by law, can only be used for tree planting. Encroachment of activities from local communities has been due to an absence of law and order (through the 1970s and 1980s) and clear demarcation of the reserve boundaries. These activities have been relocated outside of the project area so

that the project proponent adheres to the national legislation pertaining to management of forest reserves and the wetlands within the reserve.

Individuals cultivating or grazing their cattle within the land that LFC has the licence for, were allowed sufficient time for crops to mature and for harvesting - an agreement made between the project proponents and encroachers. The date for activities to move out of the reserve was communicated to the local communities by the CDO and through official letters. The community development plan, particularly the alternative livelihoods initiative, will focus on involving these individuals who have had their activities displaced, as a means of compensation.

Quantifying the extent of the activities that have to be displaced from the project area proved to be challenging due to sampling errors and difficulties in demarcating all of the cropland areas, prior to project start, through ground truthing. However, conservative methods were applied to ensure that no underestimates would be likely. To quantify the area of cropland that would be displaced, remote sensing was carried out on a Landsat image from 2004, which showed that the pre-project area of cropland was approximately 573 ha. To determine the extent of pre-project grazing activities surveys were initially carried out and then compared and adjusted in line with data from the local district livestock register. The number of cattle determined in the baseline (covering all 14 villages surrounding the project area) was 3,000. However, since the villages are all outside the project area, it was not expected that all of these cattle would necessarily graze within the project area.

G.5.5 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

Illegal activities taking place in the reserve prior to implementation of the project included clearing of land for agricultural purposes, grazing activities, charcoal burning and the collection of fuel-wood for commercial purposes. These activities are still common outside the project area where they are not classed as illegal (forest reserves are designated solely for tree planting, rendering other activities illegal) but there is a risk that they may move back inside the reserve and into the project area.

The project will help to reduce these activities through community development initiatives will help meet the demand of the drivers of the above mentioned activities or provide alternative means of livelihoods which are not to the detriment of the project and benefits derived from it. Provisions of seedlings to communities will mean that people can grow their own community woodlots, providing timber products, including fuel-wood. An efficient cooking stoves programme will reduce the demand of fuel-wood in communities surrounding the reserve, and thus lower the likelihood that fuel-wood or charcoal burning activities will re-enter the reserve. The promotion of other

alternative livelihoods such as the formation of farmer groups for apiculture, poultry and fishing will also diversify people's use of natural resources in the region, reducing the dependency on unsustainable use of forests.

G.5.6 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

Legal title to the land

The Reserve, and thus the project area, is formally owned by the government under Article 237 (2) (b) of the Constitution of the Republic of Uganda[44]. LFC acquired a land license/ permit No. 4230 from the Forest Department on 15/11/1999, which is title granting a 50 year-contract for land development through tree planting in the Kachung Central Forest Reserve. Although a limited contract of 50 years is in place, the land license can be renewed, offering the potential of even longer-term project activities.

Rights to tCERs

The Ministry of Water Lands and Environment is yet to formally include carbon rights with respect to A/R projects and so there is no Ugandan Law explicitly stipulating ownership rights. It is, however, recognised by the Ministry of Water Lands and Environment that benefits in the form of carbon credits from forests are owned by the title holder of the land, which in this case is LFC. All tCERs from the A/R CDM project will therefore be issued to - and owned by -LFC.

[44] Article 237 (2) (b) of the Constitution of the Republic of Uganda defines Central Forest Reserves as trust property of the Uganda Land Commission. The NFA is a statutory manager under the National Forestry and Tree Planting Act No. 8/2003. The Constitution of the Republic of Uganda 1995, Forest Reserves (Declaration) Order 1998, Land Act Cap 227 laws of Uganda as revised 2000 evidences the land title, i.e. that Forest Reserves are vested in the Uganda Land Commission.

Climate Section

CL1. Net Positive Climate Impacts

Refer to sections C and D of the KFP A/R CDM PDD for supplementary information.

CL1.1. 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 project applies the approved CDM methodology AR-AM0004 Version 04, entitled "Reforestation or afforestation of land currently under agricultural use".

The estimates of the actual net GHG removals by sinks in the project activity are based on the carbon stock change in aboveground and belowground biomass, estimated using equations described in Section II.7 of the approved methodology. The changes in carbon stocks in the living biomass pool are estimated based on the changes in carbon stocks of the living biomass of trees (gain and losses) minus the carbon stock in the living biomass carbon pools of non-tree woody vegetation in the year of site preparation, shown by equation 14. As described in Section G.2.3.a, carbon stock changes in pools of soil organic matter, dead wood and litter are not accounted as part of the net GHG removals by sinks.

Treatment of pre-existing vegetation

AR-AM0004 Version 04 presents two possible situations for treatment of pre-existing vegetation: pre-existing carbon stocks in the living biomass are *not* significant, as pre-existing carbon stocks in the living biomass are < 2% of the anticipated actual net GHG removals by sinks, or pre-existing carbon stocks in the living biomass *are* significant, with more than 2% of anticipated actual net GHG removals by sinks. Pre-existing carbon stocks in the living biomass in the baseline at KFP have been calculated as 43,073 tCO_2e over the first crediting period. This is 5.8% of the anticipated actual net GHG removals by sinks, and therefore defines the carbon stocks as significant. However, EB 50, Annex 21, provides guidelines on conditions under which GHG emissions from removal of existing vegetation due to site preparation are insignificant. Condition (c) from part 2 of the guidance states that if "the baseline scenario is *degrading land* involving decline in woody vegetation cover", then the "GHG emissions from felling, clearance, decay or burning of existing woody biomass during site preparation are insignificant". As shown in step 3 (b) of C.5.1 of the CDM PDD, evidence has been provided that indicates that the project baseline has been historical degradation, including a soil degradation map of the region in Uganda and NFA maps showing a change in land-class from predominantly woodland vegetation to bush vegetation. The Ecological Survey for the project area also describes a general trend of degradation over time due to encroachment activities from the local communities.

In accordance with EB 50, Annex 21, GHG emissions from the removal of existing vegetation due to site preparation at KFP are neglected and accounted as zero.

Treatment of trees

The stock change method, *Method* 2, of section 7.1 B was used (21 and 22) along with equations 10 and 11 to determine the *ex ante* changes in living biomass carbon stock in the project scenario. Disturbances are assumed in the *ex ante* estimation, such as potential fire, pest and disease outbreaks, but of frequency and intensity. The mortality factor is therefore assumed to be 10% (accounted for in the yield models).

In the absence of the project and regional specific parameters during PDD preparation for the biomass expansion factors (BEF), wood density (D), carbon fraction (CF) and root-to-shoot ratio, the project participants have used default values from the GPG LULUCF 2003 (Table 3A.1.10). The BEFs given in Table 3A.1.10 represent averages for mean growing stock or age. The variables to be used in equation B.18 and B.19 are shown in the table CL.1.1.1 below:

Table CL.1.1.1: Wood density, BEF and Root-Shoot ratio for species used

Tree species	Wood Density (tonnes d.m.m-3)	BEF	Root-Shoot ratio
Eucalyptus	0.75[45]	3.4[46]	0.20[47]
Pine	0.51[48]	1.3[49]	0.23[50]
Maesopsis eminii	0.41[51]	3.4[52]	0.27[53]

[45] Taken from the book "Uganda Timber" by C.h. Tack, published by the Ministry of Agriculture and Forestry, Forestry Department

[46] Taken from Table 3A.1.10 of the GPG LULUCF 2003, BEF_2 (overbark) for Tropical Broadleaf

[47] Taken from Table 3A.1.8 of the GPG LULUCF 2003, Mean value for Eucalypt plantation with aboveground biomass (t/ha) of >150

[48] Taken from Table 3A.1.9-2 of the GPG LULUCF 2003. Value for Tropical America, Pinus Caribaea

[49] Taken from Table 3A.1.10 of the GPG LULUCF 2003, BEF_2 (overbark) for Pines

[50] Taken from Table 3A.1.8 of the GPG LULUCF 2003, Mean value for Conifer forest/ plantation with aboveground biomass (t/ha) of >150

[51] Taken from Table 3A.1.9-2 of the GPG LULUCF 2003. Value for Tropical Africa, Maesopsis Eminii

[52] Taken from Table 3A.1.10 of the GPG LULUCF 2003, BEF_2 (overbark) for Tropical Broadleaf

[53] Taken from Table 3A.1.8 of the GPG LULUCF 2003, Mean value for Tropical/ sub tropical dry forest

The parameters, as listed in Table CL1.1.1, fall within the range provided by the GPG LULUCF 2003 (Table 3A.1.10) or are supported by other regional literature. The growth data from "*Yield of Eucalyptus and Caribbean pine in Uganda, D. Alder et al. 2003"* and "*Maesopsis eminii – a challenging timber tree species in Uganda – a production model for commercial forestry and small holders, T.Buchholz et al."* were used to project the merchantable timber volume and thus the biomass growth of the plantations. The project participants will conduct annual inventories to verify applicability of these data in the project. During *ex-post* calculations, the growth data (standing volume per hectare) will be collected and converted into biomass through Wood Density (WD) and Biomass Expansion Factors (BEF) and root-shoot ratio (R) using equations and steps described in the methodology.

The project participants consider that any changes due to thinning have been taken into consideration in the growth figures that were used; however, the trend shall be monitored. The impact of disturbances, e.g. losses from fire and pests, are considered to be small and are a result of natural events. Losses due to commercial harvests and thinnings during the crediting period shall be captured in the calculations using equation 21.

Increase in emissions of greenhouse gases:

According to the approved methodology, the increase in emissions of GHG gases resulting from loss of biomass due to conversion of pre-existing vegetation (excluding loss of biomass from herbaceous vegetation) and burning of biomass must be quantified, unless conditions at the site, following guidelines from EB 50, Annex 21, are deemed insignificant. The project participants do not practice tillage, machinery or site burning during site preparation. The increase of GHG emissions from any unplanned fire will also be quantified. The actual net GHG removals by sinks (annual and cumulative) is the carbon stock change in above- and below-ground biomass are listed in Table CL.1.1.2 below.

Table CL.1.1.2: Estimation of actual net GHG removals by sinks

Year	Estimation of actual net GHG removals by sinks (tonnes ofCO2e)
2006	0
2007	239
2008	2,796
2009	5,763
2010	13,792
2011	18,688

2012	42,159
2013	55,617
2014	79,738
2015	68,018
2016	63,869
2017	53,899
2018	73,961
2019	-20,662
2020	6,568
2021	-37,247
2022	-45,356
2023	30,289
2024	42,059
2025	94,339
Total for crediting period (2007-2026) (tCO2 e)	548,530

CL1.2. Estimate the net change in 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 of the project's overall GHG emissions reductions or removals over each monitoring period

Non-CO_2 emissions, such as CH_4 and N_2O, are expected to be emitted in the without project scenario due to charcoal production and burning of biomass to clear land for agricultural purposes; however, they are not expected to be significant. Moreover, it is conservative to assume that emissions in the baseline as zero. To illustrate the impact of non-CO_2 emissions in the baseline, CH_4 emissions have been calculated for a scenario whereby the total pre-project biomass was completely burnt for clearing land.
Equation 25 and 26 from AR-AM0004 / Version 04 were used to determine $E_{BiomassBurn, CH4}$. To calculate this, it was assumed that the total CDM project area (2,099 ha) was burnt, that the pre-project area was all shrub and grassland stratum (since ignoring the cropland stratum is conservative due to lower biomass in cropland) and that all biomass was burnt (PBB_{ikt}). Default parameters were applied as stated in the methodology.

The result was that the total CH_4 emission from biomass burning in slash and burn would be 581 tCO_2e, which is 0.12 % of the project's overall GHG impact over each monitoring period; significantly less than 5%. Therefore, the net changes in the emissions of non-CO_2 GHG emissions can be considered insignificant.

The *with* project scenario is not expected to release non-CO_2 GHG emissions which account for more than a 5% increase of the project's overall GHG emissions removals.

Non-CO_2 GHG emissions are only expected from fossil fuel used for transportation and for machinery used to manage the forest – for example, thinnings and harvestings – as well as fertilizer application. Non-CO_2 emissions from fertilizer application were estimated as 0.07% of the project's overall GHG impact, and were therefore classed as insignificant.

5% of the project's overall GHG impact over the first crediting period would be equivalent to 24,702 tCO_2e, which none of the potential sources of non-CO_2 emissions in the *without* or *with* project scenario would be likely to produce.

CL1.3. 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

No other emissions resulting from project activities are expected.

CL.1.4 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-CO2 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)

Implementation of the project is expected to give positive climatic impacts to the area. The forest cover will contribute to a reduction of green house gases emissions by acting as a carbon sink. In addition to the quantified carbon benefits of project, tree growth is also expected on villagers own land outside the project boundary – the project gives away free seedlings to the community and encourage them to develop their own woodlots close to the project area.

Net anthropogenic GHG removals by sinks are estimated at 494,049 tCO2e over the first 20-year crediting period, as shown in the table below:

Table CL.1.4.1 Summary of climate impacts

Summary of results obtained in Sections C.7., D.1., and D.2.				
Year	**Estimation of baseline net GHG removals by sinks (tonnes of CO_2 e)**	**Estimation of actual net GHG removals by sinks (tonnes of CO_2 e)**	**Estimation of leakage (tonnes of CO_2 e)**	**Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2 e)**
2006	1,273	0	0	-1,273
2007	1,378	239	0	-1,138
2008	1,484	2,796	0	1,311
2009	1,592	5,763	0	4,171

2010	1,702	13,792	7,749	4,341
2011	1,813	18,688	0	16,875
2012	1,925	42,159	0	40,234
2013	2,038	55,617	0	53,579
2014	2,152	79,738	0	77,586
2015	2,267	68,018	0	65,751
2016	2,382	63,869	0	61,487
2017	2,498	53,899	0	51,400
2018	2,615	73,961	0	71,346
2019	2,733	-20,662	0	-23,394
2020	2,850	6,568	0	3,718
2021	2,968	-37,247	0	-40,215
2022	3,087	-45,356	0	-48,443
2023	3,206	30,289	0	27,083
2024	3,324	42,059	0	38,734
2025	3,444	94,339	0	90,895
Total ($t CO_2$-e)	**46,732**	**548,530**	**7,749**	**494,049**

CL.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

The KFP A/R CDM project is taking place in Uganda, a non-Annex 1 country, which, by definition, does not have an emissions cap under the UNFCCC. Furthermore, the project is being developed as an A/R CDM project, and thus will be tradable in the compliance market.

CL2. Offsite Climate Impacts ('Leakage')

CL.2.1 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

Potential leakage is anticipated from the displacement of grazing, cropland and charcoal production activities, which were all taking place pre-project, albeit illegally within the forest reserve. It is a key objective of KFP to foster socio-economic development in adjacent communities by providing employment opportunities, by promoting diversified sources of income and by introducing more sustainable land-use practices. The project seeks to avoid the negative climate and community impacts of activity displacement through a mitigation programme that includes increasing the amount of services provided in adjacent communities, thus minimizing any potential leakage.

Many of the community members currently practice shifting cultivation. In total, 199 ha of cropland were mapped in the reserve area (pre-project) under the control of LFC, both in the plantable and wetlands conservation areas. Although the wetland areas will not be planted, and are thus outside the CDM project boundary, the croplands will still be displaced due to the condition of the license granted to LFC from NFA, which stipulates that the only activity that can take place is tree planting. The cropland areas within the wetlands will therefore be included as displaced activities, and hence included in the leakage calculations.

Fuel-wood and charcoal production is common practice for the communities surrounding the project and it's not surprising that many of the community dwellers venture into KFP to obtain these everyday necessities. KFP, under the prohibited activities in forest reserves as stipulated in the National Forestry and Tree Planting Act, will not allow people to collect fuel-wood for commercial purposes or to produce charcoal within the reserve. However, local communities can continue to access the project area to collect fuel-wood for personal use, thus no leakage is foreseen from displacement of these activities. The communities have been sensitized regarding collection of biomass from only dead trees and of that supplied from the project: vegetation cleared for land preparation, pruning remnants, non-commercial thinnings and off-cuts.

Interviews with local community members showed that many people owned cows which were grazing on and off in the project area – the maximum number of cows owned being 11. Although goats and sheep have been seen in the villages surrounding the project, the sample of interviewees that participated in the leakage survey showed that no sheep or goats graze in the project area, only cows.

AR-AM0004/ Version 4 covers sources of leakage from:

- Carbon stock decreases caused by displacement of pre-project agricultural crops, grazing and fuel-wood collection activities;
- Carbon stock deceases caused by the increased use of wood posts for fencing

No other leakage is anticipated by the project. The following sections addresses each of the above mentioned leakage types covered by the methodology:

Grazing leakage

Pre-project grazing was present at KFP, with cattle owned by the 14 surrounding village communities. Under the project activities, no grazing will be permitted in the project area, resulting in all pre-project grazing activities being displaced out of the project boundary, consequently resulting in potential leakage due to conversion of land to grazing land. The project therefore follows case 2 of the methodology: the A/R CDM project activity produces less fodder than the baseline activity, as shown below:

Case 2: $Na_{BL} > Na_{AR,t}$

Na_{BL} = Average number of animals from the different livestock groups that are grazing in the project area under the baseline scenario

$Na_{AR,t}$ = Number of animals allowed in the project area under the proposed A/R CDM project activity at year *t*

In this case, three different types of grazing area need to be addressed in determining whether there is leakage and its extent:

- Existing Grazing Lands, *EGL*
- New Grazing Lands, *NGL*
- Unidentifiable Grazing Lands, *XGL*

EGL = Total existing grazing land area outside the project boundary that is under the control of the animal owners (or the project participants) and that will receive part of the displaced animal populations, up to time *t**; ha

NGL = Total new grazing land area outside the project boundary to be converted to grazing land that is under the control of the animal owners (or the project participants) and that will receive another part of the displaced animal populations, up to time *t**; ha

XGL = Total unidentifiable grazing land area outside the project boundary that will receive the remaining part of displaced animal populations, e.g. when the pre-project animal owners decide to sell the animals, up to time *t**; ha

The following steps in accordance with the A/R CDM methodology were followed to determine the leakage from grazing.

Step 1 and 2: Data collection

The annual biomass consumption of the animals over the project area to be planted was estimated using Equation 38. The parcel index was assumed to be 1 due to the transient nature of the grazing activities over all areas of the project. The daily biomass intake by animal type (DBI_j) was taken from default data provided from Table 7 of the methodology, 6.0 kg d.m. head^{-1} day^{-1}, as no reliable local data was obtained. The other parameters required in Equation 38 were obtained from interviews with a randomly selected sample from three of the surrounding villages. One village out of each three parishes was selected randomly.

The three villages that were randomly selected to determine the number of cattle in the baseline were Agolowelo, Tetugo and Abenyonya B. A sampling approach was

adopted due to the number of communities surrounding the project. It consisted of interviewing ten households – whether they used the project area for grazing their cattle or not - from each village with a survey designed to capture all the relevant data necessary to calculate leakage, specifically the average number and type of cattle that each household owns, the amount of land available outside of the project that can be used for grazing (both private and communal) and the average time that the animals grazed within the project area, communal and private lands.

The following three tables show the data obtained from the interviews with the ten respondents from the three selected villages. Full data sets will be provided to the DOE on request at validation (NB. Interviewees have been kept anonymous in the PDD: O = Owner of cattler; C = cultivator).

Table CL.2.1.1. Grazing leakage interviews from Agolowelo

Agolowelo	*Average no. animals (5yrs before project) that grazed in KFP*			*Time spent in land type*			*Private grazing land outside KFP (EGL)*	
Name	*Cows*	*Goats*	*Sheep*	*Project*	*Private*	*Communal*	*Acres*	*Ha*
O 1	3	0	0	4	4	4	1	0.40
O 2	0	0	0	0	0	0	0.5	0.20
O 3	0	0	0	0	12	0	2	0.81
O 4	2	0	0	8	2	2	0.5	0.20
O 5	0	0	0	0	0	0	0	0.00
O 6	4	0	0	6	3	3	1	0.40
O 7	3	0	0	7	5	0	1	0.40
O 8	3	0	0	9	0	3	1	0.40
O 9	6	0	0	12	0	0	1	0.40
O 10	0	0	0	0	0	0	0	0.00
Totals	**21**	**0**	**0**	**46**	**26**	**12**	**8**	**3.24**
Average	**2.1**	**0**	**0**	**4.6**	**2.6**	**1.2**	**0.80**	**0.32**

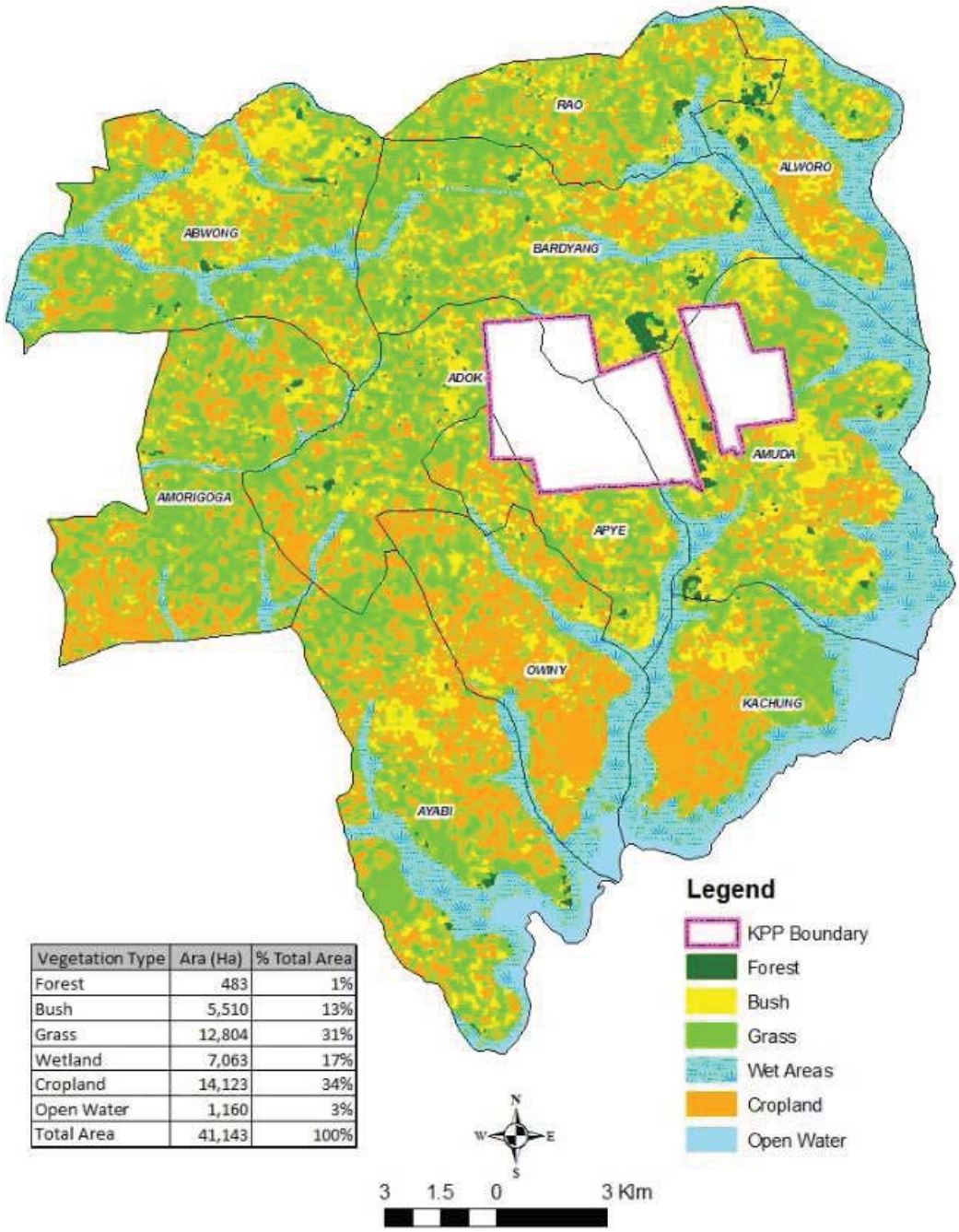
Table CL.2.1.2. Grazing leakage interviews from Tetugo

Tetugo	*Average no. animals (5yrs before project) that grazed in KFP*			*Time spent in land type*			*Private grazing land outside KFP (EGL)*	
Name	*Cows*	*Goats*	*Sheep*	*Project*	*Private*	*Communal*	*Acres*	*Ha*
O 1	4	0	0	10	2	0	1	0.40
O 2	7	0	0	6	2	4	2	0.81
O 3	0	0	0	0	0	0	0	0.00
O 4	11	0	0	9	3	0	4	1.62
O 5	6	0	0	12	0	0	0	0.00
O 6	3	0	0	7	3	2	1	0.40
O 7	0	0	0	0	0	0	0	0.00
O 8	3	0	0	6	0	6	0	0.00
O 9	0	0	0	0	0	0	0	0.00
O 10	3	0	0	8	0	4	1	0.40
Totals	**37**	**0**	**0**	**58**	**10**	**16**	**9**	**3.64**
Average	**3.7**	**0**	**0**	**5.8**	**1**	**1.6**	**0.9**	**0.36**

Table CL.2.1.3. Grazing leakage interviews from Abenyonya

Abenyonya B	*Average no. animals (5yrs before project) that grazed in KFP*			*Time spent in land type*			*Private grazing land outside KFP (EGL)*	
Name	*Cows*	*Goats*	*Sheep*	*Project*	*Private*	*Communal*	*Acres*	*Ha*
O 1	2	0	0	0	4	8	1	0.40
O 2	0	0	0	0	0	0	0	0.00
O 3	3	0	0	5	3	4	1	0.40
O 4	3	0	0	12	0	0	0	0.00
O 5	8	0	0	7	0	5	0	0.00
O 6	0	0	0	0	0	0	0	0.00
O 7	0	0	0	0	0	0	0	0.00
O 8	2	0	0	3	6	3	0	0.00
O 9	0	0	0	0	0	0	0	0.00
O 10	8	0	0	10	0	2	1	0.40
Totals	**26**	**0**	**0**	**37**	**13**	**22**	**3**	**1.21**
Average	**2.6**	**0**	**0**	**3.7**	**1.3**	**2.2**	**0.3**	**0.12**

The results from the surveys showed that the only animals that people were grazing in the project area were cows, which is in line with what was observed by staff in the first few years of the plantation. Information regarding the area of communal land outside of the project area was not captured from the interviews as local community members were unable to quantify the area of communal land outside the reserve due to the significance of the scale. There are large grassland areas around the reserve, shown in figure CL.2.1.4, which are used by many villagers to graze their cattle, and for cultivation. This is an example of a communal area where the displaced project activities will be displaced to. The total communal grazing land outside the project reserve has been estimated to be more than the A/R CDM project area, with an estimate of 12,804 ha as shown in the map in figure CL.2.1.4 – this is the figure that has been used in the calculations.



Vegetation Type	Ara (Ha)	% Total Area
Forest	483	1%
Bush	5,510	13%
Grass	12,804	31%
Wetland	7,063	17%
Cropland	14,123	34%
Open Water	1,160	3%
Total Area	41,143	100%

Figure CL.2.1.4 Map showing examples of surrounding grassland areas

Figure CL.2.1.5 Examples of grazing areas surrounding KFP



The results from the tables shown in CL.2.1.1, CL.2.1.2 and CL.2.1.3 were used to determine the baseline number of cattle, Na_{BL}. This was calculated using Equation 34 from the methodology. The fraction of total project area sampled (SFR_{PAga}) was based on the number of households sampled out of the total number of households from all of the surrounding villages (using the demographic data shown in Table CL.2.1.6. from the District Veterinary Department (Lira Livestock Register, 1999)). This extrapolation to determine a full baseline was based on the assumption that all the other villages have similar cattle grazing numbers and activities as the sample villages. Due to common subsistence livelihoods in all of the communities this was deemed a justified assumption.

Table CL.2.1.6. Number of households per village

Village	Households
Apeti A	52
Apeti B	80
Abenyonya A	92
Abenyonya B	100
Te-Amon	71
Bung	53
Agolowelo	71
Omukuceke	135
Okwor	184

Okile	90
Acuna	77
Aputi	136
Agengi	300
Te-tugo	180
Totals	**1621**

Table CL.2.1.7. Sampled and baseline number of cattle

sNa_{BL}	SFR_{PAga}	Na_{BL}
84	0.0185	4538

This estimate of the baseline of cattle is extremely large, especially when compared to the data collected in Lira's 1999 Livestock register (shown in CL.2.1.8 below), which was collected over a region larger than that of Dokolo District - back in 1999, Lira District contained 6 counties including Dokolo; in 2005, Dokolo Disrtrict was created and consequently separated from Lira District. Furthermore, the villages surrounding the Reserve are from just three of the parishes of the district. This discrepancy between the Livestock Register and sampled method may have arisen due to errors created from overestimates from participants in the questionnaires or in the assumption that all villages have similar proportions of cattle grazers. However, the number determined was clearly not realistic based on this data. The baseline number was therefore adjusted to account for the likeliness of an overestimate, with a final number – remaining conservative as based on the old district of Lira – for Na_{BL} as 3000.

Table CL.2.1.8 Livestock population from Lira's 1999 Livestock register

	Livestock population		
Parish	Cattle	Goats	Sheep
Adok	1278	3309	733
Amuda	906	1871	299
Bardyang	903	1629	272
Total	**3087**	**5809**	**1304**

Taking the baseline number of cattle as 3000 (still deemed conservative), the annual biomass consumption of the animals over the project area was calculated using Equation 38 and averages from the original data, and is displayed in Table CL.2.1.9 below:

Table CL.2.1.9. Annual biomass consumption over project area

ΔC_{LPAt}	2,538 t d.m. yr^{-1}

Step 3: Estimate the number of animals that can be displaced in EGL-areas

Dr Wilson Okwir, a veterinary scientist from the District Veterinary Department, was interviewed regarding the maximum number of cows that could be displaced to *EGLs* per ha. His advice was that the grassland areas surrounding the project area have a carrying capacity of 1 cow per ha.

The maximum annual biomass consumption over the *EGL* was calculated for the private and communal land components. The private land calculation used the area of private land conveyed by respondents through the questionnaires along with the carrying capacity of the identified grasslands; the communal land took the estimate of 2,000 ha, equating to a maximum cattle population of 2,000.

The maximum biomass that the communal grazing areas (*EGL)* can produce for animal feeding was calculated using Equation 38 and the above parameters. The results for both the private land and communal land areas are shown in the tables below:

Table CL.2.1.10. Maximum annual biomass production from communal *EGL*

$\Delta C_{Lmax\ (Private\ land)}$	945 t d.m yr^{-1}

Table CL.2.1.11. Maximum annual biomass production from communal *EGL*

$\Delta C_{Lmax,\ (Communal)}$	27,656 t d.m yr^{-1}

Using the data obtained from the interviews with the local communities regarding the time cattle spent in communal lands, the annual biomass that these areas were producing was calculated:

Table CL.2.1.12. Current annual biomass production from communal *EGL*

$\Delta C_{Current\ (Private\ land)}$	882 t d.m yr^{-1}

Table CL.2.1.13. Current annual biomass production from communal *EGL*

$\Delta C_{Current\ (Communal)}$	900 t d.m yr^{-1}

To determine whether grazing leakage is present the methodology requires a comparison of the available biomass in the *EGL* to what was produced by the project before activities were displaced (the baseline). If there is a surplus of biomass in the *EGL* which can cover the total demand of biomass from the cattle that are displaced then there is zero leakage:

- If: $(\Delta C_{Lmax} - \Delta C_{Lcurrent})_{EGL} \geq \Delta C_{LPA}$

  Then leakage due to activity displacement is set as zero (e.g. $LK_{conversion} = 0$) and no further-assessment of $LK_{conversion}$ will be necessary

Table CL.2.1.14. Determination of sufficiency of *EGL*

ΔC_{LPAt}	2,538 t d.m yr^{-1}
ΔC_{Lmax} - $\Delta C_{Current}$ (private)	63 t d.m yr^{-1}
ΔC_{Lmax} - $\Delta C_{Current}$ (communal)	25,756 t d.m yr^{-1}

Comparing the values obtained from the grazing leakage analysis at KFP, it can be seen from Table CL.2.1.14 that the *EGL* from the private and communal components are sufficient for feeding the entire population of displaced animals that were grazing in the project area. Therefore no leakage from the displacement of grazing activities is incurred.

NGL and *XGL* are not required for leakage analysis in the *ex ante* estimation as the *EGL* provides sufficient biomass for the displaced activities.

Estimation of $LK_{conv\text{-}crop}$

Subsistence agriculture was a common land-use occurring in the project area before implementation of the project; this lead to degradation of the land as woody biomass in trees and shrubs was cleared for cultivation, and soil nutrients lost from expose of top soil and cultivation of unsuitable crops for the terrain. The steps outlined in the methodology were followed as shown below to calculate the leakage from the conversion of land to cropland due to displaced cropland activities from the project area. Surrounding the project area are vast expanses of grassland and seasonally wet grasslands, which the cropland activities will be expected to be displaced to. The situation at KFP follows Case 2 of Equation 47: $CS_{AD} > CS_b$, as the carbon stock on the land to which crops are displaced is more than the carbon stock from which they originated – going from a cropland carbon stock to a grassland carbon stock.

Step 1: Number of communities occupying land inside the project boundary

Cropland leakage was determined using the community level analysis and followed the random selection method as outlined for the grazing leakage: randomly selecting three of the fourteen local communities, one from each of the three parishes which surround the project area. The randomly selected villages were Agolowelo, Tetugo and Abenyonya B. Initial mobilization to compile a list of all the households that had cropland in KFP was carried out through the Community Development Officer working with a mobiliser from each of the communities. 20 households from each of the three communities' cultivators were interviewed, which accounted for more than 10 % of the total households in each community.

Table CL2.1.15: Agolowelo, Bardyang parish

Interviewee	*Area of cropland in KFP (Ha)*	*Private land outside KFP (Ha)*	*Land class*
C1	1.21	0.81	Grassland
C2	1.21	6.07	Grassland
C3	1.21	1.62	Grassland
C4	0.81	0.40	Grassland
C5	0.40	0.40	Grassland
C6	2.02	0.81	Grassland
C7	2.02	0.81	Grassland
C8	2.43	0.81	Grassland
C9	1.21	0.81	Grassland
C10	2.43	0.81	Grassland
C11	0.81	0.81	Grassland
C12	0.40	1.21	Grassland
C13	1.21	0.81	Grassland
C14	1.21	0.81	Grassland
C15	4.05	2.02	Grassland
C16	0.81	0.81	Grassland
C17	4.86	1.62	Grassland
C18	1.21	2.02	Grassland
C19	1.62	1.21	Grassland
C20	2.83	4.86	Grassland
Total	**34.01**	**29.55**	Grassland

Table CL.2.1.16: Tetugo, Amuda parish

Name	*Area of cropland in KFP (Ha)*	*Private land outside KFP (Ha)*	*Land class*
C1	0.81	0.81	Grassland
C2	1.21	0.81	Grassland
C3	1.62	0.81	Grassland
C4	1.21	0.81	Grassland
C5	1.62	0.81	Grassland
C6	0.40	0.81	Grassland
C7	1.21	0.81	Grassland
C8	0.81	0.81	Grassland
C9	1.62	0.81	Grassland
C10	0.40	0.40	Grassland
C11	1.21	0.40	Grassland
C12	0.40	0.40	Grassland
C13	0.81	0.81	Grassland
C14	1.21	0.40	Grassland
C15	1.21	0.81	Grassland
C16	1.21	0.81	Grassland
C17	1.62	0.81	Grassland
C18	2.02	0.81	Grassland
C19	1.21	0.40	Grassland
C20	1.62	0.40	Grassland
Total	**23.48**	**13.77**	Grassland

Table CL.2.1.17: Abenyonya B, Adok parish

Name	*Area of cropland in KFP (Ha)*	*Private land outside KFP (Ha)*	*Land class*
C1	1.62	0.81	Grassland
C2	0.81	0.81	Grassland
C3	1.62	0.81	Grassland
C4	0.81	0.40	Grassland
C5	1.21	0.81	Grassland
C6	3.24	1.62	Grassland
C7	2.43	0.81	Grassland
C8	0.81	0.81	Grassland
C9	1.21	0.40	Grassland
C10	1.21	0.81	Grassland
C11	3.24	1.62	Grassland
C12	1.21	1.21	Grassland
C13	0.81	0.40	Grassland
C14	0.81	0.81	Grassland
C15	2.43	1.62	Grassland
C16	2.43	2.43	Grassland
C17	9.72	4.05	Grassland
C18	1.21	0.81	Grassland
C19	2.02	0.81	Grassland
C20	2.02	1.62	Grassland
Total	**40.89**	**23.48**	Grassland

Step 2: Total area of cropland within project boundaries of each sampled community

The total area of cropland within project boundaries from which pre-project activities were displaced was calculated for each community sampled using an average of the "*Area of cropland in KFP (Ha)"*, collected from the interviews shown in *Step 1.* This average was then applied to the total number of households in each community that had cropland in the pre-project area - determined through initial mobilisation - to calculate the total (average) area of cropland within project boundaries from which pre-project activities in each sampled community was displaced ($TACP_c$).

Table CL.2.1.18: Area of cropland from each village

Village	*Average area of cropland in KFP (Ha)*	*Total number of households with cropland in KFP*	$TACP_c$ *(Ha)*
Agolowelo	1.70	22	37.40
Tetugo	1.17	33	38.61
Abenyonya B	2.04	36	73.44

Step 3: Number of households within each selected community

The methodology uses the number of households within each selected community ($TNHH_c$) as a parameter to determine the sampling factor (SF_c); however, because the cropland leakage analysis undertaken at KFP identified all households in each sampled community that had cropland in the project area, and thus, only interviewed cultivators, the sample fraction was calculated using the total number of households with cropland in KFP rather than the total number of households in the community. $TNHH_c$ in this case is the *Total number of households with cropland in KFP*, shown in Table CL.2.1.18.

Step 4, 5 and 6: Randomly select 10% of households to be sampled; interview households; estimate area of identifiable land and classify

The results from these steps are displayed in Table CL.2.1.15, CL.2.1.16 and CL.2.1.17 shown in *Step 1*. Twenty households were randomly selected and interviewed using the survey developed by the Community Development Officer, which will be presented to the DOE on request. This equated to 91 %, 61 % and 56 % of households that had cropland in KFP and 26 %, 11% and 14 % of the total households from Agolowelo, Tetugo and Abenyonya B being interviewed, respectively. All respondents stated that the area of identifiable land outside the project that will be converted for the displaced croplands was a grassland stratum. Similarly to the grazing questionnaires, the local communities were only able to quantify their own private land that would be available for the displaced croplands to be moved to, despite there being large areas of grasslands

around the reserve (see Figure CL.2.1.4) which would be utilized by such activities – estimated to be around 2,000 ha.

Step 7: Estimate the carbon stock in each land cover stratum

The carbon stock in the cropland stratum has been estimated from the baseline field work as 0.968 tC ha^{-1}, as explained in section GL.1.4. Using methods detailed in IPCC GPG-LULUCF chapter 3.4, the grassland stratum where the displaced cropland activities will be displaced to was calculated as 9.92 tC ha^{-1} (using the average aboveground biomass value for tropical – dry grasslands (2.3 t d.m ha^{-1}) and a default root-to-shoot value for tropical grassland vegetation type (1.6)). This is equivalent to 13.5 tCO_2e.

$$CS_i = 13.5\ tCO_2e$$

Step 8: Determine the mean conservative forest biomass stock

The methodology uses a conservative assumption that unidentifiable areas must be accounted for by forest clearance. Outside the A/R CDM project there is enough grassland for all of the displaced cropland activities to shift to, meaning no unidentified lands need to be considered. For this reason, a mean conservative forest biomass stock was not determined.

Step 9: Calculate leakage

Equations 51 and 52 were used to determine the leakage from displacement of cropland activities to unidentifiable areas for each of the three villages, as shown below:

CL.2.1.19. Village 1: Agolowelo, Bardyang parish

SF_c	1.1
$LK_{conv\text{-}crop,c}$	505 tCO_2e

CL.2.1.20. Village 2: Tetugo, Amuda parish

SF_c	1.65
$LK_{conv\text{-}crop,c}$	523 tCO_2e

CL.2.1.21. Village 3: Abenyonya B, Adok parish

SF_c	1.8
$LK_{conv\text{-}crop,c}$	994 tCO_2e

Using the results from the three tables above and Equation 49 from the A/R CDM methodology, the total leakage due to conversion of land to cropland attributable to displacement was calculated ($LK_{conv\text{-}crop}$). The total area of land on which pre-project

activities were displaced was determined through ground truthing of the cropland areas with BFC's mapping team using GPSs, followed by analysis of Landsat imagery from 2004. The total area of cropland at KFP was mapped as being 574 ha. This includes cropland areas which were in both the plantable area and in the wetlands conservation zone.

CL.2.1.22 Leakage emissions from cropland displacement

$LK_{conv\text{-}crop}$	7,749 tCO_2e

Estimation of $LK_{fuel\text{-}wood}$

Project circumstances at KFP allow for the collection of fuel-wood from the A/R CDM project area but only from remaining deadwood, clearing leftovers, pruning remains, non-commercial thinnings and offcuts from harvesting. Local communities have been informed about this arrangement and understand that no fuel-wood should be taken from any living trees. No leakage is envisaged from fuel-wood collection; activities may be more restricted in the sense that locals are unable to collect fuel-wood through destructive means, but the provisions from the project itself are expected to more than compensate for this change.

Analysis of the fuel-wood demand and project supply was carried out to gauge the impact of the project activities. The pre-project consumption of fuel-wood was estimated using data from a peer reviewed paper which looks at fuel-wood demand in the Hoima districrt of Uganda, west of Lira district (Buyinza and Teera, 2008). It was found that the average family surveyed collected 65 kg $week^{-1}$. This data was deemed suitable for use at KFP due to the similar land-use trends and land-classes in the region of where the study took place.

Equation 54 from the methodology was not used to calculate the average pre-project annual volume of fuel-wood gathering in the project area as no sampling was required. The literature value of 65 kg $week^{-1}$ was instead scaled up to an annual volume and then divided by an average wood density of 0.55 t m^3 to establish the average volume of fuel-wood consumed per households, which was calculated as 6.15 m^3 per household. The total average fuel-wood consumption in the communities surrounding the project area was therefore 5,856 m^3 (953 households as demonstrated in the demographic data obtained from village population registers 2009). The subsequent step was to apply a conservative adjustment factor to this total fuel-wood consumption volume to approximate what proportion of this fuel-wood would actually be derived from the project area and what would be collected from surrounding lands. Due to the continual degradation of the project area in the baseline, fuel-wood resources have been decreasing rapidly and so this level of demand could only be met from other resources. It was therefore assumed conservative to apply an adjustment factor of 50% to the total fuel-wood consumption to estimate what would come from the project area. The

average pre-project annual volume of fuel-wood gathering in the project area was thus calculated as 2,929 m^3 yr^{-1}.

Table CL.2.1.23. Average pre-project annual volume of fuel-wood

FG_{BL}	2,929 m^3 yr^{-1}

As explained in Section CL.2.2, the project plans to minimize leakage by implementing measures to reduce any likely occurrence. Regarding leakage from fuel-wood collection, the project will supply off-cuts from pruning, non-commercial thinnnings and harvesting to the local communities to meet their energy demands. Furthermore, an efficient cooking stoves initiative is planned to be implemented in 2011, which has the potential to reduce fuel-wood demand by up to 50 % (assumed in the calculations of future fuel-wood demand). The restrictions on fuel-wood collection start in 2010 since the project proponent didn't carryout full sensitization on restriction issues pertaining to fuel-wood collection until this point in time. It is therefore assumed that fuel-wood displacement only starts to take place in 2010.

Equation 51 from the methodology was used to calculate (hypothetically) the volume of fuel-wood gathering that could be displaced due to the project each year if all fuel-wood from the project area was exhausted, $FG_{outside,t}$, and is shown in Table CL.2.1.24 below:

Table CL.2.1.24. Volume of fuel-wood gathering displaced outside project area

Year	FG_{BL}	$FG_{AR,t}$	$FG_{outside,\ t}$
2006	4981	4981	0
2007	4981	4981	0
2008	4981	4981	0
2009	4981	4981	0
2010	4981	0	4981
2011	2490	2598	-108
2012	2490	176	2315
2013	2490	5669	-3178
2014	2490	2874	-384
2015	2490	11967	-9477
2016	2490	12774	-10283
2017	2490	15330	-12840
2018	2490	5312	-2821
2019	2490	39067	-36576
2020	2490	25507	-23016
2021	2490	45874	-43384
2022	2490	44861	-42370
2023	2490	11184	-8693
2024	2490	14446	-11955
2025	2490	2105	385

As can be seen in Table CL.2.1.24, more than half of the time the yearly supply of fuel-wood to communities goes beyond the demand - seen by the negative numbers. In these years there would be zero leakage and in the years where there is a significant surplus of supply, storage could be considered to meet future years' demand. In terms of carbon equivalents, this hypothetical leakage due to displacement from fuel-wood is shown in Table CL.2.1.25, calculated using Equation 56:

Table CL.2.1.25. Fuel-wood leakage

Year	$LK_{fuel\text{-}wood,\ t}$
2006	0
2007	0
2008	0
2009	0
2010	5936
2011	0
2012	2758
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0
2021	0
2022	0
2023	0
2024	0
2025	0
Total	8,694

Table CL.2.1.25 shows that even if no fuel-wood sources were available within the project area then the total leakage due to displacement of fuel-wood collection activities outside of the project area would result in a total leakage of 8,694 tCO_2e. Following the decisions made at EB 22, Annex 15, leakage emissions from fuel-wood consumption displacement can be set as zero if $LK_{fuel\text{-}wood} < 2\%$ of actual net GHG removals by sinks. The *ex ante* estimation of net actual GHG removals by sinks is 548,530 tCO_2e, which means that this example of fuel-wood leakage would by 1.58% of actual net GHG removals by sinks, and thus, would not have to be accounted anyway. This is satisfied in this case and as such the leakage from fuel-wood collection is set as zero. It should also be mentioned that this analysis has not factored in the reduced demand of fuel-wood through the communities planting their own woodlots, which is expected to start in 2010.

Total leakage

The total leakage was calculated using Equations 31, 32 and 33:

$$LK = LK_{ActivityDisplacement} + LK_{fencing}$$

$$LK_{Activitydisplacement} = LK_{conversion} + LK_{fuelwood}$$

$$LK_{conversion} = LK_{conv\text{-}graz} + LK_{conv\text{-}crop}$$

The only source of leakage was from the conversion of land to cropland with the total leakage calculated to be 7,749 tCO_2e. The timing of this leakage would be at the point at which the cropland activities were displaced – NFA issued letters back in August 2009 stating that the cultivators had to move their activities out of the Reserve by December 2009, so an activity displacement date of 2010 is used for the leakage assessment.

Table CL.2.1.26. Estimation of *ex ante* leakage

Year	Estimation of leakage (tCO2e)
2006	0
2007	0
2008	0
2009	0
2010	7,749
2011	0
2012	0
2013	0
2014	0
2015	0
2016	0
2017	0
2018	0
2019	0
2020	0
2021	0
2022	0
2023	0
2024	0
2025	0
Total (tonnes of CO2 e)	7,749

CL.2.2 Document how any leakage will be mitigated and estimate the extent to which such impacts will be reduced by these mitigation activities

Leakage prevention measures will be implemented to abate the magnitude of these leaked emissions from displaced activities. These include:

- Provision of fuel-wood from thinnings (first pine and maesopsis thinnings at year 4), prunings, offcuts from later thinnings and harvestings
- Implementation of an efficient cooking stoves programme for local communities, with the objective of reducing fuel-wood demand;
- Promotion of improved land management practices;
- Promotion of tree-planting through community woodlots, which will produce fuel-wood and charcoal-making in areas surrounding the project area;
- Alternative livelihood programmes such as improved agricultural techniques

Table CL.2.2.1 shows the amount of fuel-wood that will be supplied through the non-commercial thinnings of pine and maesopsis that take place after 4 years.

Table CL.2.2. 1: Pine and Maesopsis non-commercial thinnings supplied as fuel-wood

Year	Fuel-wood supply from Pine thinnings, m^3
2011	38
2012	334
2013	600
2014	949
2015	1,204
2016	627

Year	Fuel-wood supply from Maesopsis thinnings, m^3
2011	2,578
2012	0
2013	5,346
2014	2,105
2015	8,720
2016	2,578

In addition to the non-commercial thinnings, offcuts from harvests and thinnings (the left over woody biomass of the crown and branches when the trunk is being removed) and pruning will be supplied to communities as fuel-wood. Offcuts will be produced from all three tree species being planted in the A/R CDM project. Remnants of biomass from pruning will be provided as another supplementary fuel-wood supply.

Measures to minimize leakage from the displacement of cropland activities will be implemented by LFC through providing assistance in the establishment of agroforestry and improved agricultural practices on farmers' lands through education and workshops with agricultural extension workers. The increased yield and market value of these crops along with more greatly maintained soil fertility of such practices will reduce the need for additional farming lands.

Communities will establish woodlots on their farms from seedlings, which will be

supplied from the KFP nursery. This is an important community development initiative that GRAS encourages at all its plantations and is often very successful due to a large number of the community people learning plantation management skills through their work experience with the company. This type of initiative also encourages knowledge transfer to others who want to be involved with community woodlots but haven't been formally educated on forestry. Moreover, development of community woodlots provides a source of fuel-wood, wind breaks, poles, and timber and soil maintenance for the local communities. Food crop production can also increase as a result improved farming conditions due to the increased fertility of community soils.

Involvement and support of all adjacent communities will contribute to project success and protection of the established plantations, which is why community interests and needs are so important in integrating into project planning and implementation. In addition to stakeholder consultations during the EIA and the ecological assessment, a permanent Community Development Officer was recruited by the company to coordinate all necessary analysis, documentation, communication and training for a successfully functioning community programme of KFP. Authorized activities, such as deadwood collection are managed and coordinated by the Community Development Officer, ensuring that they do not exceed sustainable levels.

CL.2.3 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)

The total net climate benefits of the project are shown in section CL.4 and include the project related unmitigated negative offsite climate impacts.

CL.2.4 Non-CO2 gases must be included if they are likely to account for more than a 5% increase or decrease (in terms of CO2-equivalent) of the net change calculations (above) of the project's overall off-site GHG emissions reductions or removals over each monitoring period

As described in sections CL.1.2 and CL.1.3, some non-CO_2 GHG emissions are expected from the project activity but are unlikely to account for more than 5% of the project's overall off-site GHG emissions reductions.

CL3. Climate Impact Monitoring

CL.3.1a Develop an initial plan for selecting carbon pools and non-CO2 GHGs to be monitored, and determine the frequency of monitoring. Potential pools include aboveground biomass, litter, dead wood, belowground biomass, wood products, soil carbon and peat. Pools to monitor must include any pools expected to decrease as a result

of project activities, including those in the region outside the project boundaries resulting from all types of leakage identified in CL2

Please refer to section E of the A/R CDM PDD for the monitoring plan containing all parameters pertaining to the quantification of selected carbon pools and the frequency of monitoring.

The carbon pools that will be monitored are shown below. This is following the A/R CDM methodology. The monitoring of the aboveground carbon stocks will take place every 5 years at verification. The belowground biomass will be calculated from the aboveground measurements.

Table CL.3.1.a. 1: Selected carbon pools under methodology 4, version 4

Carbon Pools	Selected	Justification / Explanation
Above- ground	Yes	Major carbon pool subjected to the project activity
Below- ground	Yes	Major carbon pool subjected to the project activity
Dead wood	No	Conservative approach under the applicability condition
Litter	No	Conservative approach under the applicability condition
Soil organic carbon	No	Conservative approach under the applicability condition

CL.3.1b A plan must be in place to continue leakage monitoring for at least five years after all activity displacement or other leakage causing activity has taken place. Individual GHG sources may be considered 'insignificant' and do not have to be accounted for if together such omitted decreases in carbon pools and increases in GHG emissions amount to less than 5% of the total CO2-equivalent benefits generated by the project. Non-CO2 gases must be included if they are likely to account for more than 5% (in terms of CO2-equivalent) of the project's overall GHG impact over each monitoring period. Direct field measurements using scientifically robust sampling must be used to measure more significant elements of the project's carbon stocks. Other data must be suitable to the project site and specific forest type

Inline with AR-AM0004 Version 4, leakage will be monitored following the leakage section of the monitoring plan for 5 years from the project start date.

CL.3.2 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

The monitoring plan for climate objectives is contained in the applied CDM A/R methodology, available in the A/R CDM PDD entitled "Kachung Forest Project: Afforestation on Degraded Lands" . This will be followed throughout the lifetime of the project. The monitoring plan will be made publically available by its inclusion in the A/R CDM PDD, which is posted on the UNFCCC CDM website. Results of monitoring will be made publically available at verification periods of the CDM cycle

Community Section

CM.1.1 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 commissioned both an Ecological Survey and Environmental and Socio-economic Impact Assessment to assess environmental, social and economic baseline conditions and to identify, predict and evaluate foreseeable impacts, both positive and negative, that may arise from project implementation. These assessments used a range of different data collection techniques to obtain reliable information, including desk-based literature reviews covering background and secondary baseline information for the project site and surrounding area, analysis of the regulatory and institutional context, demographic data, project goals and benefits; field work, including line transects of the project area to elucidate the type and status of flora and fauna, and to identify sites of specific conservation importance for both biodiversity and communities; participatory approaches, including focus group discussions and community based meetings with all stakeholders affected by the project – local communities and resources users, local institutions and organisations, district officials, NFA and NGOs.

'With project' scenario

Project activities are expected to impact communities in a number of ways. Employment opportunities are a key aspect of the project relating to community development. The project activity employs 12 professional staff, 53 group employees and 264 casual workers, which will help alleviate poverty in the region and build capacity through teaching of new skills. Multiplier effects are also expected from this local economic development, allowing new small enterprises to enter the market. Furthermore, looking at the value chain from forest to end use, additional employment opportunities will be created from key commercial activities such as sawmills, timber and furniture/ timber dealers - though currently at this stage the locality of such downstream operations is still uncertain.

GRAS and LFC's Community Development plan is expected to bring positive benefits to key problems that communities are experiencing in the surrounding project area. High on the agenda is water security. Already GRAS and LFC have acted on this imperative, protecting 3 important springs of the local communities and with a plan to also rehabilitate 5 of the dilapidated bore holes. This improvement to water security will have profound benefits to the local communities, providing more reliable local access to water.



Figure CM.1.1.1 Evidence of GRAS and LFC's community development plan – protection of springs

Other key aspects of the community development plan are to promote community woodlots through the provision of seedlings and training to local communities. Extra seedlings are being raised for the first planting season of 2010, with 154,000 seedlings expected to be provided to communities. Community woodlots will bring a valuable livelihood to communities, providing a significant monetary sum once mature.

The HIV and AIDs sensitisation programme is expected to improve health and working capacity of the company employees resulting. The specific objective of the project is to improve the level of HIV/AIDS awareness and positive living among project employees and their family members; improve access to antiretroviral medicine (ARV) to HIV/AIDs infected employees and provide psycho-social support to HIV/AIDS infected and affected employees and their families. This intervention will also augment government policy to strengthen HIV/AIDS control and prevention in the work place.

Although the primary target group of this project is project workers of LFC, their spouses and children, the whole communities in the 14 villages were reached out with sensitization, HIV/AIDS testing and other behavioural change messages. Furthermore, in an effort to strengthen delivery of health care services, the project proponent has sponsored the construction of a children's ward in one of the health centre II. According to the district medical officer, once the construction is complete, it will automatically be

upgraded from health centre II to health centre III status, leading to increased level of health care delivery and services.



Figure CM.1.1.2 Construction of the children's ward at the health centre II

This alternative livelihoods programme of the community development plan will target poor, displaced community members who have had to relocate their activities outside of the reserve. It will not be exclusive to these individuals, but GRAS recognises that this group is important to include to mitigate potential negative impacts resulting from the project. The main objective of the alternative livelihoods scheme is to increase agricultural production, increase income from production and sale of farm produce and contribute to food security of the communities. The target group will be organized into groups comprising of 30 people and will be provided with basic farm implements/tools and planting materials.

Fuel-wood collection and charcoal burning had been on-going in the KCFR in an unsustainable manner before implementation of the project. The management plan of the project will still allow for the collection of fuel-wood for household use; however, this is only permitted from dead-wood and offcuts from silvicultural activities. This scenario, therefore, means that local communities' access to local energy sources will change. Having to collect fuel-wood from the project area in a sustainable manner may mean that supply is decreased slightly in the short-term, but beyond this time frame the project is expected to deliver an excess to the supply that was previously obtained from the reserve or in the baseline. Furthermore, community woodlots will also provide a source of fuel-wood, and the Community Development Plan includes an efficient cooking stoves programme, which focuses on the training women of the communities in the skills of stove and could potentially reduce the average wood consumption by up to 50%. In light

of this, the overall impact on access to local energy sources is expected to be positive over the lifetime of the project.

One aspect of the project which will have negative impacts on the local communities is the displacement of activities from the project area, including grazing activities and cultivation. It is illegal for these activities to be taking place in a forest reserve under Ugandan law, so the project proponents have no other choice than to keep such activities out of the project area. Inevitably this will impact local communities as they have to look for new areas to graze their cattle or cultivate, which may be further away than the project area. Nevertheless, the project proponents have identified areas of land where activities can be displaced to (see section CL2). In addition, the alternative livelihoods programme in the Community Development Plan will help initiate farmer groups and offer other ways of deriving a living from different natural resources.

Sites of Special Significant Interest (SSI) to the communities have been identified through community consultations and will be conserved from the project operations. Communities will still be able to access these sites throughout the lifetime of the project.

'Without project' scenario

The baseline conditions relating to the local communities in the project region are that of widespread poverty. In the absence of employment opportunities for most locals, communities have had little choice but to seek subsistence livelihoods focused on short term yields, including the following activities: cultivation, cattle rearing, fuel-wood collection and charcoal production. These activities are, thus, an integral part of the local communities' economies; however, they come at a cost to the environment. Land degradation is common in and around the forest reserve due to the above-mentioned activities.

In the absence of the project a continuation of these activities would be expected, in turn, leading to further degradation of the project zone. Implications of this would result in local communities having to travel further to find suitable, fertile land; or already degraded land could be further degraded, not being left fallow. Over the medium to long-term, food security would therefore be exacerbated. Families would be even more focussed on subsistence livelihoods, making it more difficult to find time to spend time with the family and support educational development of their children.

Difference between 'with project' and 'without project' scenario

The project is expected to bring net positive benefits to the communities surrounding the project area.

CM.1.2 Demonstrate that no High Conservation Values identified in G1.8.4-6 will be negatively affected by the project

The wetland areas within the project zone are fundamental for meeting the basic needs of local communities, which use them as water points for their cattle. This HCV will be protected through buffer zones – where no planting will take place – with a width of 30 metres between forest boundary and wetland. Local communities are able to access the watering points throughout the lifetime of the project.

Sites of specific conservation importance to the local communities, identified from the Ecological Survey, will also be conserved. A buffer zone of 10m has been left unplanted surrounding these sites and sign boards have been installed for identification.

CM2. Offsite Stakeholder Impacts

CM.2.1 Identify any potential negative offsite stakeholder impacts that the project activities are likely to cause

The displacement of illegal activities - such as cattle grazing and cultivation - from the project area will result in encroachers having to re-establish activities in new areas surrounding the reserve. Land has been identified where these activities can be re-established; however, inevitably negative impacts will be incurred through the increased labour of re-establishing the activities and potential increase in distance to the new sites. This increase in land-use outside of the project area could result in increased competition and, thus, could affect people beyond that of users of the forest reserve.

Potential negative impacts could also arise in the short-term regarding fuel-wood supply. Communities will still be able to access the reserve for fuel-wood but will be limited to just collecting deadwood or offcuts - pre-project activities, such as living trees being chopped down for fuel-wood, will not be allowed. Overall the project is expected to bring significant positive fuel-wood benefits, providing much more fuel-wood than would be available in the *"without project"* scenario; however, the main measures which are expected to bring these benefits may be not be effective until the medium term – for example, community woodlots will not provide fuel-wood until the trees have had significant growth, the same will occur from the A/R CDM project thinning, harvestings and offcuts – resulting in a potential short-term reduction.

Pollution of local water resources from fertilizer was highlighted as a potential risk which could impact local communities, along with potential litter from polythene tubes used for seedlings in the nursery. Other potential negative impacts have been identified as pest outbreak, due to pine and eucalyptus species being vulnerable to certain pest outbreaks (*chacid wasp* and aphids); and project infrastructure causing soil erosion.

CM.2.2 Describe how the project plans to mitigate these negative offsite social and economic impacts

The project proponents are implementing a community development plan which contains alternative livelihood initiatives, including apiary, fish farming, poultry and agroforestry. These are all activities suitable for the region and ones which local communities are interested in pursuing as alternative livelihoods. This programme of activities will include the targeting of local community members who were practising subsistence activities in the project area.

The possible short-fall in fuel-wood supply to local communities in the short-term will be mitigated through implementation of an efficient cooking stoves initiative scheme, which will target training women in how to make such stoves. This is expected to reduce the demand of fuel-wood used by local communities by up to 50 %.

Potential negative offsite impacts from the pollution of water resources will be mitigated through use of chemicals only approved by NEMA and FSC, and by monitoring the water quality of the wetlands through both visual monitoring and assessment of water samples.

Pest outbreak will be monitored in collaboration with Makerere University and appropriate remedial action taken should any pests be found. Road systems for project infrastructure will be designed to minimize environmental degradation.

CM.2.3 Demonstrate that the project is not likely to result in net negative impacts on the well-being of other stakeholder groups

As demonstrated in the *"with project scenario"* in section CM 1.1, the project is expected to bring multiple benefits to the local communities and stakeholders within the project zone. Although some potential negative impacts have been identified, these are expected to be mitigated through measures implemented by the project. The project is therefore not likely to result in net negative impacts on the well-being of other stakeholder groups.

CM3. Community Impact Monitoring

CM.3.1 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)

GRAS has developed a companywide community monitoring plan, which will be transferable to each of its individual forestry projects[54]. The objective is to monitor changes in livelihood and well-being overtime in communities impacted by GRAS' projects. A sociologist with substantial experience in sociological research methods and community development was contracted to carry out the work in line with a Terms of Reference devised by GRAS (see Appendix 1 for the Terms of Reference). The plan was initially developed and tested at one of the company's Tanzanian projects and, following this, will be implemented at other project sites, including KFP. The community monitoring plan is generic and easy to tailor to different project environments.

Key variables that the monitoring plan will cover are listed below, though this is not necessarily exhaustive:

1. Employment
2. Income
3. Demographic and welfare aspects
4. Infrastructure and service provision
5. Health aspects/ profile
6. Cultural profile
7. Education profile
8. Housing profile
9. Food security/ nutrition

The generic monitoring plan and guidance will include:

- Appropriate indicators of the livelihoods of the communities, and questions that should be monitored and which can be compared inside and outside project area, and over time.
- Identify sampling technique for monitoring the selected indicators
- Advice and training on execution and note taking during surveying
- Appropriate methods for analysis, quantification and interpretation of data collected

Local communities surrounding the project sites will be assessed by the monitoring.

[54] Community Monitoring Guide For Green Resources' Forest Plantation Projects

It is envisaged that monitoring and reporting for the community monitoring plan will take place every three years, though this will be confirmed once the final plan is developed.

CM.3.2 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

Measures to protect HCV areas related to community well-being present in the project zone, outlined in section CM.1.2, will mainly be accessed through the community monitoring plan but also through additional means, such as ground truthing or remote sensing if this is deemed more suitable at the time of assessment.

For G.1.8.4, critical hydrological services will be assessed through monitoring of the wetland areas to determine whether land degradation has been abated and sustained, water levels and quality are not decreasing and that no planting is occurring within the wetlands.

Areas that are fundamental for meeting the basic needs of the local communities, G.1.8.5, include the wetland areas within the project zone. Therefore the monitoring of G.1.8.4 will also cover this component. Areas that are critical for the traditional cultural identity of communities, shown in section G.1.8.6, will be demarcated with clear sign posts so that they can be conserved. Follow up on the conservation measures will be monitored both visually and through incorporating this aspect of the project into the community consultations.

In addition to all of this, FSC assessments and audits will be carried out at the project – expected to start in 2011.

CM.3.3 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

The project proponents hereby commit to developing a full monitoring plan within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publically available on the internet and are communicated to the communities and other stakeholders.

Biodiversity Section

B1. Net Positive Biodiversity Impacts

B.1.1 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.

As described in section GL.1.7, the project proponent contracted a team of ecologists from Makerere University to carry out an ecological survey of the project zone to gauge the current status of biodiversity within the project zone. Appropriate methodologies were applied, including transects of the project area and sample plots to identify different species and their abundance. The overall findings were that the project zone is generally not rich in biodiversity due to past and present human activities reducing natural habitats through unsustainable activities[55]. However, there are wild animals that can be found within the project area, including antelopes, wild rabbits, monkeys, aquatic life and a range of different plant species. Most of the species that were found have their habitats linked to sites of strategic/significant importance, occurring along the wetland and remaining pockets of forest, which are set aside for conservation and protective measures. No first class nationally protected, endangered species or IUCN species were found. The natural vegetation has been reduced to grassland and shrubs, although there are some belts of "forested areas", as defined under the CDM, and wetlands to the west of the project zone.

'With project' scenario

The A/R CDM project will plant a mixture of exotic – pine and eucalyptus – and indigenous species – maesopsis eminii. Exotic species are not unfamiliar to the site: the Forest Department planted small areas of pine back in the 1930s and more recently in the 1970s, thus this is not the first time that such exotic species have been introduced; and furthermore, the species are not invasive – see B.1.3.

As well as reforestation, a significant area of the project zone will be conserved to benefit biodiversity and communities that use these areas. The forest area, which has been identified in the southern part of the project, will be protected and enhanced through enrichment planting with indigenous species. This will significantly improve the area's biodiversity, turning it from a degraded forest of principally exotic species (gmelina

[55] *Environmental and socio-economic impact statement report* by Enviro-Safety Consults Ltd. (2008)

arborea) to an indigenously enriched forest. This will create an environment which can harbour biodiversity.

Wetlands are a key area for biodiversity and are found in the reserve. The project proponents have therefore made the conservation of the wetlands a project objective due to the threat of degradation from agricultural activities by local communities. These activities are also illegal in the forest reserve and the project proponents must not allow the activities to be on-going. The project proponents have been facilitating the relocation of agricultural activities to areas outside of the project area, relieving the wetlands of degradation. A further measure to protect the wetland areas is a buffer zone - an area where no trees will be planted - being left around the wetlands as a precautionary measure so that planted trees will not interfere with the water table. A buffer of 60 meters (30 metres each side) is being left around the wetlands as a conservation measure. Indigenous trees found in the A/R CDM project area will also be conserved with 10m buffers.

'Without project' scenario

The results of the ecological survey show that the reserve does not have a rich biodiversity, which is not surprising due to continued degradation of the land and high human population having put continued stress on the reserve. In the absence of the project, the reserve would be expected to be further degraded through a continuation of the unsustainable land-use activities such as subsistence agriculture and clearing of trees for fuel-wood and charcoal burning. This would lead to degradation of key sites of biodiversity significance, such as the wetlands and the forest area.

Difference between 'with project' and 'without project' scenario

The project is expected to bring net positive biodiversity benefits through conservation of the wetland areas and enrichment planting of the degraded forest area with indigenous species. These activities will positively impact biodiversity in the project zone; conversely, in the absence of the project further degradation would be witnessed. LFC will monitor changes in biodiversity by monitoring soil, water and species abundance and diversity. Specifically we expect both soil and water quality and protection of natural habitats to see positive improvements as a result of the project. We will monitor these parameters on a suitable interval to ensure no negative impacts occur, and if any are witnessed the management plan will be punctually reviewed with mitigation measures put in place.

Forest plantations of *Pine* and *Eucalyptus* species have often struggled for acceptance by certain sections of society, particularly environmentalists and NGOs. The most frequent allegations are that they are harmful to the soil and may reduce valuable water resources. However, different scientific literature point to the following benefits:

Relieving pressure on natural forests is another key objective of the project. A principal cause of deforestation of natural forests in the tropics and sub-tropics is increasing demand for fuelwood and building materials by urban and rural populations particularly in poor countries. Forest plantations have a considerable role to lay in releasing this pressure (Campinhos 1999[56]; Nambiar 1999[57]; Sedjo 1999[58]; Jacovelli 2009[59]).

Planted forests may improve soils. Many forest plantations are grown on marginal land for agriculture and may act to improve soil fertility and protect against erosion. For example, significant increases in organic carbon content have been recorded when pastures were converted to *Eucalyptus* plantations in Brazil (Lima et al., 2009[60]). Forest plantations in the tropics may stabilize the soil; provide erosion control by providing soil cover, interception of rainfall and by the binding actions of roots (Evans & Turnbull 2004[61]). Because of these characteristics there are also many examples of planted forests being used in the tropics as a form of protective reclamation on degraded or sensitive sites, for example after mining operations or in degraded upland areas which were previously forested (Evans & Turnbull 2004[7]).

The project is therefore expected to bring net positive biodiversity benefits through conservation of the wetlands areas and enrichment planting of the degraded forest area with indigenous species, as well as improving the soil fertility. These activities will positively impact biodiversity in the project zone; conversely, in the absence of the project further degradation would be witnessed.

B.1.2 Demonstrate that no High Conservation Values identified in G1.8.1-3 will be negatively affected by the project.

As shown in section G.1.8.1-3, the project zone has been identified as having HCV G.1.8.1 and G.1.8.2. For G.1.8.1 the project zone is HCV since it contains a cultural site of importance to the local communities. In addition, the forest reserve and wetland area represents a protected area

[56] Campinhos, E (1999) *Sustainable plantations of high-yield Eucalyptus tree for production of fiber: the Aracruz case*. *New Forests* 17: 129-143.

[57] Nambiar E.K.S (1999). *Pursuit of sustainable plantation forestry*. Southern African Forestry Journal 184: 45-62

[58] Sedjo R.A (1999). *The potential of high-yield plantation forestry for meeting timber needs.* New Forests 17: 339 – 359

[59] Jacovelli P (2009*) Uganda's sawlog production grant scheme: a success story from Africa.* International Forestry Review 11: 117-122

[60] Lima A.M.N, Silva I.R, Neves J.C.L, Novais R.F, Barros N.F, Mendonca E.S, Smyth T.J, Moreira M.S and Leite F.P (2006). *Soil organic carbon dynamics following afforestation of degraded pastures with eucalyptus in southeastern Brazil*. Forest Ecology and Management 235: 219 – 231

[61] Evans J and Turnbull J (eds) (2004). *Plantation forestry in the tropics* (3rd Edition). Oxford University Press, New York. 467pp

with sustainable use of natural resource, and the wetland areas of the project zone represent an area of higher biodiversity value compared to the other land-class strata identified. The project will ensure that these areas will not be negatively affected by the project through conserving the cultural site and clearly demarcating it to ensure protection. To enable sustainable use of the natural resources, LFC will still allow local communities to access the wetlands with their cattle. In addition, fuel-wood collection will still be permitted within the forest reserve. The project will also aim to protect the wetlands from cultivation, which was a common activity in the baseline scenario. An alternative livelihoods programme will be implemented as a way to help protect the wetland areas. G.1.8.2 identifies the project zone as a HCV based on the biodiversity status of the wetlands. This HCV won't be negatively affected by the project as explained for G.1.8.1.

B.1.3 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 species to be planted are *Pinus caribaea*, *Eucalyptus grandis*, *Eucalyptus clones* (*grandis* and *camaldulensis* (GC) hybrids) and *Maesopsis emiini*. Other species are also being planted for trial, enrichment planting and research purposes, such as *Melia azedarach*, *Tectona grandis*, *Markhamia lutea*, *Vitellaria pradoxa* and *Gmelina arborea* trees. The carbon benefits of these trials will not be included in the carbon estimates, and thus are not included within the A/R CDM project (see map shown G.3.3 for location of experimental plots). All species have been screened against the global database of invasive species and are not invasive in Uganda[62].

Table B.1.3.1: Species to be planted in the A/R CDM project:

No.	Species selected	Type	Uses
1	*Pinus caribaea*	Exotic softwood	Timber
2	*Eucalyptus grandis*	Exotic hardwood	Poles, timber
3	*Eucalyptus clones (GC)*	Exotic hardwood	Poles, timber
4	*Maesopsis eminii*	Indigenous hardwood	Timber

B.1.4 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 planted exotic species are obtained from high quality stock generated from genetically superior seed well adapted to the prevailing site conditions and broadened within and between species so as to ensure sustainability of the plantations against pests,

[62] http://www.issg.org/database/welcome/

diseases and climatic fluctuations. The project proponents are planting both pine and eucalyptus species which are exotic to Uganda.

Possible adverse effects of the planted tree species include suppression of the grass and shrub as a result of canopy closure. This will, however, provide suitable habitats for shade tolerant plant species as well as other taxa not facilitated by fire. Tree species planted are not invasive and therefore do not pose a threat to indigenous eco-systems in and around the project site. No disease introduction is expected as a result of exotic tree planting as those species have been in use in the region for decades now without any serious disease or pest incidences.

There are recent controversies and critiques from adverse public reactions against planting of exotic species with a deep root system. The major argument is that pine and eucalyptus species have deep root growth, which demands a vast amount of water to grow that can lead to decreasing water levels from underground reserves and streams as a result of their deep root system over time.

Roots hold soil and prevent erosion, and root growth creates air pockets which lead to increased soil permeability. A national Tanzanian study by Munishi, 2007[63], identified impacts of eucalyptus on water resources. This study showed that eucalyptus trees do not degrade water resources because various species have various water requirements. Excessive water uptake is therefore a function of species type and environmental conditions. Like most other plants, eucalyptus species adjust their water uptake to the available soil water; reducing their water uptake as the soil dries and controlling water loss by regulating stomata opening. Thus, a high water table would allow a fast depletion, but as the water level falls water uptake decreases concurrently. This is supported by FAO[64] (Davidson 1993), which compares the Eucalyptus with a range of crops. Moreover, it is evident that eucalyptus can achieve a high biomass production on a low nutrient uptake (as little as one-half to one-tenth that of most agricultural and estate tree crops). The same study also reveales that Eucalyptus appears to use less water per unit weight of biomass produced than other kinds of trees and many agricultural crops. Water consumption by eucalyptus is reduced by planting trees further apart or by thinning existing plantations, thus lowering water consumption per unit area of land.

In relation to concerns regarding pine, about 70 % of the wood in a pine is above ground – the rest being in the roots. Most of the nutrients are held in the needles and litter which is not removed from the site when trees are harvested. Furthermore, a global study on the

[63] The Eucalyptus Controversy in Tanzania. Munishi (2007)

[64] Ecological Aspects of Eucalyptus Plantations. Davidson (1993) FAO

http://www.fao.org/docrep/005/ac777e/ac777e06.htm

effects of both pine and eucalyptus afforestation on water yield[65], depicted that when shrublands and grasslands were afforestated with eucalyptus and pine trees, annual run off was reduced by 75% and 40%, respectively (Farley et al 2005).

With these studies in mind, the project proponents believe that planting eucalyptus and pine will not result into water and soil degradation in the area. Planting of pine and eucalyptus shall respect a buffer of at least 60 meters (30 meters each side) from the wetland and woodland areas that will be conserved following FSC principles and criteria. This is to avoid growth disturbance by the exotic trees and also to allow harvesting to occur without impacting conservation areas.

The use of non-native species can be further justified as follows: Firstly, the deforestation rate in Uganda is extremely high, with an annual loss of 2.2 % in forest area between 2000 and 2005[66], putting the country amongst the top ten highest in the world for this period. To counter this, sources of sustainable wood products must be developed to substitute natural forest being lost through deforestation. Uganda is deficient of a sustainable timber supply which can meet the demand driving such deforestation. The project's objective is to help remedy this problem. Non native species are the most affective to use in this case, due to their faster growth. Furthermore, silvicultural knowledge and experience with native species is limited in the Lango region, with just maesopsis as an exception, which presents a significant risk in large scale planting without exotic species. The Ugandan government and SPGS both promote the planting of pine species.

B.1.5 Guarantee that no GMOs will be used to generate GHG emissions reductions or removals.

No GMOs will be used by the project to generate GHG emissions reductions or removals.

B2. Offsite Biodiversity Impacts

B.2.1 Identify potential negative offsite biodiversity impacts that the project is likely to cause.

The displacement of illegal activities such as cultivation and cattle grazing from the project area will mean that activities are re-established in areas outside of the project.

[65] Effects of grassland and shrub land Afforestation with Pines and Eucalyptus on water yield: a Global Synthesis with Implications for policy. Farley et al (2005). Global Change Biology

[66] Forest Resources Assessment, FAO of the UN, 2005

This is could result in potential negative offsite biodiversity impacts with potential land-use change to make way for agriculture and grazing activities. As shown in CL.2.1, however, there are grasslands surrounding the reserve which could accommodate the displaced activities. Although areas of the grasslands could potentially become degraded from the re-establishment of these activities – this has been assumed and accounted for in calculating the emission reductions by leakage - the project proponents are implementing an alternative livelihoods scheme to help local communities diversify livelihood activities to less land demanding ways of life (see section CM.1.1 for further details of the alternative livelihoods programme). It is therefore envisaged that not all of the activities that are displaced from the project area will be re-established.

Other potential offsite biodiversity impacts arise from pollution risks from the nursery operations where fertilizer and polythene tubes are being used. Fertilizers pose a risk to local water sources if not managed correctly, potentially polluting local water sources, including the wetlands, and causing eutrophication, which would negatively impact biodiversity with the wetlands area. Increased likelihood of pest outbreak poses a risk to offsite biodiversity, with both pine species and eucalyptus species being vulnerable to the chalcid wasp and aphids. If pests and diseases aren't monitored and controlled they would also be a potential risk to biodiversity outside the project area.

B.2.2 Document how the project plans to mitigate these negative offsite biodiversity impacts.

To mitigate negative impacts from displaced activities causing degradation to areas of land outside the project as they're re-established, the project proponents will implement an alternative livelihoods programme with the objective of creating employment and subsistence activities which are less detrimental to the environment – see section CM.1.1 for further details. The alternative livelihoods programme will target encroachers of the reserve for voluntary participation to minimize the leakage effects and consequent biodiversity impacts; however, the programme will not be exclusive to these community members. The provision of seedlings to local villages for community woodlots will also provide an alternative livelihood.

Potential pollution risks from the nursery operations will be mitigated through only using fertilizer chemicals which have been approved by NEMA and are accepted by the FSC. All of GRAS' projects are to be developed to achieve FSC certification, so management procedures will be in place to monitor the use of different types of fertilizers. Polythene tubes will be recycled when possible and disposed of properly when this isn't possible. Pest and disease training has taken place at KFP to increase awareness and capacity of employees in identifying an outbreak. Monitoring will take place through the lifetime of the project and remedial action taken when an outbreak occurs to prevent the disease or pest from moving further within the project or offsite.

B.2.3 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.

The alternative livelihoods plan is expected to mitigate some of the negative impacts to biodiversity resulting from the potential re-establishment of displaced cultivation activities from the project; however, it is likely that there will still be some re-establishment, and thus, some degradation to grasslands. Another important point which must be considered when trying to judge the overall biodiversity impact of the displacement and re-establishment of cropland is the land-class the activities are moving from, and the land-class that they going to. A significant proportion of the cultivated areas were in within the wetlands area of the project and the activities are likely to be re-established in grassland areas identified outside the project area. Displacement of cropland activities from the wetlands inside the project area to grasslands outside the project zone overall represents a net positive impact for biodiversity. This is due to the higher biodiversity value of the wetlands region compared to that of the grasslands.

With all other potential negative biodiversity impacts being mitigated and the conservation objectives of the project in respect to the wetlands and enrichment planting with indigenous species in the degraded forest area, the project is expected to bring net positive effects for biodiversity.

B3 Biodiversity Impact Monitoring

B.3.1 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).

GRAS has developed, in collaboration with a professor from Sokoine University of Agriculture, Tanzania, a companywide biodiversity impact monitoring plan and guidelines[67] (the ToR of which can be found in appendix 2). This monitoring plan seeks to quantitatively and objectively monitor the biodiversity changes in a comprehensive manner, within and outside the influence of the project and will be applicable to all of GRAS' A/R projects. The initial biodiversity monitoring plan is being developed at one of GRAS' Tanzanian projects and is seen as the overarching, generic biodiversity monitoring plan. This will then have to be tailored to each project. Variables to monitor include, species abundance and its richness, species diversity, species composition in a given strata, effects reforestation to their habitats and focusing on those species with a high risk of being negatively impacted by the project.

[67] Companywide Biodiversity Monitoring Guidelines For Green Resources Forest Plantations

The monitoring technique will vary based on nature of the species being monitored i.e. aquatic or terrestrial, plant, animal or bird species. With this study, the variables are categorised as response and pressure indicators. The response indicators will allow for direct measurement of the biota e.g. the number of certain organisms of importance in a given area, diversity indices, similarity indices and presence or absence of a given organism. The pressure indicators will measure processes that threaten aspects of biodiversity such as those related to establishment of plantations in a natural ecosystem, impacts of different plantation management regimes (by species) fire regimes, zonation of the plantations and others. Surrogate measures shall be used where indicators are difficult to assess. These measures will be used where there is a clear relationship between the abundance or presence of a given organism and a certain pressure e.g. fire regimes, plantation establishment, and management treatment among others. Monitoring scheme shall assess changes in biodiversity across the year and annual monitoring reports shall be prepared and submitted to NEMC as one of the Environmental Management Act requirements. Biodiversity monitoring plan will keep track of changes in these attributes as the project goes on and is compared with the baseline scenario. The monitoring scheme shall ensure that any changes identified are registered, quantified and rectified. The biodiversity monitoring shall be conducted consistent with the CDM monitoring plan.

The monitoring plan and guidance will include:

- Appropriate indicators of biodiversity that should be monitored and which can be compared inside and outside the project area, and over time to include terrestrial plants, avian, mammals, fish important insects and selected aquatic flora and fauna

- Identification of sampling technique for monitoring the selected indicators

- Appropriate methods for analysis, quantification and interpretation of data collected

- A tool on how to select key indicators for the generic monitoring guidance document

- Development of data entry sheets, and analysis and recommendations

The approach to be used will involve:

- First, the identification of biodiversity indicators. Indicators usually demonstrate changes in biodiversity. Depending on the level of management the indicators will be grouped into two broad categories according to what they assess may be Response Indicators or Pressure Indicators
- Visit to specific field sites for assessment of area specific conditions and review of project documents

- Second discussions with relevant staff and other stake holders for review and refinement of the selected indicators for appropriateness and acceptability. This will be done in a series of meetings possibly with appropriate staff in Mafinga and Dar es Salaam.

Response indicators

- The Response Indicators will be those that can assess how species, groups, or ecosystem attributes respond to pressures on the ecosystem

- These will therefore involve those indicators that allow for direct measurement of the biota e.g. the number of certain organisms of importance in a given area, diversity indices, similarity indices and presence or absence of a given organism

- They can provide information about other biodiversity elements, as well as the ones directly sampled

- These indicators are expected to give a more direct understanding of biodiversity though may be more difficult to measure and assess the result
- Response indicators will be the most appropriate for monitoring over the long term and will be the major focus for the current monitoring plan

Pressure indicators

- The Pressure indicators to be considered will be those that measure processes that threaten aspects of biodiversity such as those related to establishment of plantations in a natural ecosystem, impacts of different plantation management regimes (by species) fire regimes, zonation of the plantations among others

- These indicators will be more appropriately used across large scales

- It is therefore likely to be used when developing the generic guidance document in conjunction with response indicators

Other indicators

- Where appropriate indicators may be difficult to assess surrogate measures will be used. These measures will be used where there may be a clear relationship between the abundance or presence of a given organism and a certain pressure e.g. fire regimes, plantation establishment, and management treatment among others. In this case the extent of the pressure can be measured as a surrogate of the population of the organism in question.

B.3.2 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.

No HCV areas have been identified in the project zone and therefore no specific plan will be in place to assess the effectiveness of such measures.

B.3.3 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.

The project proponents hereby commit to developing a full monitoring plan within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publically available on the internet and are communicated to the communities and other stakeholders.

Gold Level Section

GL1. Climate Change Adaptation Benefits

GL.1.1. Identify likely regional climate change and climate variability scenarios and impacts, using available studies, and identify potential changes in the local land-use scenario due to these climate change scenarios in the absence of the project

Not applicable (N/A)

GL.1.2. Identify any risks to the project's climate, community and biodiversity benefits resulting from likely climate change and climate variability impacts and explain how these risks will be mitigated

N/A

GL.1.3. Demonstrate that current or anticipated climate changes are having or are likely to have an impact on the well-being of communities and/or the conservation status of biodiversity in the project zone and surrounding regions

N/A

GL.1.4. Demonstrate that the project activities will assist communities and/or biodiversity to adapt to the probable impacts of climate change

N/A

GL2. Exceptional Community Benefits

GL.2.1. Demonstrate that the project zone is in a low human development country *or* in an administrative area of a medium or high human development country in which at least 50% of the population of that area is below the national poverty line

N/A

GL.2.2. Demonstrate that at least 50% of households within the lowest category of well-being (e.g. poorest quartile) of the community are likely to benefit substantially from the project

N/A

GL.2.3. Demonstrate that any barriers or risks that might prevent benefits going to poorer households have been identified and addressed in order to increase the probable flow of benefits to poorer households

N/A

GL.2.4. Demonstrate that measures have been taken to identify any poorer and more vulnerable households and individuals whose well-being or poverty may be negatively affected by the project, and that the project design includes measures to avoid any such impacts. Where negative impacts are unavoidable, demonstrate that they will be effectively mitigated

N/A

GL.2.5. Demonstrate that community impact monitoring will be able to identify positive and negative impacts on poorer and more vulnerable groups. The social impact monitoring must take a differentiated approach that can identify positive and negative impacts on poorer households and individuals and other disadvantaged groups, including women

N/A

GL3. Exceptional Biodiversity Benefits

N/A

Annex 1

P.O. Box 4730
Dar es Salaam
06/10/2009

GREEN RESOURCES AS

INVITATION FOR THE DEVELOPMENT OF A COMPANY WIDE COMMUNITY PLAN GUIDELINES FOR GREEN RESOURCES PLANTATION, AND TAILORED TO UCHINDILE AND MAPANDA REFORESTATION PROJECTS

Introduction

Green Resources AS (GRAS) is a plantation, carbon offset, forest products and renewable energy company operating in Tanzania, Uganda, Mozambique and Southern Sudan. The company is Africa's leading forestation company and has more than 14,000 ha of forest; growing trees to generate carbon credits and bio-energy, and to manufacture wood products. Green Resources Limited (GRL) is a Tanzanian subsidiary of GRAS. GRL engages in tree planting in the Southern Highlands, specifically in Mufindi and Kilombero Districts. So far, GRL has planted over 10,000 hectares of both pines and eucalypts and small areas of local and exotic hardwoods.

Apart from developing industrial plantations, other company objectives include improving the livelihoods of the communities surrounding our projects.

Objectives of the Company

- To develop Tanzania's forest sector so that it makes a significant contribution to the sustainable development of the local community and the nation at large
- To mitigate climate change by reducing greenhouse gases through carbon sequestration in forest plantations and renewable energies
- To conserve the environment and enhance biodiversity
- To contribute towards socio- economic well being and improved livelihoods of communities residing around our forests

Objectives of contract

Communities play a significant role in our forest project implementation and success. It is a company objective to have a good relationship with the communities, and to ensure that villagers` benefit positively from the company's activities. We are interested in monitoring changes in livelihood and well-being overtime in communities impacted by our projects. We are also interested to carry out the survey at a 'control' village which hasn't been impacted by the project to compare changes in livelihood overtime 'with' and 'without' being influenced by a Green Resources reforestation project. To objectively assess changes in well-being, appropriate indicators need to be selected to, quantify and document changes, and then design appropriate survey questions that will provide relevant information for the indicators. Green Resources has worked on a draft survey, but we now need this to be improved upon to ensure that questions are appropriate, that relevant indicators are covered, and that guidance is provided on data entry, analysis and presentation of results in a report. The assignment also involves training of Green Resources Community Development Officers in execution of the survey from field work to report completion.

Terms of Reference

Design a robust, clear and repeatable monitoring plan covering appropriate indicators of changes in livelihoods of the communities directly impacted by the Uchindile and Mapanda Forest Projects. The monitoring plan should also be transferable for use at other GRL projects as well as GRAS` sister projects elsewhere in Tanzania, Uganda and Mozambique.

Specific Deliverables:

- Review and improve our questionnaire; target questions to the point and minimize open-ended responses which can make it hard to analyze quantitatively
- In the case of open ended questions provide advice for coding answers for analysis
- Develop a generic database for raw data storage and analysis
- Conduct a pilot pre-survey to check the efficacy of the questionnaire, analyze and make adjustments,
- In addition to conducting the survey in our project-villages, also do the same survey in one or two villages that is not affected by our projects but similar to the project-villages. This village shall work as a 'control' village measured against the survey villages

- Write a report showing how to analyse the data and how to interpret outcomes and draw out results. The report should also contain specific recommendations on;
- survey sampling intensity,
- how to select villages and how many,
- selection of respondents that covers a cross-section of the community in relation to gender, age, sex, income, religion/tribe etc.
- Provide group training with community officers from GRAS and guide them through the whole process of data collection and analysis in one of our GRL projects such they will able to repeat the community monitoring programme in its entirety at other locations.

The monitoring plan and guidance will include:

- Appropriate indicators of the livelihoods of the communities, and questions that should be monitored and which can be compared inside and outside project area, and over time.
- Identify sampling technique for monitoring the selected indicators
- Advice and train on execution and note taking during surveying
- Appropriate methods for analysis, quantification and interpretation of data collected

Annex 2

P.O. Box 4730
Dar Es Salaam.
14/08/2009

GREEN RESOURCES AS

INVITATION FOR THE DEVELOPMENT OF A COMPANY WIDE BIODIVERSITY MONITORING GUIDELINES FOR GREEN RESOURCES PLANTATIONS, AND TAILORED TO UCHINDILE AND MAPANDA REFORESTATION PROJECTS

Introduction

Green Resources AS (GRAS) is a plantation, carbon offset, forest products and renewable energy company operating in Tanzania, Uganda, Mozambique and Southern Sudan. The company is Africa's leading forestation company and has more than 14,000 ha of forest; growing trees to generate carbon credits and bioenergy, and to manufacture wood products. Green Resources Limited (GRL) is a Tanzanian subsidiary of GRAS. GRL engages in tree planting in the Southern Highlands, specifically in Mufindi and Kilombero Districts. So far GRL has planted over 10,000 hectares of both pines and eucalypts and small areas of local and exotic hardwoods.

Apart from developing industrial plantations, other company objectives include conservation of wetlands, water catchments areas and natural habitats for flora and fauna.

Objectives of the Company

- To develop Tanzania's forest sector so that it makes a significant contribution to the sustainable development of the local community and the nation at large
- To mitigate climate change by reducing greenhouse gases through carbon sequestration in forest plantations and renewable energies
- To contribute towards socio- economic well being of communities residing around our forests, by creating employment and participating in development projects such as building roads, hospitals, schools and village reforestation programs
- To conserve the environment and enhance biodiversity

Objectives of contract

The conservation of biodiversity has become an important issue receiving huge attention all over the world. However, biodiversity still has many different meanings to a wide number of people, and consequently can have various interpretations and definitions. The result of this is that many stake holders involved in environmental projects, such as forest conservation, describe biodiversity in a rather general manner, with little emphasis on quantitatively representing the term.

GRAS strives to use best practices in the management of its forest plantations and is committed to adhering and upholding the principles and criteria of the Forest Stewardship Council (FSC), as well as the Climate Community and Biodiversity Alliance (CCBA). The company has undertaken ecological surveys as well as environmental impact assessments for all its major plantations.

However, development of a generic biodiversity monitoring plan to assess impacts throughout project life, which can be applied to GRAS' projects across East Africa, is currently not in place and is an important requirement of the certification standards GRAS is using, in particular the CCBA. GRAS, therefore, wants to develop a *robust* monitoring plan for biodiversity, which is comprehensive and scientifically credible, and has particular emphasis on *quantitatively* and *objectively* monitoring biodiversity changes as a result of project implementation. An integral part of the plan will be to monitor biodiversity inside and around the project, but also in an area of similar pre-project habitat which is beyond the projects influence (to compare the biodiversity in the 'with' and 'without' project scenario).

This terms of reference calls for the development of a generic company wide environmental monitoring plan that can be easily adapted for all the company's forest projects across East Africa (using local expertise to tailor to local conditions appropriately, but within guidelines), as well as development of a full monitoring plan for GRL's Uchindile and Mapanda Forest Projects, with selection of species to be monitored and exact monitoring protocol clearly laid out.

Terms of Reference

Design a *robust*, *scientifically credible* and *quantitative* monitoring plan addressing all the appropriate indicators of ecosystem health and biodiversity in Uchindile and Mapanda Forest Projects, and which is able to be transferred to GRL and GRAS' other projects.

Specific Deliverables:

- A site specific biodiversity monitoring plan showing size, location, timing and frequency of monitoring for Uchindile and Mapanda Forest Projects
- A generic guidance document for biodiversity monitoring at all Green Resources Forest Projects so that local project management can create their own monitoring plans within an overarching company monitoring framework

The monitoring plan and guidance will include:

- Appropriate indicators of biodiversity that should be monitored and which can be compared inside and outside the project area, and over time (it is assumed this will include insect, avian, aquatic and mammals, although left at the discretion of the consultant to advice as appropriate)
- Identified sampling technique for monitoring the selected indicators
- Appropriate methods for analysis, quantification and interpretation of data collected
- A tool on how to select key indicators for the generic monitoring guidance document
- Development of data entry sheets, and analysis recommendations