CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM FOR A/R CDM PROJECT ACTIVITIES
(CDM-AR-PDD)
(Version 05)

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PROJECT DESIGN DOCUMENT FORM
FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 05

SECTION A. General description of the proposed A/R CDM project activity

A.1. Title of the proposed A/R CDM project activity:

Namwasa Central Forest Reserve Reforestation Initiative
Version 07 (January 30th, 2013)

A.2. Description of the proposed A/R CDM project activity:

The New Forests Company Limited (NFC) has launched Uganda's largest sustainable plantation forestry operation based in Mubende District, Uganda, 130 km outside of the capital city, Kampala. The Namwasa Central Forest Reserve Reforestation Initiative is based in one of 506 government owned Central Forest Reserves (CFR), managed by the National Forest Authority (NFA); many of these reserves have been subject to degradation through illegal timber trading and agricultural and grazing encroachment, the expansion of which the NFA has been unable to curtail on a national scale due to a lack of government resources. Through a licensing agreement, NFC has committed to a minimum 50 years of forestry activities in the reserve, with operations certified to the Forest Stewardship Council's™ (FSC) ten principles. NFC was certified to FSC in May of 2009.[1] The company plants trees and harvests timber destined for sawlog production, pole treatment and other value-added wood products. The first trees were planted in March of 2006. NFC is a subsidiary of New Forests Company Holdings Limited (NFCH).

The Namwasa Reserve is surrounded by 30 rural villages, where the primary livelihood activity has historically been subsistence agriculture or cash-cropping for bananas (*matoke*) and coffee, and less commonly animal husbandry. Rising migration trends in the district primarily prompted by the lack of access to fertile lands in drought-prone and highly degraded southern and western districts, coupled with a fast-growing local population, have increased the strains on the local eco-system; once comprised of high tropical forest, the reserve has been reduced to degraded grasslands, bushlands, and diminishing pockets of indigenous woodlands, all subject to small-scale shifting agricultural practices. NFC's landholdings covers 8,281 hectares of heavily and illegally encroached upon degraded agricultural and grazing lands. The carbon programme comprises 2,481.5 hectares of eligible land. The remaining 5,799.5 hectares form either ineligible planted lands that were forest in 1990 or conservation zones. The plantation is comprised primarily of the species *Pinus caribaea,* and *Eucalyptus grandis,* with smaller amounts of *Pinus oocarpa,* and *Eucalyptus urophylla.* 410 hectares of high conservation value forest, protected for natural regeneration purposes so as to promote biodiversity conservation and watershed enhancement, are located within the boundaries of the reserve. In addition, the company actively preserves NFC conservation areas in excess of 3,000 hectares.

The New Forests Company's Namwasa operation responds to the growing demand for quality timber resources in a country experiencing one of the world's highest birth rates, a continued construction boom and increasing pressures on a diminishing natural resource base. Uganda's rate of deforestation is estimated at an annual loss of 2.13%; Mubende District, where Namwasa is located, lost 79% - 14,712 hectares – of its forest cover between 1990 and 2005.[2] Presently, expanding timber demands cannot be met by weak timber production infrastructure. The recent influx of overseas development aid from the European Union and Norwegian Government through the Sawlog Production Grant Scheme signals the

[1] Certificate Code: SGS-FM/COC-006224. License number: FSC-C001823

[2] National Environment Management Authority. *State of the Environment Report for Uganda (*Kampala, 2008), 143.

challenges met in the Ugandan timber industry. Both large- and small-scale operators in the sector face considerable difficulties in accessing credit, acquiring technical expertise and creating value-added market chains.

Aside from generating long-term, additional greenhouse gas reductions, the Namwasa initiative fully integrates NFC's approach to responsible community engagement and environmentally responsible management practices.

The New Forests Company Ltd is a privately run enterprise with a committed corporate responsibility programme. Through regular stakeholder consultations and participatory rural appraisals, NFC has collaborated with local communities to identify key development goals and design the projects which can address these. Accordingly, the company has invested in school blocks, high school computer labs, borehole construction for improved access to potable water, and local tree seedling distribution. Most recently the company led the construction of health clinics for workers and their families, and launched an apiculture programme to help diversify local revenue streams. NFC's operations have reaped net-positive spin-off benefits for local communities through job creation, improved infrastructure and the dissemination of technical knowledge on tree growth and harvesting.

Committed to sustainable forestry, NFC is ensuring the conservation and on-going monitoring of 410 hectares of biodiversity rich forest within the Namwasa project boundaries. These high conservation areas were otherwise under threat of degradation, and are expected to regenerate as NFC has effectively mitigated localized anthropogenic pressures, including grazing, fuel-wood collection and slash-and-burn agriculture.

A.3. Project participants:

Please list project participants and Party(ies) involved and provide contact information in Annex 1.

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Indicate if the Party involved wishes to be considered as a project participant (Yes/No)
Uganda (host)	The New Forests Company Limited	No
United Kingdom	New Forests Company Holdings Limited	No
(*) In accordance with the CDM A/R modalities and procedures, at the time of making the CDM-AR-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		
Note: When the CDM-AR-PDD is prepared to support a proposed new baseline and monitoring methodology (form CDM-AR-NM), at least the host Party(ies) and any known project participant (e.g. those proposing a new methodology) shall be identified.		

A.4. Description of location and boundaries of the A/R CDM project activity:

A.4.1. Location of the proposed A/R CDM project activity:

The project is located within the Namwasa Central Forest Reserve in Mubende district, 130 km west of the Ugandan capital, Kampala. The reserve is owned by the Ugandan Government, the land rights of which have been licensed to the New Forests Company Uganda for 50 years.

A.4.1.1. Host Party(ies):

Ugandan government

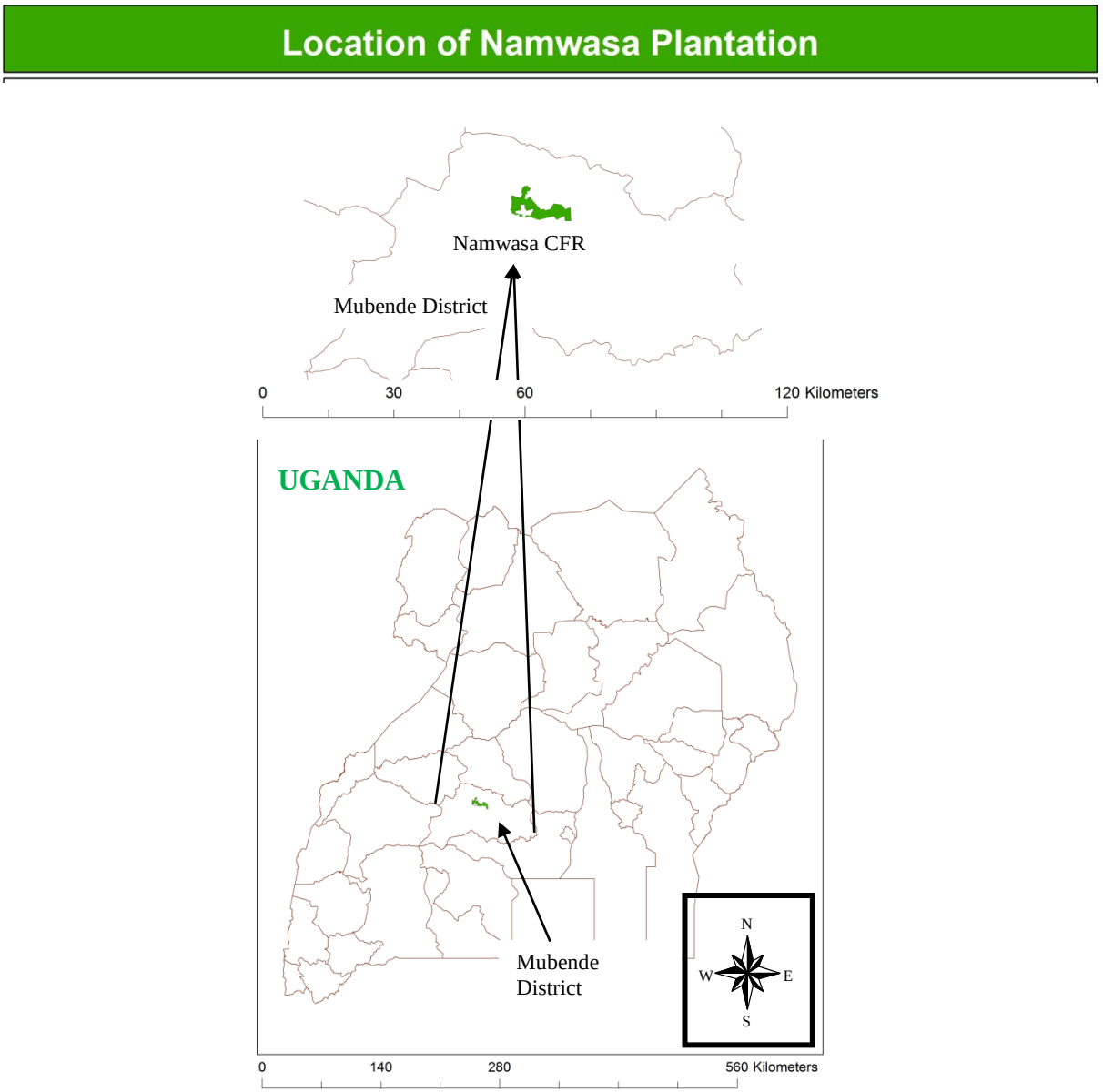
A.4.1.2. Region/State/Province:

The project is located in Mubende District.

A.4.1.3. City/Town/Community (if applicable):

The Namwasa Central Forest Reserve is situated in the sub counties of Bukuya, Madudu and Kassanda, in Buwekula and Kassanda North counties of Mubende District. Namwasa is situated about 30 km east of Mubende city.

Figure A.4.1.3: ***Location of Namwasa Central Forest Reserve in Mubende District and in Uganda***



A.4.2 Detailed geographic delineation of the project boundary, including information allowing the unique identification(s) of the proposed A/R CDM project activity:

Namwasa CFR lays approximately between 341,000 and 360,000 on the x-axis and between 65,000 and 79,000 on the y-axis in UTM Zone 36. Altitudes range from 1135 to 1540 meters. The outermost latitude and longitudes are marked by the following coordinates:

	Easting	Northing
South-east	360500	65078
South-west	341206	65078
North-east	360500	79722
North-west	341206	79722

The area covered by planting activities eligible under the CDM is 2,481.5 hectares: 490.3 hectares of eucalypts and 1991.2 hectares of pine. This does not include the 410 hectares of High Conservation Value Forest or areas unfit for planting. External boundaries are comprised primarily of local villages and a series of rural dirt roads running approximately 30 km to the main highway linking Kampala to Fort Portal. All shape files will be made available to the Designated Operational Entity (DOE).

Using advanced Geographic Information System (GIS) software, NFC has tracked the boundaries of the reserve using the regular measure of Global Positioning System (GPS) coordinates along the planting perimeters. Unique GPS coordinates are recorded for each planting compartment. GIS maps are built on a Universal Transverse Mercator (UTM) grid confirming exact boundary locations. The associated map files are attached as an appendix both in excel and shape file formats, with the adoption of unique identifiers for each segment of eligible land

A.5. Technical description of the A/R CDM project activity:

A.5.1. Concise description of the present environmental conditions of the area planned for the proposed A/R CDM project activity, including:

A.5.1.1. Climate:

Uganda has a tropical climate characterized by two rainy seasons as derived from the dynamic between a shifting equatorial low-pressure trough and the inter-tropical convergence zone. The country's rainfall is sensitive to *El Nino* effects, responsible for both flooding and drought incidences in recent years. Namwasa temperature is likely to be similar to that of Mubende, with a mean daily temperature of 20°C. Depending on the season, temperatures in Uganda will range from 17°C in July to 3°C in February.[3]

Namwasa is situated in a remote area of the country. There are no rainfall or temperature recording facilities within or near the reserve. The nearest is at Mubende Town (about 30 km to the west). Part of the climate data listed here therefore was derived from the monitoring station in Mubende Town, the data from which feeds into a system managed by the Department of Meteorology in the Ministry of Water and Environment. Due to the lack of available data, NFC regularly measures rainfall at site, as described in Table A.5.1.1

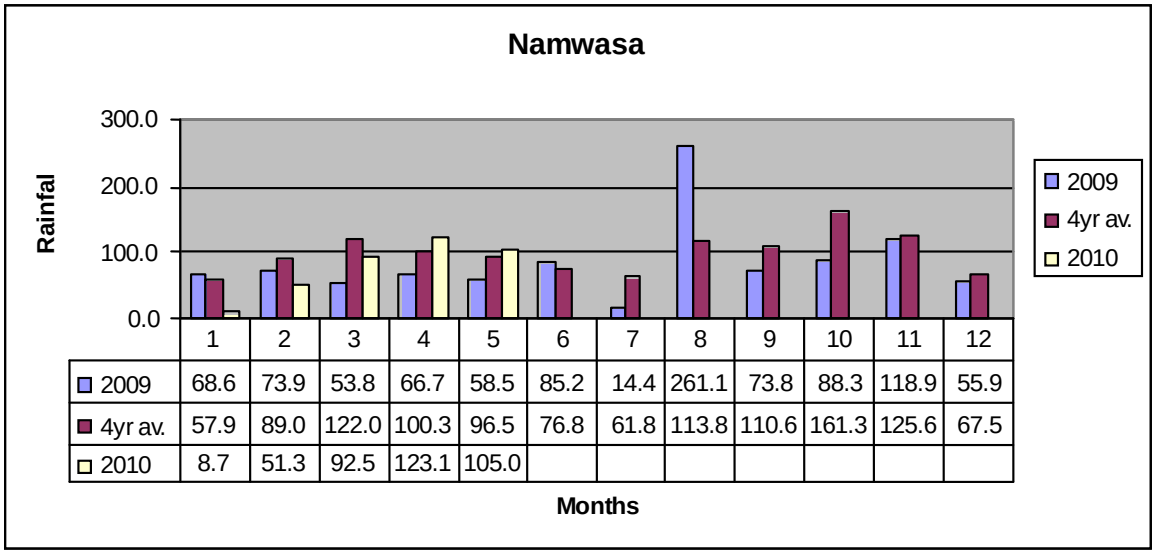
A.5.1.2. Hydrology:

Namwasa is situated between the 1125 mm and 1250 mm isohyets. The western and north-eastern parts of the reserve receive more rain than the eastern and southern eastern parts.

[3] World Water Assessment Programme, *National Water Development Report: Uganda* (Uganda, 2005), 26-27, 61.

As elsewhere in the region, the rainfall occurs twice during the year. The first rains fall during March through May. The first rains are followed by a short dry season during the months June through July, in which only sporadic showers occur. The second rainy period is during the months of September through November. Typically, the second rainy season is followed by a long dry and severe season that may start as early as the first week of December and continues to the third week of March – a period of three months without rain.

Table A.5.1.1: ***Rainfall Trends in Namwasa (mm)***



	1	2	3	4	5	6	7	8	9	10	11	12
2009	68.6	73.9	53.8	66.7	58.5	85.2	14.4	261.1	73.8	88.3	118.9	55.9
4yr av.	57.9	89.0	122.0	100.3	96.5	76.8	61.8	113.8	110.6	161.3	125.6	67.5
2010	8.7	51.3	92.5	123.1	105.0							

2009 precipitation trends in Mubende District fell in line with historical norms, even while parts of the country experienced unusually low instances of rainfall, sometimes leading to drought.[4] Mean monthly rainfall as recorded over four years was 98.5 mm.

[4] Ministry of Water and Environment, Department of Meteorology, *September to December 2009 Seasonal Rainfall Outlook* (Entebbe, August 27th, 2009), 1.

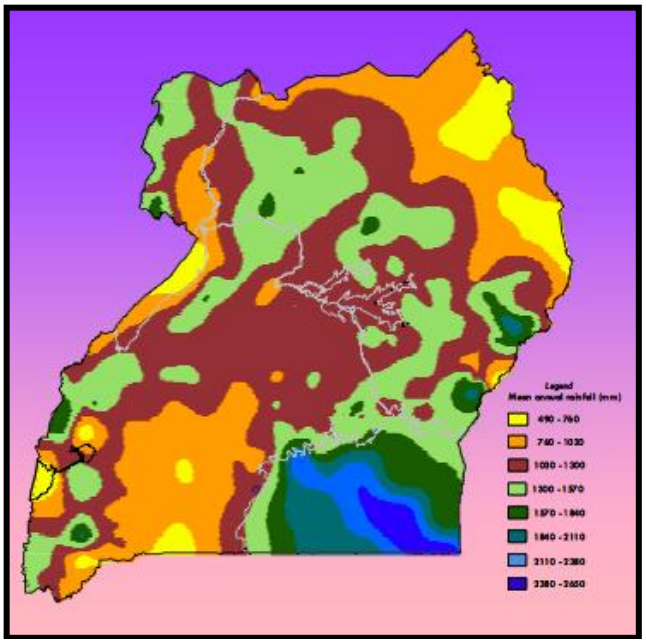


Figure A.5.1.2: ***Distribution of Mean Annual Rainfall, Uganda***
Source: National Water Development Report: Uganda.

Several permanent streams (Mpologoma, Kayanja and Nabakazi) run into the Namwasa River for which the reserve is named and which is located in the north of the CFR. Wetland zones are scattered across the plantation, housing rich biodiversity. These areas are actively preserved by NFC.

A.5.1.3. Soils:

Central Uganda – the location of Mubende district – is marked primarily by a fairly flat terrain as part of the Great African Plateau. This rises some 1,300 meters above sea level, and is typified by small, undulating, flat-topped hills.[5] The reserve occupies a series of hills in the Central part of Mubende District locally known as "Singo Hills". Some of these hills such as Mporogoma (1,441 m), Buliro (1,386 m), Kigude (1,408 m) and Bwacapira (1,356 m), mark the highest altitude in the surrounding area. The whole reserve occurs at mid altitude ranging from 1,234 to 1,444 meters.

Namwasa is made up of the Buganda – Tororo series of rocks (also known as Lower Proterozoic Toro), which dominate most of central and part of Western Uganda. They are mixed with other rock types known as Mityana series especially in the South Western parts as found on Netulidde hills. The Buganda – Tororo series are largely made up of argillites overlying basal aranites; rock composition ranges from phyllitic mudstone and shales to mica schists, typified by non-calcareous sediments. [6] Tight folding took place in these rocks in an east-north-northeastly axis. The age determination suggests that the Buganda – Tororo series of rocks are approximately 1,800 million years old.

[5] World Water Assessment Programme, *National Water*, 24.

[6] Anonymous,, "Simplified Geology of Uganda" *The Mining Journal, Ltd* 2000, 2.; World Water Assessment Programme, *National Water, 5.* SGS, *Forest Management Certificate Report: Document Number AD 36A-08* (South Africa, January 2009), 9-10.

A.5.1.4. Ecosystems:

The former Uganda Forest Department performed a biodiversity report on the CFRs in Kiboga and Mubende Districts in 1996, reporting that the areas were characterized by dry *Combretum* savannah, and scattered moist, semi-deciduous forest. The flora and fauna were highlighted for their lack of diversity and the Forest Department noted that few rare or area-restricted species were found in the reserves.[7] Further assessment by an independent research team at Makarere University in 2010 identified swamp forest, riverine forest, tropical moist forest, woodland, thicket, bushland, croplands and grassland. The semi-deciduous forest has likely lost a significant portion of its species richness due to intense degradation trends.

The 2010 baseline survey identified 288 plant species, consisting of 168 genera and 70 family groups. The most prevalent vegetation families are Fabaceae, Asteraceae, Poaceae, Malvaceae, Moraceae, Acacnthaceae and Euophorbiaceae. 88 species of butterfly have been recorded in the reserve, making up 7.1% of the country's total butterfly survey. More than half of these butterfly are dependent on forest and woodland cover. Bird species richness is particularly high because of the presence of acacia species which provide for high insect presence. 158 species were recorded in 200 meter transect points established in 2010.[8] Transects were established primarily in woodland and forest zones, and results are not representative of the majority of Namwasa's land, which is composed primarily of degraded bushland and active croplands as part of a shifting slash-and-burn agricultural cycle.

A.5.2. Description of the presence, if any, of rare and endangered species and their habitats:

In parallel with the project development and planting, NFC commissioned a Baseline Ecological Survey in late 2008. The expert identified several transects from which to observe the presence of mammals. Discussions were also undertaken with field-staff to determine which species they had seen during their work in forest stands and near conserved areas. From this, the expert developed a list of site-specific mammals, based off of direct and indirect observation in the reserve's environs. Note was made that the effect of historical illegal encroachment in the reserve coupled with illegal hunting had reduced mammal populations while also destroying their natural habitat – primarily dense primary forest in valleys, and savannah grasslands.

The final list includes two International Union for Conservation of Nature (IUCN) animals identified as vulnerable: The African savannah elephant *Loxodonta africana* and the lion *Panthera leo.* But while both animals used to occur in the area, neither one was visually identified, nor recently observed by any field-staff. As part of its commitment to FSC's ten principles, NFC will continue monitoring the presence of vulnerable species, as part of its conservation programme. Accordingly, and as described in section A.5.1.4, in late 2010 an independent research team from Makerere University initiated a biodiversity monitoring exercise, with a specific focus on bird and butterfly prevalence and vegetation regeneration trends. The list of all observed and reported animals are described in Table A.5.2.1 below.

[7] Robert Kityo, James Kalema and Derek Pomeroy, *Biodiversity of Namwasa Forest Reserve, Mubende District, Uganda: Detailed baseline studies on selected taxa for development of the long term monitoring program* (Kampala,November 2010), 18, 46.

[8] Kityo, Kalema and Pomeroy, *Biodiversity of Namwasa*, 50.

TABLE A.5.2.1: ***Observed and Reported Animals in Namwasa Central Forest Reserve, 2008***

Common Name	Scientific name	Known to occur	Used to occur	Probably still occurs	Conservation Status
Bush Duiker	*Sylvicapara grimmia*	+			Least concern
Black-and-White Colobus Monkey	*Colobus quereza*	+			Least concern
Vervet Monkey	*Chlocebus pygerythrus*		+	+	Least concern
Bushbuck	*Tragelaphus scriptus*	+			Least concern
Buffalo	*Syncerus caffer*		+		Least concern
Common Warthog	*Phacochoerus africanus*	+	+	+	Least common
African Savanna Elephant	*Loxodonta africana*		+		Vulnerable
Spotted Hyena	*Crucuta crocuta*		+	+	Lower risk
Lion	*Panthera leo*		+		Vulnerable
Crested Porcupine	*Hystrix cristata*	+			Least concern
Slender-tailed Mongoose	*Herpestes sanguineus*	+			Least concern
Common Genet	*Genetta sp*	+			Least concern
Serval Cat	*Felis serval*	+			
East African Civet	*Civettictis civetta*	+			Least concern
Side-stripped Jackal	*Canis addjustus*	+			Least concern
Leopard	*Panthera pardus*	+			Least concern
Bushpig	*Potomochoerus porcus*	+			Least concern

As part of its FSC commitments, NFC will continue biodiversity monitoring to include bird and butterfly species. This is described in more detail in section F.1 – F.3: net positive and negative environmental impacts of the project.

A.5.3. Species and varieties selected for the proposed A/R CDM project activity:

NFC has chosen its land-use activities within the CFR according to stipulations laid out in the National Forestry and Tree Planting Act (2003). The Act lays out the intended function of CFRs, which includes the protection and enhancement of forests and forest produce, and the promotion of tree-planting activities. Section 32 asserts that any land-use activity shall be solely practiced with the use of a license delivered by the NFA. With CFRs identified for the sustainable development of forestry assets, this excludes free-roaming grazing, the introduction of agricultural activities, charcoal burning or illegal timber harvesting.[9]

The Namwasa Reforestation Initiative is based on the growth of two exotic species – pine and eucalyptus - specially chosen for their suitability to the climatic and soil conditions typical to the reserve, as well as for their productive capacity. The species promote the rapid enhancement of forest produce, and the timber output of the CFR, one of the mainstay objectives of the NFA's mandate for CFR management. The following species have been chosen:

- *Pinus caribaea*
- *Pinus oocarpa*
- *Eucalyptus grandis*
- *Eucalyptus urophylla*

A.5.4. Technology to be employed by the proposed A/R CDM project activity:

The New Forests Company uses the latest state-of-the-art technologies to manage its forestry operations in Namwasa. Presently, the company is building an integrated management system (IMS) to guide plantation operations. The IMS captures all elements of the ISO 9000 / 14001 and will ensure the company's on-going compliance to FSC, as well as its strict adherence to carbon monitoring protocols. Currently the company ensures the quality of its operations with the following tools:

- NFC tracks its silviculture activities in the advanced database Microforest System, which provides accurate figures on key factors such as planting progress and stand density, mortality rates, soil characteristics and site preparation; the system facilitates ease of reference by breaking down activities by compartment and stand model, and forms the basis of all planning exercises as defined in the head offices in Johannesburg. Communications from the rural plantation are eased by the implementation of high-speed Internet technology. MicroForest is regularly updated and cross-checked at the Kampala head offices and in the field for accuracy;
- The Heads of Planning and Forests facilitate their work through the use of GIS and GPS technologies for monitoring purposes and the quality control of activities per compartment;
- The implementation of recommendations provided by Environmental and Socio-Economic Impact Assessments

[9] "Frequently Asked Questions on Forestry," Uganda National Forestry Authority, accessed July 28th, 2010, http://www.nfa.org.ug/content.php?submenu_id=12.

Plantation operations are largely guided by adherence to the Forest Stewardship Council principles. Field-based staff strictly complies with the Plantation Management Plan, Silviculture Manual and Fire Prevention Plan (to be made available to the DOE), all of which are designed to meet the needs of FSC.

NFC manages its own nurseries on site. Fertilizers are used discriminately on stands of eucalyptus, with a single application of DAP fertilizer (18% nitrogen, 46% potassium), equating to 75kg per hectare or 45 grams per tree.[10] On occasion, a second application is made, depending on observed growth patterns. A small percentage of the total land area was burned in advance of planting; slashing preparation is practiced regularly in areas dominated by thick herbaceous vegetation.

The following provides a review of NFC's plantation operations:

Site Preparation:

NFC relies on detailed maps, developed from GPS coordinates and analyzed using advanced GIS software. Namwasa is broken down into compartments, for which planting schedules are developed. Compartments are targeted for preparation, with the exact area, in hectares, for any activity determined in advance. The Plantation Manager receives instructions from the Johannesburg head-office, and delivers work orders to field-staff. All work done is recorded and the final area remapped to ensure completion of work, for cross-checking purposes. Results are sent back to the head office for inclusion in the company's advanced database system, allowing for the continuous update of compartment (stand) maps.

As there are several different vegetation structures in Namwasa's boundaries – representative of the slash-and-burn cycle of regrowth, maturation and destruction of stock for replanting - site preparation techniques can vary. No strip-ploughing or tillage is employed – all activities are managed manually with *pangas* or slashers, and hand-held saws. NFC relies on manual bush clearing, and on occasion, burning techniques to clear the more thickly vegetated portions of Namwasa lands in advance of planting. This includes slashing of non-woody herbaceous plants and small woody bushes. In general, any standing trees are cut – though given the degraded state of the land, few remain. Depending on the quantity of cleared bush, vegetation is stacked and burned upon drying, or had been recuperated by local charcoal makers for production purposes. No mechanical clearing is practiced, ensuring the integrity of soils. These site preparation techniques only apply to the more densely vegetated portions of the lands. In the instance of croplands and grasslands, minimal slashing is required to prepare the site.

Once a site is prepared, field staff lay down a baseline with chain, cable or rope to ensure plot symmetry. Pits are marked in teams: two individuals man the rope or chain, and other team members mark the pits. In strict accordance with FSC standards and the requirements outlined in the EIA, pits are laid away from wetlands, streams and dams. They are not created near indigenous forest (50 meters distance), to ensure optimum conservation results. All buffer zones are laid out in GIS maps and communicated to team members prior to pitting exercises.

Pits are 30cm in diameter and 25cm deep, and the pit's quality is measured using a pitting gauge. Pitting is identified as a low-impact planting method, which helps reduce incidence of soil erosion. NFC's Environmental Impact Assessment recommends the adoption of this technique.

[10] According to the Executive Board's 42 meeting report, paragraph 35, emissions from fertilizer use, removal of herbaceous vegetation and from transportation need not be accounted for in a proposed CDM A/R project. As such, the New Forests Company will only monitor the GHG emissions associated with biomass burning.

Seed and Seedling Quality

Per FSC stipulations and Ugandan law, no genetically modified seeds are used at Namwasa. The seeds are chosen according to their suitability to the soils at Namwasa, as determined through detailed soil analysis.

Foresters review the health and quality of all seedlings while they are still in the nursery. Seedlings are carefully loaded into vehicles for dispersal across the plantation site, and are delivered in trays carefully placed on racks. Within 24 hours of their removal from the nursery, seedlings are planted. During planting, seedlings are kept in cool, shaded areas to avoid prolonged exposure to the sun. Detailed notes are taken for each seedling dispatch, ensuring the ability to track stock numbers and stand registers; these are all filed for future reference.

Nursery Management

Nursery operations are planned 12 months in advance, based on planting targets, seed and labour availability and budgetary objectives.

Nurseries are chosen for their location near sustainable water supplies and centrality to plantation operations. Site access is ensured in advance of any construction, and typically 2-3 hectares are prepared, lined with fencing. Holding tanks are used for water storage purposes. Nursery beds are 1.2 meters wide, ensuring workers' access to the beds. Paths are 1m wide, with every fourth bed demarcated by a 2m pathway.

Sites are chosen for proximity to quality topsoil. Pine seedlings are potted for mychorrhizal soil with a minimum of a 1:10 sand/soil mixture. The pots used are designed with a 250 gauge polyethylene in a 3 inch diameter for both pine and eucalyptus. Once seeds are received from the Johannesburg head office, details on species type, purity, quality, % germination, batch number, and provenance are recorded and filed.

All sowing operations are supervised by the Nursery Manager. Pine is planted two seeds per pot, whereas for eucalyptus, broadcast sowing is used. In advance of sowing, seeds are soaked for 12-24 hours, and pots are watered immediately following sowing.

Seed stock numbers are recorded per bed. Pricking out is practiced on eucalyptus once the first pair of true leaves have expanded, and on pine once a height of 1-1.5 cm is reached. Weeding is practiced continuously; when needed, fungicide and insect control chemicals are used, per FSC stipulations. Watering frequency depends on the season and rainfall.

The Nursery Manager keeps a number of records:
1. Daily rainfall figures
2. Daily fuel/chemical stock levels
3. Seedlings dispatches
4. Seed stock balances
5. Daily labour attendance
6. Daily productivity
7. Instructions and guidelines
8. Plans/budget requisitions

9. Fertilizer, herbicide and pesticide usage register
10. Seed stock

Fertilizer Use[11]

As the soils in and around Namwasa are deficient in potassium, and occasionally nitrogen, a single application of diammonium phosphate (DAP) fertilizer is used when planting eucalyptus – 75kg/hectare. On rare occasions, fertilizer is used for pine seedlings brought to particularly deficient soils. Fertilizer is applied as a spot application using a measuring scoop and within one week of planting. Depending on the need, fertilizer may be applied post-pruning and within established stands.

Forest Maintenance

For the purposes of producing the highest quality timber, NFC thins its stands, removing poorly formed or small trees. This optimizes the quality of the prescribed stem production per hectare. Thinning takes place one year after planting during the summer months. This is performed by hand, or by using a hoe or axe. Any identified tree mortalities are replaced with seedlings that have passed a quality inspection.

Pruning is almost entirely restricted to pines. During the initial pruning activity, no more than 50% of the crown cover can be removed. The second pruning must not exceed more than 30% crown cover. Stands receive pruning treatment between 4 and 6 years of age, with the use of billhooks or hatchets. Particular attention is given to ensuring that the bark on the main stem is not damaged. Thinnings are stacked following detailed management prescriptions, to avoid risk of fire and ease of entry into the stands.

Regular roadside pruning is practiced for ease of vehicle access and road safety. Two rows of trees are pruned to meet this purpose, and more on occasion to accommodate blind corners. Similarly, firebreak pruning is undertaken at a height up to five meters, and only on trees that have attained ten meters.

Weeding is practiced regularly, as the ecological conditions are highly conducive to rapid weed regeneration. Attention is given to completely removing the weeds' root systems to prevent regrowth, using hoes or picks. Efforts are made to rely primarily on manual labour to remove weeds. Within the provisions of the Forest Stewardship Council's principles, strictly monitored herbicide applications are reverted to when necessary.

During pre-planting exercises, no weeds are to be left in the stand. For trees that are less than 1 meter high, no weeds are allowed with the inner 25 cm radius. In the 25-50 cm radius, 25% of the area may be covered by weeds less than 25 cm high. In the inter-rows, weeds may not be higher than 25 cm. For trees greater than 1m and prior to closure of the canopy, the inner 50 cm radius may be populated with an area not exceeding 25% (no higher than 25 cm), and the inter-rows cannot have weeds higher than half the tree height.

NFC has adopted a pro-active approach to managing pests and diseases. Potential insect pests and diseases common to the region have been identified. Forestry staff has been trained to identify them. As part of the forestry staff's daily rounds, it is expected that individuals look out for potential occurrences of pests and diseases. If anything is observed, it is immediately reported to the Plantation Manager, and committed to a "Disease, Insect and Disaster" logbook. Incidences are also committed to a database for

[11] According to the Executive Board 42 meeting report, paragraph 35, emissions from fertilizer use, removal of herbaceous vegetation and from transportation need not be accounted for in a proposed CDM A/R project.

record purposes. According to the particular threats posed by various pests and diseases, the Head of Forestry has developed methods for dealing with any potential incidences.

Planning

Planning is primarily based off of the use of advanced GIS software, supported by GPS ground measurements. The Head of Planning and Planning Forester develop all planting schedules; rapid communication between the rurally based plantation staff and head offices in Johannesburg, South Africa, is facilitated by high-speed, satellite based Internet.

Risk Management

NFC has implemented an exhaustive fire prevention plan and fire registry, as well as a pest and disease monitoring and mitigation system. Together, these management practices greatly reduce the risk associated with natural or human-induced disasters. The company's *Silviculture Manual* and *Fire Prevention Plan* capture the ways in which these two risks are managed. They are housed in the IMS system, and will be made available to the DOE.

A. Fire Prevention

The *Fire Prevention Plan,* to be made available to the DOE, includes the following:

- □ A description of all plantation boundaries and the location of compartments within those zones. A prescription for the management of external breaks in each boundary zone is provided, including dates of completion for activities such as slashing.
- □ The location of internal fire breaks and prescriptions for their maintenance
- □ Provisions for identifying potential fire-risk areas on pre- and post- burning season fire maps. Higher risk areas, such as the store complex and guard positions, have particular rules for maintenance that must be strictly adhered to.
- □ All external fire-risks, such as slash-and-burn practiced by subsistence farmers along the border of the plantation, are identified. Methods for mitigating fire risks from these sources are presented for field-staff.
- □ A fire danger rating system, ranging from "very easy to control" to "extremely difficult to control" is provided. The responsibilities for each field-staff member are described relative to the rating system.
- □ All available vehicles, fire-fighting tools and radio transmitters are recorded for ease of access.
- □ The approach for managing controlled burning, for site preparation, is detailed, including how to guard areas following a burn to avoid the spread of fire.
- □ Fire Procedures are detailed for both fire and non-fire seasons.
- □ The organization of labour at plantation is detailed. A single team consists of a tractor with a 3,000 litre tanker unit, including 6 labourers and a driver; a supervisor and 14 labourers; 1 forester. Provisions are made to bring in more labour in the event that the fire spreads rapidly and is uncontrollable, and for when fires take place outside of normal working hours.
- □ Fire reports and reporting documents support the tracking of all incidence of fire.
- □ Back burning may be authorized by the plantation manager to fight fires, with particular safety procedures to ensure that no one is caught between the fire and the back-burn.
- □ Roles and duties are assigned, with the determination of who becomes the "Fire Boss" during the event of an outbreak, and a Fire Boss checklist used to track proper progress in the field.
- □ Fire investigations are undertaken to detect the root cause of any plantation fires.
- □ Data sheets detailing the composition of standby teams are used.

B. Pests and Disease

NFC's *Silviculture Manual* describes the company's pest and disease control strategy:

- □ A list of the most common diseases and pests in Eastern Africa and modes of identification
- □ Prescriptions to avoid the creation of conditions under which pests and diseases thrive, notably correct site-species matching, controlled pruning and the use of disease resistant tree species.
- □ Scouting is undertaken by all forest employees and contractors, notably supervisors. Should any observations be made, samples will be taken.
- □ Reports are brought to the Head of Planning, who will determine the best way to manage the situation.
- □ A log book captures all reported incidences of disease and insect infestation.
- □ Management techniques are provided for dealing with an array of diseases and pests

A.5.5. Transfer of technology/know-how, if applicable:

Corporate responsibility is at the core of NFC's business operations. Accordingly, the company has made considerable investments in the communities surrounding Namwasa. In January of 2010, NFC initiated an outgrowers programme, led by a technically trained extension forester. The programme increases local awareness about the value of small-scale timber operations and agroforestry, helps diversify and strengthen the local economy, provides much needed technical advice, establishes a sustainable source of fuel-wood production and provides participants the opportunity to access long-term revenue streams. Management practices align with FSC principles.

In the first phase, the programme seeks to distribute seedlings destined for timber production: *Pinus caribaea* and *Eucalyptus grandis*. In a second phase, to be launched in 2012, research and development expertise will focus on introducing agroforestry techniques to locals. This will include extending seedlings for fruits such as citrus, mangos, avocados, passion fruit and pineapple.

The scheme targets individuals organized in the following ways:

- □ **Community associations:** Associations are informally organized groups of locals who are able to commit a portion of land, between ½ - 25 hectares, on which to plant. Membership to an association typically will not exceed more than 30 individuals, and are grouped according to boundaries defined by the Local Chairmen 1. The groups have a defined leadership structure and constitution by which they operate. NFC offers free sensitization programmes, and on-going technical input. Associations purchase seedlings at 10% of the price, are delivered seedlings free of charge and may sell any harvestable timber to NFC.

- □ **Local school and community groups:** Groups situated along the borders of the Namwasa plantation, and which are fully registered and recognized under Uganda law, are permitted to participate in the programme. These groups also receive free trainings and sensitization, on-going technical expertise, free seedling transportation and subsidized seedlings. Organizations with as little as ½ hectare can participate in the programme, and may sell any harvestable timber to NFC.

- □ **Commercial out-growers:** Individuals with land-holdings exceeding 25 hectares are considered commercial outgrowers. They receive seedlings at a subsidized cost, and can sell timber to NFC at the

time of harvest. Not confined to the plantation buffer zones (of 50 km), interested individuals can be located as far as 150 km from Namwasa.

Reporting to the Head of Corporate Responsibility, the Outgrower Officer is primarily responsible for managing the outgrowers scheme. This includes supervising nursery operations for outgrower's seedlings, helping establish local community associations, and ensuring the delivery of all relevant trainings to locals. Meetings with local stakeholders and participants are held semi-annually to help track the efficacy of the programme and invite critical feedback from community members.

In April and May of 2010, the EFO sensitized locals on the creation of community associations. Twenty three groups are presently drafting articles of association. 163 locals have thus far been enrolled in the programme. Annual seedling distribution is slated to reach 45,000.

A.6. Description of legal title to the land, current land tenure and rights to tCERs / lCERs issued for the proposed A/R CDM project activity:

NFC has signed a tree farming license with the National Forestry Authority (NFA), in accordance with the Tree Planting Act of August 2003. Under the Tree Planting Act, the NFA is responsible for sustainably managing all government owned Central Forest Reserves. The NFA's mandate includes developing private sector partnerships to develop the CFRs into viable plantation operations.

The tree-farming license extended to NFC authorizes the company to develop a commercial timber plantation for a duration of 50 years, commencing in April of 2005. The license extends across 8,281 hectares of central forest reserve land, of which a portion will be managed for conservation purposes. The conditions of the license include adherence to Uganda's national strategy for the CDM and the long-term engagement with local communities. All rights to tCERs accrue exclusively to The New Forests Company Ltd.

A.7. Assessment of the eligibility of the land:

NFC has applied *"Procedures to Demonstrate the Eligibility of Lands for Afforestation and Reforestation CDM Project Activities"* to illustrate the eligibility of Namwasa lands under the adopted CDM methodology A/R-AM0004 version 04 *"Reforestation or afforestation of land currently under agricultural use."* The exercise demonstrates that NFC's plantation operations included in this PDD take place on lands that were not forest when the project started, and fall within the definition of "reforestation" activities.

a. *Demonstrate that the land at the moment the project starts does not contain forest by providing transparent information that:*

(i) *Vegetation on the land is below the forest thresholds (tree crown cover or equivalent stocking level, tree height at maturity in situ, minimum land area) adopted for the definition of forest by the host country under decisions 16/CMP.1 and 5/CMP.1 as communicated by the respective DNA:*

NFC referenced Landsat imagery from 1989 and 1995, supported by field-based results of the baseline carbon stock assessments, to demonstrate that lands targeted for planting do not meet the definition of forest as communicated by the Ugandan DNA. The definition of forest is the following:

i. Minimum crown cover of 30%
ii. 1 contiguous hectare of land-cover
iii. Five meters for tree height

None of the lands on which NFC has planted trees were forest upon the start of the project in 2006. To ensure that only eligible lands were included in the carbon programme, the mapping expert carefully delineated all forested areas from 1989 using a high resolution Landsat image, stratified to demonstrate the presence or absence of trees according to the Ugandan definition of forest. This careful Landsat imagery analysis was important to undertake as portions of land within the reserve were forest in 1989, and through regular cropping, grazing and charcoal production, were lost in the decade and a half leading up to the project start-date. All areas dedicated to planting in Namwasa, and under the NFA license, were overlaid on the 1989 maps. Any lands that NFC has planted on areas that were forest in 1989 have been duly removed from the carbon project. Of the approximately 4,600 hectares NFC plans to plant by 2011, 2,481 are eligible under the CDM. These areas were not forest in 1989.

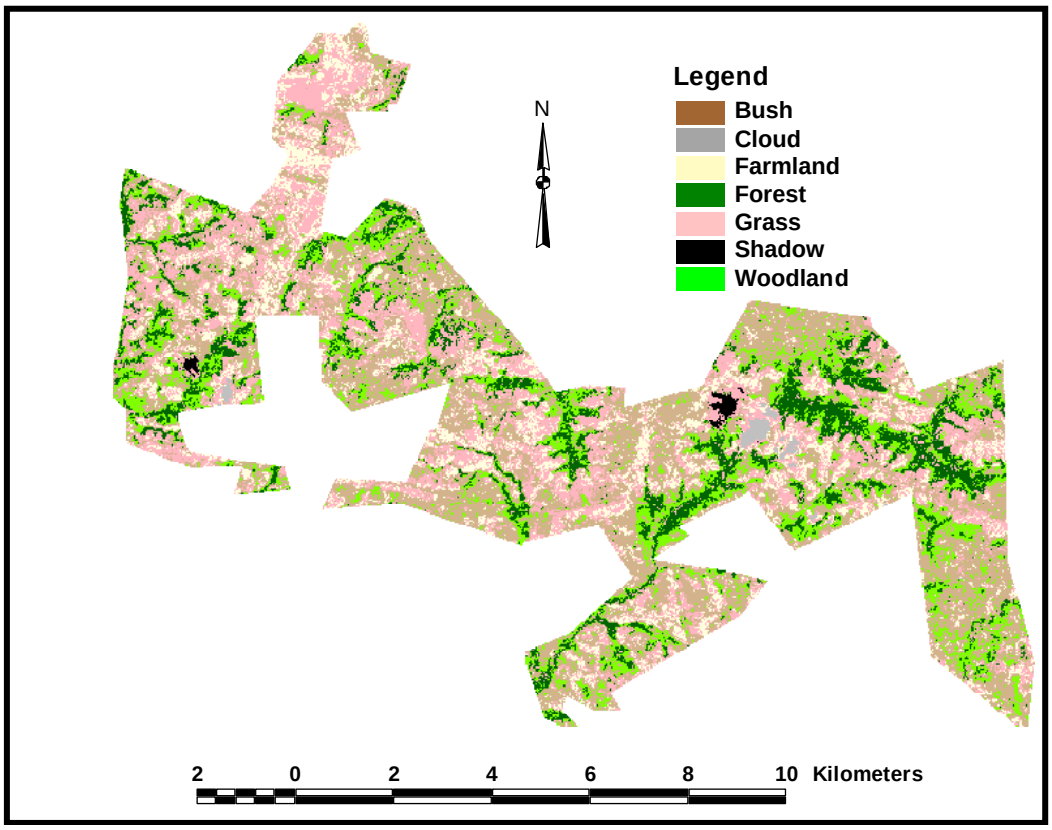
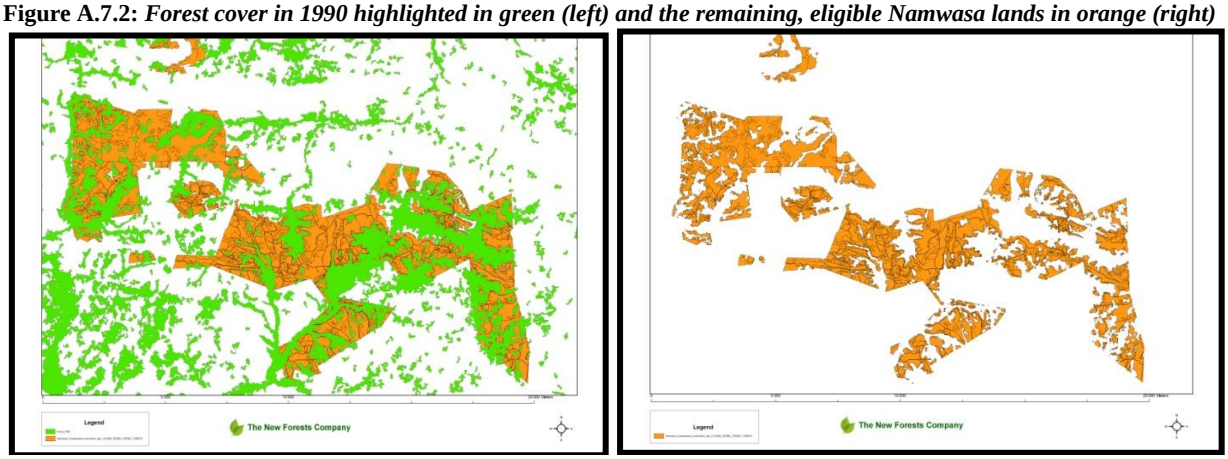


FIGURE A.7.1: ***1990 forest cover in Namwasa Central Forest Reserve***

Figure A.7.1 demonstrates which portions of Namwasa were covered with pockets of forest and woodland in 1990. NFC has initiated its conservation programme on those portions of forested land that were not destroyed in the years leading up to the project start. Any planting which has taken place on lands that were forest in 1989 – but deforested in the years prior to the project start-date – has been systematically removed from inclusion in the carbon project. This has been done by overlaying detailed maps from 1989, with forest areas highlighted, onto planting compartment maps in ArcGIS 9.3. Any

patches of forest have been highlighted, and associated compartments – or portions of compartments – have been removed from the carbon project, as detailed in Figure A.7.2.

Figure A.7.2: ***Forest cover in 1990 highlighted in green (left) and the remaining, eligible Namwasa lands in orange (right)***



(ii) *All young natural stands and all plantations on the land are not expected to reach the minimum crown cover and minimum height chosen by the host country to define forest* The Landsat mapping analysis clearly demonstrates that the land was subject to continuous anthropogenic pressures due to activities such as grazing, cropping and charcoal production and associated fires. As per the procedure, satellite imagery analysis is combined with ground-truthing to demonstrate this, and a detailed discussion follows in section B.1.

(iii) *The land is not temporarily unstocked , as a result of human intervention such as harvesting or natural causes;* Prior to the project start-date, there were no plantation operations in the CFR and no natural causes that led to the land being only temporarily unstocked. The NFA has confirmed that a break-down in the law during Idi Amin's rule (1972 – 1986) led to the Forest Department being unable to manage its CFRs, including its ability to practice plantation forestry. Indeed, the NFA has leased the lands to NFC specifically because it has historically been unable to use the reserve for its primary purpose - forest protection and production. Consequently, this led to the illegal use of CFRs for agricultural purposes.[12] NFC's own PRA's, which included a personal history as part of its leakage assessment, further demonstrated that people had witnessed the regular destruction of forest to make way for agricultural and other land clearing activities.[13]

b. Demonstrate that the activity is a reforestation or afforestation project activity.

(i) *For reforestation project activities, demonstrate that the land was not forest by demonstrating that the conditions outlined under (a) above also applied to the land on December 31st, 1989.* NFC's Landsat imagery analysis from 1989 clearly demonstrates that all eligible Namwasa lands were not forest on December 31st, 1989. Image review of a 2004 map demonstrated that a few areas had been recovered by woodland growth. Under FSC principles, NFC does not plant on any forested areas, and by 2006 when planting began, areas marked on the 2004 map would have

[12] National Forestry Authority (NFA), *Uganda's Forests, Functions and Classification* (Kampala, June 2005), 4.

[13] Dickson Biryomumaisho *Post-Displacement Leakage Assessment Report: Namwasa Reforestation Plantation Project and Resulting Shifts of Livelihood Activities* (Makerere University, Kampala, April 2010), 14, 16.

been cleared by the accelerated cropping trends. To remain conservative, however, these portions of land have also been removed from the eligible areas.

A.8. Approach for addressing non-permanence:

NFC is seeking the issuance of tCERs to address the issue of non-permanence.

A.9. Estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period:

Table A.9.1 describes annual actual net greenhouse gas (GHG) removals by sinks, as well as cumulative removals. Each crediting year is represented by the time elapsed between August 22nd (the project start date) and August 21st, a full 365 days. Site preparation emissions – including slashing and burning – are considered negligible. Under the company's Community Fuel-wood Collection Programme, leakage from charcoal production and fuel-wood gathering is fully mitigated.

Table A.9.1: ***Estimated GHG removals by sinks for the period 2005-2024.***

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 cumulative net anthropogenic GHG removals by sinks (tonnes of CO_2 e)**
Year 1	0	0	0	0
Year 2	0	4 542.0	0	4 542.0
Year 3	0	23 106.8	0	27 648.7
Year 4	0	28 029.6	0	55 858.3
Year 5	0	53 685.4	0	109 543.7
Year 6	0	70 942.9	0	180 486.6
Year 7	0	56 848.8	0	237 335.4
Year 8	0	78 245.5	0	315 580.9
Year 9	0	-37 100.3	0	278 480.6
Year 10	0	27 737.4	0	306 217.9
Year 11	0	-44 529.3	0	261 688.6
Year 12	0	5686.0	0	267 374.7
Year 13	0	-93 582.6	0	173 792.0
Year 14	0	48 509.5	0	222 301.5
Year 15	0	17 687.9	0	239 989.4
Year 16	0	13 944.7	0	253 934.1
Year 17	0	-34 276.3	0	219 657.8
Year 18	0	42 379.3	0	262 037.2
Year 19	0	-45 787.4	0	216 249.7
Year 20	0	10 314.1	0	226 563.9
Total (tonnes of CO2 e)	0	226 563.9	0	226 563.9

A.10. Public funding of the proposed A/R CDM project activity:

NFC has been the recipient of a Sawlog Production Grant Scheme (SPGS) grant, covering 1,500 hectares of its plantation asset (23% of the land slated for planting). SPGS is a grant-giving organization funded by the European Union and the Norwegian government. Its objective is to increase private sector involvement in plantation forestry and provide technical assistance as a way to respond to the country's diminishing standing timber resource base.

SPGS funds have been applied to non-CDM eligible portions of land at Namwasa (Annex 2 includes letters of clarification from the Norwegain Government and EU Commission).

SECTION B. Duration of the project activity / crediting period

B.1 Starting date of the proposed A/R CDM project activity and of the crediting period:

The official starting date of the project is August 22nd, 2005, when NFC received its first seedling invoice from Schuckar & CIA LTDA (Brazil) for the launch of its nursery operation. The invoice for the purchase will be submitted to the DOE for review.

B. 2. Expected operational lifetime of the proposed A/R CDM project activity:

NFC has a 50 year license to plant trees at Namwasa, extending through 2055, with the opportunity to extend the license to support ongoing plantation forestry activities. The company anticipates renewal of the license to continue operations beyond the initial 50 years. The carbon component of the Namwasa reforestation initiative is slated to operate for twenty years: August 2005 to August 2024 for 20 years and 0 months. As the company is committed to re-planting and harvesting, there is a high likelihood that the project will extend beyond twenty years, for two more crediting periods, up to 2064.

B.3 Choice of crediting period:

B.3.1. Length of the renewable crediting period (in years and months), if selected:

20 years and 0 months

B.3.2. Length of the fixed crediting period (in years and months), if selected:

n/a

SECTION C. Application of an approved baseline and monitoring methodology

C.1. Title and reference of the approved baseline and monitoring methodology applied to the proposed A/R CDM project activity:

NFC has adopted the approved methodology A/R-AM0004, version 04, *Reforestation or afforestation of land currently under agricultural use.*

The following tools and guidance have been adopted for completion of the PDD:

- EB 35, Annex 17 *Tool for the demonstration and assessment of additionality in A/R CDM project activities (version 02)*
- EB 22, Annex 16 *Procedures to define the eligibility of lands for afforestation and reforestation project activities*

- EB 50, Annex 21 *Guidelines on conditions under which GHG emissions from removal of existing vegetation due to site preparation are insignificant (version 01)*

- EB 51, Annex 13 *Guidelines under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant (version 01)*

- EB 51, Annex 14 *Guidelines on conditions under which increases in GHG emissions attributable to displacement of pre-project crop cultivation activities in A/R CDM project activity is insignificant (version 01)*

- EB 41, Annex 15 *Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities (version 01)*

- Guidance in paragraph 35 of EB 42 pertaining to the release of emissions associated with the removal of herbaceous vegetation

C.2. Assessment of the applicability of the selected approved methodology to the proposed A/R CDM project activity and justification of the choice of the methodology:

Applicability

A. Activities

The A/R-AM0004, methodology is applicable to the Namwasa initiatives that cover the following activities:

□ **Afforestation or reforestation of degraded land, which is subject to further degradation or remains in a low carbon steady state through assisted natural regeneration, tree planting, or control of pre-project grazing and fuel-wood collection activities (including in-site charcoal production);.** NFC is pursuing a reforestation initiative on degraded land subject to further degradation, and with a monitored fuel-wood collection programme to control pre-project fuel-wood collection, including charcoal production.

□ **The project activity can lead to a shift of pre-project activities outside the project boundary, e.g. a displacement of agriculture, grazing and/or fuel-wood collection activities, including charcoal production.** The methodology is applicable, because pre-project land-use activities have been shifted outside of the project zone – cropping, cattle grazing and fuelwood use. NFC has quantified this displacement using field-based interview techniques and satellite imagery analysis. Historically, locals practiced ad-hoc slash-and-burn agriculture within the reserve's restricted boundaries, and roaming cattle-herders would pass through the area for grazing purposes. The CDM's Executive Board's 51st Meeting's appendixes 13 and 14, which provide a means for assessing the insignificance of leakage from displaced cropping and grazing activities, will be applied to this project. Appendix 13 - *Guidelines under which increase in GHG Emissions Related to Displacement of Pre-Project Grazing Activities in A/R CDM Project Activity is Insignificant* - states that grazing shifted to degraded or degrading lands leads to insignificant leakage. Appendix 14 -*Guidelines on Conditions under which Increases in GHG Emissions Attributable to Displacement of Pre-Project Crop Cultivation Activities in A/R CDM Project Activity is Insignificant* - allows that the displacement of cropping to lands under cultivation up to five years prior to the project start-date to be deemed

insignificant. Both of these circumstances and conditions apply to the case of displaced land use outside of the Namwasa project zone, as demonstrated through field- and literature-based research.

Fuel-wood collection displacement – temporarily shifted outside of the reserve at the beginning of 2010 – was mitigated through the launch of a community fuel-wood collection programme in the same year.

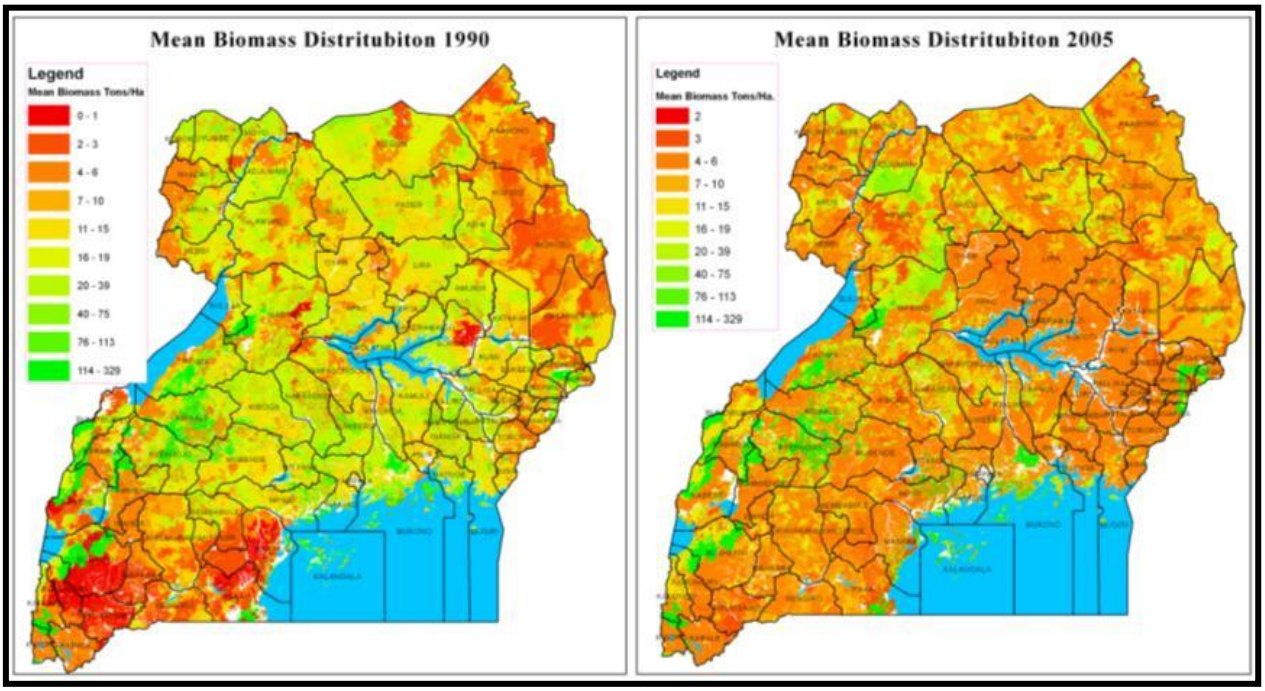
B. Conditions

□ **Lands to be afforested or reforested are degraded and the lands are still degrading or remain in a low carbon steady state:** NFC has applied the steps below in accordance with section II, step 3 of the methodology to demonstrate the regular degradation trends in the reserve. A review of the drivers and intensity of degradation is discussed in full in section C.4.1 Step 3, (b).

The pressures put on the land prior to NFC's intervention were such that local community members were regularly depleting the central forest reserve's carbon stocks. In the without-project scenario, it is assumed that the trends of degradation would continue unabated. Agricultural practices – cropping and grazing – were practiced indiscriminately across the reserve's landscape.

Comparing the change in landscape from 1990 to 2004 using advanced satellite imagery analysis demonstrates the continued depletion of lands once high in carbon stock. In 1990, tropical high forest and woodlands made up 2,957 hectares of the reserve's area (37%). Croplands covered 27% of the reserve, and bushlands some 25%. Grasslands covered just 880 hectares, or 11%. But by 2004, degraded forests had dropped to 21% of the total covered area. Farmland and bushland cover had expanded to 75% of the reserve – bushlands in fallow state making up 18% of the project area, and croplands 57%. Grasslands had decreased by 36%, down to 4% of cover, presumably to accommodate expanding agricultural systems. Decreases in biomass stock is not particular to Mubende District, where the project is located, but instead fits into larger trends of carbon stock depletion across the country, as illustrated in Figure C.2.1.

Figure C.2.1: ***National biomass loss: 1990-2005***



Source: National Biomass Study, Technical Report (2009)

In light of regional and local land-use trends coupled with an expanding population base, the baseline scenario is assumed to be continued degradation, leading to on-going reductions of the existing carbon pools.

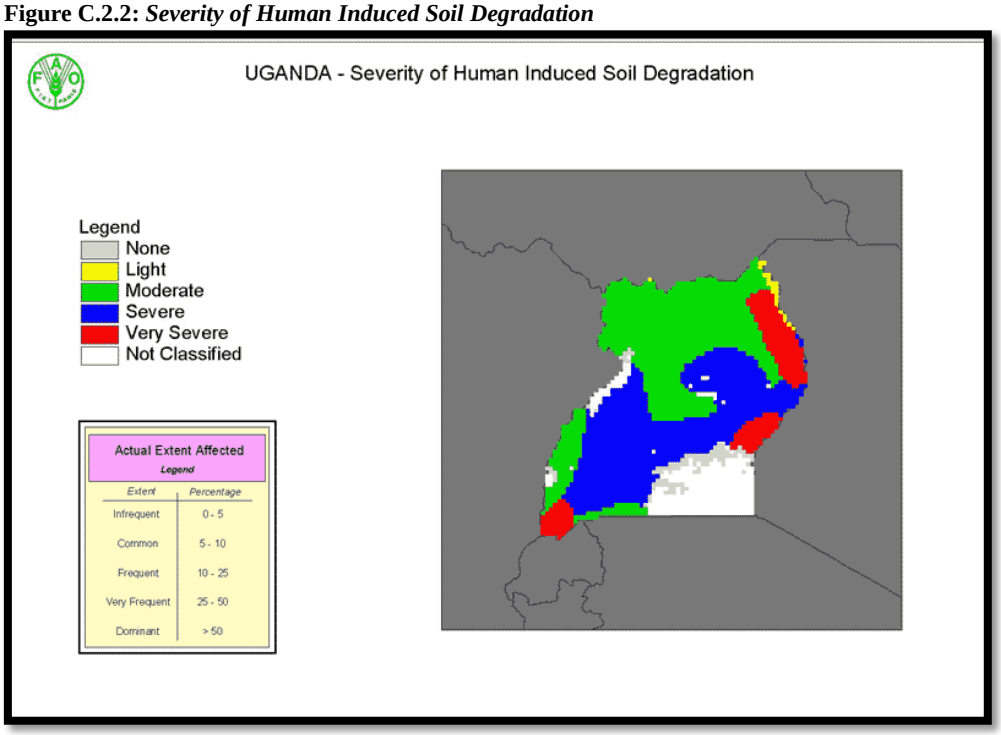
NFC will be monitoring fuel wood collection within the reserve, so as to curb pressures on land surrounding the planting activities. Moreover, the successful outgrower's scheme will promote an increase in biomass stock in villages surrounding the reserve through small-scale tree planting.

□ **Site preparation does not cause significant longer-term net decreases of soil carbon stocks or increases of non-CO_2 emissions from soil:** With strict adherence to its technical silviculture practices, laid out in the *Silviculture Manual* (available upon request), NFC practices low-impact site preparation activities, including manual pitting. Manual preparation – digging of pits – is low impact because only the soil in the immediate area of the pit (approximately 50 cm radius, radius, with 25 cm prescribed for the size of the pit and typically an additional 25 cm of weeds removed) is disturbed, which avoids mechanized scarification of the entire compartment zone. This helps decrease the incident of soil erosion. NFC uses no machines, avoiding soil compaction, which aggravates erosion and compromises the rooting ability of vegetation matter.

□ **Carbon stocks in soil organic carbon, litter and dead wood 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:** The practice of subsistence agriculture and regular grazing as the baseline scenario is expected to further exacerbate soil erosion trends in the reserve; decreases in vegetation cover due to human activity will expose soil to climatic elements – wind and rains – leading to erosion. Cattle grazing in the region – the 'cattle corridor' – is largely associated with soil degradation, as is subsistence agriculture in the area, which is subject to short fallow periods due to population pressures and land-access issues. Interviews performed in 2010 with locals demonstrated that 69% of the population

observed soil erosion trends.[14] This is further substantiated by the GLASOD survey, which demonstrates that soil degradation in central Uganda is severe (blue).

Figure C.2.2: ***Severity of Human Induced Soil Degradation***



Source: ***GLASOD survey***[15]

Not accounting for soil organic carbon ensures that the approach to GHG quantification is conservative; it is highly likely that in a business-as-usual scenario, soil organic carbon will continue to decrease, instead of remaining steady or increasing.

□ **Flooding irrigation is not permitted:** Given the location and geography of the planting site, flooding irrigation is not feasible and will not be practiced.

□ **Soil drainage and disturbances are insignificant, so that non CO2-greenhouse gas emissions from these types of activities can be neglected:** NFC exclusively practices manual site preparation. No mechanical processes have been adopted, which would disturb soils on slopes, exacerbating erosion trends.

□ **The A/R CDM project activity is implemented on land where there are no other on-going or planned A/R activities (no afforestation / reforestation in the baseline):** Landsat imagery analysis demonstrated that no planting activities were taking place on the land at the project start date. As NFC has a license covering the entirety of the project zone, and monitors its access and use, no other planting activities have been observed, or are allowed.

[14] Dickson Biryomumaisho *Post-Displacement Leakage Assessment Report: Namwasa Reforestation Plantation Project and Resulting Shifts of Livelihood Activities* (Makerere University, Kampala, April 2010), 18.

[15] "Uganda – Severity of Human Induced Soil Degradation" accessed May 2010, GLASOD Survey, http://www.fao.org/landandwater/agll/glasod/glasodmaps.jsp?country=UGA&search=Display+map+!

With reference to methodology A/R-AM004, version 04, the following table describes the inclusion of carbon pools in the project.

Table C.2.3 ***Selected carbon pools***

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
Deadwood	No	Conservative approach under applicability condition
Litter	No	Conservative approach under applicability condition
Soil organic carbon	No	Conservative approach under applicability condition

Table C.2.4: ***Gases considered from emissions by sources other than resulting from changes in carbon pools***

Sources	Gas	Included/Excluded	Justification / Explanation
Burning of Biomass	CO_2	No	Carbon stock decreases due to burning are considered insignificant under the baseline scenario
	CH_4	No	According to EB 50, annex 21 *Guidelines on conditions under which GHG emissions from removal of existing vegetation due to site preparation are insignificant (version 01)* these emissions are considered insignificant from biomass burning and are not accounted for. The guidelines outline three conditions under which GHG emissions are insignificant. The guidelines are applicable if at least one of the following conditions are met: • It can be demonstrated (e.g, as part of developing the baseline scenario) that fire due to natural or anthropogenic causes is a common occurrence in the proposed A/R CDM project area and also that such fire has occurred at least once in the last 10 years; • It can be demonstrated (e.g., as part of developing the baseline scenario) that due to natural or anthropogenic causes other than fire, clearance of woody vegetation in the proposed project area is a common occurrence, and also that such clearance has occurred at least once in the last 10 years; • The baseline scenario is *degrading land*

			involving decline in woody vegetation cover. All three conditions are applicable to the Namwasa project due to the presence of slash-and-burn agriculture and charcoal production, leading to fires, deforestation and degradation of woody vegetation cover. This was proven through satellite imagery analysis, participatory rural appraisals and the application of the web-based fire tracking system, MODIS (Moderate Resolution Imaging Spectroradiometer).
	N_20	No	Potential emission is negligibly small

C.3. Description of strata identified using the *ex ante* stratification:

Baseline stratification was performed through a detailed analysis of Landsat imagery. A shape file from 2004, at a resolution of 30m, was assessed by an outside GIS expert, formally of the National Forestry Authority. Land classes were identified through the use of data from the NFA's National Biomass Study (NBS) initiated in 1996. By region, NBS classified land-uses based off of extensive field-based research in over 4,000 plots. From these, the NBS has identified the average carbon stock associated with each particular land-use type. The NBS covered all of Uganda's territory, the results of which provide important ground reference data. Comparisons were made between the NFA's sample plots in Mubende district and NFC's Landsat imagery to test the accuracy of classification, at a scale of 1 hectare.

The mapping expert identified three major vegetation classes within Namwasa, all of which fall into one overarching strata of slash-and-burn agricultural production and are based off of a 2004 image and according to NBS classification systems:

- Degraded grasslands
- Bushlands
- Croplands

An analysis of land-use change in and around the reserve – an adjacent area of over 31,712 hectares - was undertaken. The assessment demonstrates the on-going loss of forest not only within the limits of the reserve, but in the adjacent rural areas inhabited largely by subsistence farmers. Between 1990 and 2004, deforestation reached a total loss of 83% of the original 1990 forest cover, or 6,661 ha.[16] According to John Begumana's analysis for NFC, forest was converted primarily to bushlands (18%) and croplands (57%) between 1990 and 2004.[17] Bushlands can represent regrowth in longer fallow periods, suggesting that a sizeable area of the reserve has been subject at some point in time to slash and burn agricultural practices or would be in the without-project scenario.

[16] John Beguma, *Mapping of Historical Land Use in the Namwas Forest Reserve in Uganda and Tracing Cropping Displacement.(*Kampala, June 2010), 20.

[17] John Beguman, *Namwasa Baseline Survey: Assessment of above and below ground baseline carbon pools.* **(**Kampala 2007), 7.

Table C.3.1: ***Land-use Change in and around Namwasa CFR, 1990-2004***[18]

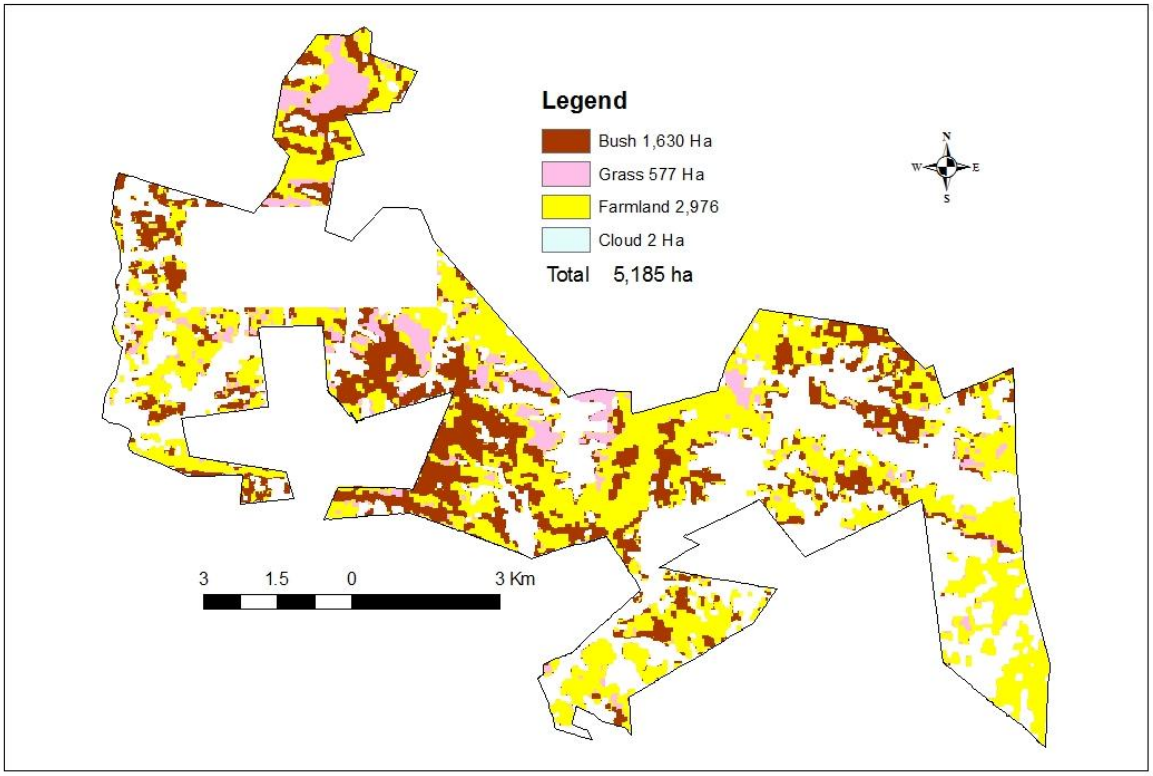
Year	Study Area (Ha)	Forest Area Remaining (ha)	Period	Forest Loss Over Period (Ha)	Loss over period as % of Original 8,022 ha
1990	31,712	8,022			
1995	31,712	6,648	**1990-95**	1,374	17%
2002	31,712	3,250	**1996-2002**	3,398	42%
2004	31,712	1,361	**2003-2004**	1,889	24%

TOTAL FOREST LOSS: 1990-2004	6,661 hectares
TOTAL PERCENT FOREST LOSS from original 8,022 ha	83%

Only forestation activities that have taken place on degraded grasslands, bushlands and croplands – one total strata as part of the shifting slash-and-burn agricultural cycle - as per the 1990 map analysis are considered eligible for inclusion in the PDD, as represented in Figure C.3.2 below. White areas are either a mine within the reserve (block on the north-westernmost left corner) or areas that were forest in 1990. The map represents 5,185 hectares of eligible land; in actuality, NFC will only plant approximately 4,600 hectares, as some areas are unsuitable for planting. Of these, 2,481.5 hectares are eligible under the modalities of the adopted methodology. The final baseline stratification covers all hectares under one baseline scenario: a slash-and-burn agricultural cycle, with varying amounts of vegetation stock representative of the succession of site establishment, crop growth and harvesting, and fallow.

[18] Begumana, *Mapping of Historical Land Use*, 19.

Figure C.3.2: ***Eligible Lands According to 1990 Land Stratification, overlaid on 2004 land classification map***[19]



Ex ante stratification for actual net GHG removals by sinks is based on the planting and management plan. It is proposed in the monitoring plan (appendix 4), and represents different species and age and working classes. The stratification was chosen according to growth models and the variations in GHG removals that are predicted for different working classes (poles versus sawn timber). The *ex post* stratification will be reviewed against the *ex ante* proposal in advance of the first verification event, taking into account any changes and deviations from the planting proposal and potential natural or anthropogenic impacts which could change the variability in GHG reductions (fires, pest outbreaks for example). Unique ID numbers will be assigned in advance of the verification. The proposed stratification is presented below in 9 strata types, according to the planting regime and working class:

***A*, size of each stratum in hectares**	**878.2**	**Pinus caribaea / pinus oocarpa: planted 2006-2007**
	578.7	**Pinus caribaea / pinus oocarpa: planted 2008-2009**
	534.3	**Pinus caribaea / pinus oocarpa: planted 2010-2011**
	108.7	**Eucalyptus grandis / urophylla poles: planted 2006-2007**
	134.1	**Eucalyptus grandis / urophylla poles: planted 2008-2009**
	124.6	**Eucalyptus grandis poles: planted 2010-2011**
	41.4	**Eucalyptus grandis / urophylla sawn timber: planted 2006-2007**
	81.5	**Eucalyptus grandis / urophylla sawn timber: planted 2008-2009**
	0	**Eucalyptus grandis / urophylla sawn timber: planted 2010-2011**

[19] NFC Planning Office with use of ArcView 9.3 and land-classifications provided by John Begumana (NFA) in his report *Mapping of Historical Land Use in the Namwasa Forest Reserve in Uganda and Tracing Cropping Displacement,* 22. Final mapped produced by NFC in Johannesburg, 2010.

C.4. Identification of the baseline scenario (if the "Combined Tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" is applied proceed to paragraph C.6):

C.4.1. Description of the application of the approach to identify the most plausible baseline scenario (separately for each stratum):

To properly identify the baseline scenario, NFC has adopted the step-wise approach proposed by the methodology A/R-AM0004. The procedure references results of the historical vegetation cover mapping to ensure appropriate adoption of the baseline scenario.

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 described in section C.2, the project meets the conditions of the adopted methodology. Baseline approach 22 (a) – Modalities and Procedures for the A/R methodologies – may be used.

Step 2. Define the project boundary as described in Section 2 "eligibility of land" above.

The project zone falls within the boundaries of the license with the NFA, as delineated on map 59/3 from 1956. A sizeable portion of these lands are included in the carbon project – just over 2,481.5 hectares – whilst others are either ineligible as demonstrated in the Landsat imagery analysis, are unfit for planting or make up the forest conservation programme. Under CDM modalities, NFC's eligible lands have been deforested since December 31st, 1989 and fall under the control of the company through its license with the NFA. Boundaries are recorded using advanced GIS software and GPS coordinates taken at site.

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

(a) ***Analyze the historical and existing land-use/land-cover changes in the context of the socio-economic conditions prevailing within the boundary of the proposed project activity:***

The rural areas surrounding Mubende district are populated with agriculturalists who rely primarily on subsistence cropping as a way of life. Due to weak NFA enforcement of central forest reserve boundaries, local and migrant populations regularly entered the Namwasa reserve to supplement their grazing and cropping activities.[20] Individuals from farther afield, searching for lands suitable for charcoal production activities, took up residence within and around the reserve to access the once rich biomass resources. Reports from the National Forestry Authority and investigations from the Ugandan Parliament both indicate that illegal encroachment upon reserves is common; normalization of NFA reserve access rules are not enforced due to lack of state resources.

Independent participatory rural appraisal (PRA) exercises ran in 2007 demonstrated that locals living around the Namwasa CFR typically farmed .8 hectares of their own land, and supplemented this by growing cash crops within the reserve on an additional 1.59 hectares. Researchers demonstrated that the

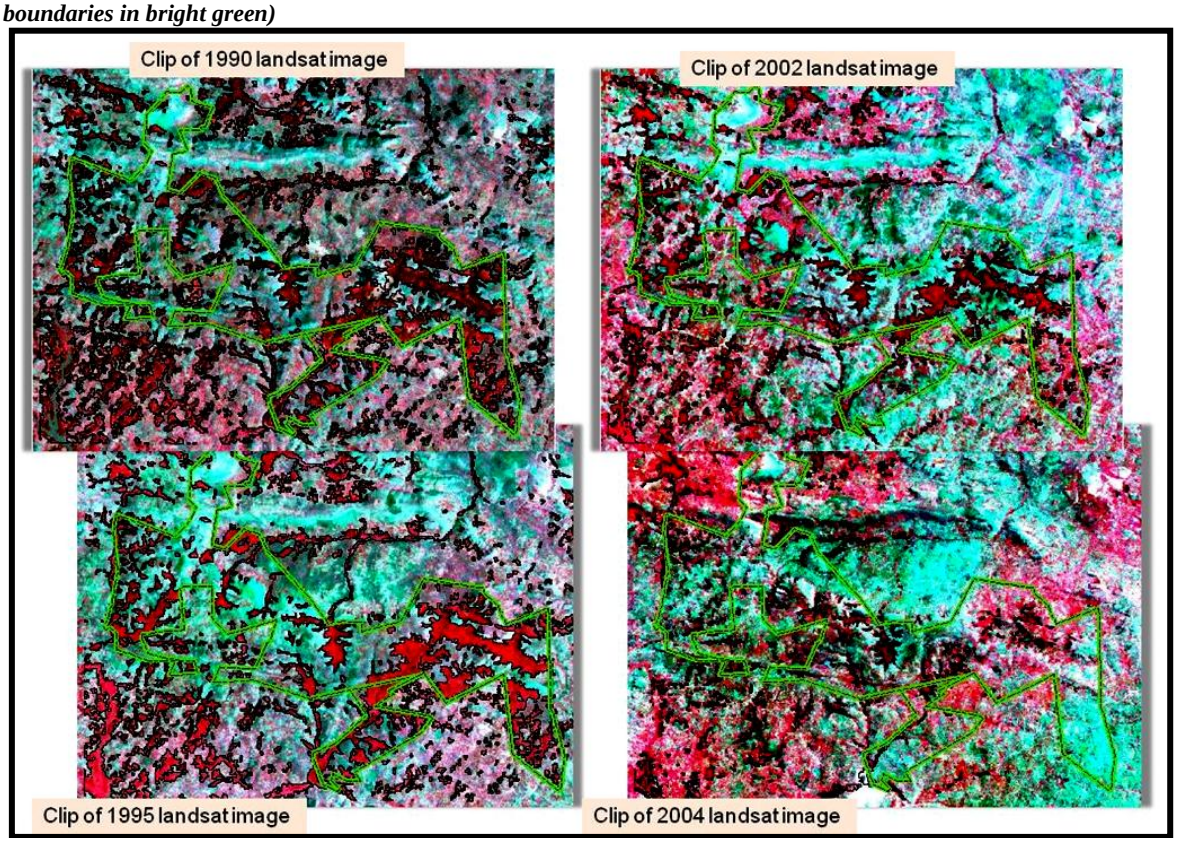
[20] John Moses Wotsomu, *Namwasa PRA* (Kampala, 2007), 1, 4, 6, 9, 20.

local farming systems are based on shifting cycles, whereby new land is cleared through slash and burning of forest or woodlands - permitting access to richer soils. In areas with lower population densities, fallow cycles might last up to seven years. But as populations increase rapidly in the areas surrounding Namwasa, shorter fallow cycles are adopted, depressing soil quality. The PRA research team performed their own historical land-use analysis using satellite images, determining that approximately 160 hectares of new farmland was opened per year from 1990 to 2004. NFC's mapping consultant showed a net increase of agricultural land to 104 hectares per year.

NFC analyzed Landsat maps from 1990, 1995, 2002 and 2004 to identify regular changes in the Namwasa landscape. Table C.4.1 describes the loss of critical forest and woodlands, explained by the expansion of low biomass-stock cropping activities across the project zone.

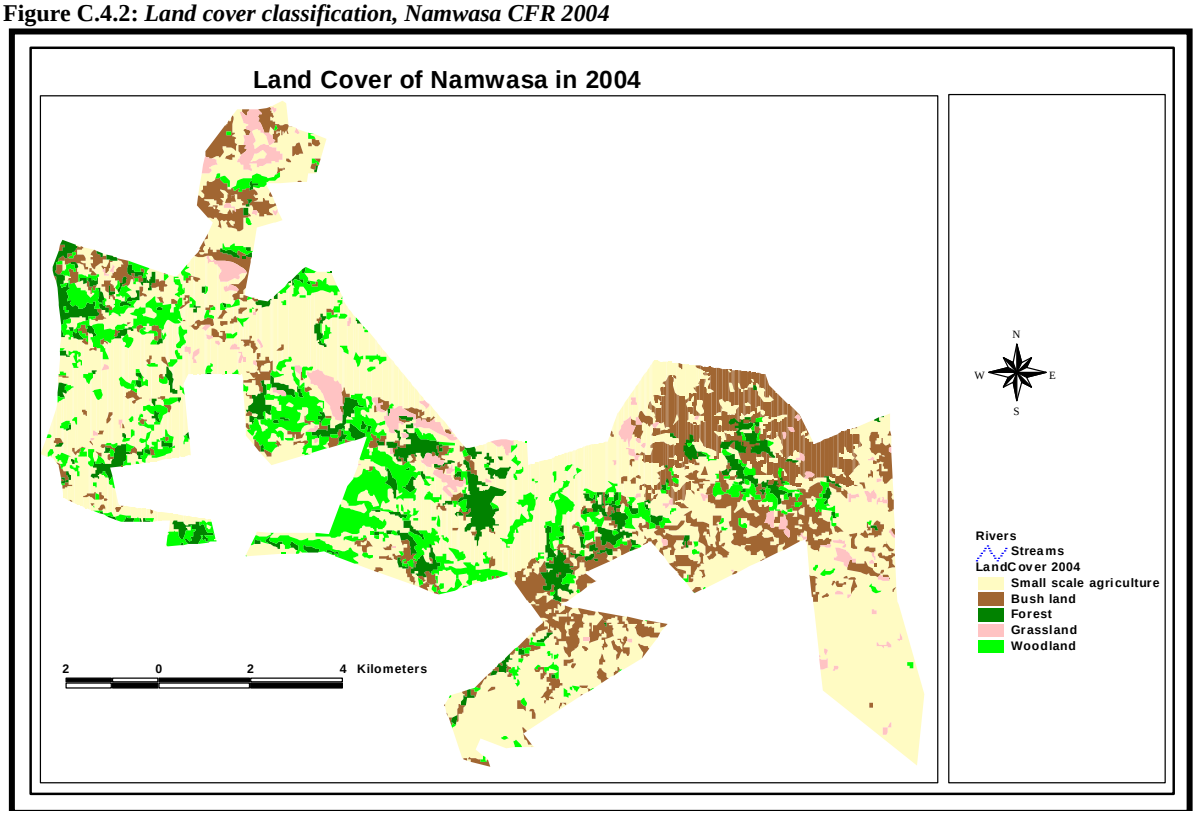
The clipped Landsat images, figure C.4.1, show the former presence of forested areas in the reserve, distinguishable by the presence of dark red. More degraded lands are visible in lighter colours, which demonstrably expand in area through the period 1990 – 2004.

Figure C.4.1: ***Clipped Landsat Images from 1990, 1995, 2002 and 2004 demonstrating the regular loss of forest cover (project boundaries in bright green)***



Compared to 1990, the land-cover in 2004 had drastically changed, with significant losses of standing forest. Population influxes and the expansion of agriculture led to the conversion of wild grasslands, forests and bushlands to extensive croplands, as demonstrated in figure C.4.2.

Figure C.4.2: ***Land cover classification, Namwasa CFR 2004***



b. Show that 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.

Agricultural Expansion and Practices

The analysis of historical Landsat images over the course of the twenty years between 1990 and 2004 clearly demonstrate the rapid loss of forest cover and associated carbon stock. In and around Namwasa, tropical high forests and woodlands have been converted into bushlands and croplands with lower c-stocks, indicative of the intense vegetation degradation in the area. The rate of forest and woodlands loss between 1990 and 2004 was just over 5% cover per year, above the average national rate estimated at 2% per year.[21] From a regional perspective, Mubende District lost 79% of its forest cover between 1990 and 2005, amounting to a net decrease of 14,712 hectares of classified forest.[22] The rate of vegetation degradation in and around the reserve accelerated in the early 2000's with a loss of forest cover per 1990 levels reaching 12%.

[21] National Environment Management Authority, *State of the Environment*, 25.

[22] National Environment Management Authority, *State of the Environment*, 143.

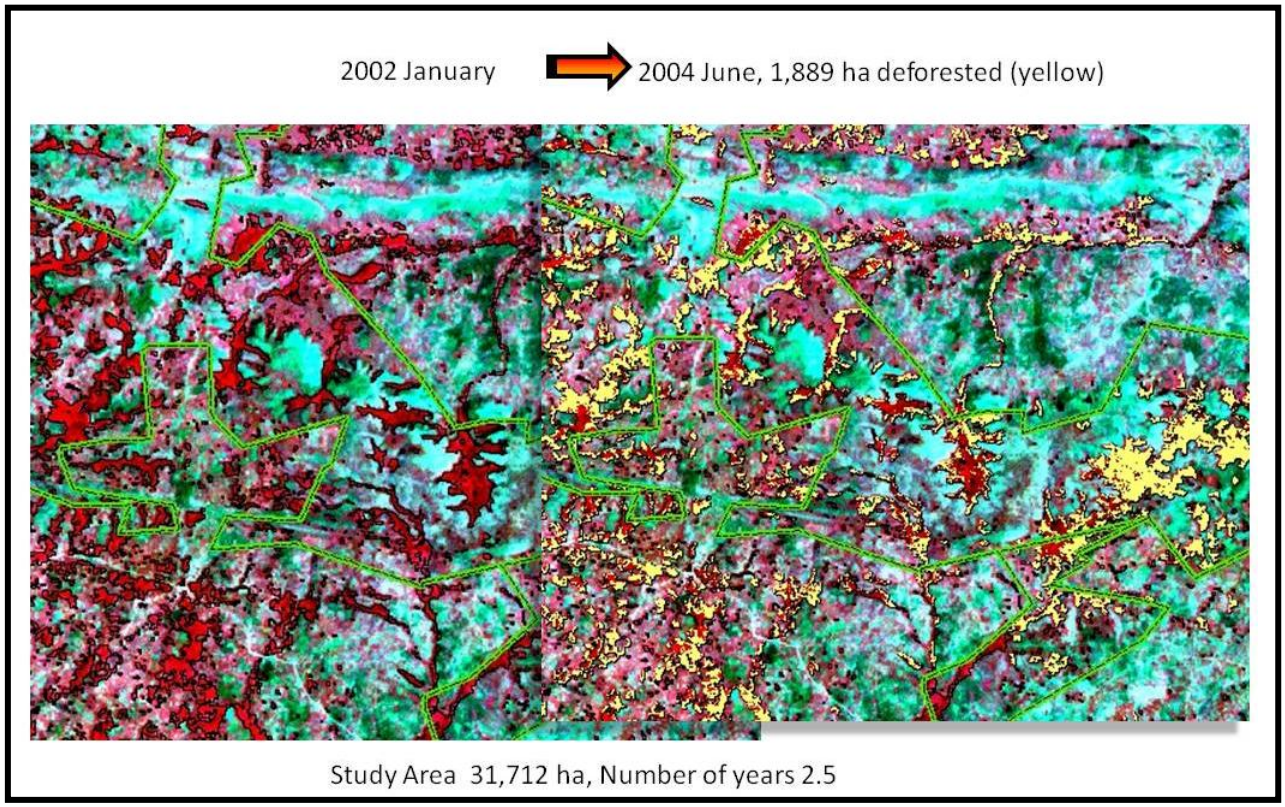


Figure C.4.4: ***Accelerated conversion of forest in and around Namwasa CFR, 2002-2004***

The National Biomass Study reports that forest loss across the country is primarily attributable to an expanding population dependent on agricultural activities to sustain their way of life.[23] Uganda's population has a high level of dependence on forest assets for fuel-wood collection, poles for building, and charcoal production. The National Environmental Management Authority (NEMA) confirms that most Ugandans rely on housing, energy and food from immediate forest assets.[24] 37% of Ugandan territory is dedicated to small-scale agriculture, with a 2% net annual increase since 1990. The vast majority of the population lives rurally, and is highly dependent on land resources to support livelihood strategies. [25]

98% of residents in Mubende District rely upon fuel-wood for heating and cooking purposes; 72% of the Mubende population rely primarily on subsistence farming.[26] Historically, forests have been cleared to make way for shifting agricultural practices, though little classified forest remains to support the practice. Household interviews in the villages surrounding Namwasa demonstrate that more than 75% of interviewees were migrants who moved to the area surrounding the reserve so as to access local lands for cropping purposes.

[23] National Forestry Authority, *National Biomass Study, 2009* (Kampala, unpublished), 11.

[24] National Environment Management Authority, *State of the Environment*, 28.

[25] Ibid

[26] Uganda Bureau of Statistics, *2002 Ugandan Population and Housing Census: Mubende District Report* (November, 2005), 8.

Soil erosion in the central and western portions of Uganda is exacerbated in savannah (grassland) areas, where on-going cattle grazing and burning for agricultural purposes weakens topsoil. NEMA reports that soil erosion in these areas is severe. Burning for agricultural purposes destroys the biological, physical and chemical properties of otherwise nutrient rich soils; it also encourages the growth of unpalatable grasses and thorny bush species such as *Acacia hockey*.[27]

Research by Pender and Jagger in the South-Western highlands demonstrated the constriction of fallow periods between 1990 and 2000, with interviewees confirming that, of the plots surveyed for soil health, 42% were subject to degradation in soil quality.[28] Household interviews and analysis of garden plots illustrated that fallow periods rarely reached above a single year. Households practicing short-term fallows did so in periods as short as .3 years. Egulu and Ebanyat similarly explored farmers' own views of key constraints to agriculture, demonstrating perceived soil exhaustion and land fragmentation accelerated by population growth as major concerns.[29] However, separate research at the household level with rural farmers indicated preferences for near-term agricultural inputs or training, and notably less interest in longer-term investments such as improved fallows or agroforestry – further highlighting monetary constraints to improved agricultural practices.[30]

Pender and Jagger expanded the research to include households in the Eastern Highlands, confirming similar trends across the country – constricted fallows, soil nutrient depletion and compromised crop yields. Research in the Eastern Highlands demonstrated that less than 10% of households practice fallow. In both the South and East, a decrease in land availability due to the growing population in part hindered the ability to adopt longer fallow options.

Mubende district is subject to similar population growth trends – 2.7% between 1991 and 2002.[31] Namwasa itself became increasingly subject to land-use conversion as immigrants moving northwards from the overpopulated southern districts took up landholdings in areas around the reserve. During a 2010 household interview survey ran in communities surrounding Namwasa, local heads of households repeatedly confirmed that they worked their agricultural lands "every season", further suggesting the abandonment of fallow cycles that boost soil nutrients and encourage the regrowth of indigenous vegetation. The severe drop in Mubende's forest assets and a growing population may have led to observed constricted fallow period cycles.

Field-based investigations into plantation and small-holder farms, in plots spread across the country, confirm the relative immaturity of vegetation – namely bush and young saplings – that can develop in short fallow periods. Of the fourteen crop-based sites that Bolwig, Pomeroy, Tushabe and Mushabe measured, only one had a notably long fallow cycle (7.8) years and a significant amount of woody

[27] National Environment Management Authority, *State of the Environment*, 240.

[28] International Food Policy Institute, *Policies for Improved Land Management in Uganda: Summary of Papers and Proceedings of a Workshop Held at Hotel Africana in Kampala, Uganda, 2001.* Ed. Pamela Jagger and John Pender (Washington D.C., 2001), 18, 32, 73; Ephraim Nkonya and others, *Strategies for Sustainable Livelihoods and Land Management in Uganda* (IFPRI, 2002), 57, 75, 77.

[29] Egulu, Beatrice, and Ebaynat, Peter, *Policy Processes in Uganda and their Impact on Soil Fertility*, July 2000.

[30] Nkonya et al, *Strategies*, 9, 16, 18.

[31] Uganda Bureau of Statistics, *Mubende District Report*, 6.

vegetation.[32] Overall, small, young trees and shrubs with a diameter at breast-height (DBH) ranging from 2.5-19.9 cm were in relative marked abundance at all sites, making up 79% of all standing vegetative indigenous species. This confirms that fallow periods in Uganda are of short enough duration to encumber the growth of mature tree and shrub species.[33] Results from a 2007 Participatory Rural Appraisal in and around Namwasa demonstrated that fallow periods were becoming shorter due to population pressures, stunting land fertility recovery.

Image C.4.5: ***Example of slash-and-burn agriculture in project area***

Image C.4.5: *A maize crop grown on the outskirts of the Namwasa CFR.*

The image illustrates the severity of slash and burn land-clearance, highlighting the burnt remains of several trees, and the few that have been left standing, in the foreground.

Maize farmers outside of the Reserve may remain in one location, increasing potential of soil erosion. In the reserve, this crop would have been abandoned – more land would have been cleared of dense biomass stock to meet cropping demands for more fertile soils.

Slash and burn agricultural is regularly practiced in the area, as seen in Image C.4.6.

Image C.4.6: ***Example of slash and burn practiced on degraded woodlands around Namwasa CFR***

[32] Simon Bolwig and others, "Crops, trees and birds: Biodiversity change under agricultural intensification in Uganda's farmed landscape*".* *Danish Journal of Geography*, 106, no. 2 (2006):7, 9.

[33] Bolwig, *Crops, trees and birds*, 10.

Fire

The regular use of fire as an agricultural tool can have significant consequences on soil quality and carbon stocks. While longer fallow periods may allow for the restoration of biomass and nutrients, increasingly shorter periods marked by slash-and-burn can lead to critical nutrient leaching and mining, and a drop in biodiversity richness.[34]

An analysis of incidence of fire in and around Namwasa was undertaken using MODIS (Moderate Resolution Imaging Spectroradiometer) software developed by the University of Maryland's "Fire Information for Resource Management System" (FIRMS).[35] The location of active fires is tracked on a daily basis by MODIS, which is attached to NASA's Aqua and Terra satellites, with images taken daily. The Terra satellite has been operational since 1999, the Aqua satellite since 2002. The location and intensity of fires is processed in the MODIS MOD14/MYD 14 Fire and Thermal Anomalies Product, with fires captured in pixels representing 1 square km. These are represented in different scales in the online Web Fire Mapper.[36] The presence of fire is determined by identifying mid-infrared radiation from any fires present on the ground, using a contextual algorithm; pixels are examined and classified into *cloud, water, non-fire, fire or unknown.*[37]

Typically, MODIS will identify fires burning or smouldering at 1000 m^2. Under the right conditions – homogenous landscapes or small amounts of smoke – fires as small as 100 m^2 may be detected. As rural farmers typically do not own land in excess of 2 hectares (20,000 m^2), it is presumed that the fire analysis performed in MODIS is an accurate representation of on-the-ground activities happening at the time of the satellite overpass. However, some fires may have been missed for the following reasons:

- Fires burning in between image satellite overpasses could be undetected;
- Fires underneath canopy are located with difficulty - in some instances, fires started by locals within more vegetation dense portions of Namwasa may not have been located by MODIS.

The fire analysis concentrated on activities within Namwasa, and within a 3.3 km (3 hundredths of a degree) perimeter around the reserve. The locations of fire was delivered via GPS coordinates (longitude, latitude), with the level of confidence reported. A review of fire activity demonstrates a rapid increase in the number of fires between 2001 and 2005, the five years leading up to the project start-date.

[34] Syaka Sadio, *Alternatives to Slash and Burn: Negotiating trade-offs* (paper presented at the XIII World Forestry Congress. Buenos Aires, Argentina, 18-23rd October), 3.

[35] Davies and others, "Fire Information for Resource Management System: Archiving and Distributing MODIS Active Fire Data*," IEEE Transactions on Geoscience and Remote Sensing* 47 no. 1 (2009):72-79.

[36] C.O. Justice and others, "The MODIS fire products. Remote Sensing of Environment," (2002), 244-262.

[37] Louis Giglio, *Modis Collection 5 Active Fire Product User's Guide Version 2.4.* (Science, Systems and Information Inc. University of Maryland, Department of Geography, February 2010), 39.

Table C.4.6: Fire *Activity in and around Namwasa: 2001-2005*

Year	Number of Fires Detected	Percent Increase
2001	5	
2002	6	20%
2003	44	633%
2004	54	22%
2005	95	75%

The acceleration of fire activity may be attributed to the increased migration trends and attendant expansion of agricultural practices. In 2010, an independent research team from Makerere performed a series of household interviews in the villages surrounding Namwasa. Participants indicated that progressively more immigrants had been arriving in the area, namely from severely degraded southern districts. The fire analysis supports local observations of expanding cropping and charcoal production, and a decrease in forest cover. It may also confirm research findings which demonstrate shortened fallow periods across the country at large (Pendler et al; Pomeroy et al.). Figure C.4.7, developed from FIRMS Web Fire Mapper (August 2010) shows the increase in fire practices between 2004 and 2005. Each snapshot is covered with yellow squares, each a pixel of 1 km^2 and illustrating the location of fire – information on the GPS coordinates and fire intensity are available for each pixel. The images are each from the month of February, 2004 and 2005 respectively. In and around Namwasa, the increase of fire was on the order of 75% (Table C.4.6).

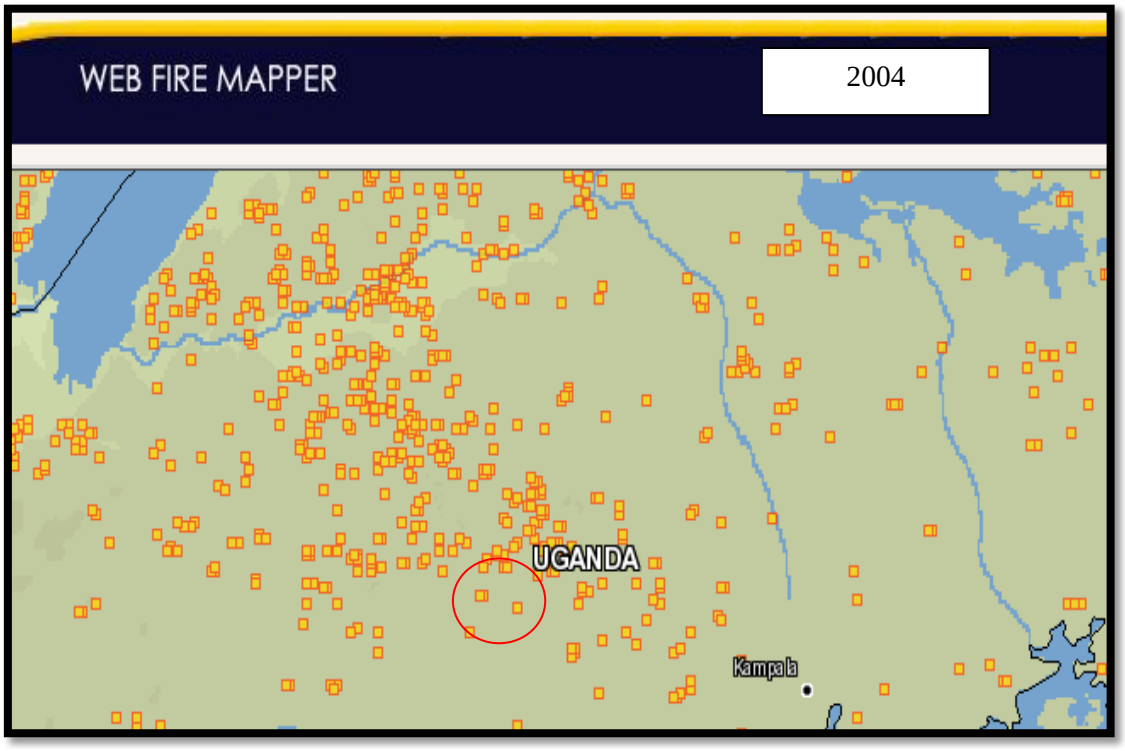
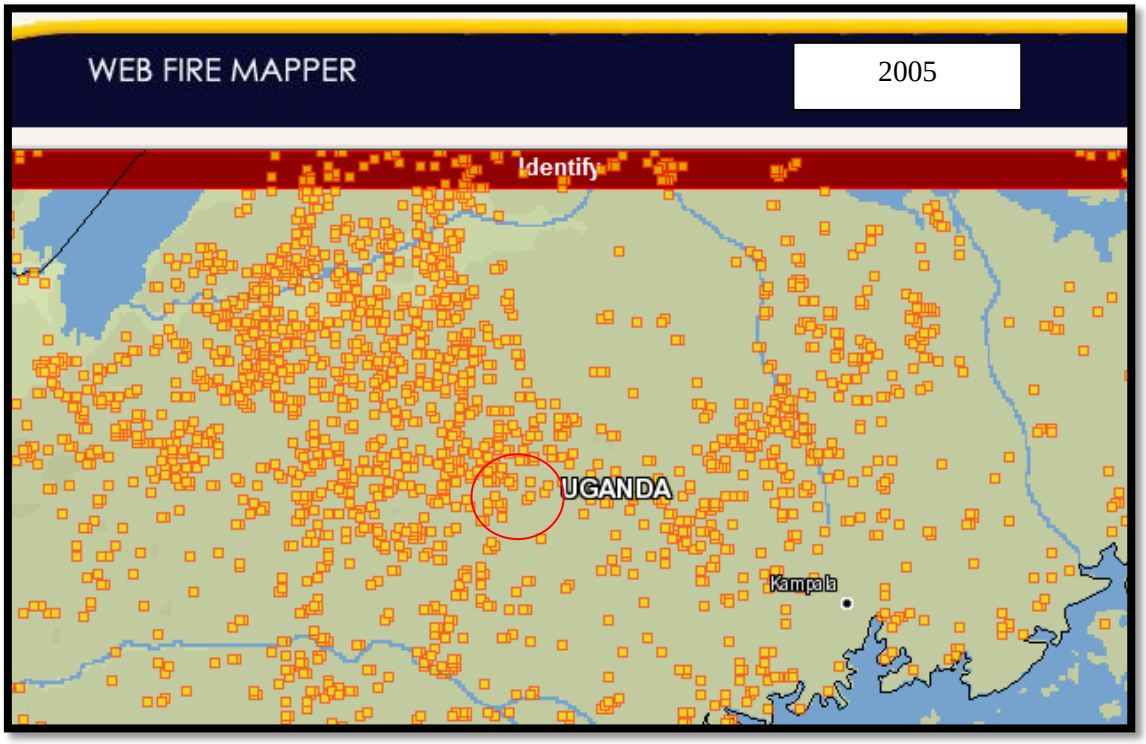


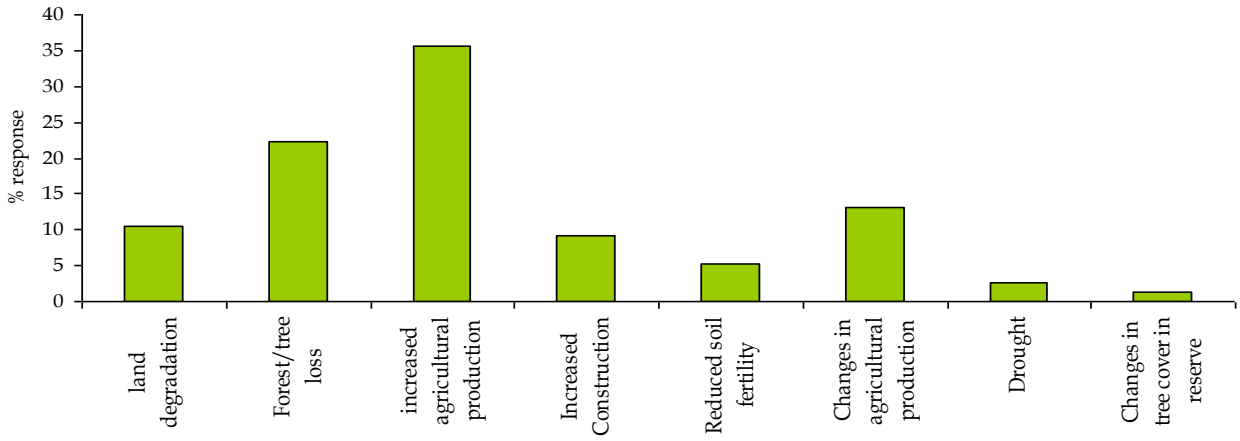
Figure C.4.7: February 2004 fires (above) and in 2005 (below)– red circle represents proximate location of Namwasa and surrounding area



Local Perceptions: Soil Fertility, Land Degradation

Local household surveys ran by an outside team of community forestry researchers from the University of Makerere in March of 2010 tracked historical land-use trends in the area. 65% of participants stated that the soil quality had diminished over time. When prompted to share their observations of land-use changes, respondents noted that forest cover had been lost over time (25%), that agriculture had expanded (34%) and that the land had been subject to degradation trends (10%). 46% of respondents noted that the loss of forest was primarily due to the expansion of cropping or changes in cropping, indicating a link between agricultural activities and soil erosion trends.

Figure C.4.8: ***Survey responses to perceived land-based trends in and around Namwasa***



Source: ***2010 Leakage Assessment***

(c) Identify and briefly describe national, local and sectoral land-use policies or regulations adopted before 11 November 2001 that may influence land-use / land-cover change and demonstrate that they do not influence the areas of the proposed A/R CDM project activity:

Forestry

Forestry policy in Uganda stems from mandates described in the nation's constitution. The National Objective and Directive Principle of State Policy in the 1995 Constitution of Uganda, (no. XIII) confirms that the State will, "…*inter alia…protect important natural resources, including water, wetlands…flora and fauna on behalf of the people of Uganda.*" Following the development of the National Forestry Plan in 2000, the Ugandan Forestry Policy was adopted in March of 2001. It holds as its overarching vision: *A sufficiently forested, ecologically stable and economically prosperous Uganda.* Most applicable to the Central Forests Reserves, such as Namwasa, are policy statements that cover the following:

- The permanent Forest Estate, overseen by the National Forestry Authority, will be conserved and managed sustainably
- Partnerships with local communities will be developed to help sustainably manage forest assets
- Support will be given to promote tree growing through extension and advisory services, including for small-scale farmers
- Forests critical to watershed protection will be established, rehabilitated and preserved

- Government supported training, research and development on sustainable forest sector development

As described in more detail in section C.5 (barrier analysis), the National Forestry Authority has been largely unable to comprehensively implement the Forestry Policy. Lack of financial and human resources has stalled protection of CFRs, the establishment of sound community partnerships and the dissemination of important technical training on the establishment of small-scale forests. The NFA reports the following:

- Of the 506 central forest reserves, only 2 have operational management plans developed with local stakeholders, with 20 more in the final drafting stages;
- Illegal encroachment is widespread, with the NFA reporting that every single reserve has an encroachment issue that requires managing. The NFA estimates the number of encroachers at 163,000;
- Of the 300,000 hectares of land identified by the NFA for plantation programmes, only 2,123 (less than 1%) have been developed by the organization itself;
- Project boundaries are poorly marked, leading to opportunistic exploitation of forest resources.

The Namwasa CFR was not privilege to resources extended by the NFA for draft management plans, for the normalization of encroachment issues or for local technical capacity building for forest establishment. For this reason, the forestry policy does not positively impact land-use in particular at Namwasa.

Agriculture:

The Government of Uganda passed the Poverty Eradication Action Plan (PEAP), adopted in 2000. Pillar two of the plan – enhancing production, competitiveness and incomes – has a heavy focus on the establishment of improved agricultural systems and enhanced productivity. From the PEAP, the Ugandan government elaborated the Plan for Modernization of Agriculture (PMA), enacted in 2001. The Plan seeks to enhance farmers' income by improving productivity per hectare, increasing market access and creating more jobs. The Plan's vision is *"Poverty eradication through a profitable, competitive, sustainable and dynamic agricultural and agro–industry sector."*

One of the major objectives of the PMA is to increase soil productivity and yields per hectare, potentially resulting in a net decrease of agricultural expansion in rural areas without comprising income-generating capacity. The National Agricultural Advisory Services (NAADS), under the Ministry of Agriculture, was established to extend technical support and feedback at a local level, across all Ugandan districts. The scope and impact of NAADS has met with significant challenges, despite the inclusion of some 400,000 small farmers. These challenges have directly impacted the uptake of new agricultural techniques at a local level:

- **Corruption:** In 2009, the National Joint Task Force investigated allegations that NAADS officials had misappropriated the organization's funds. 80 billion Ugandan shillings were stolen or mismanaged, funds otherwise destined to small farmers across the country. NAADS 2006-2007 annual report warned that lack of resources was halting the organization's ability to perform regular audits at a district level to ensure proper management of funds.
- **Impact:** Research performed in 2005 with NAADS supported and non-NAADS supported farmers demonstrated that there was no correlation between NAADS funding and increased productivity on

landholdings.[38]

- **Funding:** NAADS depends on matching funds from local officials and contributions from farmers. Funds have not been extended as expected, hampering the efficacy of the programme.[39] Funds are often released behind planting schedules, compromising the quality of the intervention.
- **Human Resources:** NAADS is understaffed, and the quality of training interventions by service providers has been reported as poor across several regions.[40]

Due to numerous barriers, neither the National Forestry Policy nor the Plan for Modernization of Agriculture is expected to impact land-use scenarios in the Namwasa Central Forest Reserve. This is further described in section C.5, step three "barrier analysis." Therefore it is assumed that the baseline scenario of shifting slash-and-burn agriculture would persist in the absence of the project due to weak policy adoption and law enforcement.

(d) Identify alternative land uses including alternative future public or private activities on the degraded land including any similar A/R activity or any other feasible land development activities.

As described in the demonstration of additionality section C.5 identified alternative land-use scenarios include those noted below.

- **Baseline scenario of continued land degradation:** Continued vegetation loss and soil nutrient depletion due to illegal use of CFR land associated with slash-and-burn agriculture, aggravated by the lack of state intervention due to weak law enforcement and a deficit of state resources.

- **Small scale reforestation for timber purposes:** Locals form small groups to access funding through the Sawlog Production Grant Scheme, establishing timber plantations in sizes no greater than 100 hectares. However, this is highly unlikely for the reasons discussed in the additionality barrier analysis. Notably, the grant scheme is slated to expire in 2013, and it is unlikely that up until that point, a significant number of locals would have accessed funds and successfully implemented timber operations to scale and that small-scale farmers would have had the ability to secure CFR land through complicated legal negotiations with the NFA. Incomes in the area are depressed enough that households would not likely be able to cover the start-up costs required for participation in SPGS. Moreover, historically locals demonstrated greater interest in illegally accessing the reserve for cropping purposes.

  In addition, other CFRs are supported by greater road and electricity infrastructure, such as the Kasana Kasaymbya Reserve, located along a major highway connecting the capital, Kampala to Fort Portal and within an hour and a half's drive from Namwasa. Kasana Kasaymbya is the site of several tree-planting activities supported by SPGS grants. Namwasa, by comparison, is located down a series of winding dirt roads, often washed out by heavy rains, and with no electricity access. Ensuring delivery of timber resources to market, by capital-intensive investments in road quality, would be financially unfeasible for small-scale tree planters.

[38] Michael J. Potts and Stella Nagujja, *A review of Agriculture and Health Policies in Uganda with Implications for the Dissemination of Biofortified Crops* (HarvestPlus Working Paper No. 1, April 2007), 54.

[39] Ministry of Agriculture, Animal Industries and Fisheries (MAAF) and prepared by the NAADS Secretariat, *Annual Report 2006-2007: National Agricultural Advisory Services* (Kampala, 2007), 53.

[40] NAADS Secretariat, *2006-2007 Annual Report*, 53.

- **NFA enforcement of forest boundaries and long-term natural regeneration of the area:** NFA acquires the resources necessary to secure and patrol the entirety of the Namwasa CFR and effectively manage internal corruption so as to entirely halt all encroachment and fund the process of assisted natural regeneration within the reserve. However, the NFA lacks the resources necessary to protect the majority of the CFRs under its control. This is partly due to a deficit of necessary funds in general, and to the severity of illegal land-use within the confines of Namwasa specifically. Moreover, the NFA is more likely to protect and develop forestry assets that are less bound by the constraints of rural infrastructure, and for which they can find viable funding partners. For example, the NFA partnered with the World Bank's BioCarbon Fund to develop the Rwoho CFR as a CDM carbon credits project.

  In light of the breadth and scope of NFA's mandate and overarching responsibilities, as well as the less-than-ideal location of Namwasa, it is highly unlikely that the organization would commit the considerable resources necessary to normalize the legal status of Namwasa, regularly patrol its borders, and allow for the land's natural or assisted regeneration. These constraints are further explored in the barrier analysis in section C.5 (institutional barriers).

- **Commercial plantation forestry activities without the CDM incentive:** A plantation forestry company could determine to launch a medium- to large-scale plantation forestry project, but without access to carbon revenues. However, large-scale plantation forestry in Uganda is virtually non-existent. There is no net-surplus of timber delivered from managed plantations, and instead there is a swift acceleration in the clearing of the state's remaining timber assets. The two largest plantation operations, ran by Global Woods and Green Resources, both rely on carbon finance. The lack of other large-scale initiatives is due in large part to an unfriendly investment climate for forestry, the poor enforcement of CFR boundaries and access rights, weak infrastructure and the long time horizon for profit generation.

Barriers to entry are described in full in section C.5, Step 3, "barrier analysis" and indicate that the continued degradation of the reserve under a shifting slash-and-burn agricultural regime is the only credible land-use in absence of the Namwasa Central Forest Reserve Reforestation Initiative

(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 decrease in absence of the proposed project activity.

As the barrier and common practice analyses in section C.5 detail, these alternative land-use scenarios face numerous challenges to adoption. Local community members lack the financial resources, land-holdings, and technical expertise necessary to implement small-scale forestry interventions. The SPGS grants are limited and the programme is due to expire in 2013. During household interviews held in March and April of 2010, local residents expressed their interest in planting trees. However, many indicated that they lacked the necessary land-holdings to plant more than a few trees; few individuals have land in excess of 1 hectare, the necessary amount to reach the national definition of forest. Only with the intervention of NFC's outgrowers scheme had some locals planted small portions of trees on their land.

With over 500 other CFR's facing similar encroachment and degradation issues as Namwasa; it is highly unlikely that the NFA would be able to mobilize the resources necessary to protect this particular reserve. Moreover, funds and research as well as scientific expertise would be lacking to establish the conditions

necessary for assisted natural regeneration of forests. This would be critical to enhancing the project zone's biomass and carbon stocks.

Given the high interest rates, and the lack of access to capital, large-scale timber plantations are difficult to fund and manage. These sorts of large-scale and long-term forestry projects are rare in Uganda. Those companies who have succeeded in establishing plantations have successfully sought out and accessed carbon finance (Global Woods' Kikonda project, Green Resources' upcoming Bukaleba project, the small-scale forestry project financed by the World Bank's BioCarbon Fund "*Nile River Basin."*)

Without the intervention of The New Forests Company Ltd, the land within the reserve would have continued to be exploited for agricultural and fuel-wood collection purposes, ensuring the conditions for continued degradation and a loss of carbon stock. Other alternatives without the benefit of carbon finance would face significant barriers.

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

As required, and per section II.3 baseline and *ex ante* stratification has been performed.

C.4.2. Description of the identified baseline scenario (separately for each stratum):

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

NFC has determined that the baseline land-use scenario is an acceleration of shifting agriculture, with increasingly shorter fallow periods and the regular use of fire, which depletes c-stocks and prevents natural vegetation regeneration. There are three vegetation classes involved in the overall rotation cropping cycle – grasslands, active or recently abandoned croplands, and diminishing amounts of bushlands representing fallow periods.

The historical land-use mapping (2004) indicated that 81% (1,994 hectares) of the total eligible project zone was clearly demarcated as farmland, subject to shifting agricultural activities as confirmed through interviews with households surrounding the reserve. Bushlands represent land that had been left fallow for some time, but which, under the baseline scenario, would have been converted back to farmland, but under increasingly narrow fallow cycles. Grasslands were sites of grazing, but also subject to shifting cropping cycles.

The overarching stratum of shifting slash-and-burn agriculture is marked by three different vegetation attributes, each representative of a different stage of maturity in the fallow cycle of slash-and-burn agriculture:

Stratum 1:

Bushlands

As described in the NBS, bushlands are vegetation dominated by bush, scrub and thicket growing together as an entity, but not exceeding an average height of 4 m. It is common to find bushlands in abandoned farmland under late fallow, or as buffer to forestland.

In the case of Namwasa, the expansion of bushlands can be due to the destruction of forests cleared for cropping purposes, as well as to extend farming fallow periods, which are nonetheless shortening. The

Landsat maps demonstrate the gradual reduction of bushlands, as fallow periods wane in length under increased cropping pressures. Consequently, bushlands can comprise part of the longer extension of slash and burn agriculture, representing peak biomass stocks in extended fallow. Under the baseline scenario – with expanding agriculture and the consequent acceleration of fires – it is not expected that bushland cover will spread or grow in density. Between 1990 and 2004, the amount of bushland in the entire CFR constricted from 25% of cover to 18%.

The National Biomass Study classified bushlands into two categories: B1 and B2. Analysis of Landsat imagery and references from field-based baseline research indicate that Namwasa bushlands fit the B1 category. Namely, this cover is marked by saplings that may grow into trees, including *Acacia spp, Combretum* and *Solanum spp* – but only under suitable conditions that allow for growth. In Namwasa, scattered trees were observed in bushlands. Field-based analysis from baseline sample plots demonstrate that above and below ground carbon stocks for bushland areas averaged to approximately 25 tons of fresh weight per hectare.

Bushlands make up a small portion of the total project area, which prior to the project start was largely dominated (81%) by farmland. Bushland growth is stunted by the regular use of fire to clear lands for new agricultural activities.

Croplands

Farmland areas include smallholder subsistence farm units scattered across Uganda. The cropping systems include single species systems and mixed cropping. Scattered trees are frequently found in the vicinity of the homesteads. Examples include fruit trees and various multipurpose trees integrated in the farming system (agroforestry).

Small-scale cropping plots - both active and those laid fallow - were scattered across the Namwasa landscape, making up the largest portion of land-use. Lands laid fallow revert to perennial weed grasses and small shrubs.

Grasslands

These are rangelands, grazing grounds, improved pastures, weed grasses, and natural savannah grassland. Various trees with bushy and woody vegetation frequently occur on this land, but grass dominates the landscape. In the case of the ongoing extension of agriculture in Namwasa, grasslands were often pulled into agricultural systems, and hence forms part of a shifting agriculture baseline, as well as stock for grazing.

Analyse the possibility of self-encroachment of trees under the current conditions:

The likelihood of natural regeneration within the baseline scenario is highly unlikely. Regular and intensifying anthropogenic pressures coupled with the ecological limitations introduced by degradation trends demonstrate the limits of unassisted forest re-growth. This is further impacted by the continued, annual use of fire, as demonstrated through the MODIS fire analysis. The analysis of historical land-use trends in step C.4 step 3 above depicts the regular practices underpinning land use in Namwasa – an acceleration of agricultural practices.

Results from the commissioned Baseline Ecological Study, 2009, demonstrated that any remaining forest patches within the reserve would have been destroyed within ten years time in the absence of

interventions to halt the baseline scenario of expanding agriculture– leading to severe degradation and destruction of important seed stocks. No areas of conserved forest in the area just surrounding the reserve were found either, which could have provided the seed sources necessary to support the re-growth of tropical forest. As such no spontaneous regeneration leading to the establishment of forest, per the Ugandan definition of forest, is expected under the baseline scenario.

C.5. Assessment and demonstration of additionality (if the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" is not used):

NFC has adopted the CDM EB 35 Annex 17 A/R methodological tool "Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities" Version 02). It has applied the following five steps:

STEP 0: Preliminary screening based on the starting date of the A/R project activity;
STEP 1: Identification of alternative land use scenarios to the A/R project activity;
STEP 3: Barrier analysis; and
STEP 4: Common practice analysis.

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

Project start-date: The project start date is August 22nd, 2005, when NFC made its first purchase of seeds for its nursery operations from Schuckar & CIA. Florestal LTDA, invoice no. 004/2005.

Consideration of sale of tCERs: The following timeline describes NFC's ongoing commitment to developing tCERs for commercialization:

1. April 2005 – license agreement signed with the NFA to manage the Namwasa CFR, with CDM commitments highlighted
2. August 22nd 2005 – purchase of seeds for nursery establishment (project start-date)
3. March 2006 – contract signed with an internationally recognized carbon asset development firm to develop tCERs prior to the start of planting
4. May 2006 – carbon asset development firm delivers preliminary feasibility report
5. October 2006 – carbon asset development firm finalizes carbon inventory TORs, leakage TORs
6. October 2006 – carbon asset development firm writes to confirm that Namwasa has a high potential for the generation of carbon credits with sustainability attributes
7. December 2006 – carbon asset development firm submits a revised methodology (*ARNM0031 Reforestation or afforestation of degrading land currently under agricultural or pastoral use, accounting for living biomass and encompass)* to the CDM EB.
8. March 2007 – EB methodology revisions and recommendations confirm that considerable amendments would be required before the submitted methodology could be adopted by the EB. Regardless, the carbon asset development firm commissions an initial leakage assessment and baseline carbon stock / historical land-use mapping assessment.
9. October 2007 – Following discussions with NFC management, the carbon asset development firm submits a memo recommending that a brand new methodology be developed for approval in December 2008, followed by a proposed and successful project validation in 2009.
10. February 2008 – Carbon asset development firm drafts a review on CDM versus Verified Carbon Standard (then the Voluntary Carbon Standard) commercialization options following rejection of CDM methodology

11. Mid-2008 – Disintegration of relationship with carbon asset development firm in light of increasingly high fee structure and ongoing delays, attempts made to identify a suitable project development partner willing to work on risk.
12. 2009 – NDA signed with potential project financier to continue tCER development
13. December 2009 – Recommendation to hire an internal Carbon Manager submitted to the board as a way to maintain momentum but avoid prohibitive consulting fee costs, inclusive of a job description
14. January 2010 – Decision taken to hire an in-house Carbon Manager
15. February 2010-2011 – Carbon Manager reviews methodology options, drafts PDD, identifies viable commercial opportunities, and contracts with DOE to initiate validation audit
16. March 9th, 2011 – CDM Global Stakeholder Consultation launched for a period of 45 days
17. August 26th, 2011 – Receipt of Ugandan DNA LoA

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***

NFC has identified four credible alternative land use scenarios, described in detail below. These take into consideration relevant sectoral policies, historical land uses and economic trends.

Alternative 1: The most likely land-use scenario is the **continued degradation of the central forest reserve** to support subsistence agricultural practices, nomadic grazing and charcoal production. Recent evidence demonstrating the continued encroachment of government lands by local communities underscores the weak legal framework under which illegal use of central forest reserves has become commonplace. Historical land-use mapping illustrates the regular and accelerated process of degradation in and around the reserve and attendant drops in biomass stocks. Given the rural location and the low average yearly income in the region, it is highly unlikely that local communities would invest in activities that enhance biomass stocks.

Alternative 2: While the continued degradation of the reserve represents the most credible long-term land-use scenario, it is possible that a few locals, by pooling their land-holdings, may have acquired the capital necessary to implement **small-scale (25 hectare) reforestation initiatives**, assisted by the Sawlog Production Grant Scheme funded by the European Union and the Norwegian government. The grants, while available to large-scale timber operations, are also available to small-scale farmers.

Alternative 3: NFA properly patrols the Namwasa CFR, halting encroachment and establishing the ecological conditions under which natural forest regeneration will take place.

Alternative 4: Plantation forestry activities without the CDM incentive: A plantation forestry company could commit to launching a medium- to large-scale plantation forestry project, but without access to carbon revenues under the CDM.

Outcome of Sub-step 1a: List of credible alternative land use scenarios that would have occurred on the land within the project boundary of the A/R CDM project activity:

1. Continued degradation of the central forest reserve
2. Small-scale reforestation initiatives
3. NFA properly patrols the Namwasa CFR
4. Plantation forestry activities without the CDM incentive

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

Alternative 1: Encroachment onto central forest reserves is considered an illegal activity in Uganda; agricultural practices, grazing and charcoal production within the boundaries of the Namwasa Central Forest reserve do not comply with mandatory applicable legislation and regulation. To protect its critical forest resources, the Parliament of Uganda enacted the "National Forestry and Tree Planting Act in 2003, under which the National Forest Authority (NFA) was created and made responsible to the Ministry of Water and Environment (Section 52). This builds off of the National Forestry Policy, which stipulates that the government must protect, maintain and sustainably manage its "permanent forestry estate," including all central forest reserves for which stipulations were made to ensure the resolution of all encroachment issues.

Under Section 54 of the National Forestry and Tree Planting Act, the National Forestry Authority is responsible for the sustainable management of all central forest reserves, of which there are 506 covering approximately 1.15 million hectares of land. Less than 5% of these have adopted forest management plans; incidences of encroachment are well documented, with an estimated 163,000 individuals illegally accessing central forest reserve lands.[41] The NFA reports that local politicians have been known to sell portions of CFR land to migrants.[42] The conditions for regular encroachment patterns were established in the turbulent, violent 1970's-80's. Despite government efforts in the early 1990's to put an end to the incidences of CFR encroachment, it has yet to be properly normalized.[43] In Mubende District in particular, migrants in search of fertile lands - and unaware of the laws governing CFR's - purchased CFR land from local politicians.[44]

The issue of encroachment persists: in April 2010, the Parliament of Uganda released a report detailing the performance of the NFA through 2004 to 2007. Findings revealed that encroachment is consistently one of the largest challenges facing the NFA and its mandate to manage its CFRs. In only 1 of the 11 study sites for the report was encroachment not cited as a major barrier to successful CFR management. The problem – widely spread across the country – is also localized to the region where Namwasa is located. Reportedly the largest issue facing the Kasana Kasaymbya reserve – where reforestation is taking place through EU funding – and located between Mubende and Mityana district is encroachment, in part instigated by opportunistic local politicians pitting local residents against NFA staff.[45] This finding is consistent with the additionality tool, which states that "If an alternative does not comply with all mandatory applicable legislation and regulations then show that, based on an examination of current practice in the region in which the mandatory law or regulation applies, those applicable mandatory legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread, i.e. prevalent on at least 30% of the area of the smallest administrative unit that encompasses the project area." As the parliamentary report demonstrates, law enforcement was only

[41] "Management of Central Forest Reserves," National Forestry Authority, accessed May 17th, 2010, http://www.nfa.org.ug/content.php?submenu_id=4

[42] NFA, *Uganda's Forests,* 4, 5.

[43] NFA, *Uganda's Forests,* 4, 5.

[44] NFA, *Uganda's Forests,* 4, 5.

[45] Ugandan Parliament, *Report of the Standing Committee on Commissions, Statutory Authorities and State Enterprises on the Performance of the National Forestry Authority from 2004 to 2007* (Kampala, May 2010), 1, 3, 13-14, 18.

successful on 9% of the CFRs that were assessed (1 / 11), or, rather, that encroachment was identified on 91% of the CFRs studied. This demonstrates that even though encroachment is illegal, it is widespread and can be considered a viable land-use alternative at Namwasa.

Alternative 2: Alternative number two – small-scale tree planting for timber purposes as supported through the Sawlog Production Grant Scheme – is consistent with applicable legal and regularly requirements. It supports the National Forestry and Tree Planting Act of 2003.

Alternative 3: Alternative number three – the NFA's enforcement of CFR boundaries – is consistent with the National Forestry and Tree Planting Act of 2003, and is one of the guiding mandates of the organization.

Alternative 4: Alternative number four – the launch of a large-scale plantation forestry operation – is also consistent with the National Forestry and Tree Planting Act of 2003, and would likely be supported by the NFA if done in accordance with EIA requirements.

Outcome of Sub-step 1b: List of plausible alternative land use scenarios to the A/R CDM project activity that are in compliance with mandatory legislation and regulations taking into account their enforcement in the region or country and EB decision on national and/or sectoral policies and regulations:

1. Continued degradation of the central forest reserve
2. Small-scale reforestation initiatives
3. NFA properly patrols the Namwasa CFR
4. Plantation forestry activities without the CDM incentive

STEP 2: Investment analysis

Not undertaken for this project

STEP 3: Barrier analysis

Sub-step 3a. ***Identify barriers that would prevent the implementation of the type of proposed project activity:***

This sub-step illustrates that there are five major barriers that prevent projects of the scale and quality found at NFC's Namwasa site from being implemented in the CFR under a business-as-usual scenario and without being registered as an A/R CDM activity. The barriers include the following:

1. Investment barriers
    a. Similar activities have only been implemented with grants
    b. Perceived country risk and credit constraints
2. Institutional barriers
3. Technological barriers
4. Land tenure and prevailing practice barriers
5. Barriers due to prevailing timber market conditions

Carbon finance delivered from participation in an A/R CDM project activity would allow organizations pursuing large-scale forestry to overcome these barriers.

The following provides transparent and documented evidence that demonstrates the existence and significance of the barriers listed above. These are applied with reference to EB 50, annex 13, point (7), which states that:

> *For projects in Least Developed Countries it is sufficient to transparently describe the relevant barriers, as less stringency is needed with regards to data availability in the actual demonstration of barrier, as compared to the projects in other countries. Projects in Least Developed Countries are not bound by the provisions in this guideline and may use other approaches that are more adapted to the local circumstances.*

In accordance with point (7), Uganda is classified as a Least Developed Country. The barrier anaylsis compliments available data with primary source references from conversations and email exchanges with local banks and forest practioners. This was combined with NFC's own experience and observations in the field, which can be easily cross-checked by an auditor through engagement with local stakeholders and investors. Evidence in the form of industry reports, statements from banks, reports from the National Forestry Authority, and country ratings have been analysed and presented in an approach adapted to Uganda's local circumstances. Many of the barriers, when considered in combination, demonstrate the reasons for which there are perceived investment risks in Uganda's forestry sector.

1. Investment Barriers:

a. Similar activities have only been implemented with grants

The Sawlog Production Grant Scheme – slated to expire in 2013 - confirms the general lack of investment appetite for timber operations in Uganda. This is perhaps best highlighted by the fact that virtually no plantation forestation has taken place in Uganda in the past 30 years; the twelve thousand hectares of plantation forest established in the early 70's have been overexploited for timber resources, with new reforestation only recently reinitiated through SPGS grants.[46] The bulk of all plantation forestry taking place in Uganda at this time is supported by the Sawlog Production Grant Scheme or carbon credit incentives (see common practice analysis). As the director of the programme has written, "...at 2003, the country had less than 6,000 hectares (ha) of over-mature, commercial timber plantations and virtually no younger crops at all."[47]

The role played by SPGS in the forestry sector is immense and without their technical and financial support, there is little chance that forest establishment would have been pursued at the rate it has been since 2004. As the organization confirms, "...the vast majority of the private growers depend on the planting subsidy provided by the SPGS."[48] Green Resources and Global Woods, the only two competitors with holdings similar in size to those of NFC, have benefited from SPGS funding. The bulk of planting under SPGS stems from small- to medium-sized land-owners – 60% – who don't face the same capital-intensive investments as larger operators do. The interest in and the success of these grants highlights fundamental financial constraints in the industry, as discussed below. More importantly, the SPGS

[46] Sawlog Production Grant Scheme, accessed April 15th, 2010, http://www.sawlog.ug/gpage3.html

[47] Paul Jacovelli, A *Ugandan Model for Engaging the Private Sector in Commercial Tree Growing* (Kampala, 2009), 1.

[48] Sawlog Production Grant Scheme, *Sawlog Production Grant Scheme Newsletter no. 16* (Kampala, July-August 2007), 11.

expires in 2013, raising important questions about the ability of land-owners to sustain their planting initiatives in the absence of funds. The scheme has noted that one of its weaknesses is the expiration of the programme. This could hinder the sustainability of the planting initiatives, which will require ongoing support to ensure that trees reach maturation, the definition of forest and quality standards.

In the case of Namwasa, establishment costs far exceed the estimated $780 / ha by SPGS, as significant money is diverted to comply with the Forest Stewardship Council (including conservation of natural habitats, wetlands and indigenous forest) to invest in local communities and to establish much-needed road infrastructure, due to the plantation's remoteness. These activities are critical for compliance with environmental standards promoted by the CDM, with the standards adopted by international funding sources, as well as for forging strong community relationships critical for project success.

b. Perceived Country Risk and Credit Constraints:

Timber operators in Uganda face difficulties in securing long-term finance in international capital markets, either in the form of debt or equity. This is in part due to perceived country risks. The World Bank's *Doing Business 2011* demonstrates the difficulty of entering into new business ventures in the country.[49] Compared to its regional counterparts – Rwanda, Tanzania and Kenya – Uganda is the hardest to start a business in, ranking 137 out of 183 countries, compared to Rwanda's "9" ranking. Perhaps more importantly, Uganda's investor protections are lowest in the East African Community, with a ranking of 132, 29 points higher than both Tanzania and Kenya. The Bank gives Uganda low overall rating - 4 out of 10 - for its strength of investor protection. The US State Department regularly releases reports on doing business in Africa. It too highlights major investor challenges, including debilitating levels of corruption in Uganda, which are costly and delay business operations. The frequency of this type of reporting from respected institutions will influence international investor behaviours and could act as a deterrent for the inflow of overseas equity and debt. Due to its corporate structure and exclusive focus on plantation forestry in East Africa, all of New Forests Company's potential investments are based on each country's local investment context and risk profile. Investments are provided to country subsidiaries, where high rates of return are required for perceived risks.

The forestry business in particular meets challenges due to the long time horizon for tree maturation. Accessing finance for forest establishment presents a significant roadblock. Stanbic Bank – one of Uganda's leading banks and NFC's local bank – has stated that "Credit specifically for timber plantations has not yet registered serious appetite."[50] As the US State Department reports, following corruption, the number one impediment to doing business in Uganda is the lack of affordable credit. The average lending rate in Uganda between 2006 and 2008 was 19.4%,[51] making debt funding prohibitively expensive for long-term projects. Corporate loans extended on a twelve month basis reportedly range from 19-25%.[52] Despite the government's attempt to induce banks to reduce interest rates through structural reforms, including massive cuts in the discount rates of 91-day treasury bills in late 2009 through early 2010,

[49] International Bank for Reconstruction and Development and the World Bank, *Doing Business 2011: Making a Difference for Entrepreneurs* (Washington, D.C., 2011), 5, 10, 47.

[50] Martin Lukwago email message to NFC Carbon Manager, April 2010.

[51] Stanbic Bank, *Uganda: Annual Economic Outlook* (February 19, 2010), 9.

[52] US Commercial Service – US Department of Commerce, Doing *Business in Uganda: 2010 Country Commercial Guide for U.S. Companies* (US Foreign Commercial Service and Department of State, February 2009), 47.

commercial banks have not reduced lending rates below 19.6%.[53] There is little liquidity available for loans that extend beyond a three-year term.

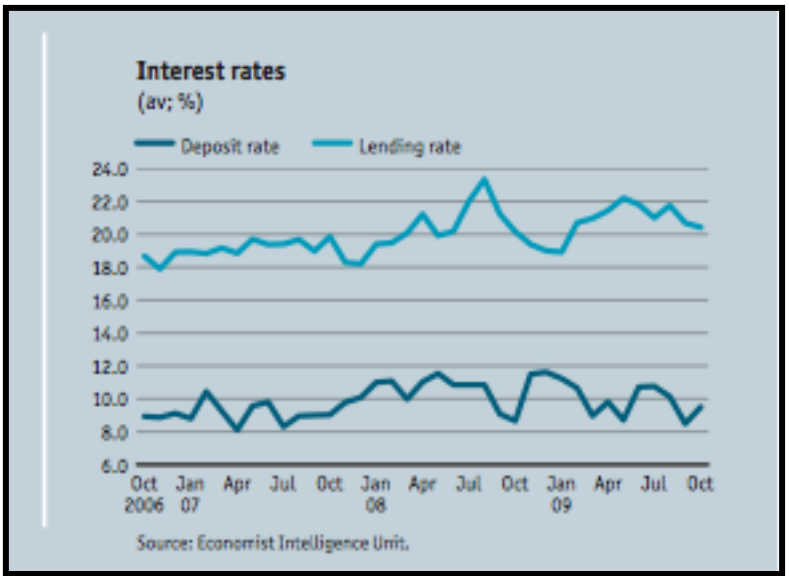


Figure C.5.1: ***2006-2009 Interest Rates, Uganda***

Access to carbon finance will facilitate NFC's objective of maintaining ecologically sound, community friendly plantation forests in the long-term. SPGS grant money helps with the initial establishment costs. But as SPGS has pointed out, it is absolutely critical that plantation operations have funds to support maintenance. SPGS, for example, discourages individuals and organizations from accessing grants if they won't have the funds necessary to ensure ongoing tree growth and management following the last grant disbursement in year three.[54] As such, carbon finance will be critical in sustaining the company's operations through the following years of tree maintenance, upkeep, replanting, indigenous forest preservation and community development. The sale of tCERs will represent a sound revenue stream, which can replace the option of taking on local loans with unsustainable interest rates.

2. Institutional Barriers:

At Namwasa, illegal use of the reserve in the form of grazing, cropping and fuelwood collection was practiced within the CFR's boundaries, as confirmed by a third-party leakage assessment run for NFC in 2007. The status of illegal use of Namwasa's land and resources would act as a major barrier for investment for project developers implementing a plantation similar in scope to that of NFC's. Exploitive and illegal access to government reserves is a spin-off effect of low institutional capacity at the National Forestry Authority, and has not been confined to Mubende District. Investors are wary of land disputes on central forest reserves, the occurrence of which is regularly cited in the media and on the National Forestry Authority's website. SPGS has stated that concerns over encroachment have been the most

[53] Economist Intelligence Unit, *Country Report Uganda* (London, May 2010), 17.

[54] Paul Jacovelli, email message to NFC Carbon Manager, February 2011.

dissuasive factor influencing investors, who have little confidence that they can gain support from the NFA on the issue.[55]

The inability of the NFA to successfully manage the wide-spread and documented illegal use of its CFRs by local populations and migrants alike – as described in sub-step 1b – represents a major institutional barrier to large-scale A/R project implementation backed by significant investment. The National Forestry Authority reports the reluctance of investors to take out tree farming licenses on CFR lands, due to the risks associated with protecting long-term forestry assets under encroachment conditions.[56] As the NFA states, "It must be noted that encroachment stands up as one of the most outstanding impediments to private sector investment in commercial forest plantations."[57] This is coupled with investor wariness that anti-encroachment policy will not be uniformly respected or enforced by relevant government bodies. Notably, during the presidential elections in 2006, the NFA was halted from displacing encroachers by presidential decree, creating measurable financial consequences for plantation timber operators.

Finally, the NFA experienced a number of resignations at the highest echelons of management in 2006/2007. This has been followed by a wave of corruption scandals. These incidents have led to the retraction of important donor support. At the time of drafting version (02) of the PDD in June 2011, seven NFA officials – 4 board members and 3 senior managers – were arrested on accounts of corruption. This at once challenges the NFA's ability to implement its own planting plans, and weakens investor's trust in the organization's ability to properly manage its leasing contracts to the private sector.[58]

Access to carbon finance can support NFC in the maintenance of its tree-farming license to the Namwasa CFR in accordance with the stipulations of the licence. Respecting its obligations under the license will require significant funds. For example, the company must pursue plantation forestry operations in compliance with the EIA – unlike smaller planters. Additionally, Schedule A of the license, point (10) states that the Licensee "shall endeavour to develop community outreach programmes and generally work with local communities." A portion of NFC's community activities focus on the normalization of CFR boundaries and responsible use of its lands.

Carbon finance at once supports NFC's activities, but by rationalizing the venture at large, ensures that the National Forestry Authority receives annual rents on the licensed land. This in turn can be used to bolster the NFA's capacity to manage its CFRs. This type of institutional arrangement can promote the flow of more investment to the forestry sector as finance institutions' confidence builds.

3. Technological Barriers:

The implementation of an A/R project in the Namwasa CFR faces significant technological barriers. Lack of electricity in surrounding communities, poor road infrastructure and the costs associated with overcoming these deficiencies are cited as a major challenge to attracting foreign direct investment in remote areas of the country.[59] The Namwasa Central Forest Reserve is located in rural Mubende District,

[55] Paul Jacovelli, email message to NFC Carbon Manager, February 2011.

[56] NFA, *Uganda's Forests,* 12.

[57] NFA, *Uganda's Forests,* 12.

[58] Sawlog Production Grant Scheme, *"Forestry Investment in Uganda and Challenges" in SPGS Tree Planting Guidelines* (Kampala, June 2007), 5.

[59] Commercial Service – US Department of Commerce, *Doing Business*, 2, 4, 41.

where dirt road maintenance is poor; the limited available routes risk flooding and deterioration during the rainy seasons, severely blocking access to the base of forest resources in the CFR. The New Forests Company Ltd, for example, had to commit a sizeable capital expenditure budget to construct roads connecting the isolated CFR to surrounding communities and improving one dirt roadway leading to the main highway. NFC has upgraded and built new roadways in excess of 240 km to support the Namwasa operation, and anticipates building more as the operation matures. However, this investment exposes NFC to new social risks. The expected increase of inmigration due to improved service delivery and perceived job opportunities puts further pressure on land-access, fragmentation and degradation trends. This in turn requires a larger allocation of NFC's resources dedicated to comprehensive, inclusive community development and stakeholder engagement. The infrastructure barrier exposes the company to increased risks of encroachment, local community discontent due to population influxes or the exposure of roads to increased traffic and related erosion.

Additionally, investments in generators, solar panels and satellite connections were necessary due to the lack of electricity and cellular service. This led to an increased investment per hectare of forest establishment. From this perspective, Namwasa is poorly situated for a traditional plantation investment. Project developers looking to invest in plantation forestry would likely identify land linked to major roadways supported by electricity access.

Local communities have virtually no access to high-quality tree seeds, which are expensive and the best stocks of which are sourced from abroad, in bulk, and at high prices. A kilogram of SPGS recommended *eucalyptus grandis*, for example, costs USD $11,000, whilst pine is approximately USD $670 a kilogram. As SPGS recommends, it is critical that seeds be sourced from established providers, typically from abroad or nurseries they helped establish. NFC only sources quality seeds from abroad, at high cost. As a case in point, the NFA used locally sourced seeds to establish its plantations in the 1990s, resulting in low yield, low quality tree production.[60] But mitigtating seed quality through importation engenders its own risks which can threaten project viability. These include delays or returns at customs, transportation damage, supply shortages and risk of non-adaption of seed to fluctuations in local climate and precipitation. Perceived risks of delays in planting and to overall performance can further weaken the plantation's investment proposition.

Otherwise, the technical skills necessary to implement and manage large-scale timber operations are not easily acquired in remote areas, where education levels are low (only 4.6% of the adult population in the area surrounding Namwasa has completed secondary school) and access to affordable training extremely limited. At a national level, and even in urban centres, major research institutions (Makerere University, NaFORRI and Nyabyeya Forestry College) have not tailored the curriculum for training individuals to implement and manage plantation operations to scale.[61]

4. Barriers due to Land Tenure and Prevailing Practice:

In April 2010, NFC commissioned an independent research team to perform a series of household interviews to assess leakage effects and gather important information about communities surrounding Namwasa. Surveys with local households demonstrate that there is a high level of migration in the Mubende area, putting strains on land access as high birth rates add to growing population trends.

[60]Christian Held, Grit Techel and Kai Windhorst, *SPGS Timber Market Study (*Kampala: Unique Forestry Consultants, November 2010), 13.

[61] Sawlog Production Grant Scheme, *Forestry Investment,* 23.

Residents reported that individuals flock to the area because of the perceived availability of fertile lands. Survey results further indicated that individuals were interested in planting trees, but their land tenure situations were a major dissuasive factor: without secure land tenure, people were reluctant to make long-term investments in tree planting, unsure as to whether they would be able to reap the financial and ecological benefits. Obtaining an official land title is an expensive and time-consuming process which few rural peoples have the resources to pursue in Uganda. Most individuals report that their land tenure falls under customary holdings or that they rent agricultural lands for production. Committing to long-term tree planting on rented land – where individuals could be evicted with little notice - was perceived to be an economically risky practice.

5. Barriers due to Prevailing Timber Market Conditions:

According to the FAO, the Ugandan timber trade is practiced primarily on an illegal, ad-hoc "spot" basis outside of Uganda's main commercial markets. Rurally based pit-sawyers sell sawn timber of poor quality due to the basic processing to which they subject it, and are not held to the enforcement of industry standards. Limited access to capital for investments in quality control leads to pit-sawyers storing extracted timber in uncovered sheds and rarely treating logs, resulting in significant weathering and depreciation of the product's value. The absence of appropriate storage spaces erodes the prices local timber dealers can command. From a plantation forestry perspective, this seriously compromises the flow of revenues that would accrue per hectare of land planted.[62]

Rural traders typically bring their timber to roadways by the forest's edge, and are only able to negotiate low prices. Of the timber extracted by traders, only about 30% of it makes its way to centralized, commercial markets, the vast majority of it being bought and consumed locally. Local pitsawers find it difficult to penetrate controlled markets, as commercial venues are ruled by powerful Kampala-based traders.[63]

Timber transportation costs would be prohibitively high for rural communities surrounding Namwasa, where road access is poor and central markets hours away. Food and Agricultural Organization (FAO) interviewees in 2005 reported an increase in transportation costs of 50% over the course of a single year, rising to 1,200,00 USH (approximately $600) for a 20-tonne truckload. Petrol prices continue to rise dramatically. In March of 2010 alone, prices increased by 35%, comparable to the 2008 fuel shortage crisis which the government poorly responded to. Uganda has the most expensive fuel prices in East Africa. [64]

Moreover, Uganda has few sawmills where added-value products can be generated. SPGS estimates that a 5,000 hectare forest must be in place to justify the costs of constructing and running a sawmill, which should be within a 50 km radius of the site of timber extraction. Aside from NFC's sawmill which went live in April 2010 in Mityana to specifically support its Namwasa operations, only Nile PlyWoods Ltd runs a large-scale timber processing plant in Jinja, Eastern Uganda, considerably more than 50 km from Namwasa.[65]

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[62] G.G.O Odokonyero, *Pitsawn Timber Production in Natural Forests of Uganda: A Forest Harvesting Case Study* (Rome: Food and Agricultural Organization, 2005), 31-33.

[63] Odokonyero, *Pitsawn Timber,* 31-33.

[64] Economist Intelligence Unit, *Country Report: Uganda,* 15.

[65] Sawlog Production Grant Scheme, *Forestry Investment,* 25.

In NFC's case, carbon revenues will alleviate this barrier in several ways. First, the company will be able to construct the necessary plantation facilities that will protect felled timber from the elements, ensuring its quality along the value-chain. Secondly, the company will be able to maintain its plantations and not be forced to cut trees pre-maturely for cash needs – historically smaller planters have done this to access early revenues, but with the result of comprising wood quality and volumes. As SPGS grants do not allow for maintenance funds, carbon finance can fill this gap. At once this ensures that trees can be left to grow longer bringing better quality wood to market, and secondly, allow for sustained carbon sequestration in a longer rotation cycle.

The land within the boundary of the proposed A/R CDM activity was not at least partially forested since December 31st, 1989. This is demonstrated through satellite imagery analysis, which shows that no forest existed on eligible land in 1989, and that forest cover did not increase between 1989 and the project start.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternative land use scenarios (expect the proposed project activity):

Per the documented evidence provided in sub-step 3a, the barriers identified prevent three of the four alternatives from being implemented. Alternative 2 – 4 are affected by the barriers to the point of being impractical. These have been removed as viable alternatives. This leaves one activity as the most credible alternative to a large-scale A/R CDM project: continued degradation of the central forest reserve.

Table C.5.2: ***Alternative activities prevented by identified barriers***

Alternative Scenarios	Alt 1: Continued Degradation	Alt 2: Small-scale reforestation initiative	Alt 3: NFA patrols and protects the reserve	Alt 4: Large-scale forestation without the CDM incentive
Barriers preventing implementation of the alternative scenario				
Investment Barriers		**X**		**X**
Institutional Barriers			**X**	**X**
Technological Barriers		**X**	**X**	**X**
Land tenure / prevailing practice barriers		**X**		
Barriers due to prevailing timber market conditions		**X**		

The most viable alternative, which faces none of the above-mentioned barriers, is the continued degradation of Namwasa lands through the acceleration of cropping, grazing and charcoal production activities within the project boundaries. Small-scale farming, grazing and charcoal production require no upfront investment or the raising of finance to be practiced using traditional methods. As there is currently no robust application of CFR land-use regulations, institutional barriers do not prevent the practice of these land-uses within government gazetted land. Moreover, rudimentary, traditional technologies are applied to graze, crop and produce charcoal on Ugandan land, assuring that technological barriers are not present for the continued degradation of the CFR. Specifically because of unclear and difficult to apply land-tenure systems in Uganda, individuals practice shifting slash-and-burning and grazing to ensure their mobility and hedge against lack of land title. Finally, as ongoing degradation is not linked to the timber market, it is in no way affected by the dynamics of the timber trade. No investment, technological, institutional or social barriers exist for these practices to continue as they historically have.

STEP 4: Common Practice Analysis

Extent to which similar forestaton activities have already diffused in the geographical area of the proposed A/R CDM project activity

Uganda has less than 1,000 hectares of mature plantation forest remaining, and only 25,000 hectares currently planted, the bulk of which is new forest.[66] Plantation operations suffered neglect over the course of 30 years. After forests were harvested in the 1980's, no viable, nation-wide effort was made to replant them. It wasn't until 2003 - with the creation of the National Forestry Authority and its commitment to better utilize Central Forest Reserves - that planting picked up. The National Forestry Authority set ambitious national goals for plantation forestry operations in 2005 – 7,500 hectares planted a year to meet a target of 150,000 hectares. But these targets are not even halfway met with current planting schedules, from either the private sector or the government's own efforts. Central Forest Reserve land set aside for planting have been heavily encroached upon, and given their remoteness, have attracted little interest from major investors.[67]

SPGS funding has found some traction in what SPGS calls the "Mubende" cluster – planting operations in and around the Mubende District. Of the 7,666 hectares slated to be planted in the region up to 2013, 2,500 ha fall under NFC's ownership (approximately 25%) funded by SPGS. And of the approximately 35 grants extended in the region, the vast majority have gone to small- and medium-scale growers. Most importantly, the bulk of the planting has taken place on the Kasana Kasambya Forest Reserve, which directly borders the main highway, avoiding the need for large infrastructure development. None of these reach the scale of NFC's operations, nor require the capital intensive investment required to establish infrastructure.

The following new operations are similar or will be similar in scale to NFC's Namwasa operations, which is deemed as a "large-scale" reforestation initiative. They represent all of the reported forestry operations

[66] Sawlog Production Grant Scheme, *Forestry Investment,* 14.

[67] Sawlog Production Grant Scheme, *Forestry Investment,* 19.

in the entire country that exceed holdings of 1,000 hectares of land[68], and none are based in Mubende District.

Table C.5.3: ***Common Practice Analysis Review***

Company Name	Location	Estimated Actual Planted Ha (May 2010)	Approximate Target Size Ha
Green Resources: two subsidiaries - Busoga Forest Co, and Katchung	Mayuga (Eastern Uganda), Lira (Northern Uganda)	Approximately 3,000	8,000
Global Woods Ltd	Hoima (Western Uganda)	Approximately 1,000	8,229
NilePly Woods Ltd	Jinja (Eastern Uganda)	Approximately 1,000	5,000

Analysis to which similar forestation activities to the one proposed as the A/R CDM project activity have been implemented previously or are currently underway

Green Resources is one of East Africa's most established forestry operators, reporting more than 14,000 hectares under management in 2008. Operating in East Africa, notably Tanzania for more than a decade, it has considerable technical, managerial and product delivery skills which differentiate it from small- and medium-sized operators with considerably less experience and capacity. Green Resources is planting in both Eastern and Northern Uganda. Its Busoga Forest subsidiary operates in Mayuge District, and manages the Bukaleba plantation with upwards of 5,780 hectares of plantable land, of which 2,259 have been planted. The plantation is predominantly pine (72%), supplemented by eucalyptus. The company is using similar harvesting cycles as NFC. Moreover, the company has also received SPGS funding. From an infrastructure perspective, Bukaleba is more closely situated to well-maintained roadways, located near the Kampala-Mombasa road and related railway system. A portion of the land was already established as plantation forest, a notable difference as NFC developed Namwasa purely as a greenfields operation.

In 2007 Green Resources acquired the Katchung forest plantation from the Norwegian Forest Group, which had been in operation and planting trees since 1996. Located in Dokolo District, the plantation has 660 hectares of land planted to date, with another 1,400 plantable. Like the Bukaleba plantation, Green Resources was able to make the investment in the plantation following forest establishment.

Global Woods, Ltd, has been managing the 12,181 hectare Kikonda Forest Reserve since 2002, actively preserving some 3,500 hectares for conservation purposes and seeking to plant the remaining land by 2022 with eucalyptus and pine. The company has received SPGS funding for its planting activities.

Founded in 1994, NilePly is located in Jinja, with its core business focused on the processing of plywood products. To supplement its resource base, the company also plants small quantities of land with pine. In 2000, the company received concession rights to 3 different CFRs, under the condition that it would restock the reserves through planting. In 2004 less than a quarter of the 1,100 hectares that was supposed

[68] Natural Enterprise Development on Behalf of Environmental Alert, *Diagnostic Study on Small and Medium Forest Enterprises (SMFE) in Uganda* (Environmental Alert, November 2009), 15.

to be replanted had been.[69] NilePly manages a less extensive silviculture operation than New Forests, with some 1,000 hectares of pine reported planted, and is located in the eastern part of the country close to markets and key infrastructure in Jinja.

Like Global Woods and Green Resources, NFC brings resource conservation and community upliftment programmes to its plantation management operations. Assuming the added financial costs of these social and environmental programmes requires that these companies identify suitable forms of innovative finance. Accordingly, access to carbon credit revenues is integral to Green Resources and Global Wood's operations, as it is to Namwasa. Global Woods has obtained carbon finance through CarbonFix to rationalize its expenditures and implementation of a long-term forestry operation and is certified to the Climate, Community and Biodiversity Alliance. Green Resources is pursuing the generation of credits under both the CDM and American Carbon Registry as well as FSC certification; Green Resources has previously and successfully accessed the market in Tanzania to support the sound financial implementation of its plantation operations through the Verified Carbon Standard (VCS). Both Global Woods and Green Resources have demonstrated that their large-scale plantation projects in Uganda would not be viable without access to the carbon market.[70] From this perspective, these companies and NFC have a distinct business model in regards to NilePly and other, smaller-scale exotic tree growers.

Compare the proposed project activity to the other similar forestation activities and assess whether there are essential distinctions between them

NFC's operations do diverge from those of Global Woods and Green Resources in one important way - only 2,481 hectares of the Namwasa plantation are eligible according to CDM modalities, only a portion of its forest estate estimated to reach some 5,000 hectares. The land used by Global Woods and Green Resources appears to have a higher rate of eligibility. In Global Woods' case, this may be due to the application of a different standard – CO2Fix – who's land eligibility requirements differ from the United Nations' 1989 forestation rule.

These two projects can treat their forestation activities as one carbon-eligible initiative. Conversely, the Namwasa forest estate as a whole has been undertaken as one integrated, managed project, and thus the ineligible land areas, whilst falling outside the boundaries of the CDM A/R initiative, are still considered a contiguous extension of one overarching project. Planting at Namwasa is driven by spatial analysis, soil sampling, available man-power and annual budget allocations. Accordingly, compartments are identified because of the underlying soil content, proximity to other compartments and a need to strike a balance between pine and eucalyptus species. For this reason, a single compartment might contain both CDM eligible and ineligible portions of land. By way of example, during the first planting season in 2006, compartment C09, which covers 34.37 hectares, included segments of land that before December 31st, 1989, was classified as bushlands and agricultural land, as well as forest. Planting across the reserve has happened indiscriminate of carbon eligibility, with NFC making no differentiation between carbon and non-carbon eligible land in regards to planning or quality control.

[69] Rosina Auren and Krystyna Krassoska, *Small and Medium Forest Enterprise in Uganda: Discussion Paper* (Kampala: Uganda Forest Sector Co-ordination Secretariat, Ministry of Water, Lands and Environment in collaboration with the International Institute for Environment and Development, 2004), 19.

[70] Green Resources AS, *Project Idea Note Bukelaba*, (March 2010), 8; Global Woods Ltd, *CarbonFix PDD Kikonda* (2008), 9-14.

For the forest estate at large, access to carbon revenues is critical to overcome the challenges presented in the barrier analysis. These barriers – notably infrastructure constraints, prevailing practice, human resources and market conditions – would be present regardless of the size of the project, and extend to the entire area of operations. The costs, for example, of building schools and health clinics for local residents, constructing and maintain a road that extends to the main highway, and ensuring the active monitoring of indigenous forest under FSC, are fixed costs that would exist regardless of the size of the plantation. These costs, for example, are critical barriers that, if not overcome, threaten market access, the integrity of community relationships and continued FSC certification, all of which are key to ensuring continued investor support. The need to train local talent, adhere to internationally recognized best forestry practice (FSC), establish infrastructure to reach markets and support a Corporate Responsibility Department to pursue community development work remain critical barriers to entry for the scope and quality of operations NFC has committed to. The CDM incentive facilitates the mitigation of these barriers, challenges with applicability across the entire forest estate.

Per the common practice analysis, NFC has demonstrated that similar forestation activities have been undertaken in Uganda, and each with the benefit of carbon finance. Although NFC has less eligible land under CDM, the carbon revenue stream proves a pivotal source of finance for covering fixed costs. The CDM incentive can help overcome numerous barriers that characterize large-scale reforestation activities in rural Africa. Accordingly, the project is considered additional and is not the baseline scenario.

C.6. Identification of the baseline scenario and demonstration of additionality using the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" (if required by the selected approved methodology):

Non-applicable

C.7. Estimation of the *ex ante* baseline net GHG removals by sinks:

With reference to section II.5 of the A/R-0004 Methodology, the *ex ante* baseline net GHG removals by sinks was assessed (C_{BSL}). A baseline carbon stock assessment was undertaken in April 2007. This was led by John Begumana, the NFA's biomass expert who played a critical role in developing the country's National Biomass Study. A final report *"Namwasa Baseline Survey: Assessment of above and below ground baseline carbon pools"* is included as Appendix 3 as a separate document to the PDD.

Methodology A/R-AM0004 version 04 states that given the state of degradation predicted under the baseline scenario that *ex ante* baseline net GHG removals by sinks will likely be zero. This assumes that the carbon stocks will continue to decrease in the absence of the project, due to prevailing land-use practices. This is conservative, as c-stocks will only continue to be depleted in Namwasa's shifting agricultural system, a net-negative loss of biomass. As the mapping exercises indicate, agricultural land is expanding across the reserve, as described in table C.7.1:

Table C.7.1: *Percent cover of major vegetation classes at Namwasa*[71]

Vegetation Class	Percent cover 1990	Percent cover 2004

[71] Landsat image analysis for 1990 and 2004 provided by John Bagman (National Forest Authority) as addendums to the report *Mapping of Historical Land Use in the Namwasa Forest Reserve in Uganda and Tracing Cropping Displacement.(*Kampala, June 2010), 22. Classifications overlaid on NFC Planning Department maps for final analysis.

Croplands	27%	57%
Bushlands	25%	18%
Grasslands	11%	4%
Degraded woodlands/forest cover	37%	21%

Agricultural plots have the lowest mean carbon stock across vegetation classes. Within fourteen years agriculture expanded to cover almost 60% of the reserve, up from 27%. This further demonstrates that the shifting cycles not only affects forest cover, but with increased intensity also affects the stocking rate in bush and grassland cover. The resultant decrease in carbon stocks is sizeable; NFC's baseline and biomass expert measured an average 9 tonnes of wet biomass stock average for active croplands, versus 25 tonnes in bushlands and 16 tonnes in grasslands. As agriculture expanded across the reserve encroaching upon other vegetation classes, 14 tonnes of bushland vegetation stock and 7 tonnes for grasslands were lost for each hectare of conversion (see baseline carbon stock assessment for all calculations), or 56% and 44% losses of stocked matter, respectively.

Of the three vegetation classes, croplands have the lowest biomass stock value. The land-use trend demonstrates that the biomass stock across the project zone was in a state of ongoing degradation, indicative of constricting fallow cycles and expansion of active croplands.

Option (c) from section II.5 is chosen for its applicability to the adopted baseline land-use, and is supported by field-based research and a literature review:

> *(c) No trees or other woody perennials will reach the threshold for the national definition of forest due to ongoing cutting and burning cycles that are part of shifting cultivation systems.*

As discussed in section C.4.1 Step 3, the increased practice of shifting agriculture stunts tree growth, has led to the removal of practically all standing forest in the reserve suitable for agriculture and depresses the ability of local ecosystems to naturally regenerate. No trees or woody perennials are expected to meet the Ugandan definition of forest: 1 hectare of land with 30% crown cover and trees of 5 meters or more. As the satellite imagery demonstrates crown and land cover requirements were not met in the project zone. This covers the one overarching land stratum marked by bushlands, grasslands and active agricultural plots that are part of the larger shifting system of intensifying slash-and-burn.

NFC applied equation **(1)**, which shows that the baseline's net greenhouse gas removals by sinks are zero:

$$C_{BSL} = 0 \text{ for all } t^* \leq t_{cp} \qquad \textbf{(Equation 1)}$$

Where:

C_{BSL} Baseline net greenhouse gas removals by sinks; t CO_2 –e

t^* Number of years elapsed since the start of the A/R project activity; yr

t_{cp} Year at which the first crediting period ends; yr

The trees and non-tree vegetation which comprise the expanding and shifting agricultural cycles within the project zone would have been regularly destroyed under the baseline scenario, $\Delta C_{B,\ ikt} = 0$. Consequently, neither Method (1) nor (2) and related formulae **(2)-(12)** for estimating the carbon content of standing trees is required to calculate the baseline net GHG removal by sinks. Instead, it is assumed that all non-herbaceous standing woody biomass stock is lost in the year of site preparation through slash and burning. This is considered conservative, as the baseline scenario demonstrates that on-going degradation and net-negative carbon stock losses are anticipated.

The parameters described below were used by the research team assessing the baseline, notably for the quantification of carbon stocks in each carbon pool using the allometric approach. The allometric approach was used to quantify carbon stocks, and also to reach the conclusion that formulae **(2) – (12)** do not apply in the project circumstances.

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

Data / Parameter:	DBH
Description/unit:	Diameter at breast height, cm
Value applied:	Variable depending on tree sizes found in baseline sample plots
Source of data:	Field measurements from baseline sample plots
Justification of choice / Measurement procedures (if any):	DBH required to assess any existing tree biomass stock. Nested, circular plots were used. In the smallest plot, trees with a DBH larger than 5 cm were measured. In the outer circular plot, trees with a DBH of 10 cm or more were measured. All measures taken at a height of 1.3 meters.
Any comment:	

Data / Parameter:	H*j*
Description/unit:	Tree height in meters for a given tree in a sample plot
Value applied:	Variable depending on measures taken in baseline sample plots
Source of data:	Fieldwork measurements
Justification of choice / Measurement procedures (if any):	Tree height required to assess tree biomass stock through use of allometric equations. Measurement taken using a calibrated hypsometer.
Any comment:	

Data / Parameter:	j
Description/unit:	Tree Species
Value applied:	Name of species depending on findings in the field
Source of data:	Fieldwork identification of tree species
Justification of choice / Measurement procedures (if any):	Required to assess proper use of allometric equations
Any comment:	

Data / Parameter:	PL_{ID}

Description/unit:	Sample Plot ID
Value applied:	Sequential plot ID numbers assigned during baseline fieldwork exercises
Source of data:	Identified in the field
Justification of choice / Measurement procedures (if any):	Required to ensure organization across fieldwork sample and plot points
Any comment:	

Data / Parameter:	CrT
Description/unit:	Crown Cover of Trees
Value applied:	Variable and dependent on observed crown cover of individual trees
Source of data:	Field measures
Justification of choice / Measurement procedures (if any):	Useful in cross-checking satellite imagery analysis and to identify forested lands per DNA definition.
Any comment:	

Data / Parameter:	F*j*(DBH,H,CR)
Description/unit:	Allometric equation for species *j*, linking tree volume to diameter at breast height (DBH) and possibly tree height (H) measured in baseline sample plots
Value applied:	Variable depending on species type / age: Dbh <20cm: Ln(w) = 0.5* 0.09937 0.909575 + 1.544561* (ln.d) + 0.50663 (ln.ht) + 0.33346* ln (cr) Dbh >=20 cm .AND. <60cmLn(w) = 0.5* 0.0892 1.795491 + 1.943912 * (ln.d) + 0.47371* (ln.ht) + 0.245776* ln (cr) Dbh>=60cm Ln(w) = 0.5* 0.05222 2.192612 + 2.032931 * (ln.d) + 0.31292* (ln.ht) + 0.436348 * ln (cr)
Source of data:	Allometric equation developed by the National Biomass Study (National Forestry Authority, 1992 and cited in appendix II of John Beguman's "Namwasa Baseline Survey))
Justification of choice / Measurement procedures (if any):	Equation subject to three peer reviews, two by the Norwegian Forestry Society and one by IFER.
Any comment:	

Data / Parameter:	CrB
Description/unit:	Crown cover of bushes
Value applied:	Variable depending on land-use type (grass, bushlands, agricultural lands)
Source of data:	National Biomass Study sample plots
Justification of choice / Measurement procedures (if any):	National Biomass Study performed extensive surveys in Mubende District, leading to a detailed analysis of bush cover in various land-use types, including bushlands, croplands and grasslands. Crown cover required to assess relative tons of bush biomass per land-use stratum.

Any comment:	

Data / Parameter:	B*tons/ha*
Description/unit:	Dry weight tons of bush biomass per hectare of land-use stratum
Value applied:	13 tons / ha and evaluated against crown cover averages
Source of data:	National Biomass Study sample plots and cross-checked against NFC baseline data
Justification of choice / Measurement procedures (if any):	National Biomass Study performed extensive surveys in Mubende District, leading to a detailed analysis of bush cover in various land-use types.
Any comment:	

Table C.7.2: ***Estimation of annual baseline net anthropogenic GHG removals by sinks***

Year	Annual estimation of baseline net GHG removals by sinks; t CO_2-e
Year 1	0
Year 2	0
Year 3	0
Year 4	0
Year 5	0
Year 6	0
Year 7	0
Year 8	0
Year 9	0
Year10	0
Year 11	0
Year 12	0
Year 13	0
Year 14	0
Year 15	0
Year 16	0
Year 17	0
Year 18	0
Year 19	0
Year 20	0
Total estimated baseline net GHG removals by sinks; t CO_2-e	0
Total number of crediting years	20
Annual average over the crediting period of estimated baseline net GHG removals by sinks; t CO_2-e	0

The baseline sample plots were measured in April 2007. Further research was performed in April 2010 to assess the carbon stock of non-tree biomass. A community assessment led by a team of outside researchers from Makerere University in April 2010 further confirmed locals' perceptions of land-use

change – increased land degradation, loss of soil fertility, expanding agricultural systems and an increase in immigrants. This was cross-checked with Landsat imagery analysis as well as a historical fire-mapping analysis.

The site-based baseline research was performed by John Begumana, expert in biomass measures and lead researcher for the National Forestry Authority's *National Biomass Study*. Phoebe Sullivan, NFC's Carbon Manager, performed the literature review and the fire analysis, and developed aspects of the 2010 leakage assessment survey, including household questionnaires for local agriculturalists with independent input from the Faculty of Forestry at Makerere University.

SECTION D. Estimation of *ex ante* actual net GHG removals by sinks, leakage and estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period

D.1. *Ex ante* estimation of actual net GHG removals by sinks:

With reference to section II.7 of Methodology A/R-AM0004 v.04, the *ex ante* actual net GHG removal by sinks for above and below ground carbon stocks was calculated using the equations 13-16, and 21-26. The actual GHG removals takes into account the growth of trees due to the implementation of the project, less the emission releases due to site preparation and activity displacement (leakage), namely fuel-wood collection.

The TARAM tool, set to A/R methodology 0004 was used to ensure the streamlining and accuracy of calculations.

Equation 13 was used to guide the overall estimation of actual net GHG removals by sinks:

$$C_{ACTUAL} = \Delta C_{P,LB} - GHG_E \quad \textbf{(Equation 13)}$$

Where:

C_{ACTUAL} Actual net greenhouse gas removals by sinks; t $C0_2$-e

$\Delta C_{P,LB}$ Sum of the changes in living biomass carbon stocks (above- and below-ground); t $C0_2$-e

GHG_E Sum of the increases in GHG emissions by sources within the project boundary as a result of the implementation of an A/R CDM project activity; t $C0_2$-e

Estimation of actual changes in living biomass carbon stocks in the project scenario

The methodology adopts equation (**14**) to assess $\Delta C_{P,LB}$ *:*

$$\Delta C_{P,LB} = \Delta C_{P,LBT} - E_{biomassloss} \quad \textbf{(Equation 14)}$$

Where:

$\Delta C_{P,LB}$ Sum of the changes in living biomass carbon stocks (above- and below-ground); tCO_2-e

$\Delta C_{P,LBT}$ Sum of the changes in living tree biomass carbon stocks (above- and below-ground);

tCO_2-e

$E_{biomassloss}$ Decrease in the carbon stock in the living biomass carbon pools of non-tree woody vegetation in the year of site preparation, up to time t*; tCO_2-e

A. Treatment of pre-existing vegetation

Insignificant Carbon Stock Releases

With reference to the CDM Executive Board's 50th meeting, Annex 21, under certain conditions the release of GHG emissions due to site preparation, including clearing and burning, can be deemed insignificant.[72] If one of three conditions is met, then the emissions may be discounted. These conditions include: a) the habitual occurrence of fire in the project zone, b) the regular clearance of woody vegetation, or c) a baseline scenario marked by degradation trends, including a decline in woody vegetation cover. As described in detail in section C.4.1, all three of these conditions are met:

- Regular and increasing frequency of fires in and around the project zone were recorded using the MODIS Fire-Mapper tool, fires that were identified on a month-to-month basis from 2000 to 2005;
- Agricultural expansion was identified through satellite imagery analysis, local PRA exercises and a literature review, with croplands covering some 60% of the reserve, up from 27% in 1990;
- Satellite imagery analysis, household interviews and a literature review demonstrated the rapid loss of biomass stocks in and around the central forest reserve, accelerating in intensity in the last decade.

This approach highlights and substantiates the applicability conditions laid out in the methodology's section I.3, under which biomass losses are likely to be considered insignificant - researchers identified the baseline scenario as degrading lands influenced by shifting cultivation cycles and associated c-stock losses, with woody biomass stocks in continuous decline in the without-project scenario. As confirmed by the Executive Board (EB) guidance, all losses associated with site preparation – clearing and burning - are deemed insignificant. Accordingly, the $E_{biomassloss}$ portion of equations **(14), (15)** and **(24)-(26)** are not applied and losses are considered to be insignificant (zero).

B. Treatment of Trees

NFC has adopted Method 2 (*stock change method*) and equations **(21)** and **(22)** to calculate *ex ante* changes in the living biomass carbon stocks. These build off of equation **(16)**. These equations refer to all woody biomass that occurs as a result of the A/R project. These take into account harvesting and mortality rates and relate to the strata specific to planting schedules (pine and eucalyptus).

$$\Delta C_{P,LBT} = \sum_{t^*} \sum_{m_{BL}} \sum_{K_p} \Delta C_{P,LB,ikt} \qquad \textbf{(Equation 16)}$$

[72] EB 50, Annex 21 *Guidelines on conditions under which GHG emissions from removal of existing vegetation due to site preparation are insignificant (version 01).*

t=1 t=1 t=1

Where:

$\Delta C_{P,LB_T}$ Sum of the changes in living biomass carbon stocks in the project scenario (above- and below-ground); tCO_2-e

$\Delta C_{P,LB,ikt}$ Annual carbon stock change in living biomass for stratum *i*, stand model *k*, time *t*: t CO_2-e yr^{-1}

i 1, 2, 3,...m_{BL} strata in the baseline

k 1, 2, 3,...*K* stand models in the project scenario

t 1, 2, 3,...*t** years elapsed since the start of the A/R project activity.

According to the methodology, accumulation in the carbon stock in the baseline scenario will not be accounted for, as it is assumed that under the baseline scenario, biomass will continue to decrease due to pressures on the land.

$$V_{ikt2} = V_{ikt1} \cdot (1 - Mf_{ikT}) + \sum_{j=1}^{J_k} (I_{v,ijT} - H_{ijT} - FG_{ijT}) \cdot T \qquad \textbf{(Equation 21)}$$

$$Mf_{ikT} = \left[\frac{Adist_{ikT}}{A_{ikT}} \right] \qquad \textbf{(Equation 22)}$$

Where:

V_{ikt1} Average merchantable volume of stratum *i*, stand model *k*, at time $t = t_1$; m^3 ha^{-1}

Vi_{kt2} Average merchantable volume of stratum *i*, stand model *k*, at time $t = t_2$; m^3 ha^{-1}

Mf_{ikT} Mortality factor = percentage of V_{ikt1} died during the period *T*; dimensionless

$I_{v,ijT}$ Average annual net increment in merchantable volume for stratum *i*, species *j* during the period *T*; m^3 ha^{-1} yr^{-1}

H_{ijT} Average annually harvested merchantable volume for stratum *i*, species *j*, during the period *T;* m^3 ha^{-1} yr^{-1}

FG_{ijT} Average annual volume of fuel wood harvested for stratum *i*, species *j*, during the period *T;* m^3 ha^{-1} yr^{-1}

T Number of years between times t_2 and t_1 ($T=t_2 - t_1$)

$Adist_{ikt}$ Average annual area affected by disturbances for stratum *i*, species *j*, during the period *T:* ha yr^{-1}

A_{ikT} Average annual area for stratum *i*, species *j*, during the period *T*; ha yr^{-1}

j 1,2,3...J_k tree species in stand model *k*

The project is populated with three stand models, for the four tree species it plants in the project zone, with the following characteristics including source of parameter data, and form the basis of the *ex ante* stratification:

Table D.1.2 a- c: Stand Model Details

D.1.2 a

Stand Model 1			
Species Used	Eucalyptus Grandis and Eucalyptus Urophylla		
Characteristics	Trees grown for poles		
Harvesting cycle	Harvested every 8 years, re-planted in the year following harvest		
Thinning Volume Losses (m^{-3} / ha) and % of crop removed	**Year 2:** 12.0 (33%) **Year 5:** 71.7 (50%)		
Parameters			
BEF	**Wood Density**	**Root to Shoot Ratio**	**Carbon Fraction**
2.99	.70 t d.m. m-3	.26	.5 t C (t d.m.)-1
Use of the following formula developed by Brown (1992) and used to develop an average for the first 12 years of eucalyptus growth: BEF = exp [3.213 - .506 * ln (BV)][73]	National Biomass Study, 1992	IPCC GPG LULUCF – Table 3 A.1.8	IPCC default

D.1.2. b

Stand Model 2	
Species Used	Pinus Caribaea and Pinus Oocarpa
Characteristics	Raised for Sawn Timber

[73]Sandra Brown, *Forestry Paper no. 134: Estimating Biomass and Biomass Change in Tropical Forests* (Rome: Food and Agricultural Organization, 1997), accessed June 1st, 2010: http://www.fao.org/docrep/W4095E/W4095E00.htm. NFC's calculations using this formula submitted to the auditor in Excel format.

Harvesting cycle	Harvested every 18 years, re-planted in the year following harvest
Thinning Volume Losses (m^{-3} / ha) and % of crop removed	**Year 5:** 16.4 (31%) **Year 12:** 70.9 (29%)

Parameters			
BEF	**Wood Density**	**Root to Shoot Ratio**	**Carbon Fraction**
1.3	.6 t d.m. m-3	.30	.5 t C (t d.m.)-1
IPCC GPG LULUCF – Table 3.A.1.10	National Biomass Study, 1992	IPCC GPG LULUCF – Table 3 A.1.8	IPCC default

D.1.2. c

Stand Model 3			
Species Used	Eucalyptus Grandis and Eucalyptus Urophylla		
Characteristics	Raised for sawn timber		
Harvesting cycle	Harvested every 12 years, planted in the year following harvest		
Thinning Volume Losses (m^{-3} / ha) and % of crop removed	**Year 2:** 12.0 (33%) **Year 5:** 71.7 (50%)		
Parameters			
BEF	**Wood Density**	**Root to Shoot Ratio**	**Carbon Fraction**
2.45	.70 t d.m. m-3	.25	.5 t C (t d.m.)-1
Use of the following formula developed by Brown (1992) and used to develop an average for the first 12 years of eucalyptus growth: BEF = exp [3.213 - .506 * ln (BV)][74]	National Biomass Study, 1992	IPCC GPG LULUCF – Table 3 A.1.8.	IPCC default

To ensure proper implementation of the methodology, data on thinning and harvesting cycles are taken into account, as well as mortality rates, the estimate for which is placed at 15%. The planting schedule for each stand, housed in worksheet A/R Plan in TARAM, is outlined in Table D.1.3. Harvests are denoted with an (H). A harvest will completely clear a given compartment of tree stock. Re-establishment hectares are illustrated for the years following the initial planting, in synch with the original hectares planted.

Table D.1.3: ***Stand Model Planting and Harvesting (H) Schedules in Hectares***

	Stand Model 1 : **Eucalyptus for Poles**	**Stand Model 2 :** **Pine for Timber**	**Stand Model 3 :** **Eucalyptus for Timber**

[74] Sandra Brown, *Forestry Paper no. 134*.

Year	HECTARES		
2006	92.5	274.7	30.7
2007	16.2	603.5	10.7
2008	81.9	427.7	33.0
2009	52.2	150.9	48.5
2010	124.6	324.5	0
2011		209.8	
2012			
2013	(H)		
2014	(H) 92.5		
2015	(H) 16.2		
2016	81.9		
2017			(H)
2018			(H) 30.7
2019			(H) 10.7
2020			33.0
2021			
2022	(H)		
2023	(H) 92.5	(H)	
2024	(H) 16.2	(H) 274.7	
2025	81.9	(H) 603.5	

The following table D.1.4 details the location of TARAM data particular to the treatment of trees for ease of reference:

D.1.4: ***Location of tree planting details in TARAM***

Description	Location
Planting, thinning and harvesting information specific to each stand model	Worksheets: SM1, SM2, SM3
Species parameters	Worksheet: Species
Overall planting schedule, including all biomass losses due to thinning and harvesting events and broken down by baseline strata	Worksheet: A/R Plan Columns: B10:E10 – B15:E15 / N10:Q10 – N15:E15 / T10:W10 – T15:W15
Carbon Stock change in reforested trees	Worksheet: Aexa Columns: B28:E28 – B63:E63

The equations used to determine the mean merchantable volume per tree species were developed from Uganda-based plantation data. Pine data was obtained from 868 sample plots established through the Forestry Rehabilitation Project, 1989-1993. Eucalyptus data was collected over the course of six years (1990-1996) from the Forestry Department's own permanent sample plots (PSPs), as well as from the Rwenzori Highlands Tea Company. The data - collected and compiled by, Alder, Drichi and Elungat - was analyzed and transformed into a model derived from a series of equations, to give overall growth rates and patterns for pine and eucalyptus species grown in Uganda.[75] Charts D.1.5 and D.1.6 demonstrate

[75] Denis Alder, Paul Drichi and David Elungat, *Yields of Eucalyptus & Caribbean Pine in Uganda* (Kampala: Uganda Forest Resources Management and Conservation Programme, May 2003), 2, 25, 37.

the anticipated growth curves for NFC's pine and eucalyptus varietals, presented in mean annual increments, as developed by Alder's models. Total biomass accumulation is marked in blue. Mean merchantable volumes are depicted in red – these are the more conservative figures employed in the PDD. The growth models can be reviewed in Appendix 8.

Chart D.1.5: ***Pinus caribaea Volume Increment (18 year rotation)***

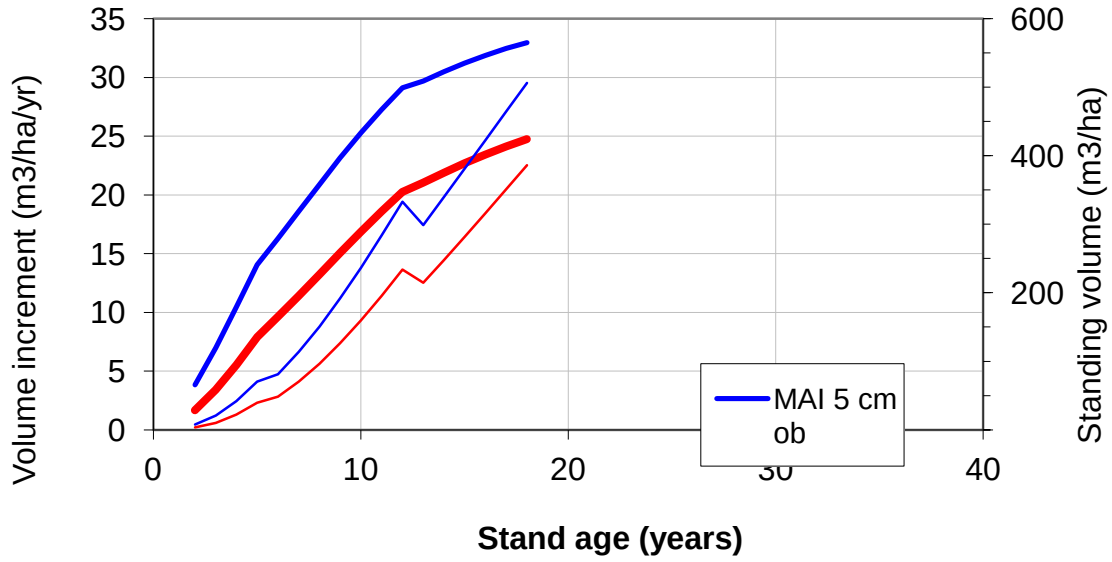
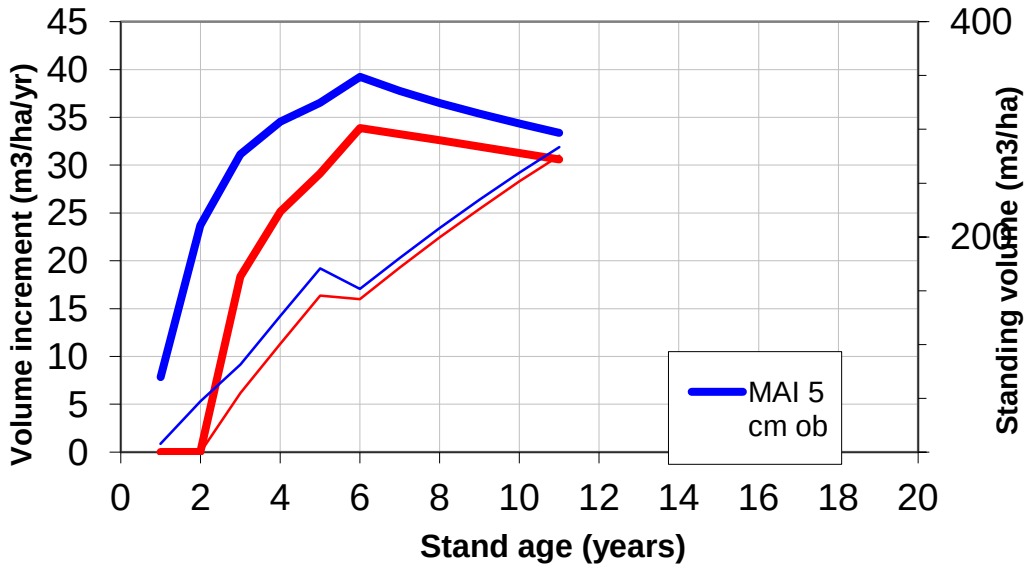


Chart D.1.6: ***Eucalyptus grandis Volume Increment (12 year rotation)***



Estimation of increase in GHG emissions by sources within the project boundary as a result of the implementation of an A/R CDM project activity

With reference to the Executive Board's 50th meeting, Annex 21, these losses are deemed insignificant, for the reasons stipulated in section D.1.A. [76]

D.2. *Ex ante* estimation of leakage:

According to the adopted A/R CDM Methodology 0004, leakage is considered any release of GHG emissions due to the displacement of pre-project activities from the project zone.

Prior to project implementation, community members as well as nomadic herdsman would illegally enter the reserve for cropping, grazing and fuel-wood collection purposes. Illegality is premised on Ugandan law, under which the NFA's Central Forest Reserves may not be accessed without appropriate permissions (The National Forestry and Tree Planting Act No 8, 2003). Upon NFC's project implementation, the legal and regulatory status of the forest reserve was reinforced, ensuring that encroachment activities were better monitored and dissuaded, reinforcing the access laws that govern forest reserves. In turn, NFC has implemented extensive community development programmes in the areas surrounding Namwasa to ensure net-positive impacts of its operations.

However, NFC as a lesee, had no legal authority to remove encroachers from the CFR, a responsiblity of the NFA and the government. Acccordingly, even though NFC planted its first trees in 2006, it did not have the legal permission to stop people from planting crops or collecting fuelwood, both of which continued. Not until February 2010 did the NFA and government led a voluntary vacation process,

[76] CDM Executive Board 50, Annex 21, *Guidelines on Conditions under which GHG emission from removal of existing vegetation due to site preparation insignificant (version 01)*.

ensuring that encroachers were formally requested to leave the reserve and stop all activities. While project implementation reinforced the legal regime and ensured the protection of remaining indigenous woodlands in February 2010, it did result in the displacement of livelihood activities. In terms of fuel-wood collection and charcoal production, and as an extension of its Corporate Responsibility programme, NFC will allow for the collection of fuel-wood resources from its thinning and harvesting activities starting in 2010 - the year that activities were displaced.

Equations (27) – (29) describe the sources of leakage that may be significant and could require accounting for:

$LK = LK_{ActivityDisplacement}$ **(Equation 27)**

$LK_{ActivititityDisplacement} = LK_{conversion} + LK_{fuelwood}$ **(Equation 28)**

where:

$LK_{ActivityDisplacement}$ Leakage due to activity displacement; t CO_2 –e

$LK_{conversion}$ Leakage due to conversion of forest to non-forest; tCO_2-e

$LK_{fuelwood}$ Leakage due to the displacement of fuel-wood collection; tCO_2-e

$LK_{conversion} = LK_{conv\text{-}graz} + LK_{conv\text{-}crop}$ **(Equation 29)**

where:

$LK_{conv\text{-}graz}$ Leakage resulting from the conversion for grazing

$LK_{conv\text{-}crop}$ Leakage resulting from the conversion for cropland

Under the conditions applicable to Namwasa, and with reference to the CDM EB 51 guidelines from Annexes 13 and 14, $LK_{Conversion}$ is insignificant.

NFC commissioned two research teams to perform leakage assessments of activity displacement – 2007 and 2010 field-based studies. The teams were made up of researchers from Kyombogo and Makerere Universities, respectively. The 2007 participatory rural appraisals and household interviews established the baseline for all leakage-based activities; 2010's independent study was carried out to determine how activities had been displaced – specifically to lands with particular characteristics. The results of the field-based, community research demonstrate the following displacement trends:

1. Individuals formerly practicing cropping within the boundaries of Namwasa have shifted their activities to smaller portions of land and onto lands that had been the site of agricultural activities between 2000 and 2004. This has been proven through field-based household interviews and cross-checked through the use of Landsat imagery analysis overlaid with GPS coordinates.

2. Individuals who allowed their cattle to graze within the boundaries of Namwasa were largely nomadic and upon displacement of the reserve have shifted to other degraded areas in Uganda's "cattle corridor". The Cattle Corridor, one of Uganda's most fragile ecosystems, is extremely degraded, as demonstrated by FAO and Woods Hole Institute satellite imagery analysis.

Similarly, leakage due to the displacement of fuelwood is zero, as the project scenario will supply more fuelwood in the project zone than the historical pre-project collection rate.

A. FUEL-WOOD CALCULATIONS:

The following describes the approach used for estimating fuel-wood leakage, as detailed in equations (50-53).

$FG_{BL} = sFG_{BL} \div SFR_{PAfw}$ **(Equation 50)**

where:

FG_{BL} Average pre-project annual volume of fuel-wood gathering in the project area; $m^3\ yr^{-1}$

sFG_{BL} Sampled average pre-project annual volume of fuel-wood gathering in the project area; $m^3\ yr^{-1}$

SFR_{PAfw} Fraction of total area or households in the project area sampled; dimensionless

FG_{BL} was determined through a field-based, participatory rural appraisal (PRA) exercise led by an independent team of experts in 2007, inclusive of household interviews and focus group discussions. The results of the PRA established the average annual volume of fuel-wood extracted from the reserve (sFG_{BL}). This is considered conservative as NFC was not able to develop a 5 or 10-year average given the lack of local figures and the otherwise illegal nature of extraction. Accordingly, it is assumed that the volume gathered is higher than the average, as population expansion and use of the reserve was particularly high in the couple years leading up to plantation establishment. The fraction of households in the project area (SFR_{PAfw}) was 37%, and was determined by the research team. The following summarizes the research findings.

- Households collected fuel wood for an average of 179 days per year, for an average daily collection of 16.3 kg per family. This factored to 1,491 metric tons of extracted fuel wood per year from the reserve. Taking into account moisture contents per metric tonne (assumed at 20%), this converts to 1,988 meters cubed of fuel wood collected per year.[77]

- A small number of charcoal burners took up residence within the reserve. Results from the PRA exercise demonstrate that 2035.5 tons of wood resources were extracted per year for charcoal production purposes. As charcoal producers typically use a mix of recently felled trees and

[77] Conversion values for metric tonnes to meters cubed, taking into account moisture contents, were adopted from the FAO "Wood Fuel Survey" Annex III-b. Rome, 1983, accessed June 1st, 2010 http://www.fao.org/docrep/q1085e/q1085e0c.htm

existing deadwood, it is conservatively assumed that the moisture content is 60%. This brings the total meters cubed to 2035.5 per year.[78]

- Total fuel-wood collection for both domestic and charcoal production purposes reaches 4,023.5 m^3.

- The independent leakage research was undertaken with reference to the entire 8,281 hectares of land under NFC's license. For the purposes of the carbon project, leakage will only be discounted from eligible lands (just under 2,500 hectares), or just below 30% of the zone in which fuel-wood was gathered within the reserve. The final fuel-wood calculations are hence conservatively multiplied by .30 to determine the final total losses in the project zone. **This means that 1,207.1 m^3 of fuel-wood, per year, were extracted from the project zone.**

NFC used the following parameters to evaluate the total extracted fuelwood volume:

Table D.2.1: ***Values used to estimate leakage associated with fuel-wood collection displacement***

Moisture content	20% for fuel-wood collection; 60% for charcoal production	PRA values were given in metric tons. These values were converted to m^{-3}, assuming moisture contents proposed by the FAO. The moisture contents were assessed using field-based observations and through published literature. These are considered conservative. According to research performed by Tabuti, Dhillion and Lye in Uganda, households typically collect fuelwood for heating and cooking purposes in the form of deadwood – smaller branches and sticks - as this responds to the need to use fuel that ignites quickly.[79] Respondents in their random and stratified household interviews confirmed that 77% of wood is collected from fallen branches and standing deadwood; 74% of homes stockpile wood at the end of the dry season to ensure low moisture content.[80] Tabuti's research also provides average moisture contents of branches, clustering around a 14% average for 48 tree and bush species typically used as a source of firewood.[81]Taking into account necessary fuelwood collection during the wet season, and occasional use of greener wood sources, NFC has conservatively adopted a 20% moisture content In regards to charcoal production, the 60% moisture content is substantiated by field-based observations and Tabuti et al's research. During NFC's 2007 leakage assessment, charcoal producers in the reserve confirmed that they produced

[78] FAO *Wood Fuel Survey*, 4.

[79] J.R.S. Tabuti, S.S. Dhillion and K.A. Lye, "Firewood use in Bulamogi County, Uganda: Species selection, harvesting, and consumption patterns," *Biomass and Bioenergy* 25 (2003): 587.

[80] Tabuti et al, *Firewood use*, 588.

[81] Tabuti et al, *Firewood use*, 584-6.

		charcoal over a period of 3 months, allowing wood to dry for about a month during the production cycle.[82] NFC uses moisture meters to assess moisture content of wood for its pole plant business, and confirms that freshly cut trees coming out of Namwasa typically have moisture content of 80%, and it takes 6 months to dry large logs of wood to 20-25%, - a 10% reduction per month. Tabuti's research confirmed that charcoal producers predominantly use "green" wood, both large sections of trees and smaller offcuts to launch the carbonization cycle.[83] To remain conservative, NFC assumes that over the course of one month of drying for charcoal production, felled wood would drop to a 60% moisture content. This is slightly below the observed reductions for large poles at NFC's pole plant, which sees a 10% reduction in moisture content per month starting at 80%. This is because charcoal producers must also include smaller – and hence faster-drying – pieces of wood to ensure ignition of kilns.
Conversion factor from metric tons to meters cubed, assuming given moisture contents	1 metric ton / m^{-3} for charcoal production; .75 metric tonnes / m^{-3} for fuel-wood collection	These conversion factors were adopted from data developed by the FAO's *Forestry for Local Community Development Programme* (1983).The data provided by the FAO presents conversion factors at different moisture level contents, allowing one to calculate metric tons to meters cubed of dry matter.[84] It is assumed that the wood used for fuelwood collection was gathered at a lower moisture content than charcoal, per evidence provided from Tabuti et al, interviews in and around Namwasa, and moisture content readings at NFC's pole plant.

Equation 51 allows NFC to determine the amount of fuelwood collection that would be displaced by NFC's activities.

$$FG_{outside,t} = FG_{BL} - FG_{AR,t} \quad \textbf{(Equation 51)}$$

where:

$FG_{outside,\,t}$ Volume of fuel-wood gathering displaced outside the project area at year *t;* $m^3\ yr^{-1}$

FG_{BL} Average pre-project annual volume of fuel-wood gathering in the project area; $m^3\ yr^{-1}$

$FG_{AR,t}$ Volume of fuel-wood gathering allowed/planned in the project area under the proposed A/R CDM project activity; $m^3\ yr^{-1}$

A second PRA exercise was run in 2010, to identify $FG_{outside,\,t}$. The March and April 2010 field-based research and household interview follow-up was undertaken following NFA's final voluntary and peaceful vacation of individuals living illegally within the confines of the reserve in February 2010, allowing for a complete assessment of fuel-wood displacement. It is assumed that fuel-wood collection is

[82] Wotsomu, *Namwasa PRA*, 15.

[83] Tabuti et al, *Firewood use*, 594.

[84] FAO *Wood Fuel Survey*, 4.

100% displaced starting in 2010 – following the voluntary vacation process. A timeline developed by the IFC following conversations with key stakeholders confirms the leakage assumptions, and will be made available to the DOE. Up until this time, and as indicated in the 2007 PRA, individuals continued to access the reserve to collect fuel wood and produce charcoal. Accordingly, $FG_{outside,\ t}$ is assessed as the *FGBL*, or 1,207.1 m^3 per year.

$FG_{AR,t}$ - the amount of fuelwood allowed / planned in the project area - was assessed by reviewing the amount of available biomass waste per thinning and harvesting schedules, presented in Table D.2.2 below and derived from the group's most up-to-date financial model:

Table D.2.2: ***Woody biomass accumulation, Namwasa***

Year	Woody Biomass waste production (m^3)
2010	2,120
2011	24,294
2012	21,709
2013	34,751
2014	56,661
2015	19,806
2016	40260
2017	36,275

According to the methodology (section 8.4.1) under one of two conditions, leakage due to fuelwood displacement can be set at zero, if one of two circumstances applies:

- $FG_{BL} < FG_{AR,t}$
- $LK_{fuel\text{-}wood} < 2\%$ of actual net GHG removals by sinks

NFC can account for zero fuelwood leakage, according to the stipulations of point (1) above. As table D.2.2. demonstrates, the company can provide above-and-beyond the 1,200 m^3 historically extracted from the project zone. Per its community fuelwood collection programme, launched in 2010, the company will provide 1,500 m^3 of fuelwood from its thinning and harvesting waste to local communities. This allows for a claim of zero fuelwood leakage,

B. INSIGNIFICANT GRAZING LEAKAGE

Per the methodology, grazing leakage is assessed using the following formulae (30) and (31) provided in the PDD.

$$Na_{BL} = sNa_{BL} \div SFR_{PAga} \quad \textbf{(30)}$$

Where:

Na_{BL} Average pre-project number of animals from the different livestock groups that are grazing in the project area; dimensionless

sNA_{BL} Sample pre-project number of animals from the different livestock groups that are grazing in the project area; dimensionless

SFR_{PAga} Fraction of total project area sampled for animal grazing; dimensionless

$$Na_{outside,t} = Na_{BL} - Na_{AR,t} \quad \textbf{(31)}$$

Where:

$Na_{outside,t}$ Number of animals displaced outside the project area at year *t;* dimensionless

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

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

Per the 2007 leakage study, the average pre-project number of animals from the different livestock groups is equivalent to 644 head of cattle. The survey interviewed 37% of villages surrounding the plantation (SFR_{Paga}) and included interviews with nomadic herders with no particular allegiance to a given community. sNA_{BL} – sample pre-project number of animals - is premised off of the 37% of villages sampled.

Under the project scenario, $Na_{outside,t}$ equals all cattle initially in the project zone (Na_{BL}) as the NFA license requires that illegal grazing be halted in the reserve. Na_{BL} was assessed during the 2007 leakage survey and PRA exercises led by an independent team. Given the local and regional land degradation trends, NFC has applied the provisions of Annex 13 from EB 51: *"Guidelines under which increase in GHG Emissions Related to Displacement of Pre-Project Grazing Activities in A/R CDM Project Activity is Insignificant."*

Application of EB 51 Annex 13

In light of grazing trends in the region and nationally, and given the highly nomadic nature of cattle grazers in the country, NFC has adopted Annex 13 from EB 51: *"Guidelines under which increase in GHG Emissions Related to Displacement of Pre-Project Grazing Activities in A/R CDM Project Activity is Insignificant."* With the provision of four potential conditions to asses, the guidelines are used to identify whether the increase in emissions associated with the displacement of grazing activities can be considered insignificant.

With reference to section III "Procedure" of the appendix, NFC has adopted point (d) section (i) to demonstrate that any increase of GHG emissions associated with grazing displacement are insignificant and need not be accounted for:

(d) The total number of animals expected to be displaced is more than 40 LSU, and the n-40 LSU (where: "n" is the total number of animals, expressed in LSU, which are expected to be displaced) are displaced to:

(i) *Areas of land that can be identified as degraded or degrading.* Application of this guideline is followed by using the "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities."

In the case of Namwasa, "n" equals 644 estimated cattle in the reserve, confirming the applicability of section (d) (i). The "*Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities*" has been adopted by NFC. It is used to prove that the lands surrounding Namwasa and in the larger cattle corridor are degraded – where the livestock have been displaced to. Cattle remained either within the vicinity of the reserve on degraded lands or cattle grazers returned to the lands they had travelled from, shifting back to zones within the twenty-nine Ugandan districts comprising the "Cattle Corridor," of which Mubende is a district. The cattle corridor has been thoroughly researched; One of the most fragile ecosystems in Uganda due to anthropogenic pressures, it is severely degraded.

Proving Insignificant Grazing Leakage with the use of the "Tool for the identification of degraded or degrading lands" (EB 41, Annex 15):

Background

In 2007, NFC commissioned a team of independent researchers to quantify pre-project grazing trends in Namwasa. The results of the household surveys and participatory rural appraisal exercises demonstrated that 644 livestock units were grazing within the boundaries of the project zone. Desk and field-based research demonstrates that the cattle herders within the boundaries display the following grazing attributes:

1. Either highly nomadic individuals, opportunistically seeking out lands on which to graze larger groups of cattle or locals with small livestock holdings – typically 2-3 goats, sheep or cattle;
2. Commitment to bringing cattle exclusively to grasslands, following behind historical degradation activities in the reserve, notably charcoal producers and agriculturalists clearing forested land;
3. No incidences of grazers converting forest or woodlands into grasslands upon which their animals could feed as this does not correspond to grazing patterns and practices.

In the case of Namwasa, small-scale farmers in the area - who accessed the reserve to increase their production of cash crops - occasionally brought smaller herds of livestock, usually no more than 5. Typically these animals would have been grazed around locals' homesteads. As described in more detail in" (C) insignificance of agricultural leakage" below, GPS coordinates of present homestead and garden areas were taken, representing the zero-grazing systems livestock have been introduced to. These were then tracked on a 2004 Landsat image, the location of grazing identified. In all cases, grazing had shifted to land that would be classified as degraded or degrading.

With reference to Stage 1 of section II "Approach" in Annex 15 of EB 41, NFC has applied an initial screening of lands to determine whether the cattle corridor zone and areas surrounding the reserve have been part of a local, regional, national or international land classification exercise and are identified as being degraded. The cattle corridor zone has been widely studied and multiple sources highlight the degradation trends particular to the area. For this reason, NFC can adopt "stage 1" and is not required to move to "stage 2" of the tool given the availability of documented research.

Section III "Procedure" of the tool confirms that presence of one of three applicability conditions (a) – (c) suffices to demonstrate the presence of degraded or degrading land. NFC has adopted (a):

> *(a) Provide documented evidence that the area has been classified as "degraded" under verifiable local, regional, national or international land classification systems or peer-review study, participatory rural appraisal, satellite imagery and/or photographic evidence in the last 10 years. If the documented evidence of degradation is older than ten years then:*
>
> > *(i) Provide evidence that the natural or anthropogenic degradation drivers and pressures that led to the land becoming "degraded" are still present and/or that there are no insufficient land management interventions to reverse degradation.*

Application of part (a) of section III "Procedure" of EB 41 Annex 15:

NFC has applied three major classification systems to demonstrate the presence of degraded and degrading land in the cattle corridor:

- □ FAO and IUCN cattle density assessment
- □ GLASOD Survey of soil degradation due to anthropogenic pressures
- □ Woods Hole Institute biomass satellite imagery survey

The Cattle Corridor falls within Uganda's dry lands, covering 84,000 square kilometres, sweeping from the southwest upwards to the north-eastern regions. Degradation trends in the corridor, notably deforestation, have been exacerbated by a rise in charcoal production, agricultural practices and population influxes.[85]
90% of Uganda's cattle live on the rangelands in the cattle corridor.[86] Approximately 6 million heads of cattle roamed the rangelands in 2002. The nomadic nature of cattle herding is largely influenced by the need to locate sources of fresh water, in an area prone to frequent droughts.[87] The soil erosion resulting from droughts and exacerbated by the rapid expansion of agriculture, has historically led to inter-district migrations of cattle herders opportunistically searching for water and fodder sources.[88] Particularly harsh droughts in 1999/2000 and 2004/2005, which led to a high number of cattle deaths, forced the migration of cattle herders to neighbouring districts, leading to incidences of land-grabbing.[89]

Figures D.2.3-4 demonstrates the cattle densities in Africa, and Uganda specifically, with the red lines acting as the delineation points of the corridor. Densities are particularly high around Mubende District, indicative of the higher degradation trends around the plantation zone.

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[85] Willy Kakuru, Clement Okia and John Okorio, *Strategy for Agroforestry Development in Uganda's Drylands* (paper presented at the Drylands Agroforestry Workshop, Nairobi, Kenya, Sept 2004), 1, 4.

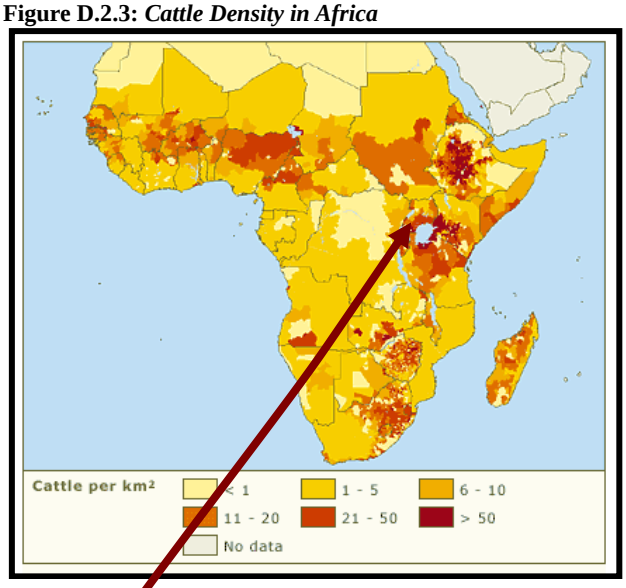
[86] W. Kisamba-Mugerwa, *Rangelands Management Policy in Uganda*, (a paper prepared for the International Conference on Policy and Institutional Options for the Management of Rangelands in Dry Areas, May 7 - 11, 2001, Tunisia), 2.

[87] Uganda Population Secretariat, *State of Uganda Population Report, 2009: Addressing the Effects of Climate Change on Migration Patterns and Women* (Kampala, 2009), 31.

[88] Population Secretariat, *State of Uganda*, 40.

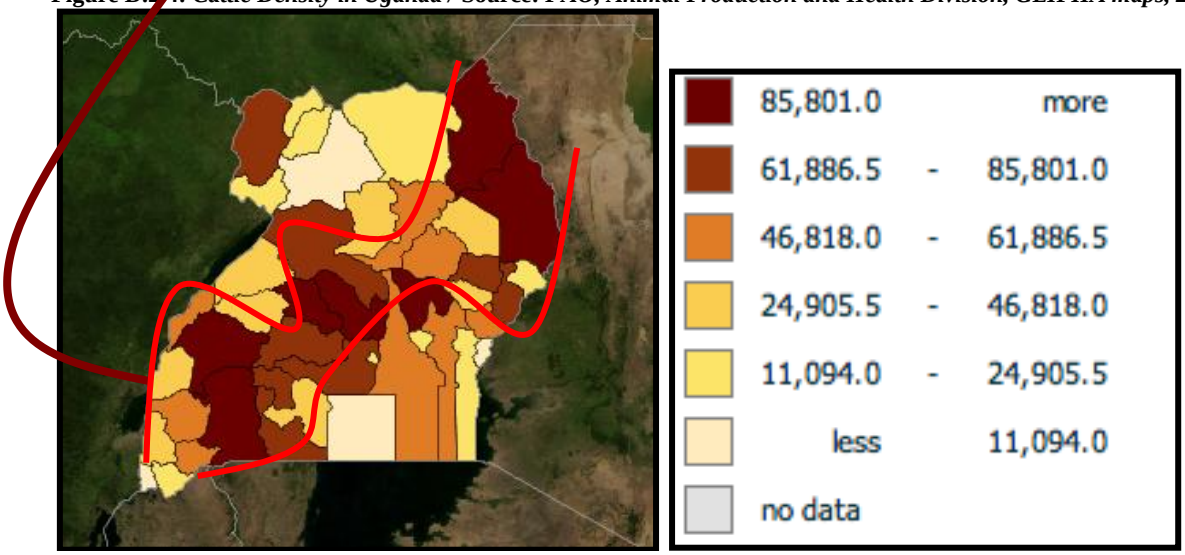
[89] Population Secretariat, *State of Uganda*, 44.

Figure D.2.3: ***Cattle Density in Africa***



Source: ***IUCN/SSC Cat Specialist Group (IUCN - The World Conservation Union)***[90]

Figure D.2.4: ***Cattle Density in Uganda*** **/ Source:** ***FAO, Animal Production and Health Division, GLIPHA maps, 2002 data***

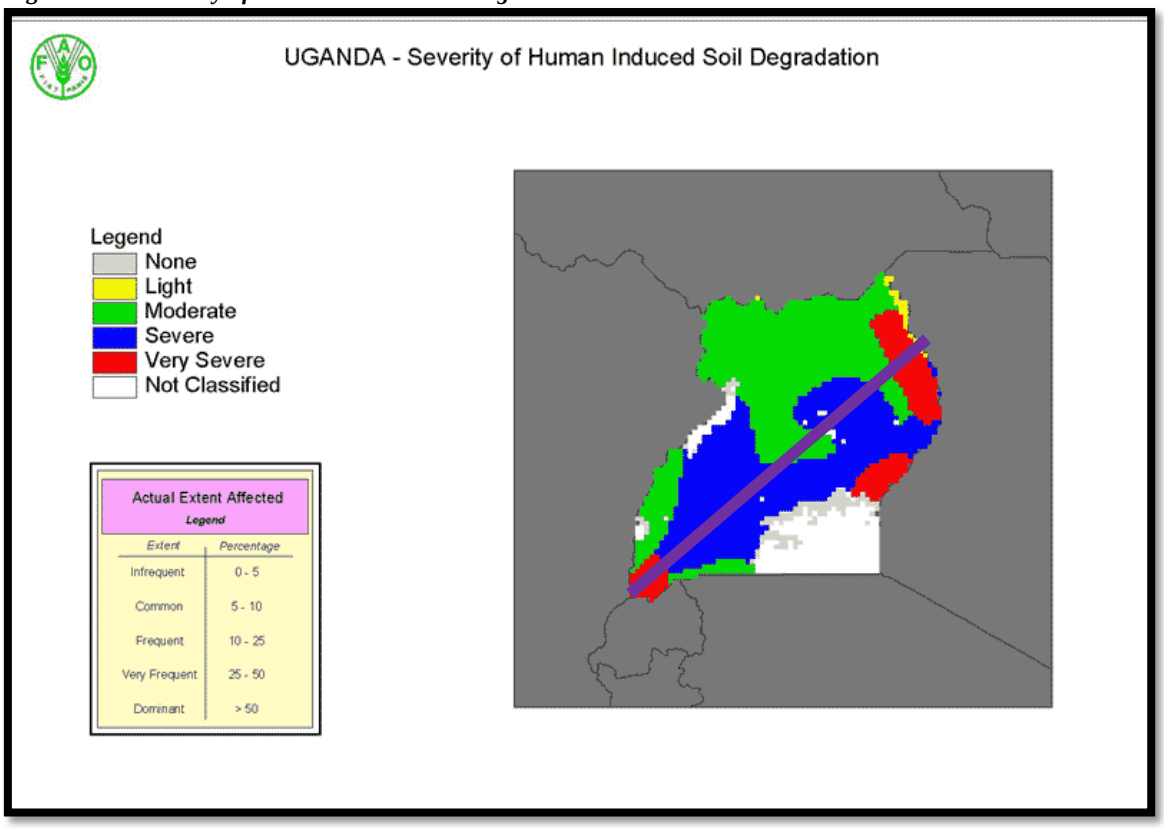


The red lines in figure D.2.4 demonstrate the proximate location of the cattle corridor, where cattle density is highest.

[90] The World Conservation Union Cat Specialist Group, Accessed July 2nd, 2010, http://www.catsg.org/cheetah/07_map-centre/7_1_entire-range/thematic-maps/AfricaCattle.gif

The Cattle Corridor has been the site of on-going de-vegetation trends and has severe levels of soil degradation; portions of the corridor have been cited as reaching levels of desertification. As the Global Assessment of Soil Degradation (GLASOD) survey carried out in the 1980's by the United Nations Environment Programme and the World Soil Organization (ISRIC) demonstrates, the soil degradation in areas frequented by cattle grazers are either classified as severe (blue) or very severe (red). According to the survey, both of these areas combined make up 70% of Uganda's population. The purple strip has been added to demonstrate the proximate flow of livestock in the cattle corridor.

Figure D.2.5: ***Severity of Human Induced Soil Degradation***



Source: ***GLASOD survey***[91]

The GLASOD survey is outdated and per section (i) of part (a) of section III "Procedure" of the tool, further evidence is presented which demonstrates that the anthropogenic degradation drivers and pressures that led to degradation persist in the corridor.

The factors leading to human-induced soil degradation have not declined in the past 20 years: population pressures, migration trends, the expansion of agriculture and the harvesting of trees for fuel-wood and charcoal production purposes have only accelerated.[92] Tropical high forest, once covering 35% of Uganda's surface area, has now fallen to 18%, or under five million hectares. 30% of Uganda's

[91] "Uganda – Severity of Human Induced Soil Degradation" accessed May 2010, GLASOD Survey, http://www.fao.org/landandwater/agll/glasod/glasodmaps.jsp?country=UGA&search=Display+map+!

[92] F.I.B. Kayanja and D. Byarugaba, "Disappearing Forests of Uganda: The Way Forward," *Current Science*, 81, No. 8 (October 2001): 1, 7. October 25th, 2001.

remaining tropical forests is considered degraded.[93] This is in part due to the expansion of cropping activities – lands converted for the purposes of agricultural production increased 15,000 square kilometres between 1990 and 2005.[94] It is expected that the arable land per capita will have dropped from 1.1 hectares to .6 between 1991 and 2015.[95]

Grazing typically happens on communal lands, though the influx of agriculturalists has increased pressures on the land and further exacerbated degradation trends in what has become Uganda's second most fragile eco-system – the cattle corridor.[96] A PRA ran in Mubende District indicated that an increase in the area of land rented has consequently decreased the amount of communal land available to pastoralists who have difficulty meeting the steep rental prices, resulting in increased migrations. [97] As Uganda's population expands, pastoralists have increasingly less land on which to forage, an issue further compounded by the fact that grazers rarely own their own land.[98]

These pressures lead to a loss in forage quality, resulting in soil quality depletion and a flourishing of xerophytic species .[99] Much of these areas are seriously degraded with gully erosion visible in some areas.[100] Soil erosion is the consequence of the soil compaction caused by regular trampling.[101] This is further exacerbated by attempts to constrict the movement of historically nomadic pastoralists who have begun to graze their cattle in greater concentrations, and with less opportunity to allow land to lay fallow in their absence.[102]

Land degradation is largely attributed to soil erosion, even in areas of the country that are flat. With 80% of the population dependent on agriculture and livestock rearing activities to sustain its rural livelihood, the lack of technical capacity to improve land-use practices, and a steadily rising land fragmentation trend, land degradation patterns persist.[103] Table D.2.6 highlights districts in the cattle corridor (highlighted in red) that are particularly affected by severe soil erosion trends. These trends are associated, in all cases, with either poor farming practices or overgrazing, or both as described in the column "Main causes of soil erosion."

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[93] Kyanja and Byarugaba, *Disappearing Forests*, 8.

[94] Population Secretariat, *State of Uganda*, 40.

[95] J. Olson and L.Berry, *Land Degradation in Uganda: Its Extent and Impact*, (Land Degradation in Drylands, May 2003), 6. Accessed May 14th, 2010:
http://lada.virtualcentre.org/eims/approver/pub_dett.asp?pub_id=92082&app=0&section=description

[96]Kakuru, Okia and Okoria, *Strategy for Agroforestry*, 2.

[97] Juliet Kanyesigye and Edwin Kayuki, *Uganda Participatory Poverty Assessment Process Mubende District Report* (Kampala, October 2002), 47.

[98] PENHA, *Uganda Annual Report 2004: Promoting Sustainable Livelihoods, Development and Social Progress in the Cattle Corridor* (Uganda, 2004), 10.

[99] Kakuru, Okia and Okoria, *Strategy for Agroforestry*, 2.

[100] National Environmental Management Authority, *State of the Environment*, 144; Kisamba-Mugerwa, *Rangeland Management Policy*, 8.

[101] National Environment Management Authority, *State of the Environment*, 163.

[102] National Environment Management Authority, *State of the Environment*, 82.

[103] National Environment Management Authority, *State of the Environment*, 52.

Table D.2.6: ***Extent and Causes of Land Degradation in certain districts in Uganda***

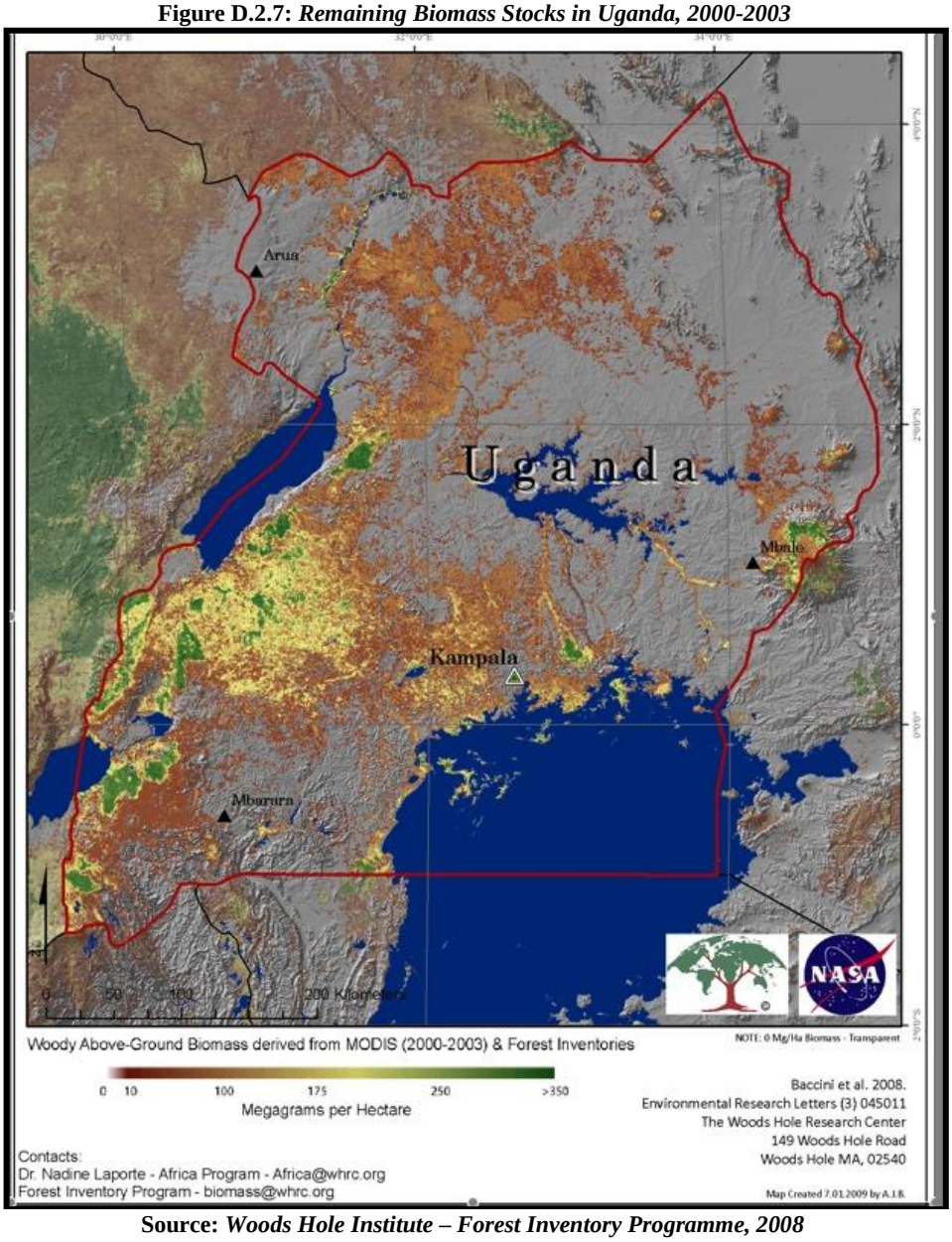
	District	Total Land Area (ha)	Estimated Area Affected by Soil Erosions		Population Density (Pple/Sq km)	Main Causes of Soil Erosion
			(Ha)	(%)		
1.	Kabale	165,300	148,770	90	250	Slopes, population pressure, deforestation, poor farming, vulnerable soil
2.	Kisoro	66,200	56,270	85	279	Slopes, population pressure, deforestation, poor farming, vulnerable soil
3.	**Mbale**	250,400	200,320	80	282	Slopes, population pressure, deforestation, poor farming, vulnerable soil
4.	**Rakai**	388,900	311,120	80	98	Vulnerable soils, poor farming, overgrazing
5.	**Kotido**	1,320,800	990,600	75	14	Overgrazing, bush burning, vulnerable soils
6.	**Kasese**	272,400	163,440	60	126	Slopes, vulnerable soils population pressure, overgrazing, poor farming
7.	Nebbi	278,100	166,860	60	114	Slopes, vulnerable soils, deforestation, population pressure
8.	**Moroto**	1,411,300	846,780	60	12	Overgrazing, bush burning, vulnerable soils
9.	**Masaka**	551,800	275,900	50	151	Slopes, population pressure, vulnerable soils, poor farming
10.	**Mbarara**	1,058,700	529,350	50	88	Deforestation, bush burning, overgrazing, poor farming, vulnerable soils
11.	Bundibugyo	209,700	83,880	40	55	Slopes, population pressure, deforestation, poor farming, vulnerable soils
12.	**Luwero**	853,900	341,560	40	53	Overgrazing, bush burning, vulnerable soils
13.	Rukungiri	258,400	77,520	30	150	Slopes, population pressure, deforestation, vulnerable soils
14.	**Kapchorwa**	173,800	52,140	30	67	Slopes, deforestation, poor farming
15.	**Mpigi**	448,600	112,150	25	204	Overgrazing, bush burning, vulnerable soils
16.	**Arua**	759,500	151,900	20	82	Slopes, vulnerable soils, population pressure, overgrazing, poor farming
17.	**Bushenyi**	490,600	981,200	20	149	Slopes, vulnerable soils, deforestation, population pressure, overgrazing
18.	Kabarole	810,900	162,180	20	91	Overgrazing, vulnerable soils, poor farming, deforestation
19.	Masindi (Rift Valley)	845,200	169,090	20	33	Vulnerable soils, bush burning, vulnerable soils

Source: ***"Land Degradation in Uganda: Its Extent and Impact" Originally cited in NEMA 2001***

Moreover, The Woods Hole Institute has produced a series of more current maps highlighting biomass stocks in several African countries, including Uganda. The map illustrates the cattle corridors low stocking rate, indicative of on-going degradation trends and representative of the soil degradation patterns

across the country highlighted in the older GLASOD survey. Highlighted in the South-Western region is Mbarara, to where some of the cattle grazers who had accessed the Namwasa Forest Reserve returned.

Figure D.2.7: ***Remaining Biomass Stocks in Uganda, 2000-2003***



Source: ***Woods Hole Institute – Forest Inventory Programme, 2008***

The evidence presented for ongoing land degradation in the cattle corridor, of which Mubende District makes up a portion confirms the correct adoption of the EB 51 Annex 13 demonstrating the insignificance of emissions associated with the displacement of grazing activities. Recognized research institutions have created land classification systems that demonstrate both the high stocking rate of livestock in the

corridor, as well as the degradation trends visible in the zone. Further evidence demonstrates the rising pressures put on standing biomass stock as fallow practices decline, poor farming practices persist, populations grow and the land tenure regime continues to frustrate roaming grazers.

C. INSIGNIFICANT AGRICULTURAL LEAKAGE

Methodology AR-AM0004, section 8.1.3 stipulates the use of formula (43) to estimate leakage associated with the displacement of cropping activities:

$$LK_{conv\text{-}crop} = CS_{AD} - CS_b \quad \textbf{(43)}$$

Where:

$LK_{conv\text{-}crop}$ Leakage resulting from the conversion for cropland

CS_{AD} Locally derived carbon stock (including all five eligible carbon pools; t CO_2-e ha^{-1} of area of land on which activities shifted; t CO_2-e ha^{-1}

CS_b Carbon stock of baseline; t CO_2-e ha^{-1}

Under the project scenario, and per the NFA license agreement, agricultural production is entirely shifted outside of the project zone. Given the conditions under which agricultural activities are displaced –to areas previously under agricultural production – NFC has adopted the use of the EB's 51st meeting's annex 14: *Guidelines on Conditions under which Increases in GHG Emissions Attributable to Displacement of Pre-Project Crop Cultivation Activities in A/R CDM Project Activity is Insignificant."*

Application of EB 51 Annex 14

The context of the displacement of agricultural activities from the Namwasa Central Forest Reserve allows for the application of Annex 14 of the 51st meeting of the CDM's Executive Board "*Guidelines on Conditions under which Increases in GHG Emissions Attributable to Displacement of Pre-Project Crop Cultivation Activities in A/R CDM Project Activity is Insignificant."*

In the Annex's procedure, NFC applies section (b) (i) to demonstrate that cropping activities once in the reserve have been shifted to lands that had, within five years of the project start date, been subject to cropping activities for at least one year. Field-based community research combined with Landsat imagery analysis substantiates this claim and allows NFC to claim insignificant cropping leakage. As per the stipulations of Annex 14, section III. 4 and point (b) (i):

The increase in GHG emissions due to displacement of pre-project crop cultivation activities attributable to the A/R CDM project activity is insignificant if at least one of the conditions (a) to (b) below is met:

NFC has applied point (b):

> *(b) The total area subjected to pre-project crop cultivation activities expected to be displaced is more than 5% of the entire A/R CDM project activity or more than 50 ha, and the n-a ha (where "n" is the area in ha expected to be displaced and "a" is 5% of the total project area or 50 ha) are displaced to:*

(i) Areas of land that have been subjected to crop cultivation activities during at least one year within a timeframe of five years before the year of the project start, or the year of signing contractual agreement for validation, whichever comes earlier:

NFC can adopt section (b) (i) because the total active agricultural production reaches over 1,000 hectares of land and because cropping within the reserve is displaced to areas that were cropped for at least one year within the five years leading up to the project start (2001-2005).

Context of Agricultural Production in and around Namwasa

The leading land-use activity within the boundaries of Namwasa prior to project implementation was agricultural production. A combination of Landsat imagery analysis and 2007 / 2010 leakage assessments demonstrated that over 1,000 hectares of land were under active cultivation (discounting abandoned gardens). Field-research revealed that individuals opportunistically entered the reserve from surrounding villages to expand upon their existing agricultural activities, typically as a way to supplement incomes. Migration trends around Namwasa were and remain high as individuals leave districts plagued by land fragmentation and degradation, seeking new cropping opportunities.

In 2007 an independent research team with assistance from NFC's community development officer and with reference to satellite imagery, drew up a list of communities surrounding the reserve and the few informal settlements within it, any of which would have used portions of the reserve for cropping purposes. This list comprised 30 villages. These villages were assessed for relevance to leakage potential and stratified accordingly, resulting in a frame of 13 villages, of which 11 positively responded to participating in the survey. The sample frame encompassed 11 of 30 potential villages, or a 37% sample frame. Interviews were conducted with heads of households to determine the amount of land currently under agricultural use.

With reference to satellite imagery analysis, the team estimated the amount of croplands subject to potential displacement, including those cropped by people living outside of the boundaries of the reserve. This was done retroactively as a cross-check against PRA survey results.

In 2010, independent researchers from Makerere University travelled to Namwasa to perform household interviews with a sub-set of the original, 2007 PRA interviewees, so as to follow up on the initial leakage assessment, and better understand land-use dynamics over time. Interviews totalled 51 across 6 of the original villages. The sampling type and approach is described in table D.2.9 below.

An analysis of the new location of displaced crops was pursued in two ways:

- Locals were asked about the ways in which they shifted their cropping activities, where those new lands were located and what was on them prior to their arrival.

- Statements made by locals were cross-checked against Landsat satellite images from 1999, 2002 and 2004, stratified by land type. The GPS units of people's displaced cropping activities were taken and overlaid on the maps, allowing for an assessment of whether not cropping had taken place in those areas up to five years prior to the project start-date. In all instances, the maps and interviews confirmed that people *solely* displaced their activities to land that had previously been under agricultural production.

- In some instances, individuals stated that they had only grazed or produced charcoal in the reserve.

Table D.2.9: Overview of Leakage Assessment Sampling for Agriculturalists			
VILLAGE OF BUSWA: Randomly Sampled			
Survey ID numbers	**# Households**	**# needed for 10% sample**	**# actually interviewed**
16, 17, 18, 19, 6b	42	4	5
VILLAGE OF NAWATA Purposively Sampled for high number of croppers			
Survey ID numbers	**# Households**	**# needed for 10% sample**	**# actually interviewed**
20, 24, 25, 27, 28, 29, 31	105	10	7
VILLAGE OF LUKONGWE: Randomly Sampled			
Survey ID numbers	**# Households**	**# needed for 10% sample**	**# actually interviewed**
1,2,3,4,5,8,9,10,11,12,13,14,1b, 2b, 3b, 4b	155	15	16
VILLAGE OF LUBOGA: Purposively Sampled for high number of croppers			
Survey ID numbers	**# Households**	**# needed for 10% sample**	**# actually interviewed**
35, 36, 38, 39, 40, 41, 42, 44, 47, 48, 49, 10b, 11b, 12b	150	15	14
VILLAGE OF MPOLOGOMA: Randomly Sampled			
Survey ID numbers	**# Households**	**# needed for 10% sample**	**# actually interviewed**
50, 51	25	2	2
VILLAGE OF KISIITA: Randomly Sampled			
Survey ID numbers	**# Households**	**# needed for 10% sample**	**# actually interviewed**
65, 66, 67, 70, 72, 20b, 21b	63	6	7

Results of the interviews demonstrated that, following normalization of the forest reserve's legal regime, individuals returned to their existing lands, purchased or rented lands upon which to grow crops or picked up agricultural production on family's lands. Most individuals, even if they had moved from other districts due to the aforementioned land pressures, remained in the area to rent or buy lands when possible. Presently, and in almost all instances locals grow crops on relatively less land than what they maintained within the reserve.

The interviews demonstrated that people had abandoned cropping in the reserve upon legal normalization of the protected reserve's boundaries. Interview respondents reported taking up new cropping activities on lands that had been regularly cropped, typically citing that cropping took place "every season" when not sure exactly what year the lands were first used for that purpose. To cross-check respondents'

statements, the research team, where feasible, took the location of croplands with a dedicated GPS unit. An outside mapping expert overlaid the GPS points on maps from 1999, 2002 and 2004, to show the existence of cropping activities on the lands prior to the project start-date. A 1999 image was adopted, as opposed to more recent 2000 ones, which were marked with considerable cloud cover.

The results of the household interviews, coupled with the Landsat imagery analysis, clearly illustrate that all cropping activities were displaced to previously cropped lands. 79% of the locations figured into cropping regimes in multiple years. Even when interview participants stated that "bushlands" were originally located on the land they shifted to for cropping, satellite imagery analysis confirmed that bushlands represent fallow and were once agricultural lands. None of the points at any time were overlaid on forest; some fell into bush in years following an earlier classification as croplands, suggesting that fallow periods can give way to thick underbrush as discussed in the analysis of the baseline. Table D.2.10 shows that all GPS coordinates fall within land classified as croplands, per the National Biomass Study; This affirms that NFC can apply Annex 14 of EB 51 and further demonstrates that individuals with smaller livestock holdings have brought their animals – cows, sheep, goats and pigs – to degraded lands around their homes for grazing purposes.

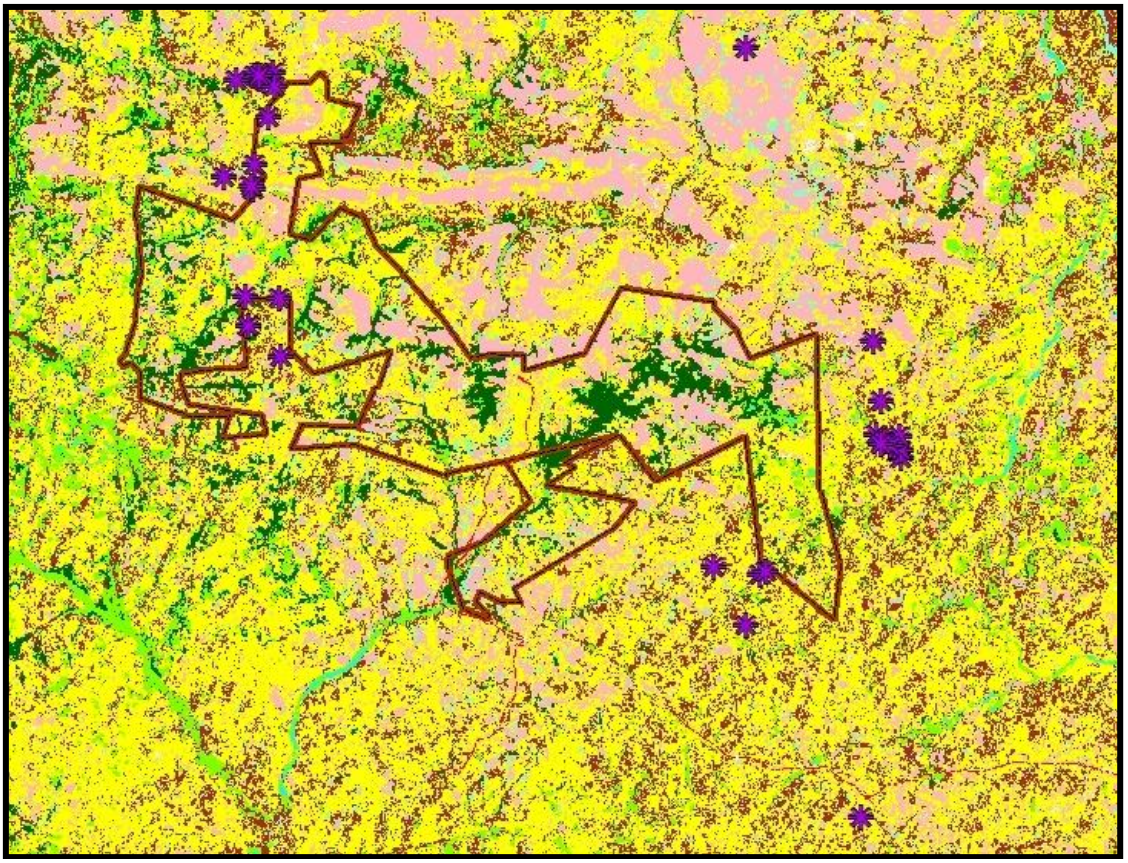
Table D.2.10: ***Characteristics of Land to which Displaced Cropping Activities were shifted***

Survey ID	Year Classified as Croplands	GPS Coordinates	Village	Small-scale Livestock holdings in 2007
1	1999, 2004	Easting: 031.45.333 Northing: 00.37.735	Lukongwe	
2	2002	Easting: 031.45.573 Northing: 00.37.600	Lukongwe	8 goats, 4 pigs
3	1999, 2002	Easting: 031.45.581 Northing: 00.37.476	Lukongwe	
5	1999, 2002, 2004	Easting: 031.45.175 Northing: 00.39.150	Lukongwe	
8	1999, 2002, 2004	Easting: 031.45.422 Northing: 00.37.660	Lukongwe	2 cows, 2 goats, 5 sheep
9	1999, 2002	Easting: 031.45.0034 Northing: 00.32.337	Lukongwe	1 cow
11	1999, 2002	Easting: 031.45.548 Northing: 00.37.793	Lukongwe	5 cows, 3 goats
12	1999, 2002, 2004	Easting: 031.45.289 Northing: 00.37.681	Lukongwe	2 cows
13	1999, 2002, 2004	Easting: 00.37.819 Northing: 031.45.220	Lukongwe	1 cow
14	1999, 2002. 2004	Easting: 031.45.422 Northing: 00.37.660	Lukongwe	1 cow
16	1999, 2002, 2004	Easting: 031.43.657 Northing: 00.35.092	Buswa	1 pig
17	1999, 2002, 2004	Easting: 031.43.657 Northing: 00.35.863	Buswa	2 cows, 2 goats, 5 sheep
18	2002, 2004	Easting: 031.42.902 Northing: 00.35.930	Buswa	
19	1999, 2002, 2004	Easting: 031.43.557 Northing: 00.35.817	Buswa	1 cow

20	1999, 2002	Easting: 031.36.734 Northing: 00.38.943	Nawata – Kikulula	
38	1999, 2002	Easting: 031.36.430 Northing: 00.42.962	Luboga	
39	1999, 2002, 2004	Easting: 031.36.624 Northing: 00.43.002	Luboga	
40	1999, 2002, 2004	Easting: 031.36.499 Northing: 00.42.900	Luboga	
41	1999, 2002	Easting: 031.36.368 Northing: 00.42.969	Luboga	
44	1999, 2002, 2004	Easting: 031.36.654 Northing: 00.42.814	Luboga	2 cows, 2 goats, 3 sheep, 3 pigs
47	2002	Easting: 031.36.558 Northing: 00.42.358	Luboga	
50	1999, 2002, 2004	Easting: 031.36.723 Northing: 00.39.768	Mpologoma	2 goats
51	1999, 2002, 2004	Easting: 031.36.250 Northing: 03.39.785	Mpologoma	
65	1999, 2002, 2004	Easting: 031.36.337 Northing: 00.41.368	Kisiita	2 cows
67	2002	Easting: 031.35.927 Northing: 00.41.509	Kisiita	2 pigs
70	2002, 2004	Easting: 031.36.343 Northing: 00.41.334	Kisiita	
10b	2002	Easting: 031.36.434 Northing: 00.42.969	Luboga	5 goats
11b	2004	Easting: 031.43.355 Northing: 00.43.355	Luboga	2 cows, 2 goats, 3 sheep, 3 pigs
12b	2002	Easting: 00.42.895 Northing: 031.36.120	Luboga	
2b	1999, 2002	Easting: 031.45.520 Northing: 00.37.565	Kyagugu	4 cows, 6 goats, 3 pigs
3b	1999, 2002	Easting: 031.45.313 Northing: 00.37.721	Lukongwe	
4b	1999, 2002	Easting: 031.45.548 Northing: 00.38.298	Lukongwe	1 cow

Figure D.2.11 illustrates the location of displaced cropping activities, overlaid on a 2002 Landsat map (four years prior to the project start-date). The image demonstrates the loss of biomass stock, with yellow representing local croplands, and green the few remaining forest fragments. Brown lines represent the contours of the Namwasa CFR.

Figure D.2.11: ***2002 Landsat image marked with displaced cropping activities***



The map demonstrates the efficacy of the field-based research, which captured displacement of cropping around the entirety of the reserve, conducting interviews spread across multiple villages. Locals typically returned their cropping activities to their homesteads, in villages neighbouring the reserve. Survey participants confirmed that the lands to which they displaced their activities had been actively cropped for multiple seasons – further indication of constricted fallow periods.

GPS coordinates were available for 32 of the total 51 individuals who were originally interviewed in 2007 and again in 2010. Of the remaining 19 individuals who were interviewed, table D.2.11 describes the reasons for which GPS coordinates were not taken by the research team. Where relevant, the table also includes statements made by interviewees about what was on the land prior to the shift of agricultural activities:

Table D.2.11: ***Survey Results from 13 households not included in GPS satellite map analysis***

ID #	Why no GPS coordinates	What was previously on land according to interview statement
10	Garden too far from interview site	Croplands
4	Garden too far from interview site	Croplands
24	Cropping on previously owned, agricultural land under the farmer's control – no shift of activities to new location	n/a
48	Garden too far from interview site	Croplands
49	Garden too far from interview site	Croplands
42	Stopped cropping in general – shifted livelihood activity	n/a
35	Stopped cropping in general – shifted livelihood activity	n/a
1b	Stated that he'd never cropped in the reserve	n/a
6b	Stated that he'd never cropped in the reserve	n/a
20b	Garden too far from interview site	Bushlands
72	Garden too far from interview site	Croplands
66	Garden too far from interview site	Croplands
25	Only produced charcoal in the reserve	n/a
27	Only produced charcoal in the reserve	n/a
28	Only produced charcoal in the reserve	n/a
29	Only produced charcoal in the reserve	n/a
31	Only produced charcoal in the reserve	n/a
36	Only collected fuelwood	n/a
21b	Only grazed in the reserve	n/a

Independent research demonstrates the proper application of EB 51 Appendix 14 and the insignificance of cropping leakage associated with the implementation of the project.

SECTION E. Monitoring plan

Methodology A/R-AM0004 requires monitoring across the following scope of activities:

- The proposed A/R CDM project activity including the project boundary, forest establishment, and forest management activities;

- □ Actual net GHG removals by sinks including changes in carbon stock in above-ground biomass and below-ground biomass, increases in GHG emissions within the project boundary due to site preparation;
- □ Leakage due to displacement of agricultural crops, grazing and fuel-wood collection activities;
- □ A Quality Assurance / Quality Control plan, including field measurements, data collection verification, data entry and archiving, as an integral part of the monitoring plan of the proposed A/R CDM project activity, to ensure the integrity of data collected.

E.1. Monitoring of the project implementation:

E.1.1 Monitoring of forest establishment and management if required for the compliance with the applicability conditions of the selected approved methodology:

The Head of Planning develops detailed planning schedules, broken down by compartment. The schedules are broken down into distinct forest operations, captured in "work orders." The results of completed work orders are uploaded into an advanced monitoring database, MicroForest. Data input is reviewed for accuracy at the Johannesburg head office and Kampala headquarters, through cross-checking budget lines, invoices and work orders. Work order forms provide extensive information on plantation activities, including the area and location of slash and burn activities, fertilizer application, weeding and planting, and the date of execution. Each month, the General Manager performs a field-based audit, which covers a portion of forest establishment activities.

In the first three years of planting, the following forest establishment practices will be monitored:

1. Site and soil preparations have been followed according to the directives laid out in NFC's Silvilculture Manual. Slash and burn activities are recorded in work orders and invoices, broken down by compartment, area and date. However, under the baseline scenario, and per EB guidelines (EB 50, Annex 21) these emissions need not be accounted for and are not included in the monitoring plan;
2. Regular surveys are performed to ensure that species have been planted in appropriate compartments, and according to planning schedules;
3. Deviations from the planned forest establishment are captured in monthly reports developed by the Head of Forestry.

The quality of seedlings is closely monitored in the nursery. No seedlings are brought to compartments for planting unless they have attained a minimum height of 20cm. Foresters and field-based workers carefully adhere to practices laid out in the *Silviculture Manual,* with their work spot-checked through monthly audits. This includes ensuring that the spacing, depth and diameter of pits meets pre-defined standards, and that weeding takes place within a pre-defined radius.

Survival counts are done in all newly planted compartments at both +- 90 days and 1 year after planting has been completed. It is the responsibility of the Silvicultural Forester and Plantation Manager to evaluate the results from the survival counts. If for any reason, the growth performance is not as expected, Silvicultural Forester and Plantation Manager's flag the compartment as a potential crop failure. Indicators of lack of growth performance will include poor height growth and excessive variation within the compartment. Should it be determined that there is a crop failure, a form is filled out. The area in question is then managed under a "disaster regime" and corrective actions are identified and monitored. This is described in more detail in the Monitoring Plan, appendix 4.

The growth performance of all 1-year-old compartments is evaluated. All information is captured in the MicroForest system for ease of reference.

To ensure successful plantation operations, NFC regularly monitors its forest management practices from planting, thinning, harvesting, coppicing and fuel wood collection.

The Head of Planning defines the planting, thinning, harvesting and coppicing schedules. These are broken down by species, compartment and date. All activities are tracked in the MicroForest system, to ensure timely implementation of proposed activities. Any deviations are registered in the Head of Forestry's monthly reports.

Enumeration teams measure the amount of biomass removed from thinning, harvesting and coppicing operations. These are reported to the Planning Forester and Head of Planning. Starting in 2010, local residents will be readmitted to the reserve and their collection of fuel wood resources monitored in Microforest and through sample plot spot checks.

Any compartments that have been harvested will be labelled in MicroForest as "temporarily unplanted" and slated for either re-planting, re-sowing or coppicing as determined by the planning schedule. Should any portion of the harvested land be left to regenerate, steps as outlined in the FSC principles will be adopted and implemented.

Aside from the adoption of a crop failure policy and attendant Management Prescriptions (MPs), NFC also has fire and pest management policies. These include procedures for identifying any disturbances, reporting on them and developing corrective measures to address them efficiently. The exact compartment location and severity of the loss through tree counts is recorded and reported to the Johannesburg head offices. All information is stored in Microforest.

E.1.2. Information on how geographic coordinates of the project boundary are established recorded and archived:

The tree farming license signed with the National Forestry Authority applied to a distinct parcel of land. NFC has delineated the land into areas according to use: planting compartments, high conservation value forest, NFC conservation zones and areas unsuitable for planting. Reference is made to identifying markers, such as roads, streams, valleys or man-made beacons to ease in-field identification of boundaries. The project boundary for the carbon program only includes eligible lands as defined by the CDM methodology and which are used for planting purposes.

Prior to any planting activities, NFC conducts its own ground surveys to verify each compartment's boundaries. During surveys, team members use GPS units to regularly track coordinates in the field. These are inputted into the GIS system, from which the Planning Forester creates detailed maps from the acquired latitude, longitude and elevation points. The values, exported into ArcView9, are used to create detailed maps outlining overall project boundaries. Individual compartment boundaries are also generated. These boundaries, coupled with each compartments specific and pre-determined characteristics, such as ID number, species type to be planted, and soil sample results, create the foundation for all forest management operations. A second ground survey is performed just after planting, to verify the boundaries of each planted compartment.

The area of each stratum and stand can be easily referenced through the GIS system. Any lands that are not eligible under the CDM are duly noted and are excluded from the overall eligible project area. Analysis of land-cover attributes dating back to 1990 determines this.

E.1.3. If required by the selected approved methodology, describe or provide reference to, SOPs and quality control/quality assurance (QA/QC) procedures undertaken for data monitored, if not included in the relevant sections below

a. Overview

The New Forests Company Ltd has adopted an integrated management system, through which management prescriptions (MPs) guide forest operations at all levels. All Integrated Management System documents are housed in a computer-based system, available to all relevant staff at head offices and at the Namwasa plantation. Any changes made to documents are immediately filtered through the system and flagged to ensure proper adoption. The IMS is compliant with ISO 14000/9001, FSC and assimilates the requirements of this A/R-AM0004 methodology.

MPs are adopted so that measurements and analysis are taken in a streamlined and standardized manner. For quality purposes, this is critical to the proper quantification of GHG emissions reductions – normalized procedures allow for consistent, credible and reliable measures. Data is captured and stored following prescribed procedures. Strict adherence to the Carbon Programme protocols is stressed at all levels of plantation management.

The Carbon Programme has specific MPs, which can be reviewed in full by the DOE. In particular these guide:

- Identification and measurement of permanent sample plots
- Training for sample plot measurements
- The collection, input and archiving of field-based data
- Identification and measurement of temporary sample plots (TSPs) to asses fuel-wood leakage
- Training for the identification of temporary sample plots for the fuel-wood programme
- The review of carbon calculations developed for the PDD

For purposes of regular oversight, the Head of Forests oversees the performance of a monthly, 10% audit of all plantation invoices. The audit reviews the proper implementation of work orders, including inspecting compartments to ensure that activities such as fertilizer application, slashing and targeted burning operations meet NFC's quality standards. The results of audits are shared with the Carbon Manager.

With reference to the adopted methodology, NFC has elaborated on four areas of quality control: reliable field measures, verification of field data collection, verification of data entry and analysis, and data maintenance and archiving. NFC's MP platform for managing these four overarching cornerstones of the programme is described below.

b. Reliable Field Measures

Relevant staff is ensured proper sensitization and training to specific procedures related to the Carbon Programme. In particular, this ensures the training necessary for the identification and measurement of permanent sample plots to measure total GHG reductions, as well as temporary plots for assessing the

removal of biomass to mitigate fuel-wood collection leakage. The Planning Department ensures delivery of the training. A qualified Uganda-based team member, such as the General Manager or a Namwasa Technical Forester gives the training to the company's designated enumeration team. A training checklist is filled out and filed so as to report on the quality, length and outcomes of the training. Training stresses the importance of accurate field measures; the trainer must establish test plots, observe enumeration team members ability to lay out the plots according to the MP, properly take several measures in the plots (DBH, height), and record the measures neatly.

In the instance that new team members join NFC and participate in activities relevant to the Carbon Programme, they too will be trained. Team members who will perform verification activities shall also be trained.

The MPs guide the identification, establishment and measurement of permanent and temporary sample plots. An attendant set of checklists ensures that data is properly recorded, that attributes specific to the plots are noted and that the names of all team members are recorded.

c. Verification of field data collection

The MP for permanent sample plots includes a section for the verification of field data collection for the plots. 10% of all the plots established will be randomly re-checked by another trained enumeration team. Plot location, DBH and tree height are all verified for accuracy. The team follows behind the first team. Both teams meet to review measurement finds and settle any discrepancies that may be due to things such as poor handwriting. Errors are corrected as needed, and all proceedings noted. The number of errors is noted. If these should exceed 5%, then the entire exercise must be re-performed until the error falls below 5%. The leader of the enumeration teams will review all corrected data to ensure the neatness of handwriting for conversion into digital format.

d. Verification of data entry and analysis

Two MPs have been designed to guide the collection, inputting and archiving of PSP and TSP measurements. Data is input into excel spreadsheets and time reviewed for any measures that appear out of the range of normalcy. It is intended that the Planning Forester and / or the Head of Planning discuss any abnormalities with the individual performing the review, should questions arise. The Technical Forester who performed the PSP inventory will be contactable during the data verification phase should any clarification be required.

10% of the inputted data points are reviewed by a team member who did not participate in its collection or original input. The team member will review the original hand-recorded data points with an Excel spreadsheet. Any discrepancies in the Excel sheet will be highlighted in colour. These will be reviewed between the team member who originally inputted the data and the person performing the cross-check. Corrections will be made. The number of errors will be recorded, and maintained in a "corrections" worksheet, highlighted in red. Should 5% of the points have been incorrectly inputted, then they will be re-inputted, with another review performed.

Another MP covers all aspects of data analysis, for the figures and calculations presented in ongoing verification events. The MP will be followed by someone other than the Carbon Manager, to ensure that data analysis is correctly performed. This will include filling out an appropriate checklist, which will be stored for DOE review.

NFC intends to adopt the SMART tool developed by the World Bank's BioCarbon Fund and el Centro Agronomico Tropical del Investigacion y Ensenanza. This will ensure that a host of critical calculations are performed consistently and accurately in advance of any verification events.

e. Data maintenance and archiving

An MP lays out the practices necessary for proper data archiving and maintenance. For all leakage analysis, and PSP monitoring, the original data sheets shall be safely stored in paper format. This will be transposed into digital formats, anticipated to be Excel. Data points may also be uploaded into a permanent Carbon Programme database system, housed, for example, in Access. In many instances, data is maintained in both the Johannesburg head offices and at the Kampala headquarters. A dedicated Carbon File is kept in both offices. Data is uploaded onto the company's server. The following will be included in the data archives:

- Original field measurements and attendant spreadsheets
- Calculations sheets for the carbon stock changes in all pools (housed in TARAM) and with an explanation of how certain data points were chosen
- GIS products
- Copies of the measuring and monitoring reports, such as baseline assessments, Participatory Rural Appraisals, and Leakage Analysis

As qualified by the A/R methodology, Table E.1.2.1 serves as the overarching checklist that informs the application of the data maintenance and overview MP.

Table E.1.2.1: ***Quality Control Activities***

QC activity	Procedures
Check that assumptions and criteria for the selection of activity data, emission factors and other estimation parameters are documented.	• Cross-check description of activity data, emissions factors and other estimation parameters with information on source and sink categories and ensure that these are properly recorded and archived.
Check for transcription errors in data input and reference.	• Confirm that bibliographical data references are properly cited in the internal documentation. • Cross-check a sample of input data from each source category (either measurements or parameters used in calculations) for transcription errors.
Check that emissions and removals are calculated correctly.	• Reproduce a representative sample of emission or removal calculations • Selectively mimic complex model calculations with abbreviated calculation to judge relative accuracy
Check that parameter and units are correctly recorded and that appropriate conversion factors are used.	• Check that units are properly labelled in calculation sheets • Check that units are correctly carried through from beginning to end of calculations; • Check that conversion factors are correct;

	• Check that temporal and spatial adjustment factors are use correctly
Check the integrity of database files.	• Confirm that the appropriate data processing steps are correctly represented in the database • Confirm that data relationships are correctly represented in the database; • Ensure that data fields are properly labelled and have the correct design specifications; • Ensure that adequate documentation of database and model structure and operations are archived
Check for consistency in data between categories.	• Identify parameters (e.g. activity data, and constants) that are common to multiple categories of sources and sinks, and confirm that there is consistency in the values used for these parameters in the emissions calculations
Check that the movement of inventory data among processing steps is correct	• Check that emission and removal data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries • Check that emission and removal data are correctly transcribed between different intermediate products
Check that uncertainties in emissions and removals are estimated or calculated correctly.	• Check that qualifications of individuals providing expert judgment for uncertainty estimates are appropriate; • Check that qualifications, assumption and expert judgments are recorded. Check that calculated uncertainties are complete and calculated correctly; • If necessary, duplicate error calculations on a small sample of the probability distributions used by Monte Carlo analysis
Undertake review of internal documentation	• Check that there is detailed internal documentation to support the estimates and enable reproduction of the emission and removal and uncertainty estimates • Check that inventory data, supporting data, and inventory records are archived and stored to facilitate detailed review; • Check integrity of any data archiving arrangements of outside organizations involved in inventory preparation
Check time series consistency.	• Check for temporal consistency in time series input data for each category of sources and sinks; • Check for consistency in the algorithm/method used for calculations throughout the time series
Undertake completeness checks	• Confirm that estimates are reported for all categories of sources and sinks and for all years; • Check that known data gaps that may result in incomplete emissions estimates are documented and treated in a conservative way;
Compare estimates to previous estimates	• For each category, current inventory estimates should be compared to previous estimates, if available. IF there are significant changes or departures from expected trends, re-check estimates and explain the difference.

E.2. Sampling design and stratification:

Section C.3 describes NFC's approach to ex ante stratification and boundary delineation. Stratification has been adopted per year of planting (age class), species type and working class.

Amendments may need to be made to the *ex ante* stratification so as to capture important changes in the project zone. *Ex post* stratification may be different in form due to the following factors:

- □ Changes in planning schedules, including shifts to harvesting, thinning and re-establishment schedules
- □ Unforeseen disturbances including fires or pest outbreaks
- □ Inclusion of new planting lands within or outside of the project zone
- □ The merging of strata
- □ Identification of other important variables overlooked or not present during the initial stratification.

The New Forests Company Ltd. has developed a management prescription and related MP to guide the monitoring of strata. This approach will ensure that NFC performs any necessary *ex post* stratification and continues to develop the most accurate estimates possible of greenhouse gas reductions and emissions. This will be facilitated by the use of sophisticated GIS systems, and attendant maps developed to a suitable scale so as to properly identify sub-stratum as needed.

Sampling Framework

NFC will identify the location of permanent sample plots (PSPs) according to modalities specified in the methodology. Measures taken from the PSPs will ensure the accurate estimate of carbon stock accumulations and deductions over the lifetime of the project, tracking the growth and harvesting cycles of the proposed project's pine and eucalyptus species. Plot IDs and related data will be stored electronically and in paper format. A specific MP details all activities related to the identification, establishment and measurement of PSPs.

Definition of the sample size and allocation among strata

The sample size depends on the level of variability in carbon stocks in the pre-defined land-use strata, the level of accuracy required, the species used, growth variation, stocking rates and the cost of monitoring. Using Winrock International's *Winrock Terrestrial Sampling Calculator* adapted to this methodology, and taking into account the variables cited above, NFC has determined the appropriate PSP sample size per equations 57, 60 and 61 in the methodology and inputted into Winrock's Terrestrial Sampling Calculator. This is highlighted in Annex 4: Monitoring Plan and described in table E.2.2.1 below:

***A* Total size of all**	**2481.5**

strata (A)		
***A*, size of each stratum in hectares**	**878.2**	Pinus caribaea / pinus oocarpa: planted 2006-2007
	578.7	Pinus caribaea / pinus oocarpa: planted 2008-2009
	534.3	Pinus caribaea / pinus oocarpa: planted 2010-2011
	108.7	Eucalyptus grandis / urophylla poles: planted 2006-2007
	134.1	Eucalyptus grandis / urophylla poles: planted 2008-2009
	124.6	Eucalyptus grandis poles: planted 2010-2011
	41.4	Eucalyptus grandis / urophylla sawn timber: planted 2006-2007
	81.5	Eucalyptus grandis / urophylla sawn timber: planted 2008-2009
	0	Eucalyptus grandis / urophylla sawn timber: planted 2010-2011
***AP* Sample plot size; ha**	500 square meters – circular plots	
St_i Standard deviation for each stratum *i* (in tons of C/ha)	**23.9**	Pinus caribaea / pinus oocarpa: planted 2006-2007
	23. 7	Pinus caribaea / pinus oocarpa: planted 2008-2009
	9.8	Pinus caribaea / pinus oocarpa: planted 2010-2011
	64.7	Eucalyptus grandis / urophylla poles: planted 2006-2007
	86.2	Eucalyptus grandis / urophylla poles: planted 2008-2009
	44.7	Eucalyptus grandis poles: planted 2010-2011
	52.1	Eucalyptus grandis / urophylla sawn timber: planted 2006-2007
	86.2	Eucalyptus grandis / urophylla sawn timber: planted 2008-2009
	n/a	Eucalyptus grandis / urophylla sawn timber: planted 2010-2011
C*i* Cost of establishment	This is not used in this analysis, as it is assumed that cost is constant across the plantation	
***Q* approximate average value of the estimated quantity, *Q*, in meters cubed per hectare**	**68.6**	Pinus caribaea / pinus oocarpa: planted 2006-2007
	70	Pinus caribaea / pinus oocarpa: planted 2008-2010
	21	Pinus caribaea / pinus oocarpa: planted 2009-2011
	74.4	Eucalyptus grandis / urophylla poles: planted 2006-2007
	126	Eucalyptus grandis / urophylla poles: planted 2008-2009
	47	Eucalyptus grandis poles: planted 2010-2011
	90.5	Eucalyptus grandis / urophylla sawn timber: planted 2006-2007
	126	Eucalyptus grandis / urophylla sawn timber: planted 2008-2009
	n/a	Eucalyptus grandis / urophylla sawn timber: planted 2010-2011
***DLP* desired level of precision**	90% confidence level	
Total Sample Plots required	**18**	
Total sample plots required per stand model	**4**	Pinus caribaea / pinus oocarpa: planted 2006-2007
	2	Pinus caribaea / pinus oocarpa: planted 2008-2010
	1	Pinus caribaea / pinus oocarpa: planted 2009-2011
	3	Eucalyptus grandis / urophylla poles: planted 2006-2007
	3	Eucalyptus grandis / urophylla poles: planted 2008-2009
	2	Eucalyptus grandis poles: planted 2010-2011
	1	Eucalyptus grandis / urophylla sawn timber: planted 2006-2007
	2	Eucalyptus grandis / urophylla sawn timber: planted 2008-2009
	n/a	Eucalyptus grandis / urophylla sawn timber: planted 2010-2011

As part of its own quality control system, NFC takes regular measures of stands, to track actual growth rates against predicted volumes. These measures (DBH and height), has helped determine the level of variance in a given stand and the standard deviation – values critical to establishing the number of necessary plots. NFC will choose the number of plots necessary to achieve a 90% confidence level with a 10% sampling error. NFC has determined that the preliminary stratification will not follow the underlying baseline scenario, but instead will be representative of species and age and working classes.

Sample Plot Size

As defined in its management prescription for PSP measurement, NFC has created circular plots, for their ease of location, covering an area of 500 m^2 each. Plot centres will be located with GPS units at each monitoring event. Per the methodology, the size of the plot is dependent on the density of the stands, and can range in size between 100 and 1,000 m^2. Consequently, NFC will implement 500 m^2 plots, capturing variances in tree characteristics without being cost prohibitive.

Following the first monitoring, the sample size for PSPs will be re-assessed, according to the measurements obtained and their level of variance. Some strata may be combined to further reduce monitoring costs.

Sample Plot Location

To avoid the introduction of any bias and preferential treatment given to the trees located in PSPs, the location of each plot is not physically marked. Instead, the centre of the circular plot is identified using a GPS unit and a pre-defined GPS coordinate chosen with a random start, followed by a systematic random sampling of plots. Aside from the technical forester, and Plantation Manager no members of the Namwasa-based forestry field-staff will be informed of the location of the plots. NFC's in-house enumeration team – which moves between all of NFC's plantations and is not involved in forestry upkeep - takes measures, tracking the centre of the plot by the pre-defined GPS coordinates. The coordinates are housed at both the Kampala headquarters - where only the CEO, General Manager and Office Manager have access to the Carbon File - and the Johannesburg head offices.

The GPS centre points will be chosen with a random start, as established in the in-house GIS data system and administered by the Planning Forester. As the baseline strata are not contiguous across the Namwasa landscape, efforts will be made to distribute plots as evenly as possible across the project zone, using techniques established in the methodology. The following attributes are recorded for each sample plot and archived according to a pre-defined best operating procedure for data management purposes:

- □ GPS centre point
- □ Compartment ID
- □ Land-use stratum and stand
- □ Assigned series number of plot
- □ Species and working class

E.3. Monitoring of the baseline net GHG removals by sinks, if required by the selected approved methodology:

Under the approved methodology, there is no need to monitor baseline net GHG removals by sinks, as this is conservatively estimated at zero, under the assumption that land degradation trends will continue as they have historically. As such, no parameters need be included in this section.

Data and parameters that are monitored (if any):

Data / Parameter:	
Description/unit:	
Source of data:	
Measurement procedures:	
Monitoring frequency:	
QA/QC procedures:	
Any comment:	

E.4. Monitoring of the actual net GHG removals by sinks:

In accordance with the planting, thinning and harvesting schedules as determined in the overarching stand model (compartment) establishment, broken down by species and working class, NFC will estimate the verifiable changes in the carbon stocks of the proposed Namwasa reforestation initiative. In accordance with the methodology, AR-AM0004/Version 04, both above and below-ground carbon stocks will be assessed. Accordingly, the soil, dead leaves and dead wood carbon stocks will not be calculated. The

The methodology's proposed equations 63 – 66 will guide calculations, allowing for the correct estimation of changes in both above and below-ground living biomass. NFC intends to adopt the "Allometric approach" to quantifying carbon sequestration in eucalyptus and pine stands, as described in equations 73-85.

Monitoring is performed in the following ways, supported through the use of advanced technologies and streamlined analysis supported by the MicroForest system:

- The establishment of permanent sample plots, chosen in a statistically robust manner, based off of available field data, per equations 57-59 and 62 of the methodology. NFC takes regular measures of its stands, and these measures will be used to determine the correct number of sample plots per stratum. DBH and tree heights will be recorded by a trained enumeration team, and measures analyzed for inclusion in the allometric approach. Priority will be given to identifying any deviations from the nationally generated pine and eucalyptus growth models that the company presently relies on. The use of the allometric approach is described in Appendix 4: Monitoring Methodology.
- GHG emissions by sources related to site preparation need not be accounted for, as described in Executive Board 50, Annex 21. Moreover, emissions associated with the removal of herbaceous vegetation need not be measured.

All data to be collected, which will act as a platform from which to monitor the verifiable changes in carbon stocks across the project boundaries as specified in this PDD, are detailed in data tables below along with the data and parameters fixed at the project start.

Data and parameters that are available at validation:

Data / Parameter:	CF
Description/unit:	Carbon Fraction t C (t d.m.)-1
Value applied:	0.5
Source of data:	IPCC default value
Justification of choice / Measurement procedures (if any):	Conservative default value identified by IPCC
Any comment:	

Data / Parameter:	DLP
Description/unit:	Desired level of precision
Value applied:	10%
Source of data:	Methodology recommendation
Justification of choice / Measurement procedures (if any):	DLP of 10% will allow for robust measure of GHG removals by sinks and will be applied for the identification of permanent sample plots
Any comment:	

Data / Parameter:	
Description/unit:	Confidence level
Value applied:	90%
Source of data:	Methodology recommendation
Justification of choice / Measurement procedures (if any):	A 90% confidence level to ensure QA/QC and measuring and monitoring precision control
Any comment:	

Data / Parameter:	F*j*(DBH,H)
Description/unit:	Allometric equation for species *j*, linking tree volume to diameter at breast height (DBH) and tree height (H) measured in plots for stratum *i*, species *j*, time *t*
Value applied:	For pine: $V_o = 0.00004534\ d^{1.8875}\ .H_d^{1.0304}$ $V_u = 0.00001638\ d^{1.9497}.H_d^{1.2006}$ Where Vo is overbark volume, Vu is underbark volume, d is DBH and H is height. For eucalyptus $V = 0.489\ (G.H_d)^{0.942}$

	Where V is volume, G is basal area (for which the DBH measurement is required) and H is tree height. See paper published by Alder et al pages 11 and 30.
Source of data:	Allometric equations developed by Alder et al and captured in dynamic excel sheets, based off of field-based research in Uganda
Justification of choice / Measurement procedures (if any):	Locally specific equations developed off of dedicated field-based research and set at the start of the project
Any comment:	NFC will use this equation over the lifetime of the project, per the methodological requirements

Data and parameters that are monitored:

Data / Parameter:	D*j*
Description/unit:	Wood density for species *j* / t.d.m m^3
Source of data:	National Biomass Study, 1992
Measurement procedures:	Review published literature for any changes to expected density values for planted trees, with priority given to local and national data sets
Monitoring frequency:	Every five years
QA/QC procedures:	Ensure any new values are developed from credible research organizations or qualified professionals
Any comment:	

Data / Parameter:	i_{ID}
Description/unit:	Stratum ID
Source of data:	Each stratum, representative of an overall stand model has a unique ID, according to species type and working class and age
Measurement procedures:	Stratum ID to be generated following planting
Monitoring frequency:	At stand establishment
QA/QC procedures:	A review of changes in the MicroForest system to be performed with the Planning Department to ensure consistency of stratum IDs and assessed against total hectares planted, thinned, harvested or damaged. Should any new strata be developed, this will be added to the list.
Any comment:	Stratum IDs will be evaluated against any crop damages / failures that may occur and which could require the merging or splitting of individual stands (compartments) into new strata

Data / Parameter:	A_i
Description/unit:	Area of each stratum

Source of data:	GIS mapping review
Measurement procedures:	Each stratum is comprised of distinct stands (compartments) and the areas of each will be summed to evaluate the total stratum area
Monitoring frequency:	Prior to the start of the project and adjusted thereafter every 5 years
QA/QC procedures:	The area of each stratum is determined by walking the perimeter of each compartment upon planting and taking regular GPS coordinates. These are uploaded into the GIS system for an assessment of boundaries and total area
Any comment:	

Data / Parameter:	ID_{ikt}
Description/unit:	Stand ID
Source of data:	MicroForest system
Measurement procedures:	Each stand within a given stratum (compartment) is assigned a unique ID number,
Monitoring frequency:	At stand establishment
QA/QC procedures:	A review of changes in the MicroForest system to be performed with the planning department to ensure consistency of stratum IDs and assessed against total hectares planted, thinned, harvested or damaged
Any comment:	Stand (compartment) IDs will be variable over the course of the project, due to the potential of crop failures which could require the merging or fragmentation of compartments as part of the management regime

Data / Parameter:	A_{ikt}
Description/unit:	Area of each stratum *i*, stand model *k*, at time *t*
Source of data:	GIS mapping review
Measurement procedures:	Each stratum is comprised of distinct stands (compartments) and the areas of each is assessed following establishment of the stand using advanced GPS and GIS systems
Monitoring frequency:	Yearly
QA/QC procedures:	A review of changes in the MicroForest system to be performed annually with the Planning Department to ensure consistency of stand (compartment) IDs and assessed against total hectares planted, thinned, harvested or damaged and per any merging / splitting that could be prescribed
Any comment:	NFC uses the term “compartment” to denote “stand”

Data / Parameter:	DBH
Description/unit:	Diameter at breast height, cm
Source of data:	Field measurements at permanent sample plot locations
Measurement procedures:	Measurement of DBH taken at permanent sample plot locations per pre-defined procedures
Monitoring frequency:	Every 5 years
QA/QC procedures:	Identifying and Measuring Permanent Sample Plots MP

	Data input and archiving MP Training for Sample Plot MPs
Any comment:	

Data / Parameter:	H*j*
Description/unit:	Tree height / meters for a given species
Source of data:	Field measurements at permanent sample plot locations for assessment of tree growth and net GHG removals
Measurement procedures:	Measurement of H*j* taken at permanent sample plot locations per pre-defined procedures
Monitoring frequency:	Every 5 years
QA/QC procedures:	Identifying and Measuring Permanent Sample Plots MP Data input and archiving MP
Any comment:	

Data / Parameter:	R*j*
Description/unit:	Root-shoot ratio for a given species and based on stand age and biomass per hectare
Source of data:	Local research / IPCC default values
Measurement procedures:	Literature review to determine whether more localized values have been developed which would enhance accuracy of calculations
Monitoring frequency:	Every five years
QA/QC procedures:	Ensure any new values are developed from credible research organizations or qualified professionals and that they are relevant to stand age and biomass per hectare
Any comment:	

Data / Parameter:	$BEF_{2,j}$
Description/unit:	Biomass expansion factor for conversion of stem biomass to above-ground tree biomass for trees species *j* /dimensionless
Source of data:	Local research / IPCC default values
Measurement procedures:	Literature review to determine whether more localized values have been developed which would enhance accuracy of calculations
Monitoring frequency:	Every five years
QA/QC procedures:	Ensure any new values are developed from credible research organizations or qualified professionals
Any comment:	

Data / Parameter:	n
Description/unit:	Sample size in the project area
Source of data:	Calculations
Measurement procedures:	Described in Identifying and Measuring Permanent Sample Plots MP
Monitoring frequency:	Every five years

QA/QC procedures:	Use of Winrock Terrestrial Sampling Calculator
Any comment:	

Data / Parameter:	n*i*
Description/unit:	Sample size for stratum *i*
Source of data:	Calculated
Measurement procedures:	Described in Identifying and Measuring Permanent Sample Plots MP
Monitoring frequency:	Before the start of the project and adjusted thereafter every 5 years
QA/QC procedures:	Use of Winrock Terrestrial Sampling Calculator
Any comment:	

Data / Parameter:	nTR_{PLikt}
Description/unit:	Number of trees in the sample plot
Source of data:	Field based measurements
Measurement procedures:	According to pre-defined measurement activities stored in the IMS and based on physical count of trees
Monitoring frequency:	Every five years
QA/QC procedures:	Identifying and Measuring Permanent Sample Plots MP Data Input and Archiving MP Training for Sample Plot MPs
Any comment:	

Data / Parameter:	PL_{ID}
Description/unit:	Sample Plot ID
Source of data:	IDs are assigned once the location of the plots has been determined and according to calculations of the number of sample plots required per stratum
Measurement procedures:	
Monitoring frequency:	Before the start of the project
QA/QC procedures:	Identifying and Measuring Permanent Sample Plots MP Data Input and Archiving MP Training for Sample Plot MPs
Any comment:	

Data / Parameter:	Lat/Lon
Description/unit:	Plot location
Source of data:	Random start location to ensure no introduction of bias and using GIS system
Measurement procedures:	Randomly select all sample plots using a random start
Monitoring frequency:	Every five years
QA/QC procedures:	Identifying and Measuring Permanent Sample Plots MP

	Training for Sample Plot MPs
Any comment:	

Data / Parameter:	j
Description/unit:	Tree species
Source of data:	Fixed at project start
Measurement procedures:	10% audits of forest implementation
Monitoring frequency:	Yearly
QA/QC procedures:	Audit checks per procedures in the IMS
Any comment:	

E.5. Leakage:

Cropping and grazing leakage are considered insignificant and do not require monitoring. According to section 7.1.3 of the methodology, "For each verification period, estimate the average fuel-wood collection in the project area to estimate the volume of fuel-wood gathering displaced outside the project boundary. Monitoring can be done by periodically interviewing households, through a Participatory Rural Appraisal (PRA) or field-sampling." NFC has determined that it will pursue field-sampling in temporary sample plots.

Data and parameters that are available at validation:

Data / Parameter:	CF_j
Description/unit:	Carbon fraction of dry matter of species *j*
Value applied:	0.5
Source of data:	IPCC default value, see table D.2.1: *Values used to estimate leakage associated with fuel-wood collection displacement*
Justification of choice / Measurement procedures (if any):	Default value from IPCC
Any comment:	

Data / Parameter:	FG_{BL}
Description/unit:	Average pre-project annual volume of fuel-wood gathering in the project area
Value applied:	1,2070.5 m^3
Source of data:	An independent PRA study in the project zone (*ex ante* in A/R-CDM-PDD)
Justification of choice / Measurement	Per methodological requirements and proposed sampling strategy

procedures (if any):	
Any comment:	

Data / Parameter:	SFR_{PAfw}
Description/unit:	Fraction of sampled areas sampled for fuel-wood collection - dimensionless
Value applied:	11 of 30 villages
Source of data:	An independent PRA study in the project zone and according to proposed sampling methodology (*ex ante* in A/R-CDM-PDD)
Justification of choice / Measurement procedures (if any):	Per methodological requirements and proposed sampling strategy
Any comment:	

Data / Parameter:	SHH
Description/unit:	Sampled households, number of households
Value applied:	275 households
Source of data:	An independent PRA study in the project zone and according to proposed sampling methodology (*ex ante* in A/R-CDM-PDD)
Justification of choice / Measurement procedures (if any):	Per methodological requirements and proposed sampling strategy
Any comment:	

Data / Parameter:	SHH_c
Description/unit:	Sampled households in community *c*
Value applied:	25 households per community
Source of data:	An independent PRA study in the project zone and according to proposed sampling methodology (field measurement at year 0)
Justification of choice / Measurement procedures (if any):	Per methodological requirements and proposed sampling strategy
Any comment:	

Data and parameters that are monitored (if any):

Data / Parameter:	$FG_{AR,\,t}$
Description/unit:	Weight of fuel wood gathered in the project area according to monitoring results, then converted into volumes
Source of data:	Field measures assess amount of fuelwood biomass waste collected in pre-defined compartments (metric tons)
Measurement procedures:	Field-based assessment using temporary sample plots
Monitoring frequency:	Yearly
QA/QC procedures:	Training for Leakage Temporary Sample Plots MP

	Temporary Sample Plot Leakage Training MP Leakage Data Input and Archiving MP
Any comment:	

Data / Parameter:	D*j*
Description/unit:	Wood density for species *j* / t.d.m m^3
Source of data:	National Biomass Study, 1992
Measurement procedures:	Review published literature for any changes to expected density values for planted trees, with priority given to local and national data sets
Monitoring frequency:	Every five years
QA/QC procedures:	Ensure any new values are developed from credible research organizations or qualified professionals
Any comment:	This will only be used to assess the density of wood to be collected in the future from NFC plantation compartments, and does not affect the fixed volumes assessed at the project start (pre-project fuel-wood gathering) and based on National Biomass Study values

Data / Parameter:	BEF_2
Description/unit:	Biomass expansion factor – dimensionless
Source of data:	IPCC default values
Measurement procedures:	Review published literature for any changes to expected density values for planted trees, with priority given to local and national data sets
Monitoring frequency:	Every five years
QA/QC procedures:	Ensure any new values are developed from credible research organizations or qualified professionals
Any comment:	This will only be used to assess the BEF_2 of wood to be collected in the future from NFC plantation compartments, and does not affect the fixed volumes assessed at the project start (pre-project fuel-wood gathering) and based on IPCC default values

E.5.1. Proposed measures to be implemented to minimize potential leakage:

Leakage from cropping and grazing displacement is considered insignificant under the Annexes 13 and 14 of the Executive Board's 51st meeting in December 2009.

Leakage from fuel wood collection exceeds 2% of total net GHG emissions, and will be accounted for with the use of formulas **(108)** – **(110)**. A community fuel wood collection programme was launched in 2010, the progress of which will be monitored on a yearly basis, with the use of temporary sample plots to assess biomass extraction from eligible compartments. The initial level of fuel-wood and charcoal extraction, which forms the leakage baseline, was assessed by an independent team of researchers in 2007. The details of the monitoring programme are described in the Fuel-wood Collection Manual.

Per the fuel wood collection programme's manual and related MPs, data will be collected at site during temporary sample plot measurements. Data from fieldwork will be sent to the Kampala and Johannesburg Head Offices for archival and analysis purposes.

E.5.2. Specify the procedures for the periodic review of implementation of activities and measures to minimize leakage, if required by the selected approved methodology:

A community fuel-wood collection programme was launched in 2010, with the creation of a management structure, a briefing to the Corporate Responsibility team to ensure local community awareness and the establishment of management prescriptions by which fuelwood gathering volumes will be assessed A community fuelwood collection manual was drafted with the input of the planning, forestry, CR and carbon departments. The Forestry and Planning departments confirmed from field-based observations that fuel-wood from thinned compartments was already being extracted by local community members. The first measurements of the amount extracted will take place in mid-2011 to allow for proper lead time and community uptake.

A 2007 leakage assessment provided the baseline information necessary to establish annual fuel-wood extraction trends. These figures will serve as the basis for establishing the amount of mitigated leakage. The programme accomplishes the following:

1. Establishes the management structure from which fuel wood collection activities will be allowed within the reserve
2. Allows as many community members as possible to access the programme
3. Effectively tracks and measure the amount of fuel wood collected within Namwasa, so as to present robust calculations to any carbon auditors and mitigate all leakage effects

NFC has developed Management Prescriptions to support the manual, ensuring sound implementation and data management quality control. The manual will be made available to the DOE at the time of validation. Any updates to the manual will be made available at consecutive verification audits.

E.6. Provide any additional quality control (QC) and quality assurance (QA) procedures undertaken for data monitored not included in section E.1.3:

Table E.6.0: ***Additional Quality Control Measures***

Data ***(Indicate ID number)***	Uncertainty level of data (High/Medium/Low)	**Explain QA/QC procedures planned for these data, or why such procedures are not necessary.**
PSP location	Low	Plots will be located using GPS units, with the centre point stored in a dedicated file. The use of a second team to follow-up on measurements will also help ensure accuracy of centre-point locations.
DBH	Low	A verification team will ensure, through random sampling that all DBH's taken in PSPs fall within a pre-determined range of acceptable error. The Management Prescription for Identifying and Measuring Permanent Sample Plots guides this practice, and relevant field-staff will be trained to it.
Wood Density	Low	Uganda-specific values derived from findings in the National Biomass Study, and to be compared with site-specific values developed for the company's pole treatment plant. Variations will be noted and changes made accordingly to calculations should they be significant.
BEF	Low	Any data that deviates significantly from IPCC default values will be analyze

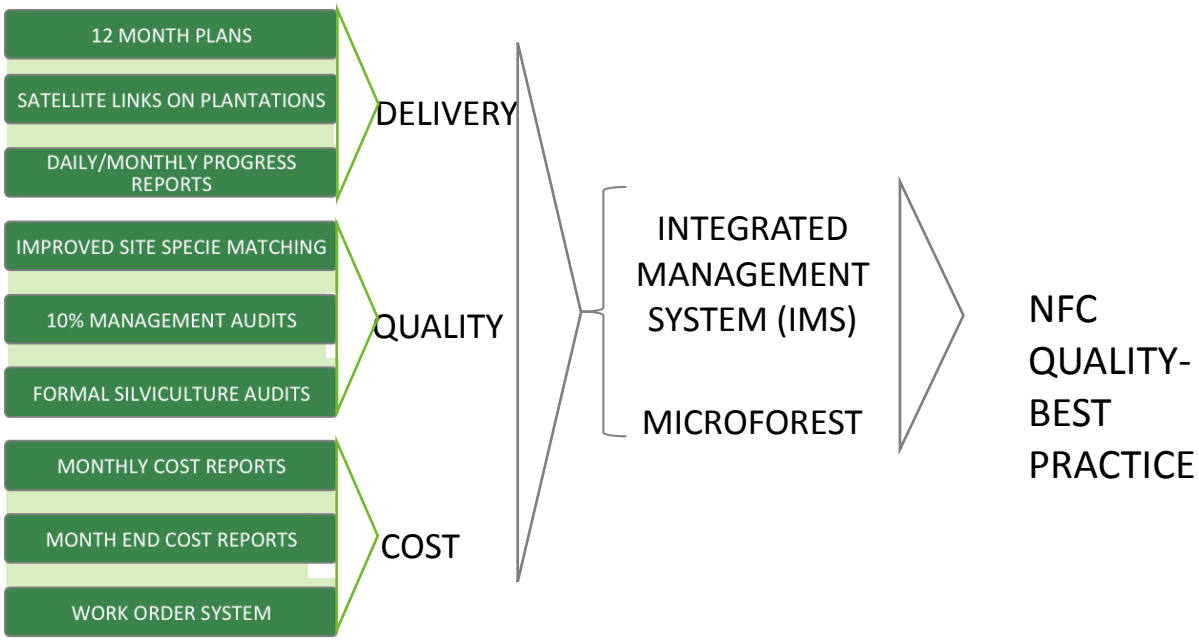
Carbon Fraction	Low	IPCC default value used
Root-shoot biomass ratio	Low	IPCC default values used, specific to climatic and ecological conditions in Namwasa
Volume of fuel wood collection	Low	Enumeration team to assess removals through the use of temporary sample plot measures in compartments subject to thinning or harvesting activities
Tree species planted	Low	Head of Forests 10% monthly audits randomly checks proper implementation of planting work orders

E.7. Please describe the operational and management structure(s) that the project proponents will implement in order to monitor actual net GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity:

Namwasa lands are solely licensed to The New Forests Company Ltd, and NFC will be responsible for project implementation along with NFCH, its holding company. NFC will use the following platforms to execute and manage its Namwasa Carbon Programme, as described in figure E.7.1:

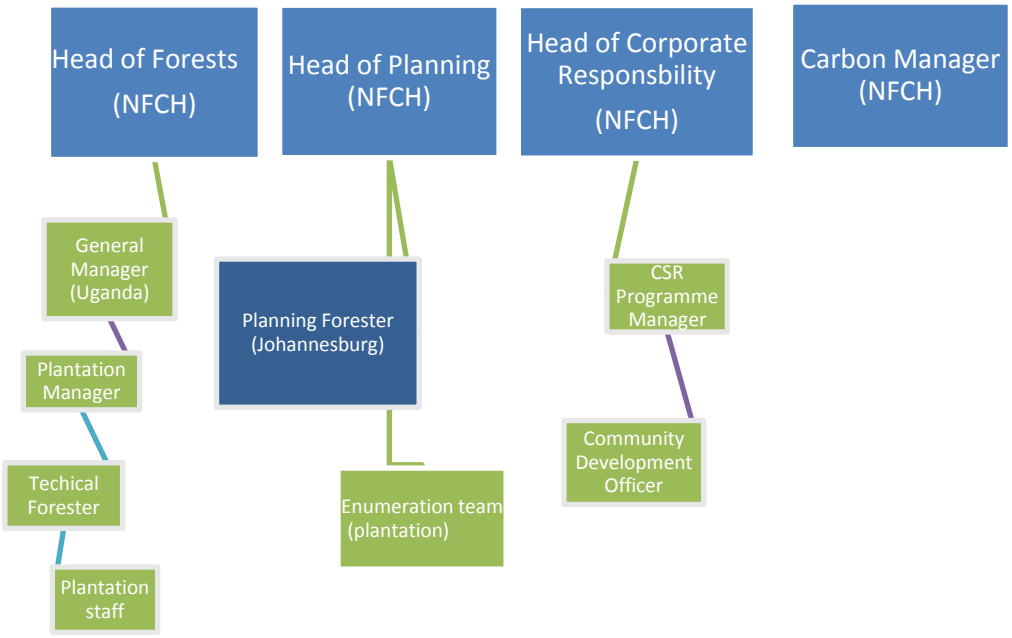
- The use of the Integrated Management System, through which pre-determined procedures – management prescriptions - will be followed for all measuring activities, data management and calculations associated with GHG removals, including sample-plot enumeration events to measure tree height and DBH to support the BEF analysis required in this methodology;
- Use of MicroForest data system to track compartment activity, site preparation, change in status of any *ex ante* strata due to any damages (crop failure, fire, pests, etc) and managed by the Planning Forester;
- Cross-department collaboration between forestry, corporate responsibility and carbon functions to ensure mitigation of fuel wood leakage effects and the regular monitoring of collection by local community members;
- Access to information developed through FSC management - biodiversity monitoring activities and best practices for environmental risk mitigation;
- Flow of information related to the regular monitoring and evaluation of social impacts as developed by the Corporate Responsibility department and captured in the team's monitoring and evaluation process.

Figure E.7.1.: ***Quality Control and Management at Namwasa***



The Johannesburg management team ensures the delivery of technical training and instruction on advanced forestry management to the staff under The New Forests Company Ltd – a Ugandan-based subsidiary - via the New Forests Company Holdings Ltd. A carbon file is maintained in Kampala, though critical information - GIS mapping data, MicroForest system, results of monitoring activities – is stored in the Johannesburg offices, under management of NFCH Ltd's Carbon Programme.

An organizational chart helps describe the hierarchy and reporting structure between the Johannesburg, Kampala and Plantation offices. Blocks in blue represent members of the New Forests Company Holdings Ltd (NFCH), and green blocks are individuals who work in Uganda's The New Forests Company Ltd.



Roles and responsibilities of departments are described below, as well as the various management prescriptions that various team members are responsible for helping implement

Technical Forestry: The Head of Forests, HoF (based in Johannesburg) oversees all nursery and silviculture operations and ensures the mitigation of fire and pest related risks. In addition, he ensures that the plantation remains certified by the Forest Stewardship Council. The Namwasa-based Plantation Manager reports weekly via the Uganda General Manager to the HoF, and is responsible for the day-to-day operations associated with seedling upkeep, site preparation, planting, weeding, thinning and harvesting and road maintenance The PM is supported by a team of technical foresters as well as contract labour who execute work orders as defined by the Planning Department.

Management Prescription Oversight and Implementation:

- *Identifying and Measuring Permanent Sample Plots MP:* The Technical Forester (TF) will be responsible for delivering training to the enumeration team, unless otherwise determined at the Group level by the Planning Department. The TF, as team leader, will ensure that permanent sample plot measures are taken – DBH and height – according to the MP, including the establishment of circular sample plots of 500 square meters each. The TF must ensure the proper notation of measurements, reviewing them at the end of each day for consistency with observed measures as well as for neat penmanship. Data sheets must be delivered to Johannesburg according to prescribed procedures.

- *Training for Sample Plot Measures:* Training for sample plot measurements will be assigned by the Planning Department to a member of the forestry team, likely either the Ugandan General Manager or the Technical Forester. Training should last approximately ½ day at site, and be done on prototype plots. The trainer will ensure that the team members are familiar with the *Identifying and Measuring Permanent Sample Plot MP*, are comfortable using all required equipment, are able to lay out plots, notably on slopes, and are able to take precise measurements to meet quality standards. The trainer will fill out the *Training Checklist*, which will record each participant's success and cross-check the review of all required elements. The trainer must ensure that the checklist, as well as his/her CV is delivered to the Johannesburg head offices for archival and control purposes.

- *Data Input and Archiving MP:* The Technical Forester (or other team leader as assigned by the Planning Department) will be responsible for ensuring that data is collected in an organized, consistent and legible manner upon completion of the permanent sample plot enumerations in advance of any verification event. Daily reviews of data sheets are required, and all original sheets must be delivered to the Kampala Head Office. Here, the General Manager will be responsible for ensuring that copies are made of the originals, the originals are properly filed in the carbon folder and that a second controlled copy is sent to the Johannesburg head offices for data entry purposes.

- *Reviewing Strata MP:* The Plantation Manager will be responsible for ensuring the delivery of reports to the headquarters which detail any destruction / damages at plantation that could be due to severe weather events, fire, pest infestation or any other occurrence that would affect the standing tree stock. Data sets may be collected on several different checklists, including the *Statistical Fire Report*, the *Crop Damage Report* and the *Damage Severity Field Sheet.*

Planning: The Planning Department is based in Johannesburg, and is run by the Head of Planning and supported by the Planning Forester. The Department is responsible for delivering soil assessments to help determine species mix and planting regimes, for creating buffer zones and roadways in respect of FSC principles, and ensuring the regular delivery of quality data on tree growth and survival rates across the plantation. The Planning Forester manages a field-based enumeration team, which makes regular measurements of DBH and height, assessing the growth and survival rates and overall health of trees in each compartment. Measurements are analyzed in-house by the Planning Department through its sophisticated Microforest software. From this the department can best gauge the types of interventions required at plantation, including the need for beating up, the extent of thinning, the timing of harvests and the construction of infrastructure (namely roadways) to support plantation activities.

The Plantation Manager and associated staff implement forest establishment activities according to schedules developed by the Head of Planning. All site preparation, weeding, planting, thinning and harvesting activities are captured in Work Orders. Work Orders are audited by the Ugandan General Manager on a monthly basis and cross-checked in the Johannesburg Office through invoicing and budget overviews. The system of cross-checking and audits ensures sound communication between Johannesburg management and field-based staff.

The Planning Department will play a crucial role in identifying randomly selected permanent sample plots from which key data variables (height, DBH) will be measured for carbon-specific purposes, as well as organizing enumeration teams and ensuring they are properly trained to related management prescriptions. The Planning Department will facilitate the analysis of data collected in temporary sample plots to assess fuelwood leakage mitigation efforts. Moreover, with reference to regular enumeration

events captured in Microforest, the planning department will be able to assess any yearly damages to compartments, and ensure that these are properly recorded in the GHG removals and emissions.

Management Prescription Oversight and Implementation:

- *Identifying and Measuring Permanent Sample Plots MP:* The Planning Forester (Johannesburg) will assign a trainer (likely the Technical Forester) to ensure correct application of the MP and offer operational support in organizing the enumeration team. (S)he will also help identify the location of random sample plots and deliver a map as well as a list of GPS centre points to plantation. The Planning Department will ensure the provision of all tools required for the exercise. Moreover, the department will ensure that a second follow-up team is organized to double-check the accuracy of results.

- *Training for Sample Plot Measures:* The Planning Department will assign a trainer, likely the Ugandan General Manager or the Technical Forester, to deliver the MP elements. The department will also be largely responsible for organizing the team to be trained, ensuring there are enough members to support a second team for a review of the sample plot measurement accuracy, and that required tools and maps are delivered or already available at plantation.

- *Reviewing Strata MP:* The Planning Forester will be responsible for making all amendments to strata with reference to information received from plantation. Changes will be made with reference to both the GIS platform and Microforest. Amendments will be made in this case of disturbances – mortality due to severe weather events, fire or pest infestation – and changes made to strata size, and where necessary, compartment (stand) IDs as required. The *Reviewing Strata Checklist* will be filled out by the department in collaboration with the Carbon Manager to ensure that all potential sources of change to the carbon compartments are captured and recorded.

Corporate Responsibility: The Head of Corporate Responsibility, based in Johannesburg, defines the type and scope of community development interventions in the villages surrounding Namwasa. Her/his work is supported by a Kampala-based Corporate Social Responsibility Programme Manager as well as a field-based Corporate Development Officer (CDO). The team works from a multi-year year plan, supported by a series of indicators maintained in a strategic log-frame and the adoption of a monitoring and evaluation (M&E) approach. M&E allows for a sound analysis of the quality and success of the community development work, and provides opportunities for the team to adjust interventions as needed.

The CDO is based at Namwasa, residing in one of the local villages. Whilst directly responsible for making sure that development programmes are being implemented, (s)he acts as a liaison between NFC and locals, and is the first point of contact for receiving any grievances, formalized through a grievance procedure. (S)he reports directly to both the HoCR and the CSR PM on a weekly basis. Additionally, the team maintains relationships with stakeholders, including local chairmen, district officials, ministries and the National Forestry Authority, facilitated through an annual meeting.

The CR team will work with the Carbon Manager to ensure that locals are aware of the opportunity to collect fuelwood within the reserve to mitigate leakage effects.

Carbon: The Carbon Manager, based in Johannesburg, collaborates across a variety of departments, ensuring the sound delivery of quality data from the planning, forestry and corporate responsibility functions. She is responsible for guaranteeing that Management Prescriptions (MPs) comply with methodological requirements and are properly adhered to in the field. Moreover, she ensures that key data

parameters are measured according to the monitoring plan, stipulates cross-checks for data entry and review, ensures steps are taken to mitigate fuelwood collection leakage, and manages relationships with the DNA, DOEs and prospective tCER buyers.

Management Prescription Oversight and Implementation:

- *Identifying and Measuring Permanent Sample Plots MP:* The Carbon Manager will be responsible for the overall implementation of the MP, coordinating the planning and forestry department's efforts and, as needed, travelling to plantation to oversee correct application of the prescription.

- *Data Input and Archiving MP:* The Carbon Manager will be responsible for receiving data sheets shipped from Kampala and inputting them into a permanent data base. (S)he will ensure that another individual at the office reviews the data for accuracy, running the checklist for data quality control and the data entry accuracy test.

- *Training for Sample Plot Measures:* The Carbon Manager is responsible for the overall implementation of the MP, and may travel to plantation to ensure proper delivery of its elements. (S)he will be responsible for receiving all relevant documents in the Johannesburg headquarters and archiving the training checklist to standard.

- *Reviewing Strata MP:* The Carbon Manager will work with the Planning Department to ensure the overall implementation of this MP, especially in regards to scheduling the annual review.

- *Verification Review MP:* The Carbon Manager will appoint a team member to perform the review, which will require an analysis of elements listed in table G *Quality control activities and procedures* of the methodology. A checklist will be filled out by the appointed individual and stored for DOE review.

Other Senior Management: The Namwasa operations are supported by a talented senior management team in Kampala: the CEO, General Manager and finance team. Moreover, the Group Head of HR, the Group CEO and the Group CFO (and finance team), all based in Johannesburg advise on the development of Namwasa.

SECTION F. Environmental impacts of the proposed A/R CDM project activity:

F.1. Documentation on the analysis of the environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary of the proposed A/R CDM project activity:

Legal Parameters:

In 1997 the National Environmental Management Authority (NEMA) published guidelines for EIAs, which, under Ugandan law, should be undertaken for any large-scale development project prior to implementation. Under the terms and conditions of the NFA license to NFC for timber operations, NFC performed an EIA in advance of initiating any project activities in Namwasa.

In addition to the EIA, NFC also commissioned a baseline ecological study in 2008: *Baseline ecological and socio-cultural survey for Namwasa Forest Plantation Project.* This was followed up in 2010 by a *Namwasa Biodiversity Survey Report*, drafted by experts at Makerere University.

The results of the Namwasa EIA were accepted and approved by the National Environmental Management Authority on the 28th of October, 2005 under certificate number 984. Access to the EIA and approval documents will be granted to the DOE.

Summary of EIA:

Forestry makes positive contributions to Uganda, boosting the gross domestic product, creating employment and providing critical natural resources to a consumer base highly dependent on forest products such as fuel-wood, charcoal, craft and construction materials and medicines. Natural forests attract tourists and provide critical eco-system services.

Given the rural location of the CFR, new road infrastructure needs to be built, which can accommodate a higher flow of traffic. Class (A) and Class (B) roads will suffice until harvesting begins, at which point Class (C) roads will be introduced as well. Table F.1.1 describes road class specifications.

Table F.1.1. ***Road Classification Specifications***

	Class A	Class B	Class C
Loaded travel speed (km/h)	30	25	15
Empty travel speed (km/h)	45	35	20
Road width (m)	7	5	4
Gravel width (m)	4	3	-
Gravel depth (cm)	15	10	-
Sight distance on curves (m)	50	35	20
Maximum downhill grade (degrees)	5	5	7
Maximum uphill grade (degrees)	4	4.5	7

The reserve is located in Mubende District and stretches across the sub-counties of Buwekula, Bukuya and Kassanda. NFC will establish a plantation forestry operation managed for sustainable yields. It will produce the materials for sawn timber. The company has committed to preserving existing pockets of indigenous forest for biodiversity conservation and rehabilitation.

The reserve falls under the ownership of the Government of Uganda; the government has awarded management rights to the National Forestry Authority. The area was classified as a reserve in 1963 by the Kabaka's Government. In 1968, the Kabaka's government transferred the rights to the reserve to the Central Government by Statutory Instrument no 176. NFC holds a 50-year license from the NFA.

Community members back the project. They see opportunities for long-term employment. They are eager to see the protection of water resources through assisted natural regeneration projects in the valleys housing critical water catchments.

The EIA proposed that the following negative impacts could be realized over the lifetime of the project if no pro-active mitigation measures were taken:

- □ water pollution through site clearance, harvesting or use of agro-chemicals
- □ soil erosion from planting operations or road construction
- □ fires
- □ pest and disease infestation
- □ waste build-up
- □ noise pollution from the use of heavy vehicles and machinery
- □ dust from moving vehicles
- □ vehicle accidents
- □ mishandling of chemicals leading to potential health threats to workers
- □ disposal of hazardous waste and management of liquids

The chart below highlights the broad categories of potential negative impacts outlined in the EIA, with a more detailed discussion of specific impacts to monitor:

Action/Activity
WATER POLLUTION and DRAINAGE: Agro-chemicals could leach into ground water with net-negative impacts if glyphosate isn't applied, forestry operations could impact on water quality.
Ensure that a protection zone of 50m is left between the area to be planted and water courses.
Ensure oil from heavy machinery is not allowed to drain into water courses
Ensure rehabilitation of borrow pits used to build roads, following natural land contours to allow for proper water drainage.
SOIL EROSION: Exposed topsoil from site preparation and road construction could lead to incidence of soil erosion.
Avoid building roads along contours and steep slopes. Rely on pitting for planting seedlings to avoid exposing topsoils to agents of erosion.
Ensure that proper drainage system to handle storm water run-offs is put in place so that soil/land erosion and deposition of materials originating from the road construction and in areas to be planted is controlled.
BIODIVERSITY IMPACTS: Forestry activities could impact standing forest and water catchments areas.
Ensure that roads are placed in a way to minimize felling of trees.
Conserve riverine vegetation in its natural state. Allow vegetation on rock areas to thrive. Protect forest pockets so as to provide non-timber forest products to community members.
NOISE POLLUTION: Use of heavy machinery during harvesting operations can negatively impact local community members
Ensure that the levels of noise generated from the various activities at the site comply with the National Environment (Noise Standards and Control) Regulations 2003.
WORKER SAFETY: The poor executive of forestry practices can threaten worker safety
Ensure that the workers are adequately protected from exposure to excessive dust, agrochemicals and noise, or injury through provision of appropriate gear including earmuffs, masks, safety boots, and safety helmets.

Ensure that the speed of the traffic transporting the construction material is regulated and appropriate road signage installed at various road junctions and access road leading to and from the project site, in order to minimize accidents.
Ensure training of staff in handling of equipment and safety procedures.
SOCIAL IMPACTS: Care should be taken to ensure that locals' concerns about environmental impacts be taken into consideration and that community members are made aware of plantation activities.
Create awareness among community members about the project
Ensure that interference and inconvenience to any community in the neighbourhood is avoided, and that the concerns of any such community regarding the operations of the forest plantation, are addressed frequently and in consultation with the local leadership.
FIRE and OTHER NATURAL HAZARDS: Fires started by community member's bush-clearing activities could threaten forest assets. Disease could strike and damage tree stands.
Ensure provision of adequate fire fighting equipment at the project site
Ensure strict hygiene in nurseries and ensure healthy plant material is imported or sourced within Ugandan boundaries.
WASTE HANDLING: Solid waste – packaging, plastic string, oil filters, organic waste – will be generated. Liquid waste in the form of oil will be produced.
Ensure separation of waste into bio-degradable and non-biodegradable waste
Ensure fuel and oil is stored in a banded area, on impervious floor and connected to an oil interceptor
Ensure disposal of hazardous waste by a licensed contractor

Environmental Contributions:
A 2009 audit to the FSC standard led by SGS[104] and available to the public confirmed the following concerning NFC's environmental contributions:

- **Conservation**

Some 24% of the FMU is not afforested with commercial spp and consist largely of natural forests, riverine wetlands and other herbaceous and grass communities. These areas are protected and are managed for conservation purposes. They are representative of the original vegetation, in so much as the remaining natural areas on the FMU do represent the original composition of the vegetation communities.

- **Buffers and Natural Corridors**

Natural corridors and buffers along water courses are indicated on maps and are in place in-field with at least the legally required 50 m left open between such water courses and any compartment. A process of identifying areas not suitable for afforestation has been carried out on most parts of the plantations and is on-going. New road construction is a major environmental impact...EIAs are compiled for all new roads, new gravel pits, quarries or sandpits – or where a major expansion of an existing site is planned. Detailed prescriptions are in place and adhered to when building new roads to ensure minimum environmental damage during construction and that good road drainage is put in place for erosion control. An internal Corrective Action System for identifying, recording and monitoring progress with actions taken to address negative environmental impacts is in place. This system ensures that problem areas are

[104] SGS Qualifor, *Forest Management Certification Report: Project Number 2405-UG.* 22nd January, 2009.

recorded as part of normal operational practice and formally logged. This system is in practical use by foresters

- **High Conservation Values**

An assessment of High Conservation Values was undertaken by the company, using environmental consultant advice - both national and regional. A detailed document is available on the procedures that were followed to identify the High Conservation Value Forest on the FMU. The baseline surveys were conducted by a team of specialists that included a recognised EIA specialist (accredited with NEMA and holds an MSc in environmental and resource assessment), vegetation ecologist, sociologist, vertebrate ecologist and ornithologist. These baseline studies were evaluated by a regional experienced environmental consultant to determine compliance with the HCVF requirements.

Baseline Ecological Survey

The Baseline Ecological (2007) survey adopted a methodology by which 200 meter transects were established in each of the forest blocks, near roadsides for ease of access. For the fauna analysis, the expert made direct observations and also sought out identifying footprints or tracks, and scat. Seventeen types of mammals were detected. Opportunistic observations and the Timed Species Count approach were used to identify bird species. A total of 99 species were identified.

The baseline floral survey was conducted by establishing six transects across hill tops, valleys and areas that were already covered by pine stands. Woody species were identified within the boundaries of 10 x 10 quadrants, and non-woody species captured in 5 x 5m quadrants. In the event that species were observed outside of quadrants, these were opportunistically recorded so as to ensure the integrity of the final list. The DAFOR scale was adopted to measure the relative abundance of species (D=Dominant, A=Abundant, F=Frequent, O=Occasional and R=Rare). Any species that could not be identified in-field were brought back to Makerere University for further analysis. The researcher identified 170 species belonging to 70 families. The commonest families were Asteraceae and Poaceae with 20 species each, followed by Euphorbiaceae and Fabaceae with 14 species.

The survey confirmed that forest pockets in valleys and on ridges serves as corridors through which animals can pass while foraging for food. NFC's operations will also help halt illegal hunting and reduce the pressures on natural habitats.

Starting in 2010, NFC adopted a regular biodiversity monitoring system with the assistance of experts at Makarere University. Key management practices to implement have been established, and may encompass the following:

1. **Permanent Sample Plots:** PSPs will be established across an array of forest and woodland types, so as to track the regeneration potential and progress of protected areas. Data will be collected on the presence of invasive weeds and other species, on the type and density of indigenous vegetation, and canopy structure. The PSPs will be measured every three years through 2016, so as to establish trends in vegetation health and regeneration.

2. **Monitoring Recovery:** Highly disturbed areas will be identified, with the aim of understanding how to support a swift recovery to a more regularized ecological state. Through a literature review, several assisted natural regeneration techniques will be adopted and tested in the field. The progress of the interventions will be tracked: diameter and height of trees, canopy recovery, presence of invasive

species, etc. From these interventions, a comprehensive management plan tailored to the particular needs of the forest and woodlands patches will be drafted and adopted at a plantation level.

Impacts outside of the Project Zone:

Outside of the project zone, NFC's support of the outgrowers scheme provides the technical support and oversight required to ensure that locals have the opportunity to decrease their pressures on the environment by raising their own fuel-wood sources on degraded lands. The extension of services spearheads environmental education and the uptake of more sound land management practices. NFC's Corporate Responsibility programme provides regular monitoring updates on the progress and impact of the outgrowers scheme. Care is taken to adopt FSC principles in outgrower's activities.

NFC does not expect to generate any net-negative impacts outside of the project zone. The company's Corporate Responsibility staff holds annual meetings with district officials, during which concerns about forest management and any potential impacts on surrounding communities can be voiced and addressed. Moreover, locals maintain close contact with the plantation based Community Development Officer, to whom they can address concerns. In turn, these are brought to the attention to the Head of Corporate Responsibility, who can decide to either integrate concerns into the on-going multi-year strategic plan, or, depending on the severity of the issue raised, pursue immediate action to mitigate impacts. This regular information sharing allows NFC to keep close tabs on the way in which its operations affect the local environment and those that inhabit it.

F.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken an environmental impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation:

NFC commissioned an EIA, the results of which are available in the document *Project Brief for Namwasa Forest Plantation, Mubende District Uganda – August 2005*. The most significant potential environmental impact is the spread of uncontrolled wildfire. To mitigate this, NFC has adopted a comprehensive fire strategy. Details of the strategy are available in NFC's *Fire Protection Plan.* All related fire-monitoring activities are captured in the *NFC Fire Report Policy* and *NFC Fire Report Template*.

Whilst the expert running the EIA did not identify other significant impacts, NFC has nonetheless adopted a series of mitigation measures, as described in Table F.3.1 below. The bulk of these mitigation and management activities are described in detail in the *NFC Silviculture Manual 2009* or in the document stream housed in the company's Integrated Management System.

F.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section F.2. above:

TABLE F.3.1: ***Environmental Impacts and Associated Mitigation Measures***

CATEGORY	**NFC ACTIVITY**
Water Pollution	To avoid pollution of wetlands and pristine water sources, NFC has applied FSC principles (6) and (10). All critical wetland and water sources have been identified and buffer zones created around them extending a minimum of 50 meters. The coordinates and locations of these have been marked and are housed in the GIS system.

Soil Erosion	In collaboration with the planning department, the Plantation Manager identifies the location of roads, with particular attention given to contours so as to avoid sloping areas that could exacerbate soil erosion.
Conservation	Roads are not constructed in areas of high conservation value, where indigenous trees thrive.
Conservation	In 2010, NFC committed to implementing a regular biodiversity monitoring programme in order to observe the natural regeneration patterns of its 410 hectares of high conservation zone areas. This will be accomplished through the random selection of permanent sample plots, for which regular measures will be taken on flora and fauna density, diversity and growth over time. An outside expert from the University of Makerere led the first phase of the programme in October 2010, with support from forestry students through a learning programme financed by NFC.
Water Protection	Policies are in development for the establishment and use of borrow pits – to be performed just prior to when harvesting takes place in 2013.
Waste Management	In compliance with FSC, NFC ensures the proper placement and control of its oil tanks.
Noise Pollution	Policies are in development and will be ready for release in 2013 when the use of heavy machinery and trucks will be necessary for all harvesting activities.
Chemical use	As detailed in the EIA, safety equipment is not required and water sources will not be adversely affected if NFC adopts the use of glyphosate. Glyphosate is the only chemical used on plantation.
Harvesting	Once harvesting operations begin, signs will be erected, both to facilitate the safe flow of traffic and to indicate harvesting protocols to field-staff members.
Community Impacts	NFC's Corporate Responsibility Programme hosts regular stakeholder meetings in surrounding communities and has implemented numerous social and livelihood support programmes in the villages surrounding the plantation.
Water Protection / Soil Erosion	NFC is compliant with FSC criteria related to storm water run-off and soil erosion. In the coming year, it will also implement a map tracking system whereby any soil erosion observations will be pinpointed and action taken to mitigate them adopted.
Community Impacts	NFC's Corporate Responsibility programme holds regular consultations with local stakeholders and relevant leaders.
Harvesting	NFC has adopted and monitors the application of safety procedures for each silviculture operation. As it moves into the harvesting cycle, new procedures will be adopted to encompass all related activities, notably for the handle and use of heavy-machinery and chainsaws.
Waste Management	NFC is compliant with the FSC criteria related to the proper separation and disposal of bio-degradable and non-biodegradable waste products.
Waste Management	NFC is compliant with the FSC criteria related to the proper disposal by hazardous waste by a licensed contractor. A registered waste transportation and disposal company, identified by the National Environmental Management Authority (NEMA) is contracted to collect

	all hazardous materials.
Fire	NFC's Fire Protection Plan covers all aspects of fire prevention, including the assurance of necessary fire-fighting equipment and protective gear on site, placed in convenient locations, along with radio transmitters to facilitate rapid reporting of any fire outbreaks. Fire breaks have been created across the plantation and prescriptions given for their regular upkeep; their location is marked with GPS coordinates and stored in the MicroForest database. A select number of team members are trained to put out fires and provision plans have been made for managing different intensities and scopes of fires.
Pests and Diseases	Team members are trained in the identification of diseases and pests. When tending to their everyday forestry responsibilities, field-staff also check for any sign of infestation, which is reported to the Plantation Manager for immediate attention.

SECTION G. Socio-economic impacts of the proposed A/R CDM project activity

G.1. Documentation on the analysis of the major socio-economic impacts, including impacts outside the project boundary of the proposed A/R CDM project activity:

In January of 2009, an outside expert performed an ecological and socio-cultural analysis of Namwasa. The report indicated that community members had identified important and positive socio-economic impacts delivered by NFC's plantation operations. These included income generating activities, improved infrastructure, schools and seedling distribution.

New Forests Company collaborates closely with the communities surrounding Namwasa, partnering to discuss local challenges and impediments to meaningful development, investigate the viability and appropriateness of projects and identify long-term development needs of the communities. NFC invests in programmes that can become self-sustaining over time, ensuring initial buy-in of communities, on-going community contribution to projects and ultimate local ownership of projects. A Community Development Officer, who works at plantation and lives in one of the surrounding villages, works directly with locals.

Net-Positive Project Contributions

Income Generation: Income generation includes the creation of jobs at site, both in forest establishment activities and nursery management. Labour is recruited at all levels of technical expertise. Depending on the season, NFC will employ upwards of 800 workers. While the majority of field-workers are men, efforts are made to hire women as well. They typically work in the plantation's nursery and throughout the pitting and planting phase.

NFC also focuses on diversifying and building the local economy through the support of new income generating activities. In September 2006, NFC began a free seedling giveaway programme, with an initial distribution of 35,000 seedlings. The amount has increased since 2006, to reach 45,000 and within the context of the more formalized out growers scheme supported by regular technical trainings and interventions. In addition, locals are guaranteed a market with NFC for trees that reach term and quality standards.

In the second quarter of 2010, NFC also launched an apiculture programme at Namwasa. Managed by a field-based Apiculture Officer (AO) reporting to the Corporate Social Responsibility Programme Manager, the programme seeks to enlist interested locals to form associations and market their honey. The AO will organise between 7 and 10 groups comprised of upwards of 20 individuals. Following training on apiculture techniques and small business development, each group will be assisted in drafting a short business plan and budgets; they will be linked up to a suitable microfinance organization to access start-up funds. NFC will partially subsidize the cost of safety equipment, and will be instrumental in sourcing apiculture materials. The AO will regularly visit the groups to lend technical support and feedback, demonstrate harvesting techniques and help identify suitable markets.

2. **Improved Health Infrastructure:** Health initiatives around Namwasa began with the construction of boreholes, shallow water wells and water harvesting tanks. Access to potable water has helped reduce the risk of waterborne illness in communities surrounding Namwasa. NFC supports regular water quality testing.

Each year, NFC runs health fairs at each plantation, in collaboration with the United States Agency for International Development (USAID) funded Health Initiatives for the Private Sector. Local labourers are trained in HIV/AIDs, malaria and tuberculosis TB detection, and are given guidance on how to transmit their knowledge to their fellow community members.

Expanding upon its commitment to healthcare interventions, NFC launched the construction of a local clinic in 2010, to be accessed by the more than 500 seasonal fieldworkers at Namwasa. Providing anti-malaria, first aid, HIV-related and common General Practice healthcare services, the clinic will be equipped to open its doors to local residents in 2010.

3. **Education:** To-date, NFC has constructed five double classroom blocks in the villages surrounding Namwasa, providing educational opportunities to over 3,400 students and dramatically improving educational infrastructure around Namwasa. In operation since January 2008, Forest High School provides rural students access to computer training, practical science lessons via the Science Laboratory and space to concentrate on educational success in a state of the art library. 230 students are currently enrolled at the school. NFC has donated 150 school desks and 3 duplicating machines to help score tests.

In addition, NFC has funded the distribution of the "learning paper" throughout schools surrounding Namwasa. The paper is a substitute for expensive and scarce workbooks and textbooks.

4. **Preservation of cultural relics:** The 2009 socio-cultural review, undertaken as part of the FSC certification process, identified an important cultural site within the reserve's boundaries. The relic is protected by NFC. The site, located in Kawrwana sub-county, and referred to as "Mujinja" (the rock), is believed to be the home of Buganda's sacred spirits. The large boulder is considered the origin of all life, peace, riches, wisdom, luck, prosperity and language. The FSC 2009 audit report published by SGS confirms that the sacred site may be readily accessed by any interested peoples.

5. **Road Infrastructure:** To ensure more ready access to the plantation holdings, NFC has developed and improved upon existing road infrastructure, in excess of 200 kilometres. This has helped build up local markets. Local *boda-boda* (motorcycle) drivers have also reported an increase in revenue through a more regular influx of individuals to village centres.

Monitoring and Evaluation:

To best evaluate the short term outcomes and long term on-going impacts of its community work, and to effectively tailor its programmes to meet the needs of its neighbours, NFC has committed to launching a programme of regular monitoring and evaluation. The Corporate Responsibility Department - managed in Johannesburg with field reports delivered by the Ugandan-based Corporate Responsibility Manager and Community Development Officer - has devised a series of indicators by which to track the progress of community interventions. These are captured in the "NFC Logical Framework Results Chain" The indicators cover health, education, income generation, and community empowerment. These will be made available to the DOE. NFC's annual sustainability report, adhering to the Global Reporting Initiative's requirements will also be made available for any validation and verification audits.

G.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken a socio-economic impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to supporting documentation:

Negative impacts of NFC interventions have been identified, primarily through engagement processes at the local level with communities and at the regional level with government stakeholders. These are described in Section H.2, as they pertain primarily to NFC's corporate responsibility approach that relies on information gathering through regular meetings.

G.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section G.2 above:

Monitoring and remedial measures are captured in the company's "NFC Logical Framework Results Chain" and maintained in the Corporate Responsibility Database.

SECTION H. Stakeholders' comments

H.1. Brief description of how comments by local stakeholders have been invited and compiled:

Collection of information, opinions, perspectives and comments by local stakeholders began when NFC first started operations in Namwasa. This remains an ongoing process, and is an essential component to plantation management. NFC considers regular communication with its local stakeholders to be a key success factor in the long-term viability of the project. There are numerous instances in which various critical risks were mitigated through early detection of issues. NFC is quick to respond to issues raised by local communities, allowing the company to effectively address issues before they escalate. Because of the importance of sustaining pro-active communication and building strong relationships with our local stakeholders, NFC developed numerous formal and informal avenues to collect local perspectives. These avenues are described in detail below.

NFC's stakeholder identification is comprised of two overarching goals. One is to identify individuals and institutions which can help mitigate the risks associated with plantation forestry in Africa. This, for example, would include identifying local leaders who can help mobilize locals to learn about fire prevention, grazing and illegal settlement. Secondly, NFC identifies stakeholders who can help it achieve its community engagement objectives. Identification of stakeholders is an ongoing process, informed by

the evolving relationships with community members, politicians, institutions and local civic leaders. The "Interested and Affected Parties List", included as an attachment to the PDD, lists those individuals and institutional relationships critical for NFC to mitigate risk and contribute to community development. Key to this list is identifying stakeholders who can represent the communities neighbouring Namwasa, villages affected by and who in turn impact the plantation's activities.

The NFC CR Department holds as one of its tenants of community development to respect and uplift existing methods of recognizing and identifying local leadership. For example, the local committee chair people are nominated, voted on and selected by their communities, and thus are responsible for representing the will of local community members. Additionally, civic leaders and local economic leaders are directly involved in community development projects and offer valuable feedback into planning and in reflecting on the success of past projects in the area. For this reason, they are included as stakeholders, key in communicating community concerns and requests to NFC staff.

NFC's key interventions touch upon education, livelihood enhancement and health. For this reason, local civic leaders, elected officials, local business leaders, schools and health professionals are identified as stakeholders who can help orient the company's interventions, ensuring the high quality and suitability of its approach. Moreover, NFC has observed the many ways in which households, communities and countries are driven by the efforts and ingenuity of women, particularly in Africa. It behoves NFC to encourage female participation in planning and project efforts, as women and children are most directly affected by its development portfolio.

Introduction of the company to local communities: In 2006, and in advance of conducting an early stage PRA, the Community Development Officer (CDO), carried out meetings in all the communities surrounding the plantation, introducing them to NFC, the company's planting plans and its CSR programme. During this process, NFC gathered initial feedback, and allowed the villages to nominate 4 village residents to participate in the PRA.

Participatory Rural Appraisal: Following up on the community introduction, the CDO collected the participants from all participating villages and ran a week-long training in community mobilization, meeting management, interviewing, and other relevant skills necessary for the villagers to carry out a PRA. After the week-long training, individuals returned to their villages to collect all the information necessary, for a duration of six weeks. Upon completion of the exercises, they met with the CDO and passed on all the relevant information and comments.

Rapid Rural Appraisal: When NFC formally developed the post of Corporate Responsibility Manager in 2008, she performed an RRA in the communities surrounding Namwasa to better acquaint herself with local development priorities and to gather feedback on existing NFC interventions. The RRA was carried out in 7 parishes surrounding Namwasa. During the exercises, community members requested that NFC focus on education, health, income generation and water quality interventions.

Socio-Economic-Cultural Survey: The company sought an external view of local context and community dynamics so as to enhance its perspective on the impact and quality of its interventions. In 2008, the external consultant carried out a socio-economic-cultural survey to further advise the company on local perspectives, sensitivities, and opinions.

Regular Engagement of National Stakeholders: The company manages regular meetings and communication with National Stakeholders in the project, including, but not limited to:

- □ National Forestry Authority
- □ Minister of State for Environment
- □ Area Members of Parliament
- □ Uganda Investment Authority
- □ Uganda Timber Growers' Association
- □ Sawlog Production Grant Scheme
- □ Presidential Investors' Round Table

Bi-annual district meetings: The company carries out bi-annual meetings with the Mubende District Leadership to ensure updates on the company's issues and progress; during these meeting, NFC's CSR team seeks out District leaders' opinions, thoughts, and general feedback about the company. Participants include, but are not limited to:

- □ Resident District Commissioner (Presidential Appointee at District level)
- □ Local Council Five, Chairperson (Political Head of the District) and Council members
- □ District Internal Security Officer
- □ District Natural Resources/Environment Officer
- □ District Police Commander
- □ Sector Manager, National Forestry Authority
- □ District Health Officer
- □ District Education Officer
- □ District Water Officer

Regular meetings/communication with Sub-County Administration and LC1s: The CDO remains in regular communication with the Sub-County administrations for all sub-counties that surround Namwasa. NFC involves them in planning, implementing and maintaining community development projects and engages them on operational progress and challenges. Individuals include, but are not limited to:

- □ Sub-County Chiefs (administrative head of the sub-county)
- □ Local Council Three, Chairperson (political head of the sub-county) and Council members
- □ Sub-County Community Development Officers
- □ Gombolola Internal Security Officers
- □ Sub-County Environment/Natural Resources Officers
- □ National Forestry Authority Supervisor for Namwasa

Regular community meetings: The CDOs hosts regular community meetings in surrounding village whenever a new area is being established or any specific issue arises from a particular community. This is an ideal opportunity for any local residents to voice their opinions and concerns about the company in a public venue.

Official Complaints and Disputes Resolution Procedure: As part of its FSC commitments, NFC has adopted an official complaints and disputes resolution procedure. Issues that arise are recorded in a complaints and disputes register, with associated risks also noted. The procedure can be reviewed in Annex 5. A hardcopy of the register is maintained in the plantation offices.

Daily interactions with community members: At Namwasa, NFC employs a Community Development Officer to communicate with community members and leaders, carry out community development

projects, and support operations in all areas relevant to local stakeholders. He/she continuously receives feedback from the communities and other stakeholders. All relevant issues are shared with both the Corporate Responsibility Programme Manager and Plantation Manager, including recommendations on how to resolve any issues.

H.2. Summary of the comments received:

Through the above channels and methodologies, the following feedback has been collected at neighbouring and district/national levels.

Positive Feedback from Neighbouring Stakeholders:

Locals have expressed gratitude and appreciation for the following NFC development interventions:

Local job opportunities created: Most of the stakeholders around Namwasa are extremely appreciative of the job opportunities created locally. While the surrounding communities may not always seek wage labour over subsistence farming, local residents are appreciative of the opportunity to earn additional income levels. Opportunities exist for direct employment with the company, and also through spin-off job creation established in cluster industries that have grown due to increased local purchasing power.

Community projects: Notably, locals have recognized the importance of the upgrading and/or construction of five double classroom blocks in primary schools, the construction of New Hope Day Care Centre for orphans and vulnerable children and the establishment of and continued investment in Forest High School.

Water Projects: NFC has invested in four shallow wells surrounding the plantation, as accessing clean drinking water is a challenge in these communities.

Road Maintenance and Construction: NFC has built a road network through the plantation which locals have access to. The company has also maintained and upgraded community roads, enabling locals to access markets more easily - a strong priority amongst the communities.

Seedling Giveaway: The communities are also very appreciative of the seedling giveaway programme which they feel is an opportunity to enhance their income in the future, secure their source of firewood locally, and assist in restoring the natural environment.

Labour accommodation blocks: NFC has built labour accommodation for its workers, which adhere to FSC stipulations, and which offer a safe and comfortable residence for employees.

Negative feedback from Neighbouring Stakeholders:

Crop Land Competition: Historically, community members used part of the Central Forest Reserve for cultivation, albeit illegally. Community members express regret when new areas of the CFR are prepared for planting, as it impacts their land access.

Grazing Land Competition: Once an area is bush cleared for NFC's operations, it becomes prime land for cattle grazing. Occasionally cattle grazers express discontent that they are not allowed to use the reserve to feed their livestock.

Payment Issues: Although NFC strictly complies with the labour principles dictated by FSC, some of the labourers also complain about delayed payments and have requested salary increases.

Request for Improved Health Services for Labour: Some plantation labourers have voiced concern that they do not have adequate health services available to them. The local facilities are extremely poor quality and the district hospital is 40 kms away, and thus not accessible.

More Labour Accommodation: Final labour quarters will be completed in 2011 to ensure that all employees can be housed.

Security Guards are Extorting Money: The surrounding communities sometimes report that the Askar Security Guards contracted by the company extort money from them.

Security Risks of Labour from Elsewhere: Some community members worry that the labour brought in from other districts to work for the company could be a security risk for local communities.

Community Projects are Concentrated on One Side of the Reserve: Some communities have noted that the majority of the community projects to date are located on one side of the reserve and the other side has been neglected.

Positive Feedback from District/National Stakeholders:

Rural job opportunities created: This is a key area of priority of the government and all stakeholders are appreciative of the 600 rural, unskilled jobs that the plantation creates for both men and women.

Community projects: The community development projects are popular among district and national stakeholders, as they assist the government in achieving their development goals and gaining the support of the communities. The education projects, water projects, roads and seedling giveaway were all highlighted as successes in their view.

Volunteerism in Community Development Projects: the District Education Officer in Mubende pointed out that the most significant impact of the Namwasa project in her view is instilling the value of volunteerism. During a speech, she noted that the greatest impact of NFC's work is the company's model which engages locals to personally contribute to community development projects.

NFC's investment model: the Uganda Investment Authority (UIA) recognized NFC with the Silver Investor of the Year Award in 2007 in appreciation of NFC's CSR oriented investment model. UIA continues to compliment NFC's intervention as one of the most sustainable investments in Uganda. They, and other government officials and stakeholders, have applauded NFC's integration of CSR as a strategic focus of company operations and a key to its business model.

Scale and scope of NFC's planting capacity and quality: The NFA and other stakeholders regularly recognize NFC as the largest private tree planter in Uganda which has continuously met its planting targets and continues to deliver on its plantation management and business plans.

NFC's positive impact on the environment: All stakeholders at a district or national level understand the importance of reforesting Namwasa, as it has traditionally been the watershed of the entire district, though now it is almost entirely deforested. They all comment regularly on the importance of reforesting it for environmental protection and the sustainability of the local communities in the area. They also appreciate the positive impact of providing training to local communities to plant their own trees for income generation and environmental enrichment.

Decreased National Security and Environmental Risks of Illegal Settlers: Because the government sought to support NFC's important environmental and social interventions in Namwasa CR, the government facilitated a dialogue process with the illegal settlement communities to encourage them to voluntarily vacate the area. The Ministry of Water and Environment is appreciative of this because of the positive environmental risk this will have, preventing the continued deforestation of the area by illegal settlers. The Internal Security Organization and all district officials responsible for security in the district are also appreciative of the decreased national security risk posed by illegal activities in the reserve.

Negative Feedback from District/National Stakeholders:

Land Competition: Most of the district and national stakeholders are concerned about the land competition in the surrounding communities when they are no longer able to illegally use the forest reserve for cultivating.

Request for Pay Increases: Most of the district and national stakeholders also request for pay increases on a regular basis.

Requests to Scale up Community Development Programmes: While they are appreciative of our interventions, government officials ask that more projects be introduced, especially those of political importance to them.

Security Risks of Moving Labour: The District Internal Security Officers sometimes express concern over moving outside labour into their districts.

Political and socio-economic implications of voluntary vacation of land and land competition generally: While all district and national stakeholders understand the laws and constitution of Uganda as well as the positive benefits of the voluntary vacation, some also worry about the socio-economic and political ramifications of the voluntary vacation process.

H.3. Report on how due account was taken of any comments received:

Critical review of positive and negative feedback is important for identifying the scope of the CSR programme. It guides the design of interventions that ensure buy-in from local, district and national stakeholders and which generate substantial social and political capital. NFC has continuously had strong support from local, district and national level politicians. Politicians cite the numerous benefits detailed as reason for which they stand behind NFC's operations.

The social capital among NFC's local communities has been extremely helpful, both in mitigating serious risks, such as fire – there have been zero arson attempts on the plantation to date - as well as in providing general support to the company's operations including, but not limited to whistle-blowing on fraud or theft of plantation assets, assistance in fire fighting, and provision of labour.

The negative impact perceptions are also extremely important for NFC to track and mitigate. Below are some of the measures NFC has implemented to address negative impacts:

Land Competition for Grazing and Intercropping: In order to mitigate these impacts, NFC has tried numerous interventions on all of its plantations including a pilot of intercropping and of grazing in the plantation. Unfortunately, both of them negatively impacted the newly planted trees, so after numerous

warnings, both programmes had to close. In order to mitigate the impact on the household incomes due to land competition, NFC has scaled up its seedling giveaway programme to a full outgrower scheme with training, associations, 90% subsidized seedlings and a full time extension forester for technical support. It is also launching an apiculture programme in 2010 for more short-term revenue options that are of benefit to the forest and benefit from the forest's presence. The company is also beginning a fuel wood collection programme on plantation for the benefit of surrounding communities. The company is confident that the creation of job opportunities for rural unskilled labour has helped to mitigate the impact of lost lands.

Train Contractors: In order to normalize the delivery of payments, NFC is in the process of comprehensively training its contractors in business management, including cash flows, time management for improved productivity and book keeping. NFC is also auditing its contractors' payments to ensure reliable payments; the company will begin intervening when abnormalities are identified.

Banks: The company is working with its banks to encourage them to provide more timely transfers of funds to contractors, ensuring timely payments to labourers.

More Labour Accommodation: Each year the company will continue to build additional labour accommodation blocks. All long-term maintenance labour is fully accommodated (provisions for approximately 400-500 labourers).

Provision of Health Services: Because the health services near the plantation are so poor, NFC has not been able to provide high quality health services for its labour. Therefore, the company has just completed the construction of a health centre to provide high quality services on plantation for labour and surrounding communities.

Eliminating External Security Guards: NFC brought on external security guards to protect against external risks. However, through community consultation processes, NFC has recognized that this has generated negative perceptions of the company, and could undermine the quality of its operations. NFC has committed to training its own staff internally and will guard against extortion in the future with increased accountability and auditing.

Manage Community and Political Expectations: In NFC's regular interactions with all stakeholders, the company manages local expectations, communicating regularly about the scope of its community projects.

Projects Concentrated near Establishment: To date, the villages where community development projects have been concentrated have primarily been near areas where planting has taken place. This explains the concentration of projects on one side of the reserve. However, as the final stages of planting take place, NFC will be launching projects in other areas as well.

Security Risks of Moving Labour: To decrease security risks associated with importing labour from other districts, NFC has worked with the District Internal Security Officer. Together, they have developed a system whereby when new labourers travel to plantation, they must carry a letter from the Plantation Manager, and they must bring a reference letter from their LCI Chairman introducing them, recommending them for the job, and confirming they are above a certain age. New employees are then introduced to the Subcounty Internal Security Officers so that they are known to the local authorities.

PROJECT DESIGN DOCUMENT FORM
FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 05

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROPOSED A/R CDM PROJECT ACTIVITY

Organization:	The New Forests Company Limited
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E-Mail:	info@newforestscompany.com
Website URL:	www.newforestscompany.com
Represented by:	CEO
Title:	
Salutation:	Mr.
Last Name:	Tonderai
Middle Name:	
First Name:	Kachale
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PROJECT DESIGN DOCUMENT FORM
FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 05

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Represented by:	Carbon Manager
Title:	
Salutation:	Ms.
Last Name:	Sullivan
Middle Name:	
First Name:	Phoebe
Department:	Carbon
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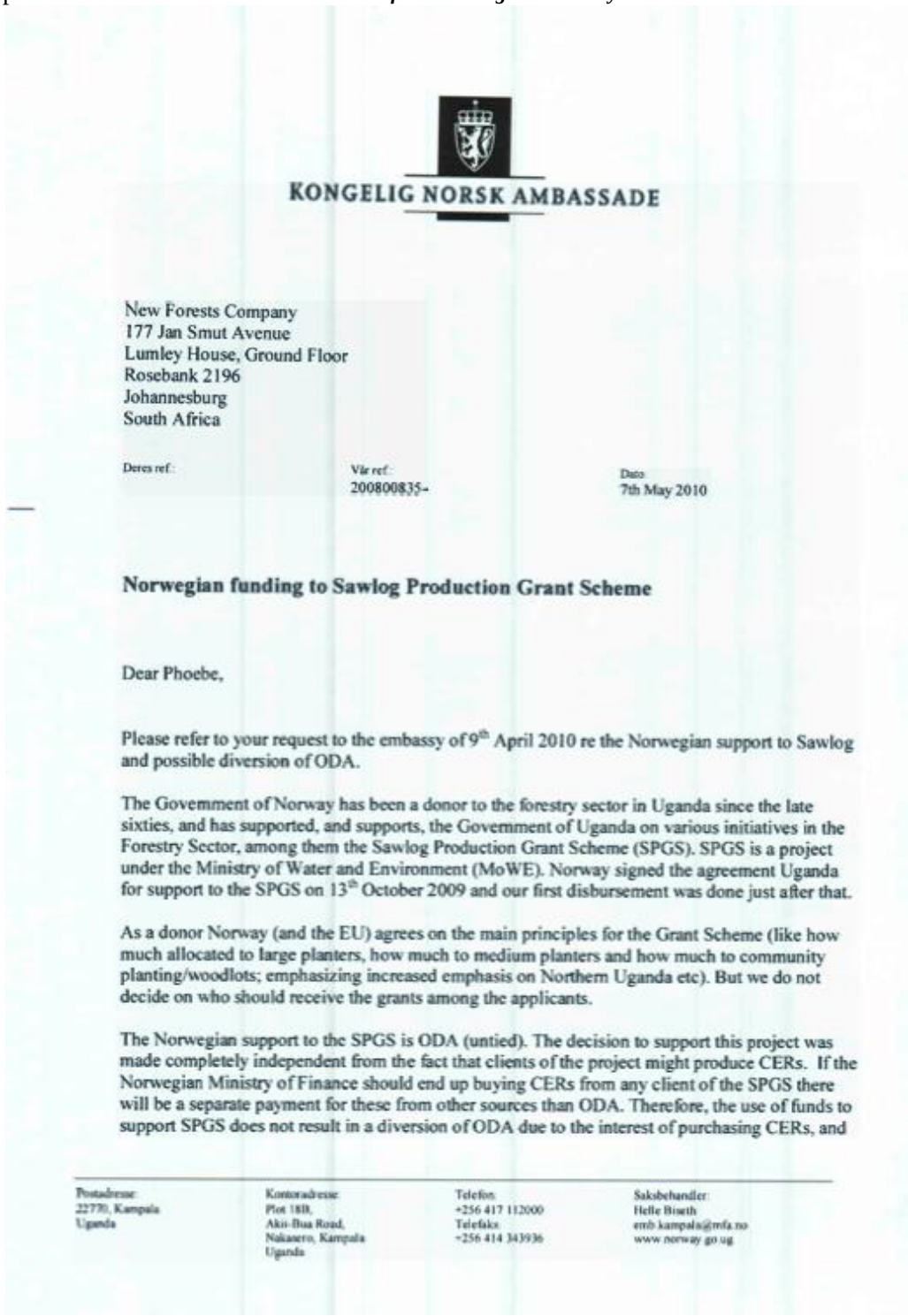
Direct FAX:	+27 11 447 7 345
Direct tel:	+27 1 144 77 343
Personal e-Mail:	Phoebe.sullivan@newforests.net

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The New Forests Company Ltd has received funding from the Sawlog Production Grant Scheme, a programme funded by the Norwegian Government as well as the European Union's Delegation to the Republic of Uganda. This funding has been applied to non-CDM eligible portions of land at the Namwasa

plantation. **FIGURE 1 of Annex 2:** ***Letter from Norwegian Embassy***



KONGELIG NORSK AMBASSADE

New Forests Company
177 Jan Smut Avenue
Lumley House, Ground Floor
Rosebank 2196
Johannesburg
South Africa

Deres ref.: | Vår ref.: 200800835- | Dato: 7th May 2010

Norwegian funding to Sawlog Production Grant Scheme

Dear Phoebe,

Please refer to your request to the embassy of 9th April 2010 re the Norwegian support to Sawlog and possible diversion of ODA.

The Government of Norway has been a donor to the forestry sector in Uganda since the late sixties, and has supported, and supports, the Government of Uganda on various initiatives in the Forestry Sector, among them the Sawlog Production Grant Scheme (SPGS). SPGS is a project under the Ministry of Water and Environment (MoWE). Norway signed the agreement Uganda for support to the SPGS on 13th October 2009 and our first disbursement was done just after that.

As a donor Norway (and the EU) agrees on the main principles for the Grant Scheme (like how much allocated to large planters, how much to medium planters and how much to community planting/woodlots; emphasizing increased emphasis on Northern Uganda etc). But we do not decide on who should receive the grants among the applicants.

The Norwegian support to the SPGS is ODA (untied). The decision to support this project was made completely independent from the fact that clients of the project might produce CERs. If the Norwegian Ministry of Finance should end up buying CERs from any client of the SPGS there will be a separate payment for these from other sources than ODA. Therefore, the use of funds to support SPGS does not result in a diversion of ODA due to the interest of purchasing CERs, and

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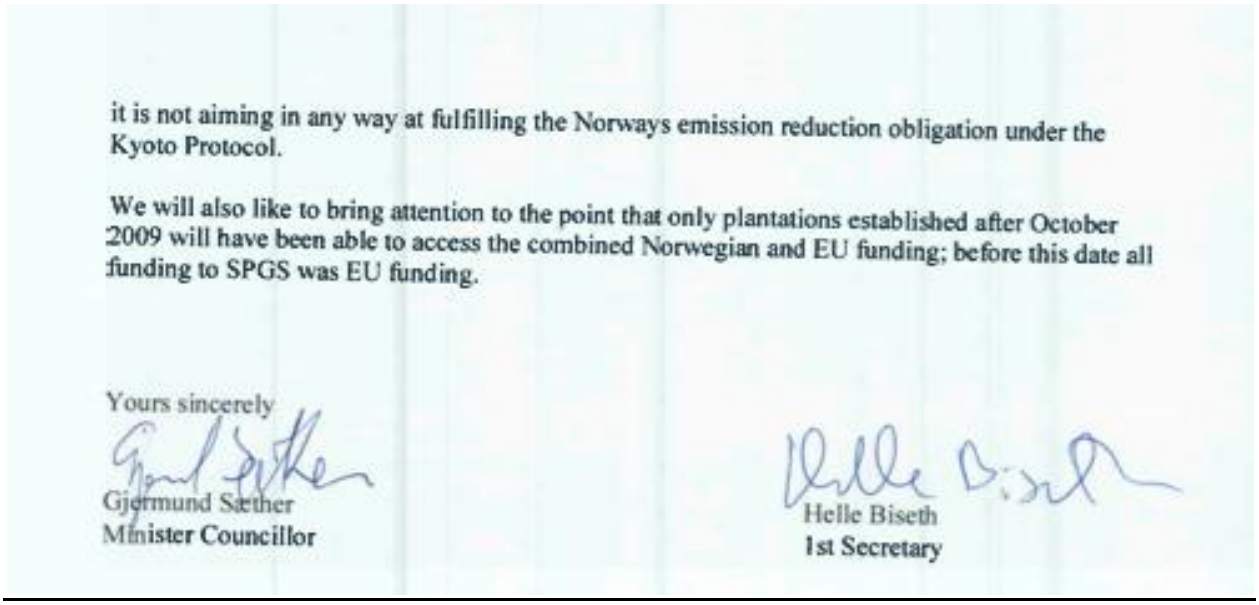


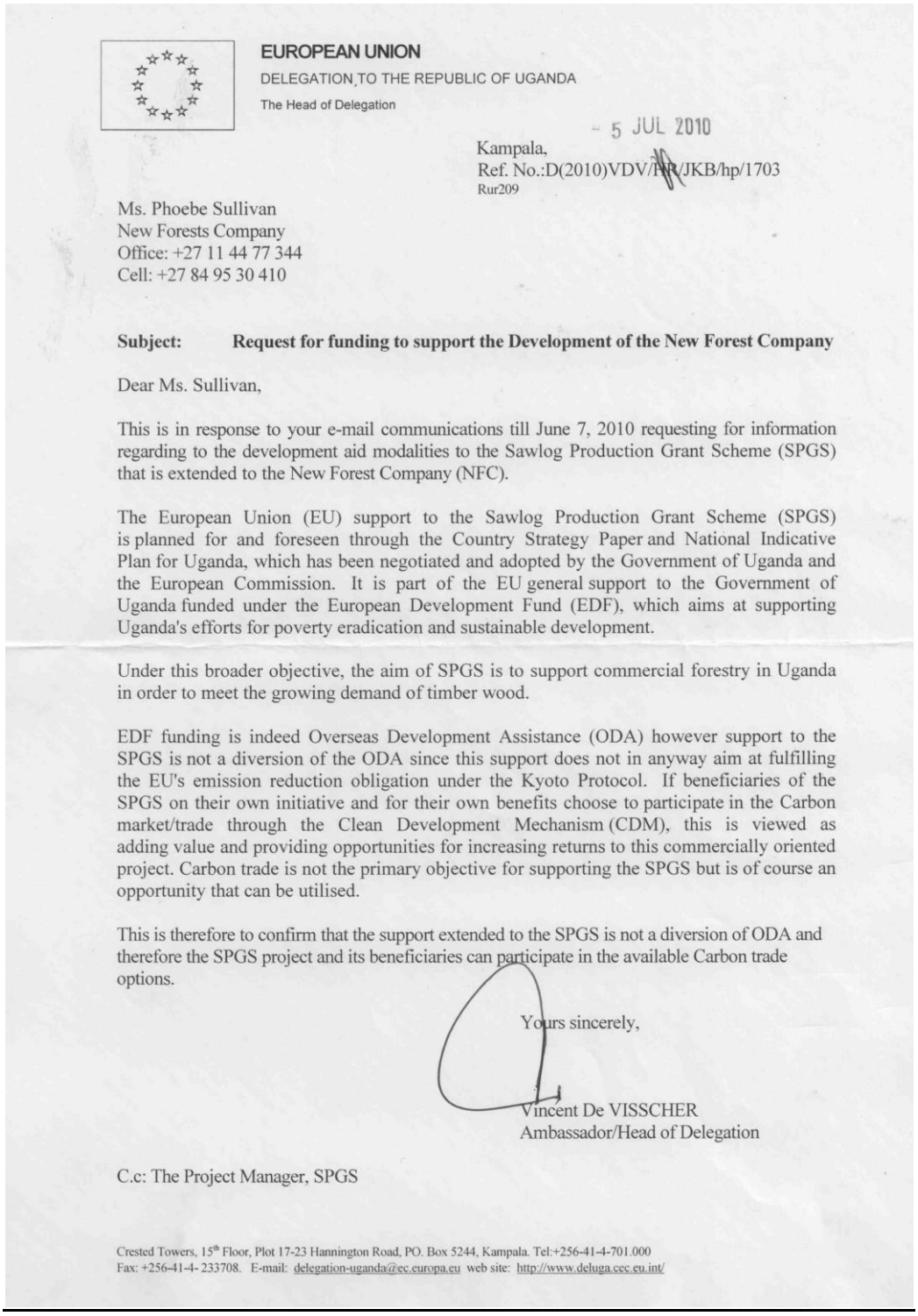
it is not aiming in any way at fulfilling the Norways emission reduction obligation under the Kyoto Protocol.

We will also like to bring attention to the point that only plantations established after October 2009 will have been able to access the combined Norwegian and EU funding; before this date all funding to SPGS was EU funding.

Yours sincerely

Gjermund Sæther
Minister Councillor

Helle Biseth
1st Secretary



EUROPEAN UNION
DELEGATION TO THE REPUBLIC OF UGANDA
The Head of Delegation

- 5 JUL 2010

Kampala,
Ref. No.:D(2010)VDV/HP/JKB/hp/1703
Rur209

Ms. Phoebe Sullivan
New Forests Company
Office: +27 11 44 77 344
Cell: +27 84 95 30 410

Subject: Request for funding to support the Development of the New Forest Company

Dear Ms. Sullivan,

This is in response to your e-mail communications till June 7, 2010 requesting for information regarding to the development aid modalities to the Sawlog Production Grant Scheme (SPGS) that is extended to the New Forest Company (NFC).

The European Union (EU) support to the Sawlog Production Grant Scheme (SPGS) is planned for and foreseen through the Country Strategy Paper and National Indicative Plan for Uganda, which has been negotiated and adopted by the Government of Uganda and the European Commission. It is part of the EU general support to the Government of Uganda funded under the European Development Fund (EDF), which aims at supporting Uganda's efforts for poverty eradication and sustainable development.

Under this broader objective, the aim of SPGS is to support commercial forestry in Uganda in order to meet the growing demand of timber wood.

EDF funding is indeed Overseas Development Assistance (ODA) however support to the SPGS is not a diversion of the ODA since this support does not in anyway aim at fulfilling the EU's emission reduction obligation under the Kyoto Protocol. If beneficiaries of the SPGS on their own initiative and for their own benefits choose to participate in the Carbon market/trade through the Clean Development Mechanism (CDM), this is viewed as adding value and providing opportunities for increasing returns to this commercially oriented project. Carbon trade is not the primary objective for supporting the SPGS but is of course an opportunity that can be utilised.

This is therefore to confirm that the support extended to the SPGS is not a diversion of ODA and therefore the SPGS project and its beneficiaries can participate in the available Carbon trade options.

Yours sincerely,

Vincent De VISSCHER
Ambassador/Head of Delegation

C.c: The Project Manager, SPGS

Crested Towers, 15th Floor, Plot 17-23 Hannington Road, PO. Box 5244, Kampala. Tel:+256-41-4-701.000
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Figure 2, Annex 2: ***Letter from the European Union on ODA***

Annex 3

BASELINE INFORMATION

Presented in a separate document:

Namwasa Baseline Survey – Assessment of Above and Below Ground Carbon Pools

Annex 4

MONITORING PLAN

Please see attached document "*Monitoring Plan: Namwasa Central Forest Reserve Reforestation Initiative"*

Annex 5
COMPLAINTS AND DISPUTES RESOLUTION PROCEDURE
(NFC 12 in FSC Procedure List)

Forestry can alter landscapes, having a significant impact that affects aesthetics, environmental services as well as spiritual and cultural use of land. When the impacts lead to dissatisfaction amongst stakeholders, this can negatively affect sustainable forest management. For this reason, impacts and their results need to be addressed through transparent and well managed processes. The issues of forest access, land rights and tenure, sites of special significance and stakeholder participation are frequently the cause of conflict which needs to prevented, and if this is not possible, need to be managed.

This procedure deals with how the Plantation Manager and Corporate Social Responsibility Manager should monitor stakeholder satisfaction and handle the complaints received from them.

2. RESPONSIBILITY

Responsibility	Person
Maintenance of Stakeholder Register	Corporate Social Responsibility Manager
Management of Disputes/complaints on plantation	Corporate Social Responsibility Manager – regional issues, Plantation Manager for plantation issues, unless referred to another manager.
Management of regional complaints and corporate social responsibility issues.	Corporate Social Responsibility Manager/General Manager

3. OPERATIONAL REQUIREMENTS AND GUIDELINES

3.1 Stakeholder Complaints

3.1.1 The management of conflict or stakeholder dissatisfaction may arise, not from problems of legal rights, but from other issues that are important to the stakeholder. This may, for example, relate to the perceived costs from management practices or in cases where benefits have not met expectations.

3.1.2 A register of all complaints received are to be kept at every plantation and regionally by the Corporate Social Responsibility Manager. This could include a summary of events compiled by the Plantation manager/Corporate Social Responsibility manager, or the complaint correspondence received by the plantation or head office.

3.1.3 Where required, a written copy of the reply to the complaint must also be logged on the complaints register.

3.1.4 If complaints are dealt with through a personal meeting with the complainant, a summary of the outcomes of the meeting must be recorded with the written complaint, and logged on the complaints register.

3.1.5 All telephonic complaints should be dealt with immediately if possible.

3.1.6 If the complaint cannot be dealt with immediately, the complaint should be recorded in the complaint register, so that it can be logged, and receive the necessary attention.

3.2 Monitoring Stakeholder Satisfaction and Conflict

3.2.1 The rights of stakeholders are to be balanced against the environmental, economic and social importance of forests to the country as a whole. Therefore all rights conferred in the law are subject to the state's right to protect and conserve forests according to principles of sustainable management.

3.2.2 As a result, the nature of a planned public participation process will depend on what is planned and the goal of the intervention. In some circumstances stakeholders only need to be informed about certain initiatives or aspects of it. Other initiatives require stakeholder opinions and views in order to improve decisions and the sustainability of the intervention.

3.2.3 The degree of monitoring required will therefore depend on the nature of the stakeholder interaction. Increased monitoring will be required for activities which are more likely to impact on stakeholders or cause conflict.

3.2.4 Meetings and the response to company projects will provide a baseline for the assessment of stakeholder concerns and satisfaction. Further monitoring should be done by interaction with the relevant stakeholder groups, through meetings, workshops or other such events.

3.3 Managing Stakeholder Disputes

3.3 1 The causes or sources of disputes can be many and varied. The most common causes are the following:

a) scarcity of resources (finance, equipment, facilities, etc).

b) different attitudes, values or perceptions.

c) disagreements about rights, needs, goals, priorities and interests.

d) poor communication.

e) poor or inadequate representative structures.

f) lack of teamwork.

g) lack of clarity in roles and responsibilities.

3.3.2 The two main drivers of stakeholder satisfaction are rights and interest. These can also lead to dispute:

a) "disputes of right", where people or groups are entitled by law, by contract, by previous agreement or by established practice to certain rights. Disputes of right will focus on conflict issues such as legally enforceable matters or unilateral changes in accepted or customary practices. A dispute of rights is, therefore, usually settled by legal decision or arbitration and not by negotiation.

b) "disputes of interest", where the conflict may be a matter of opinion, such as where a person or group is entitled to some resources or privileges (such as access to resources, better working conditions, etc). Because there is no established law or right, a dispute of interest will usually be solved through negotiation.

3.3.3 Through monitoring stakeholder satisfaction it is important to recognise when dissatisfaction may lead to a dispute and act before it escalates.

3.3.4 If a dispute arises, the Plantation/Social Responsibility Manager should use one of the following methods to manage and resolve the conflict.

a) **Negotiation**: this is the process where mandated representatives of groups in a conflict situation meet together in order to resolve their differences and to reach agreement.

i) It is a deliberate process, conducted by representatives of groups, designed to reconcile differences and to reach agreements by consensus.

ii) Negotiations often involve compromise - one group may win one of their demands and give in on another. Political and community groups also often use this method.

b) **Mediation**: when negotiations fail or get stuck, parties often call in and independent mediator. This person or group will try to facilitate settlement of the conflict.

i) The mediator plays an active part in the process, advises both or all groups, acts as intermediary and suggests possible solutions. In contrast to arbitration (see below) mediators act only in an advisory capacity - they have no decision-making powers and cannot impose a settlement on the conflicting parties.

ii) Third party agents, such as specialist service providers may provide the Plantation/Social Responsibility Manager with the appropriate skills and objectivity to gain trust and confidence from the conflicting groups or individuals.

c) **Arbitration**: means the appointment of an independent person to act as an adjudicator (or judge) in a dispute, to decide on the terms of a settlement.

i) Both parties in a conflict have to agree about who the arbitrator should be, and that the decision of the arbitrator will be binding on them all. Arbitration differs from mediation and negotiation: the arbitrator listens to and investigates the demands and counter-demands and takes over the role of decision-maker.

4. MONITORING, REPORTING AND CORRECTIVE ACTIONS

4.1 The Plantation Manager and Corporate Social Responsibility manager must each maintain a complaints register.

4.2 The Corporate Social Responsibility Manager must monitor stakeholder perceptions and proactively attempt to minimise conflict through strategic planning.

5. RECORDS

Record	Kept at	Record period
Complaints Register	Estate Office/Corporate Social Responsibility Office	Ongoing, but old records discarded after five years

6. APPLICABLE LEGISLATION AND GUIDELINES FOR FURTHER REFERENCE

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ANNEX 6:

EXAMPLE OF GROWTH MODELS FOR PINE AND EUCALYPTUS SPECIES - EXCEL

Yield model for *Eucalyptus grandis* in Uganda

Site index	32.0	*Planting N/ha*	1666	Survival %	90%	*Density index %*	100%

	Main crop before thinning						Thinnings					MAI		CAI
Age	Hdom	N/ha	Dg	G/ha	Vol_{5ob}	Vol_{10ub}	Thin%	N/ha	Dg	Vol_{5ob}	Vol_{10ub}	Vol_{5ob}	Vol_{10ub}	Vol_{5ob}
1	7.0	1499	4.8	2.7	8							7.8		7.8
2	12.9	1499	9.2	10.0	47		33%	499	7.5	12.0		23.7		39.6
3	17.2	1000	13.0	13.3	81	55						31.1	18.4	46.0
4	20.5	1000	15.0	17.8	126	101						34.6	25.1	44.9
5	23.2	1000	16.6	21.6	171	146	50%	500	13.7	71.7	61.2	36.5	29.1	44.3
6	25.5	500	21.0	17.4	152	142						39.2	33.9	52.7
7	27.4	500	22.2	19.4	181	172						37.8	33.3	29.1
8	29.1	500	23.3	21.3	208	200						36.5	32.6	27.7
9	30.6	500	24.2	23.0	235	226						35.4	31.9	26.3
10	32.0	500	25.0	24.5	260	251						34.3	31.3	25.0
11	33.2	500	25.7	25.9	283	276						33.4	30.6	23.8
12	34.4	500	26.3	27.2	306	**298**						32.5	**30.0**	22.7
13	35.4	500	26.9	28.4	328	320						31.7	29.3	21.7
14	36.3	500	27.4	29.5	349	341						30.9	28.7	20.7
15	37.2	500	27.9	30.5	368	361						30.1	28.2	20.3

Yield model for Caribbean Pine in Uganda

Site index	16.57	*Planting N/ha*	1372	Survival %	90%	*Density index %*	100%

	Main crop before thinning						Thinnings					MAI		CAI
Age	Hdom	N/ha	Dg	G/ha	Vol_{5ob}	Vol_{10ub}	Thin%	N/ha	Dg	Vol_{5ob}	Vol_{10ub}	Vol_{5ob}	Vol_{10ub}	Vol_{5ob}
2	3.0	1235	6.9	4.7	8	3						3.8	1.7	7.7
3	4.8	1235	9.5	8.7	21	10						7.0	3.4	13.3
4	6.6	1235	11.7	13.4	42	22						10.4	5.5	20.8
5	8.4	1235	13.8	18.5	70	40	31%	385	13.1	16.4	9.2	14.0	7.9	28.4
6	10.1	850	16.4	18.0	81	48						16.3	9.6	27.4
7	11.8	850	18.2	22.2	114	70						18.6	11.4	32.5
8	13.5	850	19.9	26.4	151	97						20.9	13.2	37.1
9	15.1	850	21.4	30.7	192	126						23.1	15.1	41.1
10	16.6	850	22.9	34.9	236	159						25.3	16.9	44.5
11	18.0	850	24.2	39.1	284	**195**						27.3	**18.6**	47.3
12	19.4	850	25.4	43.2	333	234	29%	246	24.0	70.9	49.8	29.1	20.3	49.5
13	20.7	603	27.7	36.2	299	215						29.7	21.0	36.6
14	22.0	603	28.8	39.2	340	247						30.5	21.9	40.8
15	23.2	603	29.8	42.2	381	281						31.2	22.7	41.4
16	24.3	603	30.8	45.0	423	316						31.9	23.4	41.8
17	25.4	603	31.7	47.7	465	351						32.5	24.1	41.8
18	26.4	603	32.6	50.3	506	386						33.0	24.7	41.6
19	27.4	603	33.4	52.8	548	422						33.4	25.3	41.3
20	28.3	603	34.1	55.2	588	457						33.8	25.8	40.7
22	30.0	603	35.5	59.7	667	526						34.3	26.6	39.6

CDM – Executive Board

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History of the document

Version	Date	Nature of revision
05	EB 55, Annex 22 30 July 2010	Restructuring to reflect changes applied in the design of approved A/R CDM baseline and monitoring methodologies. Due to the overall modification of the document, no highlights of the changes are provided.
04	EB35, Annex 20 19 October 2007	• Restructuring of section A; • Section "Monitoring of forest establishment and management" replaces sections: "Monitoring of the project boundary", and "Monitoring of forest management"; • Introduced a new section allowing for explicit description of SOPs and quality control/quality assurance (QA/QC) procedures if required by the selected approved methodology; • Change in design of the section "Monitoring of the baseline net GHG removals by sinks" allowing for more efficient presentation of data.
03	EB 26, Annex 19 29 September 2006	Revisions in different sections to reflect equivalent forms used by the Meth Panel and assist in making more transparent the selection of an approved methodology for a proposed A/R CDM project activity.
02	EB 23, Annex 15a 24 February 2006	Inclusion of a section on the assessment of the eligibility of land and the Sampling design and stratification during monitoring.
01	EB15, Annex 6 03 September 2004	Initial adoption.
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