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Sustainable Agriculture in a Changing Climate

Project Design Document (PDD) for Validation Using the Climate, Community and Biodiversity (CCB) Project Design Standards Second Edition (December 2011)

climatechangesolutions

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PROJECT HIGHLIGHTS

Project Highlights	
Project Proponent	CARE International
Contributions from	CARE International, Camco, ICRAF
Host Country	Kenya
District	Nyanza
Land Type	Degraded agricultural land
Total Project Area	50,000 households across lower and mid Nyando
Project Start Date	September 2010
Total Carbon Stocks in Project Area	7,458,233
35-year Carbon Credits (VCUs) issued	2,633,906
Primary Degradation Drivers	Human drivers: Over-grazing and intensive agriculture Natural drivers: Soil erosion and climate change
Project standards	CCB v2 Verified Carbon Standard (VCS) Version 3
Selected Methodology	AR-AMS0001 v06 - Simplified baseline and monitoring methodologies for small-scale A/R CDM project activities implemented on grasslands or croplands with limited displacement of pre-project activities

DEFINITIONS

Issue	Definition
Above Ground Biomass	All biomass of living vegetation, both woody and herbaceous, above the soil including stems, stumps, branches, bark, seeds, and foliage. Note: In cases where forest understory is a relatively small component of the above-ground biomass carbon pool, it is acceptable for the methodologies and associated data used in some tiers to exclude it, provided the tiers are used in a consistent manner throughout the inventory time series (IPCC, 2006).
Afforestation	The direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources
Agroforestry	An ecologically based natural resource management system in which trees are integrated in farmland and rangeland
Below-ground Biomass	All biomass of live roots. Fine roots of less than (suggested) 2mm diameter are often excluded because these often cannot be distinguished empirically from soil organic matter or litter (IPCC, 2006).
Cropland	Includes arable and tillage land and agro-forestry systems where vegetation does not the meet the forest definition.
Deadwood	Includes all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps, larger than or equal to 10 cm in diameter (or the diameter specified by the country) (IPCC, 2006).
Deforestation	Meets the definition of forest at the beginning of the historical reference period, or 10 years before project start date, whichever is earliest. Does not meet the definition of forest anymore at some time after the start of the historical reference period (or 10 years before project implementation) as the result of direct human-induced interventions. Will not meet the definition of forest within the period of time used to define temporarily un-stocked.

Forest	Forest includes natural forests and forest plantations. It is used to refer to land with a tree canopy cover of more than 10 percent and area of more than 0.5 ha. Forests are determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 m (FAO, 2001).
Forest Degradation	The gradual loss of carbon on forest land as a consequence of direct human intervention (e.g., logging, fuel-wood collection, or human-induced fire) but still remains forest land.
Grassland	Includes managed and unmanaged rangeland, pasture land, wild land, recreational areas, and silvo-pastoral systems that do not meet the forest definition.
Grouped Project	A project to which additional instances of the project activity, which meet pre-established eligibility criteria, may be added subsequent to project validation
Reforestation	The human-induced conversion of non-forest land back to forest land (e.g., from cropland to forest, or grassland to forest). Reforestation is excluded from this methodology as a project activity for generating carbon credits.
Settlements	Includes all developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories.
Soil Organic Matter	Includes organic carbon in mineral soils to a specified depth chosen by the country and applied consistently through the time series2. Live and dead fine roots within the soil (of less than the suggested diameter limit for below-ground biomass) are included with soil organic matter where they cannot be distinguished from it empirically (IPCC, 2006).

I. EXECUTIVE SUMMARY

This Climate, Community and Biodiversity (CCB) Project Design Document (PDD) is being submitted on behalf of the project proponent CARE International, with contributions from Camco and ICRAF.

The Sustainable Agriculture in a Changing Climate (SACC) project has been designed to deliver positive climate change impacts by promoting afforestation and reforestation (AR) activities in the project area. These activities will contribute to carbon storage and hence less carbon will be released to the atmosphere in the form of carbon dioxide. In addition to this climate benefit, the project delivers livelihood benefits to the communities both within and bordering the lower and mid Nyando.

The project area covers 208,185 hectares of mixed use land, much of which is in a degraded state. Of this, AR activities, which constitutes the main project intervention, is eligible in up to 132,629 hectares of the total land area.

This PDD demonstrates that through effective and appropriate agroforestry techniques and local sustainable development activities, the SACC project will sequester 3,203,314 tCO_2e over the 35 year project crediting period of which 2,633,906 tCO_2e will be released (i.e. tradable VCUs), equivalent to annual emission reductions of 73,164 tCO_2 after allowing for the non-permanence risk buffer.

This PDD also demonstrates the reliance of local communities (with a population of more than half a million), on woody products for both domestic uses and their livelihoods. The provision of community benefits that arise from project activities, such as enhanced agricultural production, forest product production and income from selling these products, is demonstrated through compliance with the optional 'Exceptional Community Benefits' Gold Level section.

Additionality of the project activities is demonstrated through the VCS VT0001 Tool for Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, Version 1.0.

In addition to CCB registration, the project has also been submitted for registration under the approved Verified Carbon Standard (VCS) methodology AR-AMS0001 v06.

II. GENERAL SECTION

G1. Original Conditions at the Project Site

General Information

G1.1 Project Area Location and Physical Parameters

The SACC project will be implemented in the lower and mid Nyando River basin, a land area that encompasses more than 115,000 households. The Nyando River basin is located in western Kenya in the Nyanza District, confined within latitudes 0°25' S and 0°10'N and longitudes 34°50' E and 35°50' E[1](Figure 1.1). In recent years this area has been subject to increasing environmental degradation and is affected by droughts and floods that are a function of both the physical characteristics of the area and human influence on the land, both of which are outlined in the following section.

Topography and Catchment Description

The project area falls within the Lake Victoria Lowlands and Floodplains Region and is surrounded by Lake Victoria to the west, the Tinderet Hills to the east, the Nandi Escarpment to the north and Kisii Hills to the south. The lowlands are found at an approximate elevation of 1,100 masl and have a relatively flat topography, which gradually grades to steep slopes with an elevation of ~3,000 m in the north-eastern and southern areas that constitute the upper reaches of the Nyando catchment[3].

The Nyando River basin encompasses the Kisumu, Nyando, Nandi and Kericho Districts, and drains into Winam Gulf of Lake Victoria. The basin has a total area of 3,550km^2 and a main river course of 153km[4]. Even though it is an important source of water for the people in the region, the Nyando River frequently floods during periods of heavy seasonal rainfall, causing damage to homesteads and farmlands. Sondu Miriu River is the second largest in the area and a hydroelectric power plant has been constructed on the lower reaches of the river[5]. Aside from the two major arterial rivers, several streams including Awach Kano, Asawo, Nyaidho and Ombeyi also drain from the project area into Lake Victoria.

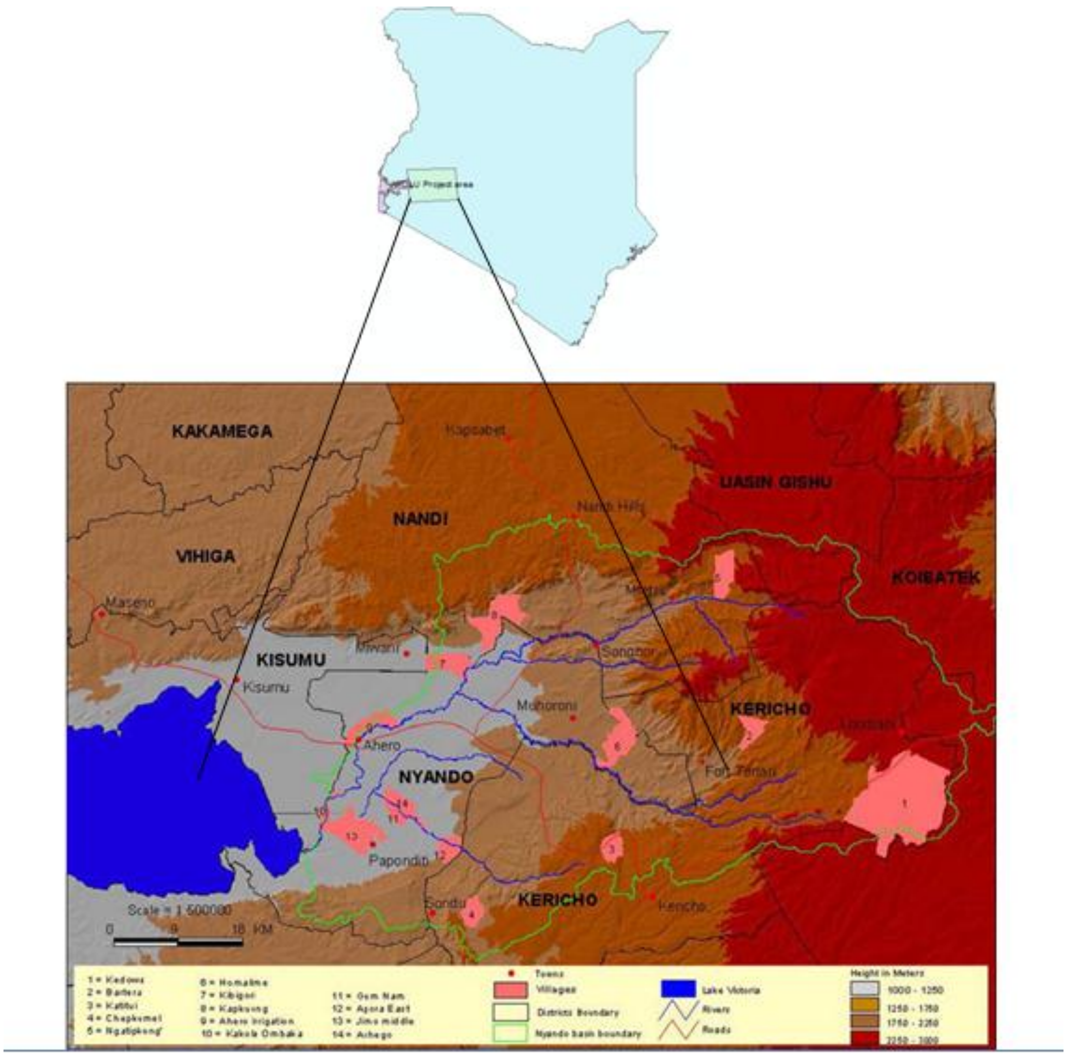


Figure 1.1 The Nyando catchment in relation to Kenya and the surrounding Nyanza District (adapted from Onyango *et a*l, 2005)

Climate and Hydrology

The project area has a tropical climate with a bi-modal pattern of rainfall occurring mainly between March – April and October – November. Two dry seasons occur in the intervening periods and hence rainfall is distributed unevenly on an annual scale. Average annual precipitation in the Nyando basin ranges between 900 – 1,600 mm and annual temperatures typically range from 20 - 35°C[6]. Climate change related modifications to the regional climatic regime have far reaching effects on agricultural production within the project area. Frequent long dry spells that are characteristic of tropical climates may hinder AR activities and drought conditions are becoming increasingly common[7].

High rates of human population growth in the region mean that the implications of erratic water flow regimes will be felt by more people. A recent flooding event in 2002 affected 175,000 people and disturbed thousands of hectares of cultivated land in the Nyando basin and surrounding catchments[8]. The effects of flooding and drought events are exacerbated by improper land use and deforestation, both of which are contributing to the most severe problems of agricultural stagnation and environmental degradation found anywhere in Kenya[9].

Soils

The project area supports a wide range of soil types, from soils with a high content of silt and clay such as *Ferrasols, Nitisols, Cambisols* and *Acricsols,* predominant in the upland areas to *Luvisol, Vertisol, Planosol, Cambisol* and *Solonetz* soil profiles from Holocene sedimentary deposits in the lower basin[10]. The soils are typically well drained and moderately fertile, which is essential for the sustentation of agricultural practices in the area. Soils in the upper reaches of the project area are relatively shallow and are prone to sheet and rill erosion[9,11]. In the lower reaches of the Nyando basin pedological profiles are comprised of deep, sodic soils which are prone to gully formation[9]. Changes to climate and land use have resulted in increased rates of soil erosion across the project area, with greatest losses recorded in the lower Nyando (Figure 1.2).


Figure 1.2 Soil erosion documented during field studies in the Lower Nyando

Soil erosion has severe implications for agricultural productivity in the area and the Nyando River Basin is considered to be a soil erosion hotspot, with some of the most severe erosion on the African continent contributing to the widespread degradation of previously productive agricultural land. Loss of land to soil erosion at rates of >40 Mg/ha/yr[12] may hinder the implementation of AR activities, particularly in the more susceptible gully-forming soils of the lower Nyando.

The process of soil erosion has led to the influx of sediment laden water with nutrients such as phosphorus and nitrogen from the project area into Lake Victoria[13]. Nutrient leaching from cultivated soils has led to depletion of soil fertility in the Nyando catchment and subsequent eutrophication in Lake Victoria. Eutrophication has a negative impact on fish stocks for local fisherman as it promotes plant growth in the lake, which in turn removes large volumes of oxygen from the water. This demonstrates the downstream environmental and economic implications of increasing rates of soil erosion in the lower and mid Nyando basin.

G1.2 Types and Condition of the Vegetation in the Project Area

Historical Vegetation Distribution

Historically the entire mid Nyando block was covered in equatorial forest[14]. The native forest vegetation consisted of evergreen broadleaf forest, where the most ubiquitous tree species were *Croton megalocarpus, Diospyrus abyssinica, Funtumia latifolia, Olea welwitschii, Dombeya spp* and *Dovyalis abyssinica*[15]. At lower altitudes in the lower block (<1400m), forest vegetation graded into perennial grasslands comprised of species such as *Themeda triandra, Hypairhenia hirta, Panicum spp* and*Eragrostis spp.* Grasslands were typically interspersed with evergreen and semi-deciduous bushlands including *Dodonea angustifolia, Carissa edulis, Rhus natalensis, Rhus vulgaris* and *Euclea divinorum*[15]. In the inland valleys of the Nyando basin and at the river mouth, *Cyperus spp.* wetlands and riparian vegetation constituted the main native vegetation communities[15].

The vegetation distribution described above is representative of conditions in the Nyando basin prior to 1960. Since 1960 large scale land use changes have significantly disturbed the native vegetation communities[4](Figure 1.3) and the resultant distribution is a function of several key factors.

1. Post-independence (1963) severe flooding around Lake Victoria created a large resettlement scheme into Tinderet Forest, which now forms part of the project area in mid Nyando[14]. This resulted in the clearance of large forest areas for settlement, after which time the population more or less stabilised.
2. Following the post-election clashes in 1992 squatters arrived in to the area, many of whom resorted to charcoal making which resulted in massive deforestation[17].

Levels of deforestation in the project area have been investigated using increasingly available remotely sensed data, which provides high resolution imagery with extensive spatial and temporal coverage. A study by Ogutu *et al* (2005)[18] has shown that encroachment on forest reserves and wetlands and transformation of farm lands from perennial to annual cropping systems characterize the major changes in vegetation in the Nyando basin.

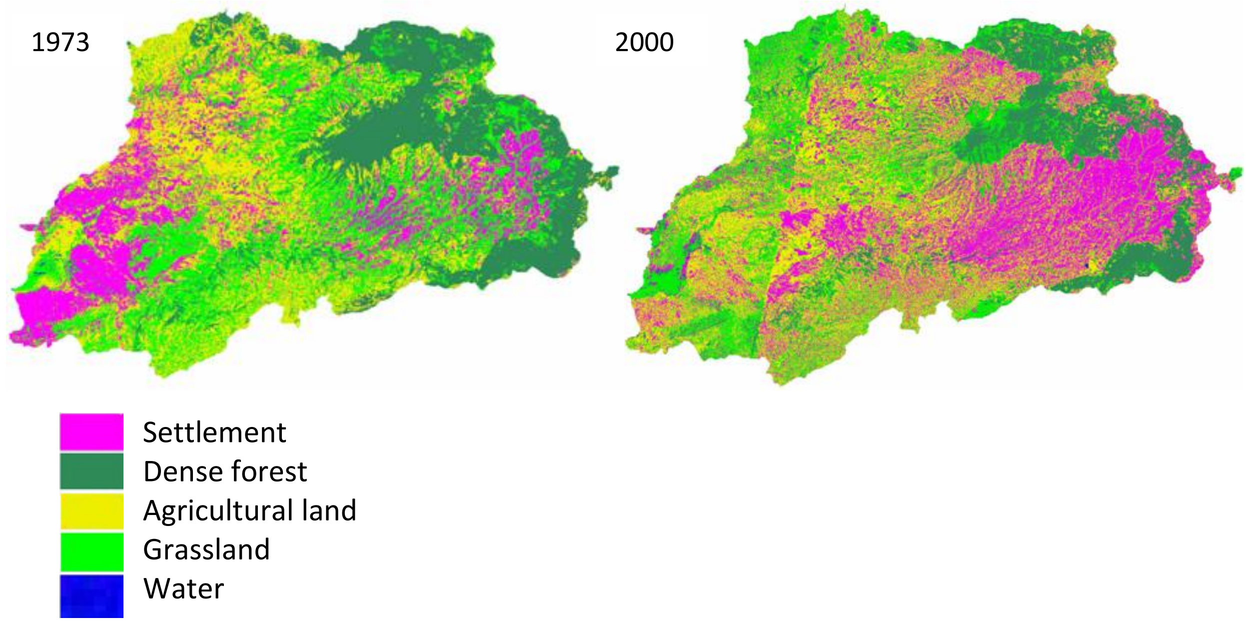


Figure 1.3 Landsat imagery used to show large scale vegetation and land use changes in the Nyando basin between 1973 -2000 (Source: Olaka[16])

Current Vegetation Distribution

In order to support a larger population, the mid Nyando basin now comprises significant areas of cultivated arable land used for agricultural production: both crop cultivation and raising of livestock. Within the cultivated areas a mixed cropping system is used, where cereals (*Zea mais,Sorghum bicolor,* and *Panicum milaiceum*), pulses (*Vigna radiata*) and root vegetables (*Manihot esculenta,Maranta arundinacea,*and *Ipomoea batatas*) are typically grown[19]. Dominant agricultural land-uses in lowland areas are maize (*Zea mais*), sorghum (*Sorghum bicolor*), sugarcane (*Saccharum officinarum*), irrigated rice (*Oryza sativa)* and communal pasture[20]. The lower basin is flood-prone and annual flooding near the delta leaves rich alluvial deposits that are cultivated and yield good harvests[21].

There are two remaining forest areas, Tinderet and Mau forests, that are currently being heavily deforested due to charcoal burning and illegal farming[17]. Unsustainable agricultural practices have resulted in widespread areas of fallow and bush land, comprised of sparsely distributed species such as *Dodonea angustifolia, Carissa edulis, Rhus natalensis, Rhus vulgaris* and *Euclea divinorum*[15]*.* An increasing area of land in the project area is unable to support vegetation communities as the previously fertile soil is degraded by erosive forces.

The influx of eroded soil into Lake Victoria has led to the widespread colonisation of *Eichhornia crassipes:* a non-native species of water hyacinth. *Eichhornia crassipes*was introduced to Africa as recently as the 1980s, yet now covers a total lake area of 5,000 ha[22]. This invasive water based plant dominates the lower Nyando River, at its point of entry into Lake Victoria in the Winam Gulf. Abundant nutrients derived from agricultural soils and warm water temperatures mean that the plant continues to spread prolifically across the lake, resulting in decreased lacustrine productivity and significantly reduced fish stocks[22].This is compromising the Lake Victoria fishery and eroding a keystone in local livelihoods, as fishing is one of the few sources of income that is not directly linked to agriculture.

Decreasing land productivity has resulted in the adoption of agroforestry by some land owners in the project area. The trees planted in agroforestry initiatives are for multiple purposes including[23]:

1. Fuel wood production
2. Wind breaks
3. Timber production
4. Fruit production
5. Food production
6. Soil fertility
7. Medicinal product production
8. Fodder production
9. Aesthetics
10. Soil conservation

In the Nyando project area farmers retain a small number of naturally occurring species such as *Terminalia brownii* and *Acacia spp* for agroforestry purposes. However the practice has led to the introduction of exotic species, in favour of native species outlined previously. The most commonly used exotic species are *Grevillea robusta* and *Eucalyptus camaldulensis*[23.] Indigenous species across the designated project area are increasingly being replaced by exotic species on the homestead scale.

G1.3 Boundaries of the Project Area

The AR activities supported by the SACC project will extend to ~50,000 households over a total project area of 208,185ha within the lower and mid Nyando River basin (Figure 1.4). Agroforestry initiatives will be implemented on the homestead scale, on land which is privately owned. Land adjudication has been completed in the communities and allotment numbers have been issued to individuals. Allotment numbers give tenants the right to a title deed; however farmers do not typically have title deeds because of the high cost of survey of 10,000KSH per farm (approx. USD 100) associated with the process.

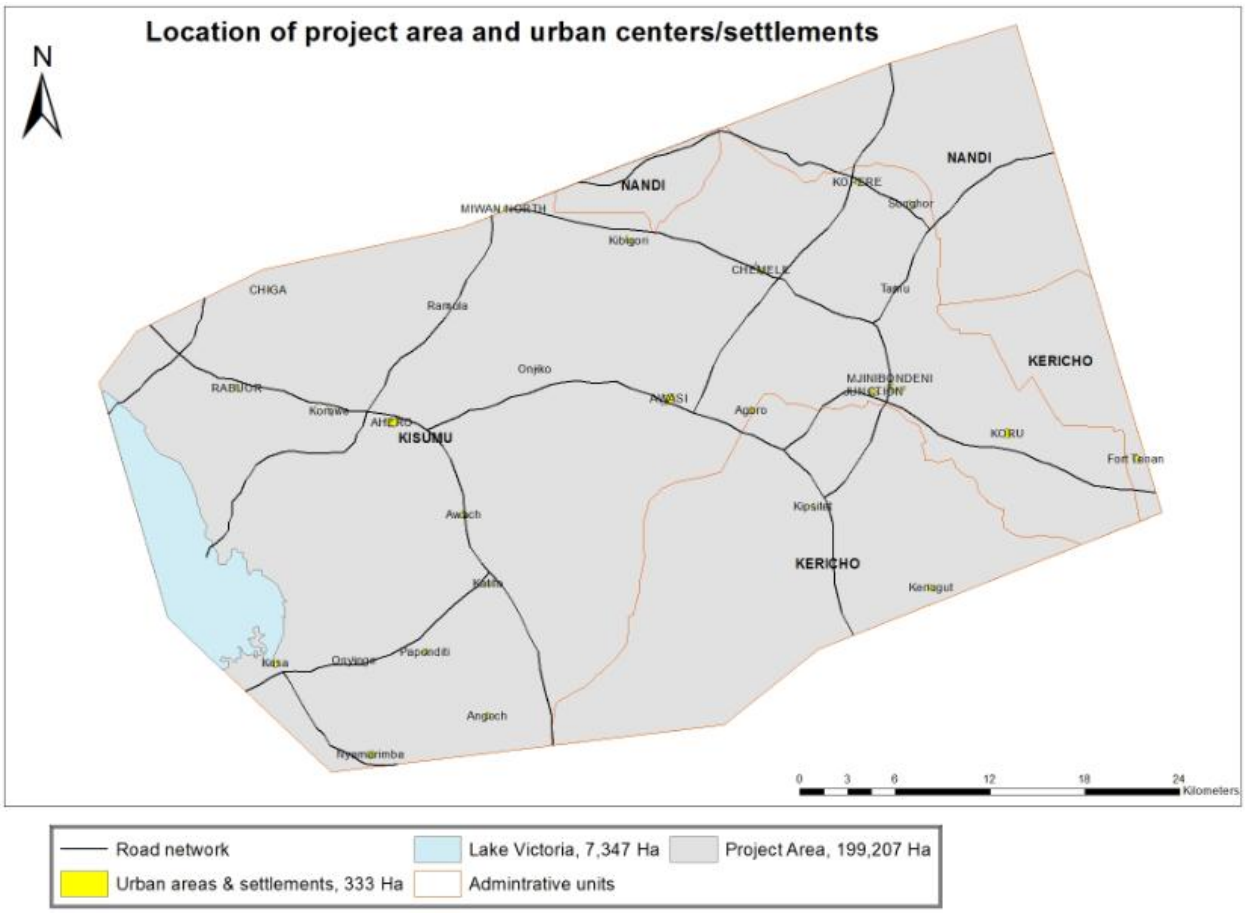


Figure 1.4 SACC Project Area

Remote sensing (Landsat at 30m resolution) has been used to produce maps that provide clear differentiation between the eligible and ineligible areas within the project zone. Ineligible areas encompass the following land uses:

- Forest (at any point in time series 2000, 2003, 2006 or 2011)
- Sugar cane production area – referred to as the sugar belt

- Irrigated rice production area – referred to as the rice belt
- Other wetland
- Settlement
- Water
- Other land uses which includes roads, quarries and airstrips

Within the remaining eligible areas AR project activity instances will be made up of many discrete areas of land, each of which will be mapped using GPS and assigned a unique geographical identification. The project intends to build upon existing AR activities in the lower and mid Nyando basin by using carbon finance to extend these activities to other eligible areas within the River basin.

The project has been classified as large scale. It will result in the sequestration of >16,000 tonnes of CO_2 / year over the project duration, although the project activities will take place on small farm holdings. However during the initial phase of the project, instances of AR activities will be put into practice on a small scale that does not cover the target >50,000 households. The project is structured to allow for the expansion and crediting of the project activities to a wider area of the lower and mid Nyando River basin, subsequent to validation of the initial project activity instances. Hence the project can be categorized as a grouped project, whereby the inclusion of new project activities and expansion of the area targeted by the project will follow after initial validation which will relate to the initial 1,343 participating farmers.

New instances of project activity will be validated at the time of verification (against the eligibility criteria). Each new instance of project activity will use the existing technical specifications for AR activities developed during the initial project activity phase; however it is expected that the process of project roll out may be streamlined with increasing levels of awareness, support, institutional and technical capacity. The SACC project will follow the requirements set out for grouped projects in the VCS standard. No further geographical sub-division within the project area was required to determine the baseline, for the demonstration of additionality, the non-permanence risk analysis or for the assessment of activity shifting and market leakage. The eligibility criteria for all new instances of project activity are:

- New project activity instances must be located within the project boundaries delineated

- No forest cover between 2000 – present (forest as defined by DNA with more than 30% canopy cover and larger area than 0.25 ha)
- No sugar cane areas are eligible
- No rice growing areas are eligible
- No wetland areas are eligible
- Need to apply same technology i.e. the technical specifications in Annex 1.

A map which delineates the project area and all eligible land areas within the area is displayed below.

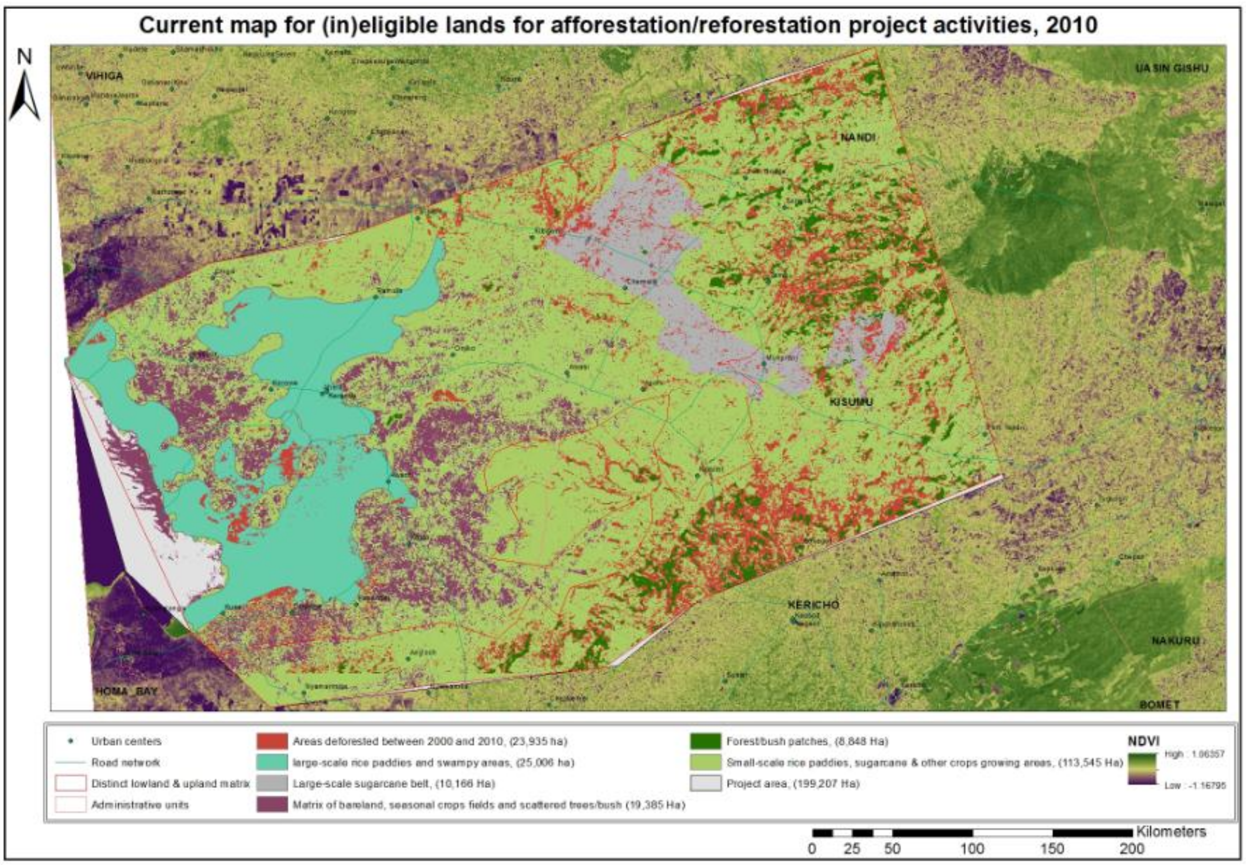


Figure 1.5 Current ineligible and eligible lands for AR project activities, 2010

Eligible areas account for 132,629 ha of the project area and ineligible account for 75,556 ha. Of the eligible lands, 58,902 ha are in the upland areas (>1,300m a.s.l) and 73,727 ha are in the lowland areas (<1,300m a.s.l).

In addition to the area that is covered by this project document, there may be potential for the establishment of a similar project funded by CARE in the Homabay area. The area suffers from many of the same issues of environmental degradation and decreasing land productivity as the lower and mid Nyando basin and hence would benefit from similar AR activities. The implementation of this secondary project is subject to the success of the SACC project in the lower and mid Nyando basin.

Project Area Leakage Belt

Project activities can contribute to measurable and attributable increases in GHG emissions outside the project area, a process known as leakage. There are two different types of leakage, primary leakage (which includes activity shifting), and secondary leakage also known as market leakage. The SACC project may specifically affect market leakage. Market leakage occurs when projects significantly reduce the production of a commodity causing a change in the supply and market demand equilibrium that results in a shift of production elsewhere to make up for the lost supply.

Market leakage will be determined indirectly, as leakage from the project area will be difficult to monitor directly. However scientific knowledge will be used to provide credible estimates of the likely impacts, which in this instance will result from the shifting of grazing animals from the project area. No leakage belt will be delineated because the leakage area (if leakage does occur) will be in unidentifiable grazing land areas that are not under the control of the animal owners.

G1.4 Current Carbon Stocks within the Project Area

The applicable VCS methodology for this project is AR-AMS0001 v06 ‘Simplified baseline and monitoring methodologies for small-scale A/R CDM project activities implemented on grasslands or croplands with limited displacement of pre-project activities”

This methodology has been selected for the following reasons:

Project activities are implemented on grasslands or croplands;	✓
Project activities are implemented on lands where the area of the cropland within the	✓

project boundary displaced due to the project activity is less than 50 per cent of the total project area;	
Project activities are implemented on lands where the number of displaced grazing animals is less than 50 per cent of the average grazing capacity[1] of the project area;	✓
Project activities are implemented on lands where ≤ 10% of the total surface project area is disturbed as result of soil preparation for planting.	✓

The estimation of carbon stocks and projection of future changes in carbon stocks are based on the VCS methodology AR-AMS0001 v06. Following this method, estimation of carbon stocks include detailed and statistically determined field sampling and Remote Sensing/GIS-based systems of land-use and management activity data, which will also be integrated for future Reporting, Monitoring and Verification. The basic elements involved can be summarised as:

- Identifying significant land use and/or management activities
- Identifying significant land use categories
- Identifying significant carbon pools
- Identifying significant CO_2 emissions or removals by sinks from various carbon pools
- Identifying significant non-CO_2 (if any) gases and from what categories.

Stratification

Sub-step 1: Assess the Key Factors

The key factors that influence carbon stocks in the above- and below-ground biomass pools within the project zone have been identified as soil features, local climate, landform, forest type, dominant tree species and project actions.

Sub-step 2: Collect Maps of Key Factors

The general soil types in the region are a complex of moderately drained very deep, dark reddish – brown, dark grey to black, firm to very firm, sandy clay to clay, sodic and/or cracking soils (Planosols,

1 See Appendix D.

gleysols, solonetz, vertisols and fluvisols) (Jaetzold & Schmidt, 1982). The predominant soils in Kano and Nyakach plains are black cotton soil, sandy red soil and laterite soil. The soils are well drained, deep and dark reddish brown in colour of volcanic footridges and lacustrine plains which have developed from igneous basalt and phenolites. Almost all soils distributed in Kano Plains are fine-textured except for some soils in the piedmont plain that are coarse to moderately coarse textured. Soils in the Nyakach plain also show a broad variation. Soils at the fan base and lacustrine are finer while that at the piedmont plain are coarse- textured. The pH of the soils in this region ranges from 4.5 to 10.4. In the cuspate delta, a high pH of 9 or more is observed, while humic gleysols near swamps indicates low pH values of 4.5. Most of the soils are non saline.

The soils in the lower reaches in Nyakach plains are dominated by sodic soils which are prone to gully formation.

Climate and vegetation information for the catchment are detailed in G1.1 – 1.3. The map below demonstrates how indigenous forest resources are subject to degradation, in a continual shift of land use to low yielding agricultural land (Figure 1.6).

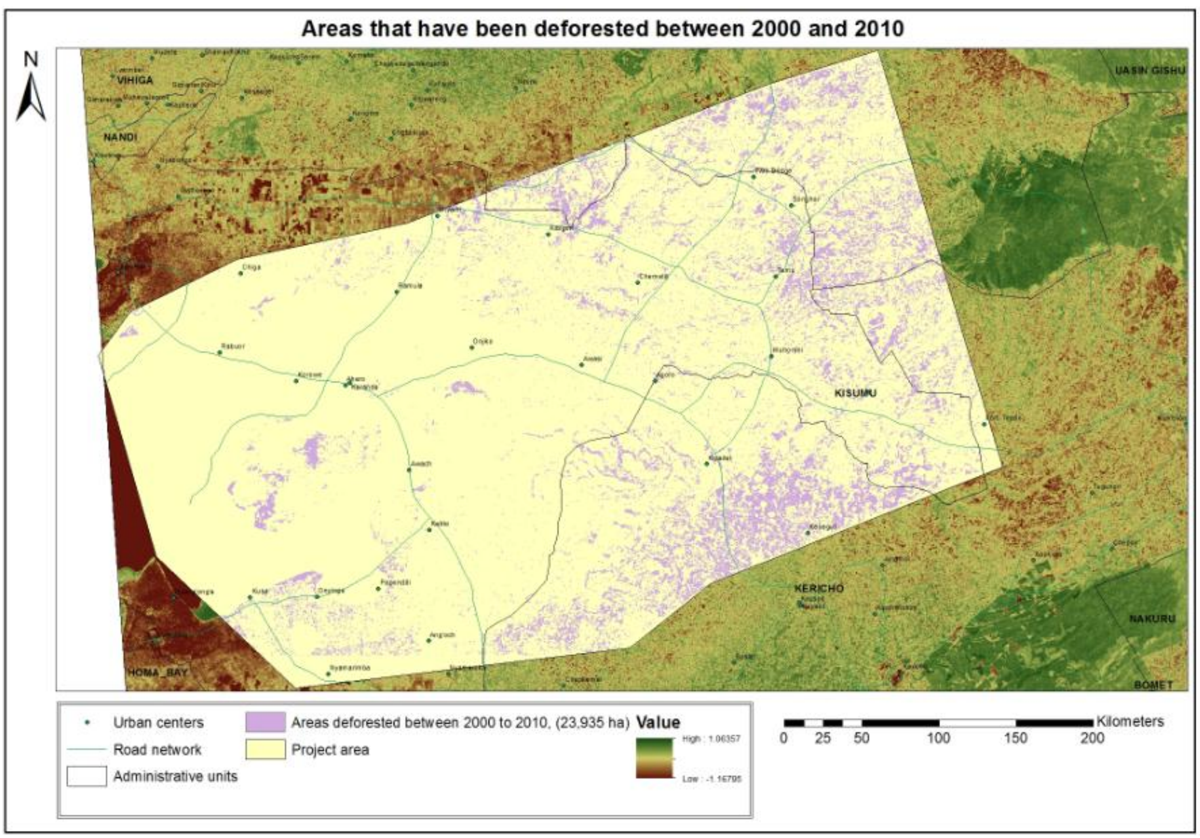


Figure 1.6 Conversion of forested areas to other land uses from 2000 -2010

Sub-step 3: Preliminary Stratification

Table 1 Land use stratification	
Land use classification and description	**Eligible / ineligible**
Forest (at any point in time series 2000, 2003, 2006 or 2010)	Ineligible
Sugar cane production area	Ineligible
Irrigated rice production area	Ineligible
Other wetland	Ineligible
Lowland matrix of cultivated trees combined with other sporadic on farm vegetation	Eligible
Upland matrix of cultivated trees combined with other sporadic on farm vegetation	Eligible
Bush	Eligible
Grassland	Eligible
Barren	Eligible
Settlement	Ineligible
Water	Ineligible
Settlements	Ineligible
Other land uses including roads, quarries, airstrips	Ineligible

Stratification is important to ensure accuracy and precision of data collected. Stratification involves dividing the project area into sub-populations (strata) that form relatively homogeneous units. Stratification is based on satellite imagery, aerial photographs and maps of vegetation, soils and/or topography. The results of remote sensing were validated through ground truthing by field survey. The initial unsupervised land cover classification, which was based upon field observation, identified the strata as shown in Table 1.

Sub-step 4: Field Survey

The field survey was undertaken in two phases. During the first phase upland and lowland agricultural strata were further divided for greater accuracy in estimation of baseline carbon stocks (see table 2)

Table 2. Land use stratification		
Preliminary land use classification and description (1)	**Preliminary land use classification and description (2)**	**Eligibility**
Forest (at any point in time series 2000, 2003, 2006 or 2010)	Unchanged	Ineligible
Sugar cane production area	Unchanged	Ineligible
Irrigated rice production area	Unchanged	Ineligible
Other wetland	Unchanged	Ineligible
Lowland matrix of cultivated trees combined with other sporadic on farm vegetation	Ag10	Eligible
	Ag20	Eligible
	Ag60	Eligible
Upland matrix of cultivated trees combined with other sporadic on farm vegetation	Ag10	Eligible
	Ag20	Eligible
	Ag60	Eligible
Bush	Unchanged	Eligible
Grassland	Unchanged	Eligible
Barren	Unchanged	Eligible
Settlement	Unchanged	Ineligible
Water	Unchanged	Ineligible
Settlements	Unchanged	Ineligible
Other land uses including roads, quarries, airstrips	Unchanged	Ineligible

Biomass data from a minimum of six randomly located 0.1 hectare sample plots in each of the eligible land use strata was collected. After analysis of the data from the preliminary sampling, it was established that the baseline carbon stocks for all of the 44 plots sampled was less than four tons of carbon dioxide per hectare with a standard deviation of 2.64 tCO_2e. Baseline carbon stocks in the different strata sampled were shown to be low (<4tCO_2/ha) with relatively low variation between samples. It therefore made sense to merge all the initial strata into one single matrix to cover all of the upland and lowland all of the eligible project area. The Winrock sample calculation tool (2007) was used to calculate that 225 additional 0.1 hectare sample plots were required located based on a matrix across all the eligible project areas in order to achieve a precision level of 10% and a confidence level of 95% of baseline carbon stocks within the eligible project areas. A single baseline carbon value will therefore apply to all new project activity instances within the project area delineated within this document.

Sub-step 5: Final Stratification

The final stratification merged all the agricultural strata (excluding rice and sugarcane) together with the grassland, barren and bush strata to form a single baseline stratum which is eligible for new project activity instances within the project area (see Flow Chart 1) in both lowland and upland areas. This baseline stratification is in line with the methodology applicability conditions, namely that project activities are implemented on grasslands or croplands. According to AR-AMS0007[2] the following definitions apply to cropland and grassland:

> **Cropland.** Arable and tillage land that contains annual and/or perennial crops and/or woody vegetation that does not impair its eligibility for AR CDM project activities.
>
> **Grassland.** Rangeland/pasture-land subjected to any kind of anthropogenic exploitation that may include systems with woody vegetation that does not impair eligibility of the land for A/R CDM project activities.

These definitions of cropland and grassland are assumed to be the same for the SACC project.

Further details of the stratification methods used are available in Annex 2.

A copy of the Winrock sample calculation tool will also be sent to the validator.

[2] http://cdm.unfccc.int/methodologies/DB/1GB973D5DQ1XKYBG8V2R357T9RMVUI

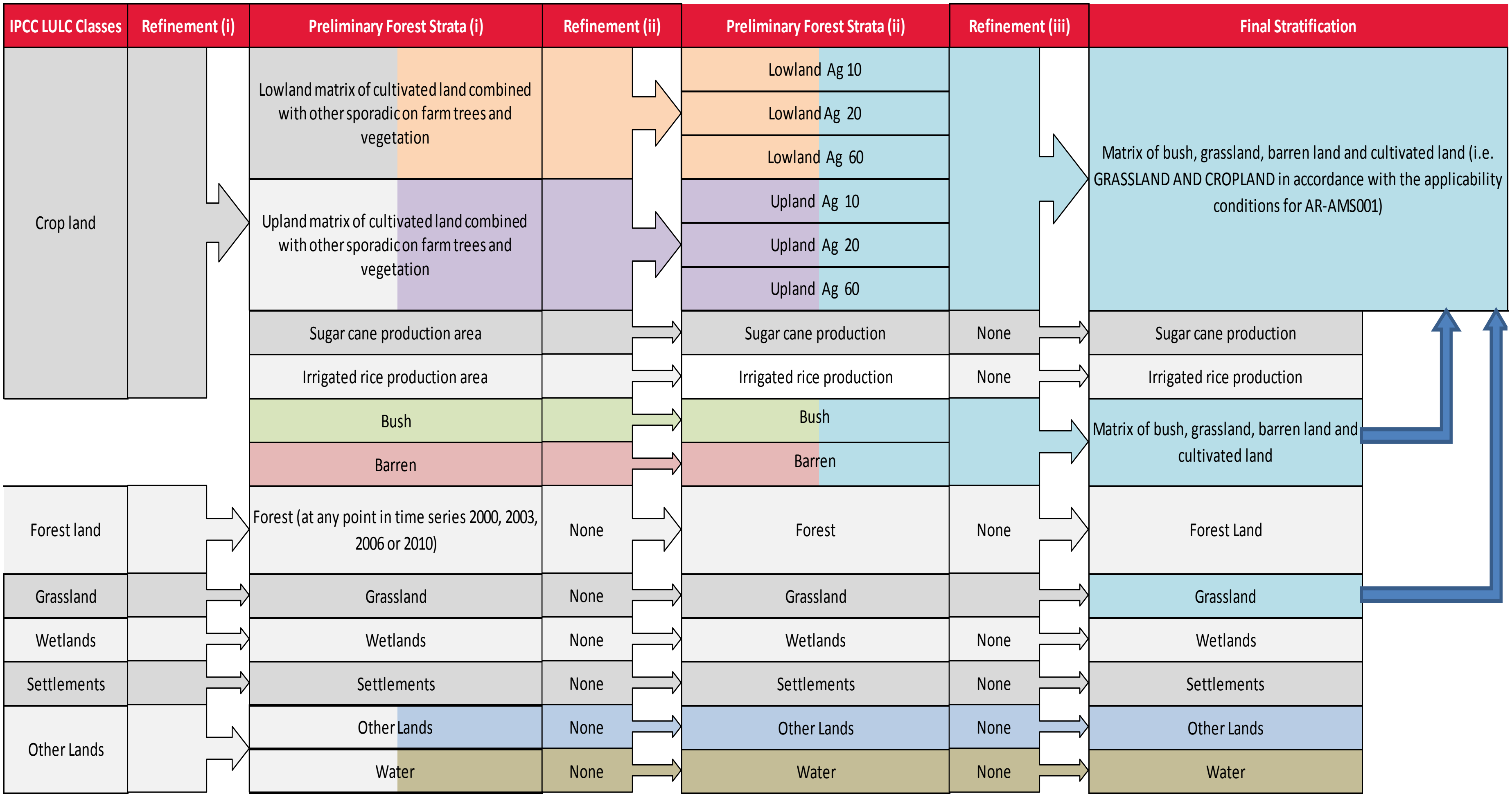


Figure 1.7 Stratification process

Method of Calculation - Baseline Carbon Stocks

Baseline carbon stocks were determined using equations 1, 2, and 6 of AR-AMS001 / V.6. (See attached spreadsheet Final Carbon Baseline for SACC.xls).

Sampling Methodology

To determine the carbon stock in the area prior to project, 225 sample plots were analysed. Vegetation in these plots was measured for the following parameters:

- Diameter of tree at breast height (cm)
- Height (m)
- Stem volume (m^3)
- Dry wood density (tons/m^3)

These data were used in a number of equations, using carbon content variables and conversion factors, to determine the following outputs:

- Stem dry biomass (tons/stem)
- Total dry biomass (tons/stem)
- Carbon/tree (tC/tree)
- Carbon density (tC/ha)

These outputs are necessary to determine the total baseline carbon stock and this was measured for each land type identified in the stratification process.

Results of Carbon Stock Calculation

The results of the carbon stock calculation demonstrate that for a matrix of cultivated trees combined with other sporadic on farm vegetation, bush and bare land, the average carbon stock was 6.34tCO_2/ha. It was found that the difference between carbon stocks for this land use type in upland and lowland areas was negligible (<5%). Average baseline biomass (above and below ground for woody perennials and below ground for grasses) based on the 127 samples taken from within the project area is 2.48 tonnes with standard deviation of 5.57 tonnes of biomass per hectare. A conservative estimate of baseline biomass is 3.45 tonnes per hectare with a confidence level of 95% which is equivalent to 1.73 tonnes of carbon per hectare (equivalent to 6.34 tonnes of CO_2 / hectare).

Values for biomass carbon stocks in other land use stratum within the project area are presented in Table 3. The calculations for carbon storage in sugarcane, rice paddies and forests are all based on IPCC values. These areas are not eligible to participate in project AR activities and no changes are expected to carbon stocks within these stratum as a direct or indirect result of any project activities.

Carbon stocks for land use types identified in the stratification process are detailed below (Table 3).

Table 3 Total biomass carbon stock in SACC project area

Land use stratum	Area (ha) within project area	tCO_2/ha	Carbon stock (tCO_2)
Matrix of bush, grassland, barren land and cultivated land	154,989	6.34	982,630
Sugarcane production	11,578	110.00[3]	1,273,580
Irrigated rice production and wetland area	25,108	18.33[4]	460,313
Forest land	8,830	537.00[5]	4,741,710
Settlements	333	0.00	0
Other lands (including water bodies)	7,347	0.00	0
TOTAL	208,185		7,458,233

[3] Sugar cane source '2006 IPCC Guidelines for National Greenhouse Gas Inventories' Volume 4 Agriculture, Forestry and Other Land Uses. Ref to chapter 5, Table 5.9, Default Biomass Carbon Stocks Present on Land Converted Cropland in the year Following Conversion. For perennial crops in tropical moist areas carbon stock after one year is 10 tC. Sugare cane is a perennial crop typically managed aver a 6 year cycle with 4 harvesting rotations within that cycle. We have conservatively assumed additional 10 tC sequestered per year over each 6 year period with long term average carbon storage of 30tC.

[4] Irrigated rice source '2006 IPCC Guidelines for National Greenhouse Gas Inventories' Volume 4 Agriculture, Forestry and Other Land Uses. Ref to chapter 5, Table 5.9, Default Biomass Carbon Stocks Present on Land Converted Cropland in the year Following Conversion. For annual crops carbon stock after one year is 5 tC.

[5] Forest Land source '2006 IPCC Guidelines for National Greenhouse Gas Inventories' Volume 4 Agriculture, Forestry and Other Land Uses. Ref to chapter 4, Table 4.7, Above ground biomass in tropical moist deciduous forest is 260 tonnes dry matter per hectare and ratio of below ground to above ground biomass is 0.2 (Table 4.4). The carbon fraction [tonne C (tonne d.m.)-1] is 0.47.

Total biomass carbon stock (tCO_2) in the SACC project area is estimated to be 7,458,233.

Community Information

G1.5 Community Description

Basic Parameters

The entire project area is densely populated due to numerous resettlement schemes dating back to the 1960's and a growing population.

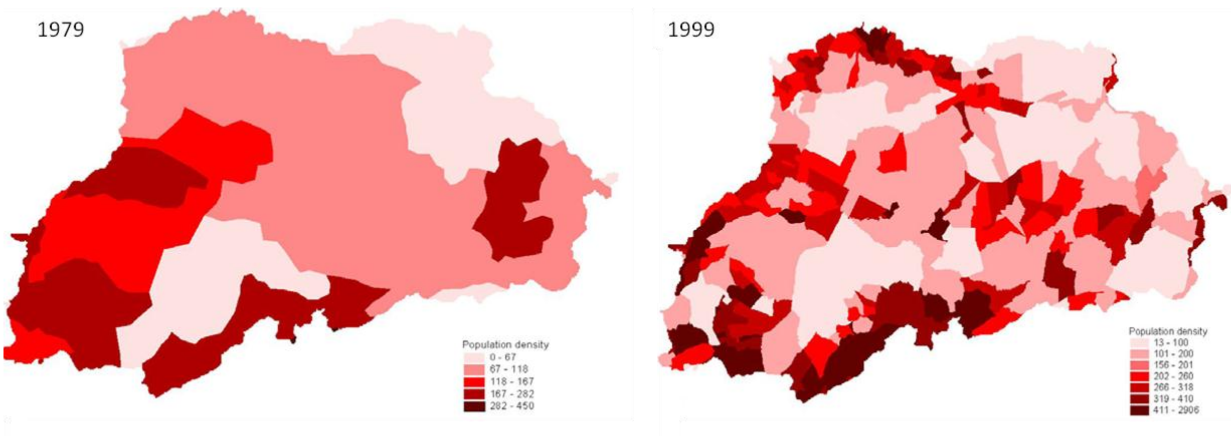


Figure 1.8 Population change in the Nyando basin between 1979 -1999 (Source: Olaka[16])

The project area contains three constituencies in their entirety; Muhuroni, Nyando and Nyakach with 93,204 households according to the 2009 census (see Table 4). Parts of the Kisumu East, Tinderet and Kipkelion constituencies are also located inside the project area though it is not clear what proportion of the population live inside the boundaries of the project area. It is estimated that there are up to 115,000 households living inside the project area that may benefit from the SACC project with a total estimated population of more than 500,000 people. This figure includes population from parts of Kisumu East, Tinderet and Kipkelion, although these constituencies are not included in their entirety within the project area.

The population of the Nyando basin is mostly young, with 42.7% of the population between the ages of 0-15 years (KIHBS - Basic Report). The population is comprised of 51.3% females and 48.7% males (KIHBS

– Basic Report), although high rates of population increase may invalidate these figures, which were collected in 2006.

Table 4 Population Density projections in the Nyando basin by Division		
Constituency	**2009**	
	Popn	**No. of HH**
Muhoroni	**145,764**	**33,551**
Nyando	**141,037**	**30,439**
Nyakach	**133,041**	**29,214**
Kisumu East	264,227	67,291
Tinderet	199,514	42,860
Kipkelion	206,590	42,310
Total area	**1,090,173**	**245,665**

Source: Nyando District Development Plan 2008-2012[24]

The population in the Nyando Basin is among the poorest in Kenya, 65% of the homes are poor in comparison to 52% for Kenya on average[23]. Poverty is less prevalent in the rural areas at 61% compared to urban areas, where it stands at 72%[24]. Poverty is rife in the project area due to a combination of social, economic and environmental factors, some of which are identified below:

- Degradation of land used for crop cultivation
- Frequency of drought and flood events
- Gender disparity
- Lack of title deeds
- Low literacy rates
- Land conflicts

In addition to the above, Western Kenya is also characterized by high levels of disease and destitution. Recent studies in the area indicate a high prevalence of malaria, HIV/AIDS (29.4% infection rate), tuberculosis and water associated diseases[25], and limited access to healthcare serves to increase the poverty in the area.

Basic household parameters used to indicate poverty consistently show that the lower and mid Nyando basin is poor relative to the provincial average (Table 5). The 'pro-poor' nature of the SACC AR project could play an important part in alleviating poverty across the area.

Table 5 A comparison of basic household parameters across different data sets to evaluate the similarity of sample used for analysis[26].

Basic Indicator	Lower Nyando	Mid Nyando	Nyanza province
Male-headed household (male=1.0)	0.68	0.92	0.60
Hold title to land (yes=1.0)	0.93	0.61	-
Farm size (acres)	2.32	3	-
Household education - None	0.32	0.16	0.18
Household education – primary	0.5	0.59	0.60
Household education – secondary	0.13	0.15	0.19
Household education – post secondary	0.3	0	0.3

The vast majority of stakeholders within the project area belong to one major language and ethnic group: the Luo, who settled in the lower and middle watershed, although there is a significant presence of a second group: the Kalenjin (comprising the Nandi and Kipsigis sub-groups), who live in upstream areas. Resettlement of the large farms in the upper catchment has led to the coexistence of distinct clusters of Kalenjin and people from other ethnic groups. This was one of the factors that contributed to politically motivated "tribal clashes" in 1992, 1994 and 1997[27].

Both the Luo and the Kalenjin rely on agriculture as a primary source of income. About 60% of the population are employed in agricultural activities, which contribute to 52% of household earnings[24]. Despite heavy reliance on agriculture, less than 20% of Kenyan land is suitable for cultivation and of this only 20% is classified as being of high or medium potential. The lack of alternative sources of income has forced communities into poverty and output from the agricultural sector is low due to the poor use of modern agricultural technology, lack of proper storage, erratic and unreliable rainfall, lack of credit facilities, high costs of seed and other inputs, and poor road networks. In the 2009/2010 drought year farm productivity, measured in terms of Kenyan shillings, decreased by an average of 50% across the lower and mid Nyando basin[26] and agricultural productivity is likely to worsen in light of high levels of land degradation and increasing frequency of floods and droughts across the project area.

Gender Roles

Agricultural and agroforestry activities are typically male-dominated, although women are generally the primary users of timber products in the project area. Households with female heads have lower food security, as they tend to own smaller and less productive farms[26], and gender roles in communities across the project area are such that females do not generally have control over income-generating activities. Previous studies have confirmed strong gender differentiation in household roles across the Nyando basin, with women bearing most responsibility for household water supply[28].

Preliminary studies in the area have determined that gender control over resources varies between different communities and hence when implementing the AR activities, these heterogeneities need to be taken into consideration[29]. Generally women cannot claim ownership of trees and this will affect who is responsible for the maintenance of vegetation introduced by the SACC project. However women can plant trees like *Calliandra* and *Gliricidia* (hence the eponym "women's trees") for fodder/wood fuel and there is opportunity for female involvement in the project through the introduction of different types of vegetation.

Non-native species will not have been assigned gender controls amongst communities in the Nyando basin and hence women can take responsibility for new species planted for AR purposes. During initial consultation with the community, it was determined that women have preferred fodder tree species on farms such as *Gliricidia* spp. and *Leucaena* spp. Efforts will be made by CARE to include these species in planting interventions, as women will mostly be responsible for the maintenance of trees planted on the homestead scale as part of the SACC project. It is hoped that placing attention to gender issues in the project area prior to the project will result in a project that is equally beneficial to both genders.

G1.6 Current Land Use

The main land uses observed within the project area are:

* **Subsistence farming**. Most farmers practice subsistence farming. There are numerous limitations to commercial agriculture, including lack of resources for investment and small land sizes especially in lower Nyando where the population is fairly dense and the average land holding per household is less than 1 hectare.
* **Settlement**. The lower Nyando project intervention area has attracted a lot of settlers especially from the flood prone areas, thereby increasing its population considerably.
* **Grazing.** Livestock is a major asset to the community living in these areas. The number of livestock has continued to grow resulting in overgrazing in most parts of the project area. The typical practice in Lower Nyando is free grazing.
* **Sugarcane.** This is a perennial plant that is harvested up to four times over a 6 year period[30] and is used in the lower and mid Nyando basin as a cash crop. Sugar cane production is associated with burning of land prior to harvesting which contributes to land degradation in the area[31].
* **Rice.** Farming of rice has become increasingly common in the lower Nyando catchment, where both the Nyando River and Lake Victoria provide sufficient irrigation for crop cultivation.

Land use change

Remote sensing analyses of the project area indicate that a large proportion of the land is degraded or degrading agricultural land, which historically would have been forested. The result of the large increases in fallow land and grassland combined with the decline in tree cover is increasing competition between land use types; a problem which is further exacerbated by soil infertility that prevents over-cultivation of cropland. The predominant land use changes occurring are:

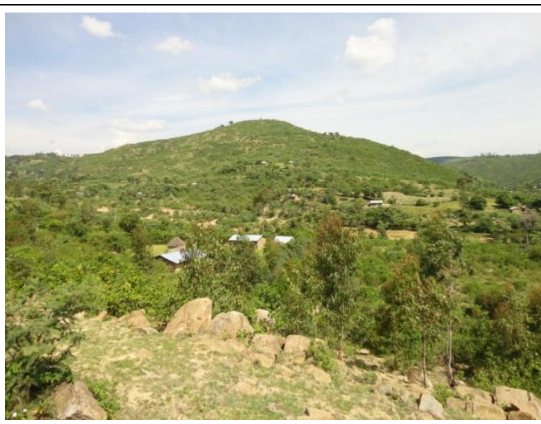
1. Community bush land is under increasing pressure from grazing by livestock and encroachment for agricultural cultivation, the majority of which appears to be relatively recent. In the past, exploitation of the bush land was intense for firewood, charcoal, construction timber, clearance for settlement and agriculture. This has decreased recently because community bush has become increasingly scarce.

2. Farming. The community has been practising farming without proper technical knowledge. Poor farming practises have resulted in erosion and exhaustion of soils necessitating shifting agriculture. A lot of land has been left fallow and bushland has been cleared to give room for more agricultural land.
3. Settlement. There has been an increase in the number of homes although some extensive bare areas of land still remain and tree cover throughout the region is negligible with the exception of sporadic trees located around homesteads.

History of tree planting

Tree planting activities to date in the proposed project areas have been limited, with a survey conducted in the project area identifying approximately 2,000 farmers to have participated in AR activities[32]. There is however increasing awareness of the need for tree planting after exhausting the trees which were previously naturally available. Consultation with local communities has revealed that people want to plant trees but have limited knowledge of the appropriate species to use in planting schemes, and generally have insufficient financial capacity to make such an investment[26]. There is a need for extension services and farmer support to develop tree planting programmes. This project presents an opportunity for financial barriers to be surmounted and carbon finance schemes are likely to result in the widespread adoption of AR activities in the lower and mid Nyando basin.

Valid land use covers for tree planting

Bush	Grassland
	

Lowland matrix	Lowland matrix
	
Upland matrix	**Forest edge**
	

Biodiversity Information

G1.7 Current Biodiversity

Wildlife Biodiversity

Kenya is widely known for its abundant and diverse wildlife, especially large mammals such as elephants, zebra and buffalo. However a long history of human habitation and agriculture in the Nyando basin has resulted in the replacement of native wildlife primarily with species used for agriculture. There are no recorded species in the project area that are classed as vulnerable (VU) endangered (EN) or critically endangered (CR) according to the IUCN Red List.

The project presents an opportunity for replenishment of biodiversity in the lower and mid Nyando basin, as tree planting schemes are likely to encourage insect and bird life. Previous studies have shown that areas subject to AR activities can support species that are assemblages that are as abundant and diverse as native forests; however the species composition of these assemblages is highly modified from natural conditions[34].

Botanical Biodiversity

The lower and mid Nyando basin has suffered a loss of plant biodiversity in light of climate change and resettlement[17]. The land uses that dominate the lower and mid Nyando basin are identified in the images G1.6 above, where it is evident that land types look degraded and have relatively low species diversity. Hence continued transition of forested areas to agricultural land for economic purposes will decrease the biodiversity of the project area.

AR activities planned in the project area will introduce indigenous tree species including*, Markhamia lutea* and *Terminalia brownii* and carefully selected exotic / naturalized species including *Eucalyptus spp, Casuarina spp, Grevillea robusta* and *Leucaena Leucocephala.* Exotic tree species selection has been done with the objective of meeting the needs of project participants for forest products. The project activity instances will serve to enhance biodiversity on the homestead scale in addition to the crop species that have largely replaced indigenous trees in the lower and mid Nyando basin. However, the controlled nature of the replanting scheme means that increases in botanical biodiversity that can be attributed to the project are limited.

G1.8 High Conservation Values Evaluation

G1.8.1 Globally, Regionally or Nationally Significant Concentrations of Biodiversity Values

There are no (a) protected areas (b) threatened species (c) endemic species (d) areas that support significant concentrations of a species in the project area.

G1.8.2 Large Landscape-level Areas with Significant Naturally Occurring Species

Significant naturally occurring animal species have largely been replaced with species used for agricultural activities in the project area. Across the entire lower and mid Nyando naturally occurring plant species such as *Terminalia* have been diminished due to high levels of deforestation, which was initiated with resettlement schemes within the project area in the 1960s. The remaining pockets of *Terminalia* are the principal areas with significant naturally occurring species.

G1.8.3 Threatened or Rare Ecosystems

The eastern boundary of the project area is adjacent to the Tinderet Forest, which is a threatened area where timber reserves are under high pressure from local communities for use as firewood and charcoal. Within the project area itself, several pockets of indigenous *Terminalia* forest remain. The SACC project aims to decrease reliance on threatened forested areas, by providing finance for tree planting on the homestead scale.

G1.8.4 Areas that Provide Critical Ecosystem Services

The River Nyando is a critical ecosystem in the project area. It provides many fish species with breeding grounds, yet these areas are threatened as excess plant material derived from soil erosion and the resultant process of eutrophication congest the water ways. The project presents an opportunity for erosion control and hence will contribute to the restoration and maintenance of productive riverine ecosystems. Soil is a precious resource in the lower and mid Nyando basin, as it is essential for the sustentation of agricultural practices that have previously been identified as a primary source of income for ~60% of the population. Conservation of soil resources is essential for food, fodder, medicines or building materials and therefore the project can be identified as meeting the requirements of local communities.

G1.8.5 Areas Fundamental for Meeting the Basic Needs of Local Communities

The majority of land in the lower and mid Nyando basin is used for agricultural purposes, which provides local people with their basic food requirements and income. Agricultural practices will be protected, supported and bettered by the introduction of the SACC project and this forms the founding principle of the proposed AR activities.

Livestock and subsistence farming are the principle economic activity of the communities in Nyando basin. By tradition, the community hold livestock as a form of banking system. Livestock may be sold when cash is required. This will normally happen during times of stress. Most of the families have livestock which will affect tree planting since animals are bound to disturb the young trees. These are factors to consider during the implementation of the SACC project.

G1.8.6 Areas Critical for the Cultural Identity of Communities

Culturally property and land rights are still skewed in favour of men and less for women and youths, occasionally resulting in conflicts in the Nyando basin. There are also a number of productive socio-cultural taboos such as the timing of sowing as led by the eldest person in the community or household (*Golo kodhi)* prior to which no one else is allowed to plant amongst the Luo. For Kalenjins it is believed that the strength of a man is determined by the acreage of land under maize leading to delays in planting or cultivation of large areas that are unmanageable for the respective communities.

Education is an important agent for attitude and culture change. Poor people typically have least access to education and therefore the poor tend to take longer to change their ways of doing things and adopting to new production technologies. Their views towards gender roles are traditional and this element of the culture has not changed, even with the encroachment of westernized views into urban areas in Kenya.

G2. Baseline Projections

G2.1 Most Likely Land Use

The most likely land use scenario was assessed as part of the demonstration of additionality (see Section G.2 Additionality) and follows Approved VCS Tool VT0001, Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, Version 1.0.

The most likely land use in the lower and mid Nyando basin is a continuation of pre-project activities, involving overgrazing and unsustainable harvesting of timber products primarily for use as wood fuel, which will result in on-going deforestation and widespread land degradation. Continuation of pre-project activities will exacerbate environmental issues of soil erosion and eutrophication of aquatic ecosystems that have been outlined previously (Section G1.1). Population increases combined with a lack of alternative livelihood opportunities, decreasing timber resources in the project zone and insufficient capacity to protect the remaining vegetation resources clearly provide evidence that the pre-project condition, characterized by escalating use and resource extraction, is the most likely future land use.

Figure 1.6 demonstrates that although most of the deforestation in the SACC project area took place prior to the 1980s, there is still pressure on timber resources in the area. Deforestation and degradation are still taking place and this is supporting evidence of the unsustainable nature of the pre-project activities.

The drivers of GHG emissions, namely overgrazing, burning of crop land, inefficient and unsustainable use of fuelwood (firewood and charcoal), are discussed in detail in G2.3.

G2.2 Additionality

To establish a preliminary justification for the SACC project, it is important to adopt a process that considers whether the agroforestry activities proposed by CARE would have occurred if, holding all conditions in the project area constant, they were not implemented as part of a carbon offset project. This process, applied to demonstrate additionality for the project, is comprised of four steps dictated by the VCS Tool VT0001, Version 1.0, 'Tool for Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities'. The project proposed for implementation by CARE in the lower and mid Nyando basin meets the two applicability conditions set out in VT0001.

Additionality Procedure:

- **STEP 0**. Preliminary screening based on the starting date of the AR project activity;
- **STEP 1**. Identification of alternative land use scenarios to the AR project activity;

- **STEP 2**. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or
- **STEP 3**. Barriers analysis; and
- **STEP 4**. Common practice analysis.

Step 0. Preliminary screening based on the starting date of the AR project activity

Evidence that the afforestation or reforestation project activity has a starting date after 31 December 1999 but before the date of its registration is provided in Annex 3, in the original proposal for the SACC project.

Step 1.

This step serves to identify alternative land use scenarios to the proposed VCS AR project activity(s) that could be the baseline scenario, through the following sub-steps:

Sub-step 1a.

The identified credible land use scenarios for the land within the project boundaries in the absence of the SACC project are:

1. Continuation and escalation (given population increase) of deforestation and degradation of the land as a result of unsustainable harvesting of timber products and overgrazing in line with historical trends.
2. Afforestation / reforestation of the land within the project boundary performed without registration as a VCS project activity.
3. Development of alternative livelihood activities and new employment opportunities.

Sub-step 1a contains more than one land use scenario and therefore the project cannot be considered additional at this stage.

Sub-step 1b.

The list of plausible alternative land use scenarios to the project activity is in full compliance with mandatory legislation and regulations, taking into account their enforcement across the country. The scenarios are developed as a function of behavioral changes that might take place within the project area that would be in line with Kenyan law.

Sub-step 1c.

The historical trends regarding land use and land use change in the lower and mid Nyando basin indicate that deforestation and land degradation is the most likely scenario for the land within the project's boundary. There have been small scale AR projects implemented in the project area previously, yet these are limited due to insufficient financial and technological capacity of the local population. Diversification of employment opportunities is not expected in a rural area where agriculture is the primary income source and fishing operations in the lower Nyando are threatened due to depleted fish stocks in Lake Victoria. Statistics show that livestock numbers are decreasing across the project area[32], due to the need to sell animals during drought and flood events and shifting cultural habits. Finally it is unlikely that pressure will be taken away from existing timber sources, as the local population requires them for wood fuel and charcoal making activities on the homestead scale.

Step 3. Barrier analysis

Sub-step 3a.

A barrier analysis has been performed in place of the investment analysis (Step 2). The following barriers have been identified (barriers are not specific to the project or the project proponents):

Institutional barriers

There is limited guidance available at the grass-root scale in Kenya as to sustainable farming practices. Past government policy has included implementation of higher commodity prices in order to increase incentives to adopt soil conservation measures in agricultural activities[35]. However studies have shown that there is no simple relationship between price distortions created by government policies and farmers' incentives to adopt conservation measures[35]. Policy-induced price changes could lead to either more or less conservation, depending on site-specific conditions. In the Nyando basin, land degradation continues despite preventative governmental policy, as there is lack of knowledge about sustainable agricultural practices amongst some local communities.

Lack of extension services at sub-location and village level is also an important barrier to the SACC project. Carbon finance will enable the project to fund non-governmental these extension services. The Aglife project demonstrates the significance of this barrier, as tree planting occurred once extension agents were in place and farmers were supported without any other incentives.

The main institutional barrier is poor leadership and lack of accountability in the management of land which leads to lack of trust[29]. The strategies for dealing with these barriers includes training and providing workshops on group formation, leadership, group dynamics and financial management. The project will also provide clearer guidelines and rules relating to harvesting of timber products for wood fuel and all other activities that impact upon vegetation resources (e.g. grazing and burning) prior to project implementation. These guidelines will be important in ensuring the sustainability of agroforestry practices after initial planting has been completed.

Technological barriers

There is currently a lack of access to planting materials and a shortage of modern equipment for agricultural activities in the lower and mid Nyando basin. During initial consultation with local communities these factors were outlined by many farmers as placing restrictions on the development of agroforestry practices in the project area. The issue of purchasing seeds was a particular area of concern, as high seed prices have forced some farmers into selling livestock to sustain their agricultural inputs[36]. The barrier associated with the purchase of planting materials and tools for agricultural activities can be overcome with carbon finance revenues.

Revenue from carbon finance can also be used for other domestic investment. For example the community of the lower and mid Nyando basin lacks access to household technologies, such as fuel efficient stoves. Carbon finance revenue can help the community access these efficient stoves, which in turn will place less reliance on existing forest resources to provide wood fuel. This is an example of positive feedback that might result from the project activities to improve agricultural practices and yields, whilst alleviating poverty amongst local communities.

Barriers related to local tradition

The traditional Luo way of life is based around agriculture and pastoral herding. Typically communities in the lower and mid Nyando basin have not had opportunities to develop the skills required to establish sustainable planting and maintain trees over an extended period of time. Furthermore there are also a number of socio-cultural barriers and taboos, such as timing sowing as led by the eldest person in the community or household (*Golo kodhi)* prior to which no one else is allowed to plant amongst the Luo. For Kalenjins it is believed that the strength of a man is determined by the acreage of land under maize leading to delays in planting or cultivation of large areas that are unmanageable for the respective communities[29].These significant barriers can be overcome through the sale of carbon offsets and education of the local population as to the benefits of AR activities. The carbon finance resulting from AR activities will be used to develop awareness in sustainable planting techniques.

Local traditions dictate that livestock herds are kept for use as payment when debts need to be settled, as demonstrated by the use of livestock to purchase seeds[26]. The presence of large herds means that land in the lower and mid Nyando basin is under high pressure from grazing. The project will decrease grazing pressure, as famers will be able to access money through carbon finance and therefore will not be required to keep such large herds for use as emergency payment.

Barriers due to prevailing practice

The SACC project will be the second project developed under the AR-AMS0001 VCS methodology in the host country. Previous projects have been implemented in the host country under VCS methodologies, including the TIST Kenya programme and the Kasigau Corridor REDD Project, registered in central and southern Kenya, respectively. The latter project follows a methodology developed for avoided deforestation activities, whilst the former focuses on reforestation activities, similar to the proposed project in the lower and mid Nyando basin. The TIST programme was implemented on a small scale and used the same methodology: AR-AMS0001. Hence there is a history of successful implementation of this method of AR intervention in the Kenya and there should be no barrier due to prevailing practice.

Barriers due to local environmental conditions

Unfavourable climate conditions such as droughts and flooding are becoming more frequent and damaging in the lower and mid Nyando basin. 2009 saw both natural disasters decrease farm productivity levels across the project area by ~50%, from an average of 45,250 Ksh to 20,600 Ksh. Losses are typically greatest amongst smaller, poorer herders in the lower basin, who have fewer resources to take water to their livestock and crops during extreme dry periods. The lower basin tends to be affected by floods and droughts on a cyclical basis and hence the issues of land degradation and soil erosion are exacerbated relative to the mid Nyando basin. This project is intended to deliver substantial climate adaptation benefits to farmers affected by adverse climate conditions across the project area, through the development of sustainable resource management plans and reduction in over-reliance on exploitation of natural resources.

The issue of food security will also be addressed by the SACC project by placing focus on sustainable farming practices across the project area and development of agroforestry systems to improve soil conservation. Over an extended period of time this could contribute to increased crop yields and hence improved food security for land owners in the lower and mid Nyando basin.

Barriers due to social conditions and land-use practices

The underlying causes of deforestation and land degradation are poverty amongst local land owners and an increasing population (Table 1.1). The average annual income for people in Kenya is 720 USD[37]and hence many Kenyans, particularly those who make a living from agriculture, live in a state of poverty. The agents of deforestation and land degradation are primarily poor and are engaged in activities that result in land degradation to meet either subsistence or very low earning commercial agricultural activities.

Previous research has demonstrated that there is understanding amongst local farmers that crop diversification can be used to improve land condition[26]. Furthermore it is understood that trees help to maintain soil stability and fertility[26], yet it is not always feasible for farmers to diversify crops or plant trees due to financial barriers, which include the high costs of seedlings and promotion of the cultivation of crops which can be sold for the greatest profits.

Sub-step 3b.

The identified barriers would not prevent the implementation of at least one of the alternative land use scenarios. Table 6 below demonstrates this.

	Table 6. Barriers in relation to different land use scenarios		
	Scenario		
Barrier	Continuation and escalation of land degradation	Afforestation / reforestation of the land	Development of alternative livelihood activities
Institutional	There is limited enforcement of environmental protection laws	Afforestation is promoted rather than prevented	There are no laws restricting people to certain jobs
Local tradition	This is the traditional norm in the Nyando catchment	2000 farmers have already taken part in afforestation	There is diversification of employment, as 27% of people are not employed in agriculture full time
Prevailing practice	This has been prevailing practice since the 1960s	Afforestation is not prevailing practice, but farmers are taking part in schemes	Diversification of employment opportunities means that alternative livelihoods could becoming prevailing practice
Environmental conditions	Environmental conditions will promote further degradation	Trees can be supported by the soils, even with poor environmental conditions	Environmental conditions may force people from agriculture into other livelihoods
Social conditions and	Social conditions mean that some people are unaware of	Intervention from bodies such as ICRAF will lead to	Agricultural land use practices do not provide

land-use practices	their impact on the land and hence will not change their practices to preserve it	increased awareness that afforestation is a valuable land use practice	high wages and people may want to increase their income through alternative livelihoods

Step 4. Common practice analysis

Kenya has a long history of land degradation. National annual rates of deforestation between 1990 and 2010 are estimated to be 0.34% and soil erosion losses are increasing across the lower and mid Nyando basin. The prevention of land degradation is not considered to be common practice despite the long term benefits that would be observed in terms of increased agricultural yields and soil fertility. Most communities are unable to realize the economic value of timber resources in ways that do not involve deforestation and degradation and therefore, they have not adopted sustainable land use practices on a large scale across the project area.

There are agroforestry activities similar to the proposed project activity previously implemented or currently underway in the lower and mid Nyando basin. However these are sparsely distributed across the project area and are limited to famers with sufficient investment power or third party funding to initiate such activities. Approximately 2,000 farmers in the project area are already involved in agroforestry activities, often initiated in association with the World Agroforestry Centre (ICRAF) and under the guidance of their staff[26]. This however does not represent a significant proportion of the population, which has generally been shown to suffer from increasing poverty as a function of land degradation and population increases (Section G1.5). Higher incidences of poverty leave the local population unable to engage in AR activities, as they have insufficient financial and technological capacity to do so.

Additionality summary

Similar activities to the SACC project cannot be observed on a large scale across the project area. The proposed project activities represent a significant excursion from the baseline scenario for the lower and mid Nyando basin and hence the SACC project is considered to be highly additional.

The approval and implementation of the project will overcome institutional barriers, technological barriers, barriers related to local tradition, barriers due to prevailing practice, barriers due to local ecological conditions and barriers due to social conditions and land-use practices. Hence the project will provide numerous benefits including:

1. Prevention of carbon emissions to the atmosphere, that would occur as a result of the land use activities prevalent in the alternative scenarios.
2. Influence other regional, national, and international stakeholders who can see this as a testing ground for future carbon finance activities related to AR activities and are expected to be motivated to participate in a "learning by doing" exercise regarding carbon monitoring, verification, certification, trading, and carbon project development in general.
3. Close interaction between individuals, communities, government, and carbon markets to intensify the institutional capacity to link networks for environmental products and services.
4. Improvement of land productivity across the project area and increased sustainability of soil resources for future agricultural activities.
5. Empowerment of poor members of society and women through their inclusion in AR activities.
6. Increased financial capacity of the targeted poor section of society from the benefits of carbon finance.

G2.3 Carbon Stock Changes

Project Emissions

Project emissions are considered insignificant and therefore neglected.

Ex ante actual net GHG removal by sinks

Ex ante actual net GHG removal by sinks

Ex ante actual net GHG removal by sinks was estimated in accordance with the methods presented in CDM AR-AMS0001 / V.6 using equations 11, 12, 13, 14, 15, 17 and 21.

The carbon stocks for the project scenario at the starting date of the project activity[6] (*t*=0) shall be the same as the baseline stocks of carbon at the starting date of the project (*t*=0). Therefore:

Equation 11

$$N_{(t=0)} = B_{(t=0)}$$

For all other years, the carbon stocks within the project boundary ($N_{(t)}$) at time *t* shall be calculated as follows:

Equation 12

$$N_{(t)} = \sum_{i=1} (N_{A(t)\,i} + N_{B(t)\,i}) * A_i$$

where:

$N_{(t)}$ Total carbon stocks in biomass at time t under the project scenario (t C)

$N_{A(t)\,i}$ Carbon stocks in above-ground biomass at time t of stratum *i* under the project scenario (t C/ha)

$N_{B(t)\,i}$ Carbon stocks in below-ground biomass at time t of stratum i under the project scenario (t C/ha)

A_i Project activity area of stratum *i* (ha)

i Stratum *i* (I = total number of strata)

6 The starting date of the project activity should be the time when the land is prepared for the initiation of the afforestation or reforestation project activity under the CDM. In accordance with paragraph 23 of the modalities and procedures for afforestation and reforestation project activities under the CDM, the crediting period shall begin at the start of the afforestation and reforestation project activity under the CDM (see UNFCCC website at <http://unfccc.int/resource/docs/cop9/06a02.pdf#page=21>).

Above-ground biomass

For above-ground biomass $N_{A(t)\,i}$ is calculated per stratum *i* as follows:

Equation 13

$N_{A(t)\,i} = T_{(t)i} * 0.5$

where:

$N_{A(t)\,i}$	Carbon stocks in above-ground biomass at time t under the project scenario (t C/ha)
$T_{(t)i}$	Above-ground biomass at time t under the project scenario (t d.m./ha)
0.5	Carbon fraction of dry matter (t C/t d.m.)

1. If biomass tables or equations are available then these shall be used to estimate $T_{(t)i}$ per stratum *i.* If volume table or equations are used then:

Equation 14

$T_{(t)i} = SV_{(t)i} * BEF * WD$

where:

$T_{(t)i}$	Above-ground biomass at time *t* under the project scenario (t d.m./ha)
$SV_{(t)i}$	Stem volume at time t for the project scenario (m^3/ha)
BEF	Biomass expansion factor (over bark) from stem to total above-ground biomass (dimensionless)
WD	Basic wood density (t d.m./m^3)

Values for $SV_{(t)i}$ have been obtained from national sources (based on field data collection from within the project). Values for *BEF* have been obtained from table 3A.1.10 of the IPCC good practice guidance for LULUCF. Values for wood density have been obtained from Table 3A.1.9 of the *IPCC good practice guidance* for LULUCF.

Below-ground biomass

For below-ground biomass, $N_{B(t)}$ is calculated per stratum *i* as follows:

Equation15

$N_{B(t)\ i}=T_{(t)}\ *\ R * 0.5$

where:

$N_{B(t)\ i}$	Carbon stocks in below-ground biomass at time t under the project scenario (t C/ha)
$T_{(t)}$	Above-ground biomass at time *t* under the project scenario (t d.m./ha)
R	Root to shoot ratio (t d.m./ t d.m.)
0.5	Carbon fraction of dry matter (t C/t d.m.)

Equation17

The removal component of actual net GHG removals by sinks can be calculated by:

$\Delta C_{PROJ,t} = (N_t - N_{t-1})*(44/12)/Dt$

where:

$\Delta C_{PROJ,t}$	Removal component of actual net GHG removals by sinks per annum (t CO_2-e/year)
$N_{(t)}$	Total carbon stocks in biomass at time *t* under the project scenario (t C)
Dt	Time increment = 1 (year)

2. Project emissions are considered insignificant and therefore:

$GHG_{PROJ,t} = 0$

where:

$GHG_{PROJ,\ t}$	Project emissions (t CO_2-e/year)

Equation21

The net anthropogenic GHG removals by sinks for each year during the first crediting period are calculated as,

$ER_{AR\ CDM,\ t} = \Delta C_{PROJ,\ t} - \Delta C_{BSL,\ t} - GHG_{PROJ,\ t} - L_t$

where:

$ER_{AR\ CDM,\ t}$	Net anthropogenic GHG removals by sinks (t CO_2-e/year)
$\Delta C_{PROJ,\ t}$	Project GHG removals by sinks at time t (t CO_2-e/year)
$\Delta C_{BSL,t}$	Baseline net GHG removals by sinks (t CO_2-e/year)
$GHG_{PROJ,\ t}$	Project emissions (t CO_2-e/year)

L_t Leakage attributable to the project activity at time t (t CO_2-e / year)

To improve the accuracy of the estimation of carbon sinks, the project area was stratified into Upland (between 1300 and 1800m above sea level) and Lowland (between 1120 m and 1300 m above sea level) zones, and carbon models developed for each technical specification (i.e. planting plan) based on the tree species proposed for each specification. The results of GHG removals by sinks are therefore presented for each of the six strata. The strata are listed in Table 7.

Table 7: Project planting plan stratification

1	Lowland	Dispersed interplanting
2		Woodlot
3		Boundary planting
4	Upland	Dispersed interplanting
5		Woodlot
6		Boundary planting

The equations were applied in the following order:

- Equation 14 – Above ground biomass
- Equation 13- Above ground carbon
- Equation 15 – Below ground carbon
- Equation 11 – Carbon stocks at starting date of project activity
- Equation 17 – Annual removals
- Equation 12 – Total project carbon

ABOVE GROUND BIOMASS

Stem volume is a critical parameter required for equation 14. There is no information concerning the growth characteristics of the trees to be planted through the SACC project. The SACC project therefore collected data on tree growth rates from within the project area in order to determine SV. The following methods were used to determine the SV potential of the tree species recommended in the 3 different project planting systems at different points in time:

a. Field data collection

1.1.1. Tree selection

Trees of different ages and sizes throughout the range of interest (1-50 years old) were selected from the locality of the project area. Selected trees must be of a known age. Tree age is usually established through conversation with the farmer. Ideally, a minimum of 10 trees in each age class (i.e. 1 – 10years, 11 – 20 years, etc.) should be measured for each species. If there is a lot of variation among individual trees, larger sample sizes may be necessary.

1.1.2. Measurement

A separate data sheet was used for each farm visited. For each farm visited the following records were made:

- Location of measurement;
- Geographical coordinates of the site
- Elevation in m.a.s.l.;
- Soil type.

For each tree measured the following was recorded:

- the species;
- the diameter of the stem 1.3 m above ground level (a stick marked at 1.3 m can be useful for determining the correct height to make the measurements). Be aware of the correct way to measure trees with non-standard stems (see Figure 1.9). Record the value in cm to one decimal place (i.e. 10.2 cm);
- the height of the tree, measured directly for smaller trees, or with a clinometer for larger trees. Record the value in m to one decimal place (i.e. 3.4 m);
- crown position (1-5; see Figure 1.10);
- crown form (1-5; see Figure 1.11);
- whether the tree is planted or grew naturally;
- age of the tree; and
- any signs or details of management (e.g. coppicing or pruning).

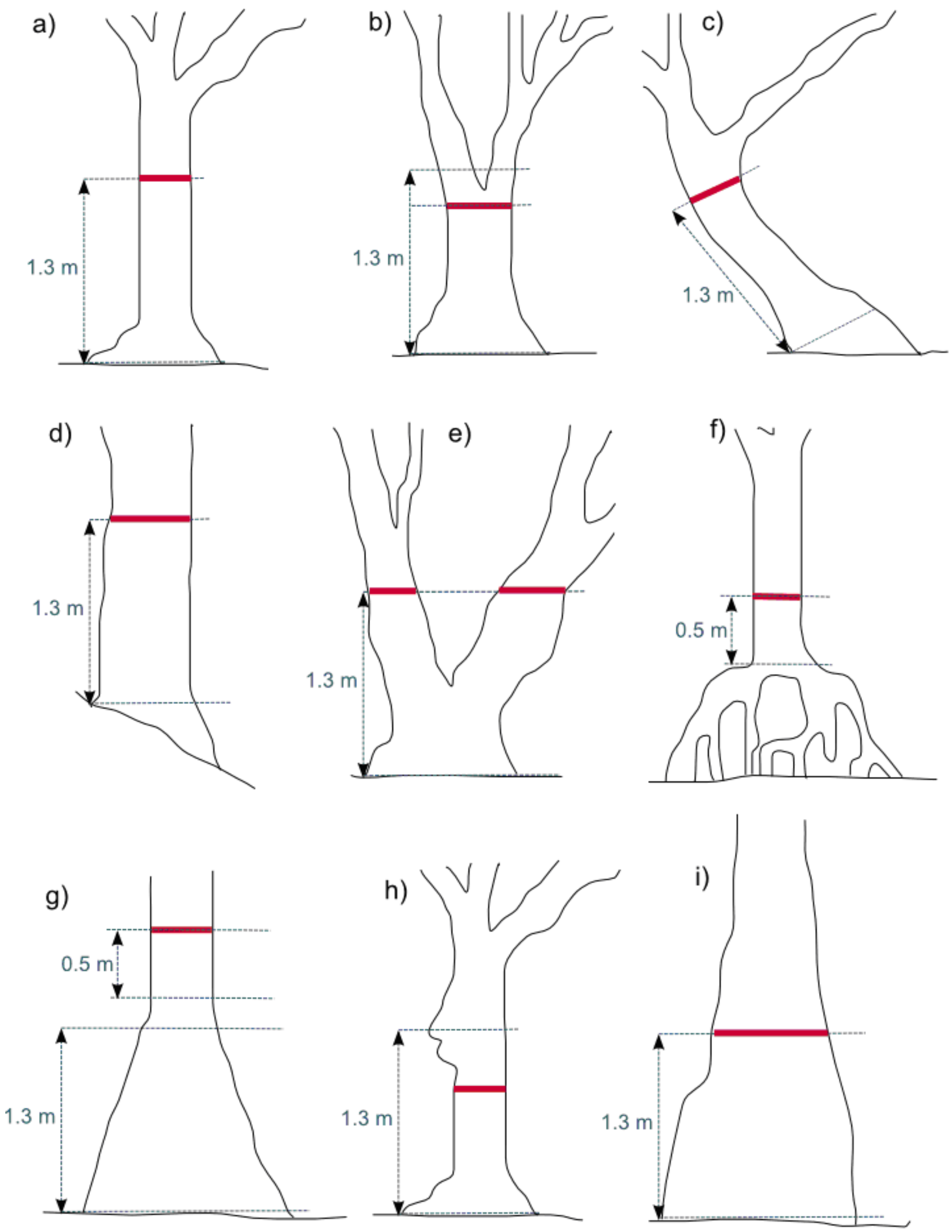


Figure 1.9: To determine the point of measurement for trees: a) Whenever possible record d.b.h. at 1.3 m height b) if the tree is forked at or below 1.3 m, measure just below the fork point; c) if the tree is leaning, make sure the tape measure is wrapped around the tree according the tree's natural angle (instead of parallel to the ground); d) if the tree is on a slope measure record measure 1.3 m on the uphill side; e) if it is not possible to measure below the fork point, measure as two trees; f) if the tree has stilt roots, measure 50 cm above the highest stilt root; g) if the tree is buttressed at 1.3 m, measure

50 cm above the top of the buttress; h) if the tree is deformed at 1.3 m, measure 2 cm below the deformity; i) if the tree is fluted for its entire height, measure at 1.3 m If the tree has fallen but is still alive (if there are green leaves present) measure the d.b.h. as if it was standing). Pass the tape under any vines or roots on the stem.

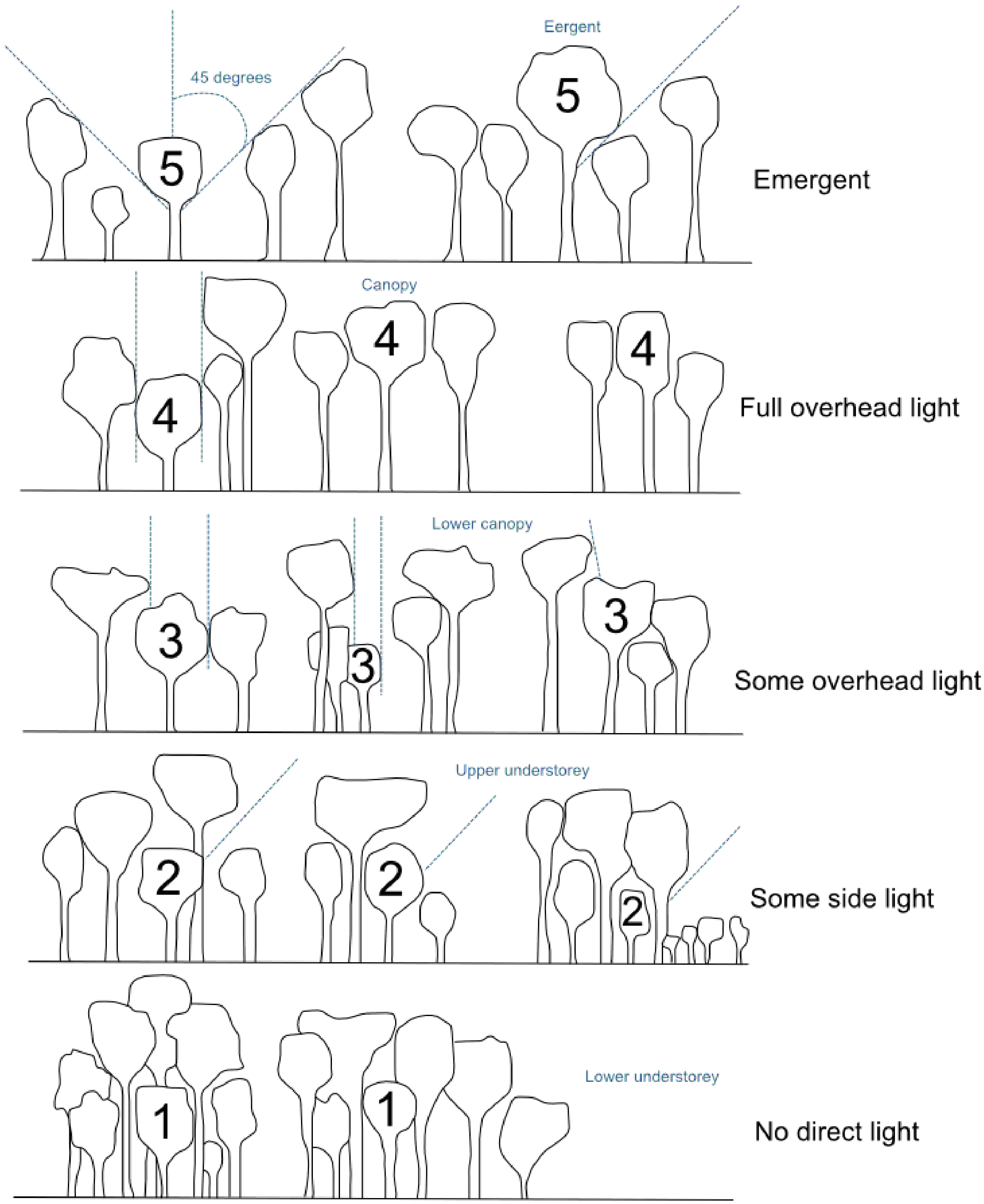


Figure 1.10: Crown position index (CPI; trees are classified on a scale from 1 to 5 depending on light received by the crown of the tree.

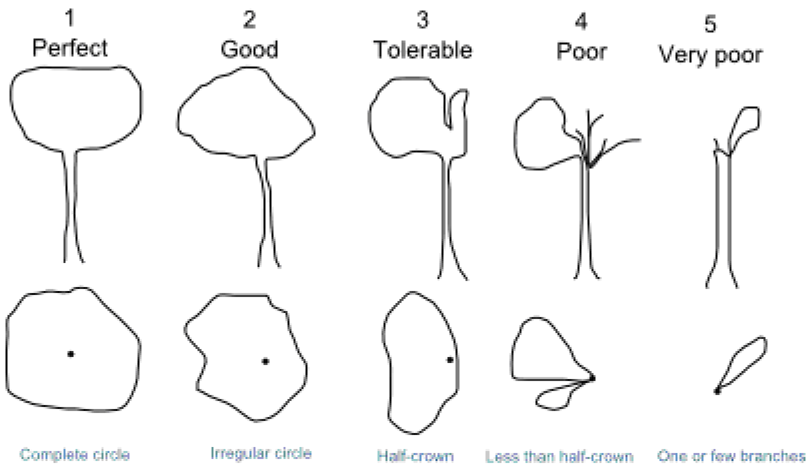


Figure 1.11: Crown form index (CFI); trees are classified on a scale from 1 to 5 depending on the condition of the crown.

The actual number of tree measured within each age class is shown in Tables 8 and 9. Where the minimum target of 10 trees has not been achieved this is due to the non-availability of suitable trees to measure within the project area.

Table 8: Tree species and miminum number of trees to be measured in Lowland areas

Tree species	1 – 10 years	10 – 20 years	20 – 30 years	>30 years
Markhamia lutea	10	8	4	3
Casuarina equisetifolia	24	7	10	
Grevillea robusta	23	18	4	12
Eucalyptus camaldulensis	21	11	1	
Terminalia brownii	11	16	10	10
Leucaena leucocephala	20	11	4	

Table 9: Tree species and miminum number of trees to be measured in upland areas

Tree species	1 – 10 years	10 – 20 years	20 – 30 years	>30 years
Markhamia lutea	20	13	1	
Casuarina equisetifolia	24	10	10	12
Grevillea robusta	26	19	8	4
Eucalyptus camaldulensis	10	5	7	7
Terminalia brownii	11	2	6	11
Leucaena leucocephala	13	4	2	

1.2 Data analysis

The tree measurement data (height and dbh) was used to calculate current annual volume increment (CAI) for different tree species (m^3/ha/yr) and standing volume at different points in time (as required for equation 14 of AR-AMS0001):

Estimate dbh:height relationship (plotted dbh vs height and calculated best fit line)

Estimate dbh:age relationship (plotted age vs dbh and calculated best fit line)

Estimate height:age relationship (plotted height vs age and calculated best fit line)

Calculate individual tree stem volume in (m^3) using the predicted dbh and heights from trees of age 1, 2, 3, ...5…20, etc. Next calculate the predicted stem volume of the tree at ages 1, 2, 3, ...5…20, etc. based on the volume of a cone using the Huber formula:

$$v_i = \frac{\pi \left(\frac{d_i}{200} \right)^2 h_i}{\rho}$$

Where ρ = form factor (a form factor of 3 has been used for all tree species)[7]. The factor 200 is used to convert the cross-sectional area units from cm^2 to m^2.

Calculate annual increment per tree at age in successive years from planting to harvesting as the increase in volume between the two ages (e.g. volume at age 15 minus volume at age 10) divided by 5 (years)

Multiply the CAI per tree by the number of trees in the technical specification (refer to the establishment and maintenance plan) to annual volume increment per hectare (m^3/ha).

A forecast of individual tree stem volume for the species growing in lowland and upland conditions (stratum) is presented in Tables 10 and 11

[7] Australian Government, Department of the Environment and Heritage Australian Greenhouse Office. http://www.greenhouse.gov.au/nrm/fieldmeasurement/part02/section4two.html.

Table 10: Tree stem volume (m^3)in lowland stratum						
Year	*Markhamia lutea*	*Casuarina equisetifolia*	*Grevillea robusta*	*Eucalyptus camaldulensis*	*Terminalia brownii*	*Leucaena leucocephala*
1	0.00064638	0.00118684	0.0008546	0.0006814	0.00097161	0.00106639
2	0.00299525	0.00281325	0.01302009	0.01822685	0.01434324	0.01010251
3	0.00724474	0.00666844	0.03009655	0.04885039	0.03359995	0.02241207
4	0.01530116	0.01647795	0.04816455	0.08413996	0.05425721	0.03543636
5	0.02881501	0.04203215	0.06614585	0.12094552	0.07498713	0.04842451
6	0.04416495	0.07557325	0.08368698	0.15795982	0.09532498	0.06112057
7	0.06059328	0.11469058	0.10067377	0.19459258	0.11510302	0.07343747
8	0.07764523	0.15771007	0.11708272	0.23056903	0.13427082	0.08535379
9	0.0950366	0.20346988	0.13292684	0.26576561	0.15282775	0.09687533
10	0.11258407	0.25115137	0.14823365	0.30013554	0.17079469	0.10801916
11	0.13016653	0.30016747	0.16303556	0.33367231	0.18820133	0.11880651
12	0.14770263	0.35009007	0.17736562	0.36639074	0.20508014	0.12925955
13	0.16513725	0.40060243	0.19125556	0.39831674	0.22146352	0.13939986
14	0.18243293	0.45146725	0.204735	0.42948163	0.2373825	0.14924782
15	0.19956437	0.50250498	0.21783126	0.45991889	0.25286614	0.15882229
16	0.21651478	0.55357862	0.2305693	0.48966235	0.26794134	0.16814063
17	0.2332734	0.60458304	0.24297187	0.51874509	0.28263289	0.17721873
18	0.24983378	0.65543719	0.2550597	0.54719893	0.29696352	0.18607112
19	0.26619258	0.70607852	0.26685167	0.57505413	0.31095407	0.19471105
20	0.28234873	0.75645873	0.27836499	0.60233925	0.32462365	0.20315067
21	0.29830277	0.80654064	0.28961539	0.62908115	0.33798982	0.21140108
22	0.31405643	0.85629581	0.30061727	0.65530501	0.35106869	0.21947246
23	0.3296123	0.9057027	0.31138382	0.68103442	0.36387511	0.22737418
24	0.34497354	0.95474524	0.32192719	0.70629146	0.37642273	0.23511484
25	0.36014376	1.00341175	0.33225854	0.73109679	0.38872421	0.2427024

Table 11: Tree stem volume (m^3)in highland stratum						
Year	*Markhamia lutea*	*Casuarina equisetifolia*	*Grevillea robusta*	*Eucalyptus camaldulensis*	*Terminalia brownii*	*Leucaena leucocephala*
1	0.00434908	0.00025421	0.00092152	0.00105828	0.00036226	0.00574219
2	0.01501513	0.00227294	0.0100257	0.00626055	0.00128802	0.01961032
3	0.02856556	0.00593452	0.0240999	0.0156839	0.00457963	0.03306138
4	0.04411996	0.02388749	0.04201477	0.04948499	0.00904618	0.04546368
5	0.06123327	0.0495855	0.06313429	0.09414402	0.02307401	0.05689484
6	0.07963202	0.08012229	0.08703854	0.14524392	0.0424608	0.06749627
7	0.09912952	0.11371334	0.11342493	0.20020136	0.06517628	0.07739397
8	0.11958956	0.14923907	0.14206279	0.25744655	0.09021117	0.08669035
9	0.14090796	0.18597419	0.17276923	0.31598866	0.11687002	0.09546748
10	0.1630023	0.22343501	0.20539494	0.37518266	0.14466514	0.10379152
11	0.18580561	0.26129111	0.2398152	0.43459852	0.17324793	0.11171635
12	0.20926229	0.29931251	0.27592399	0.49394462	0.20236485	0.11928636
13	0.23332542	0.33733685	0.31362979	0.55302103	0.23182869	0.12653859
14	0.2579548	0.37524839	0.35285268	0.61169004	0.26149945	0.13350425
15	0.28311562	0.41296415	0.3935221	0.66985705	0.29127135	0.14020991
16	0.30877735	0.45042464	0.43557522	0.72745774	0.3210638	0.14667839
17	0.33491307	0.48758738	0.47895568	0.78444947	0.35081501	0.15292945
18	0.36149877	0.52442238	0.52361253	0.84080515	0.38047744	0.15898032
19	0.38851294	0.56090895	0.56949948	0.89650906	0.4100144	0.16484615
20	0.41593618	0.59703331	0.61657426	0.95155371	0.43939762	0.1705403
21	0.44375089	0.63278691	0.66479804	1.00593772	0.46860537	0.17607465
22	0.47194104	0.66816515	0.71413505	1.05966414	0.49762104	0.18145982
23	0.50049194	0.70316641	0.76455217	1.11273926	0.52643207	0.18670531
24	0.5293901	0.73779135	0.81601866	1.16517174	0.55502912	0.19181971
25	0.55862307	0.77204233	0.86850588	1.21697191	0.58340541	0.19681077

The choice of trees species, tree numbers planted and thinning regime is the same in lowland and highland locations. The tree species that will be planted according to each one of the planting plans (technical specifications) is presented in Table 12.

Table 12: Number of tree to plant							
Planting plan	*Markhamia lutea*	*Casuarina equisetifolia*	*Grevillea robusta*	*Eucalyptus camaldulensis*	*Terminalia brownii*	*Leucaena leucocephala*	Total
Dispersed interplanting (per hectare)	100		100		100	100	400
Woodlot (per hectare)	320	320	320	320	320		1600
Boundary planting(per 400 metres)	40	40	40		40	40	200

The proposed thinning regime for each one of the planting plans (technical specifications) is shown in Tables 13, 14 and 15

Table 13: DIP thinning regime (number of trees remianing per hectare)							
Year	*Markhamia lutea*	*Casuarina equisetifolia*	*Grevillea robusta*	*Eucalyptus camaldulensis*	*Terminalia brownii*	*Leucaena leucocephala*	Total
1	100	0	100	0	100	100	400
2	100	0	100	0	100	100	400
3	100	0	100	0	100	100	400
4	100	0	100	0	100	100	400
5	100	0	100	0	100	100	400
6	100	0	100	0	100	50	350
7	100	0	100	0	100	50	350
8	100	0	100	0	100	50	350
9	100	0	50	0	100	50	300
10	100	0	50	0	100	50	300
11	50	0	50	0	50	50	200
12	50	0	50	0	50	50	200
13	50	0	50	0	50	50	200
14	50	0	50	0	50	50	200
15	50	0	50	0	50	50	200

16	50	0	50	0	50	50	200
17	50	0	50	0	50	50	200
18	50	0	50	0	50	50	200
19	50	0	50	0	50	50	200
20	50	0	50	0	50	50	200
21	50	0	50	0	50	50	200
22	50	0	50	0	50	50	200
23	50	0	50	0	50	50	200
24	50	0	50	0	50	50	200
25	50	0	50	0	50	50	200

Table 14: WDL thinning regime (number of trees remianing per hectare)

Year	*Markhamia lutea*	*Casuarina equisetifolia*	*Grevillea robusta*	*Eucalyptus camaldulensis*	*Terminalia brownii*	*Leucaena leucocephala*	Total
1	320	320	320	320	320	0	1600
2	320	320	320	320	320	0	1600
3	320	320	320	320	320	0	1600
4	320	320	320	320	320	0	1600
5	320	320	320	320	320	0	1600
6	320	320	160	160	320	0	1280
7	320	320	160	160	320	0	1280
8	320	320	160	160	320	0	1280
9	320	160	160	160	160	0	960
10	320	160	160	160	160	0	960
11	160	160	160	160	160	0	800
12	160	160	160	160	160	0	800
13	160	80	80	80	160	0	560
14	160	80	80	80	160	0	560
15	160	80	80	80	80	0	480
16	160	80	80	80	80	0	480
17	80	80	80	80	80	0	400
18	80	80	80	80	80	0	400
19	80	80	80	80	80	0	400
20	80	80	80	80	80	0	400
21	80	80	80	80	80	0	400

22	80	80	80	80	80	0	400
23	80	80	80	80	80	0	400
24	80	80	80	80	80	0	400
25	80	80	80	80	80	0	400

Table 15: BND thinning regime (number of trees remianing per 400 m planted)

Year	*Markhamia lutea*	*Casuarina equisetifolia*	*Grevillea robusta*	*Eucalyptus camaldulensis*	*Terminalia brownii*	*Leucaena leucocephala*	Total
1	40	40	40	0	40	40	200
2	40	40	40	0	40	40	200
3	40	40	40	0	40	40	200
4	40	40	40	0	40	40	200
5	40	40	40	0	40	40	200
6	40	40	40	0	40	20	180
7	40	40	40	0	40	20	180
8	40	40	40	0	40	20	180
9	40	20	20	0	40	20	140
10	40	20	20	0	40	20	140
11	20	20	20	0	20	20	100
12	20	20	20	0	20	20	100
13	20	20	20	0	20	20	100
14	20	20	20	0	20	20	100
15	20	20	20	0	20	20	100
16	20	20	20	0	20	20	100
17	20	20	20	0	20	20	100
18	20	20	20	0	20	20	100
19	20	20	20	0	20	20	100
20	20	20	20	0	20	20	100
21	20	20	20	0	20	20	100
22	20	20	20	0	20	20	100
23	20	20	20	0	20	20	100
24	20	20	20	0	20	20	100
25	20	20	20	0	20	20	100

Above ground biomass at time t under the project scenario is calculated using **equation 14**.

The value for SV has been obtained from national sources (see Tables 10 & 11).

BEF value of 1.25[8]

Basic wood density (t.d.m./m3) values obtained from ICRAF database [9] and refer to the medium value (Table 15)

Table 15: Basic wood density values (t.d.m./m3)					
Markhamia lutea	*Casuarina equisetifolia*	*Grevillea robusta*	*Eucalyptus camaldulensis*	*Terminalia brownii*	*Leucaena leucocephala*
0.99	0.92	0.62	0.913	0.78	0.5

Carbon stocks in above-ground biomass under the project scenario (at time *t*) are calculated based on **Equation 13**.

The value for carbon fraction of dry matter (t C/t.d.m.) is 0.5.

Carbon stocks in below-ground biomass at time *t* under the project scenario (tC / ha) are calculated using **equation 15**.

The root to shoot ratio (t.d.m./ t.d.m.) applied was 0.2[10]

The value for carbon fraction of dry matter (t C/t.d.m.) is 0.5.

Carbon stocks in biomass at time t under the project scenario (t C/ha) are the sum of carbon stocks in above-ground biomass and below-ground biomass (see **equation 12**).

[8] 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Chapter 4 Forest land. TABLE 4.5 DEFAULT BIOMASS CONVERSION AND EXPANSION FACTORS (BCEF), TONNES BIOMASS (M3 OF WOOD VOLUME)-1

[9] http://www.worldagroforestry.org/sea/Products/AFDbases/WD/Index.htm

[10] 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Chapter 4 Forest land. TABLE 4.4 RATIO OF BELOW-GROUND BIOMASS TO ABOVE-GROUND BIOMASS ®

Table 16: Carbon stocks in biomass at time t under the project scenario (t C/ha) – lowland stratum			
Year	DIP	*WDL*	BND
0	0	0	0
1	0.2	0.9	0.1
2	2.0	9.9	0.9
3	4.7	24.7	2.1
4	7.9	43.0	3.6
5	11.4	66.5	5.7
6	13.9	68.6	7.6
7	17.3	90.1	10.1
8	20.7	112.4	12.6
9	20.9	98.4	11.2
10	23.8	114.4	13.0
11	16.4	114.9	10.7
12	18.0	128.7	12.0
13	19.7	91.4	13.4
14	21.3	100.0	14.7
15	22.8	96.6	16.1
16	24.4	104.2	17.4
17	25.9	97.9	18.7
18	27.4	104.4	20.0
19	28.8	110.8	21.3
20	30.3	117.1	22.5
21	31.7	123.3	23.8
22	33.0	129.4	25.0
23	34.4	135.5	26.3
24	35.7	141.5	27.5
25	37.0	147.4	28.7

Table 17: Carbon stocks in biomass at time t under the project scenario (t C/ha) – highland stratum			
Year	DIP	*WDL*	BND
0	0	0	0
1	0.6	1.5	0.2
2	2.4	7.2	1.0

3	4.7	16.0	2.1
4	7.5	34.5	3.6
5	11.0	59.8	5.8
6	13.7	66.9	7.7
7	17.9	91.2	10.3
8	22.4	117.0	13.1
9	23.1	112.4	11.8
10	27.3	133.3	14.0
11	19.6	132.6	11.5
12	22.3	151.5	13.1
13	25.1	110.0	14.7
14	27.9	122.5	16.4
15	30.8	121.4	18.0
16	33.7	132.6	19.7
17	36.7	124.0	21.4
18	39.7	133.8	23.1
19	42.7	143.5	24.8
20	45.8	153.3	26.6
21	48.9	163.1	28.3
22	52.1	172.8	30.1
23	55.3	182.6	31.8
24	58.5	192.3	33.6
25	61.7	202.1	35.3

Baseline carbon stocks are forecast to remain constant at the current (year 0) level throughout the project crediting period. The carbon stocks for the project scenario at the starting date of the project activity are the same as the baseline stocks (**see equation 11**). The project removals have been calculated as the difference between the baseline carbon stocks and the project carbon stocks over the entire project period.

The results of this calculation (i.e. additional carbon sequestration above baseline) for the three planting scenarios in both lowland and highland strata (t C/ha) are presented in Tables 17 and 18.

Table 17: Net GHG removals by sinks (t CO2-e/ ha)– lowland stratum			
Year	DIP	*WDL*	BND
0	-6.3	-6.3	-0.6
1	-5.6	-3.1	-0.2
2	1.2	30.2	2.7
3	11.1	84.1	7.0
4	22.6	151.5	12.6
5	35.5	237.5	20.4
6	44.6	245.1	27.4
7	57.1	324.0	36.3
8	69.4	405.7	45.6
9	70.3	354.3	40.3
10	81.0	413.1	47.0
11	53.6	415.0	38.5
12	59.8	465.7	43.5
13	65.8	328.8	48.5
14	71.7	360.2	53.4
15	77.5	347.8	58.3
16	83.1	375.8	63.1
17	88.6	352.7	67.9
18	94.1	376.4	72.7
19	99.4	399.8	77.4
20	104.6	422.9	82.0
21	109.8	445.7	86.6
22	114.8	468.3	91.1
23	119.7	490.5	95.6
24	124.6	512.4	100.1
25	129.4	534.1	104.4

Table 18: Net GHG removals by sinks (t CO2-e/ ha)– highland stratum			
Year	DIP	*WDL*	BND
0	-6.3	-6.3	-0.6
1	-4.1	-0.7	0.3

2	2.4	20.0	3.1
3	11.1	52.3	6.9
4	21.0	120.3	12.7
5	33.9	213.1	20.5
6	43.9	239.2	27.6
7	59.3	328.2	37.1
8	75.8	422.8	47.3
9	78.4	405.9	42.7
10	93.7	482.5	50.7
11	65.7	479.9	41.4
12	75.6	549.1	47.3
13	85.7	397.0	53.3
14	96.1	442.7	59.3
15	106.6	438.8	65.4
16	117.4	480.0	71.6
17	128.2	448.4	77.9
18	139.3	484.1	84.1
19	150.4	519.9	90.4
20	161.7	555.7	96.8
21	173.1	591.5	103.2
22	184.6	627.3	109.6
23	196.3	663.1	116.0
24	208.0	698.9	122.4
25	219.9	734.6	128.9

<u>Capping</u>

The crediting period for each instance of project activity is 25 years although the project longevity is expected to extend indefinitely beyond the end of the crediting period. All three systems involve thinning whereas the woodlot and boundary planting system s are also expected to include harvesting at some point (unspecified) beyond the end of the crediting period. According to the AFOLU requirements, section 4.5.3, where harvesting is included the maximum number of GHG credits available shall not exceed the long term average GHG benefit as shown in Table 19.

Table 19: Long term average GHG benefit (t CO_2 / ha)			
	Rotational harvest	Capping	
		Lowland	Highland
Dispersed interplanting	None	None required	None required
Woodlots	>25 years	328	400
Boundary planting	>25 years	51	58

3.3 Leakage

Field research conducted in the lower and mid Nyando basin (Camco, September 2011) resulted in a comprehensive assessment of the potential for leakage to occur as a function of SACC project activities. Household survey was the principal technique used to evaluate leakage potential and involved interviewing people in 126 households selected randomly from the 1,343 households participating in the SACC project at the time of the survey.

The results of the survey allow a solid conclusion to be drawn - leakage from the SACC project is insignificant (<10%) and is therefore assumed to be zero (See equation 19 in AR-AMS0001). Refer to Section CL2.1 of this document for more detailed information about leakage.

3.4 Summary of GHG Emission Reductions and Removals

Project emissions and leakage are assumed to be zero and are therefore not shown in any subsequent calculations.

To date 1,343 farmers implemented AR activities as part of the SACC project in 2011. A summary of the planted areas is shown in Table 20.

Table 20. SACC project planting in 2011 (actual to date)			
Location	Dispersed interplanting (ha)	Woodlots (ha)	Boundary planting (metres)
Lower Nyando	0.01	29.52	23,686
Mid Nyando	10.91	7.14	67,714

A summary of the GHG emission reductions and removals forecast as a result of SACC project AR implementation to date is shown in Table 21.

Table 21. GHG emission reductions and removals forecast as a result of 2011 planting					
Year	Cumulative CO_2	Buffer removed in period	Credits released from buffer	Remaining cumulative buffer	Credits for sale in period
2011	-445				
2012	-110				
2013	1,742				
2014	4,566				
2015	8,461				
2016	13,575	4,208	0	4,208	9,367
2017	15,713				
2018	20,991				
2019	24,078				
2020	23,007				
2021	24,930	3,520	631	7,097	8,466
2022	22,546				
2023	23,946				
2024	25,364				
2025	26,470				
2026	26,585	513	1,065	6,545	2,207
2027	26,702				
2028	26,820				
2029	26,941				
2030	27,063				
2031	27,186	186	982	5,750	1,397
2032	27,311				
2033	27,436				

2034	27,563				
2035	27,692				
2036	27,821	197	863	5,084	1,301
Net Emission Reductions (Number of VCUs)					22,736

As a grouped project a number of informed assumptions have been made in order to estimate the project capacity to generate future VCUs. The assumptions include:

1. The total number of farmers that will participate in AR activities is 50,000 over an 11 year period
2. Enrolment will occur according to the following schedule:

Table 22. SACC project enrolment schedule

Year	1	2	3	4	5	6	7	8	9	10
Number of new farmers enrolled	2,000	2,000	4,000	4,000	6,000	6,000	6,000	6,000	6,000	6,000

3. The annual and cumulative planted area using the dispersed interplanting system is shown in Table 23

Table 23. Forecast of DIP implementation in SACC project

Year	1	2	3	4	5	6	7	8	9	10	11
DIP planted area per year (ha)	242	242	483	483	725	725	725	725	725	725	242
DIP cumulative planted area (ha)	242	483	966	1,449	2,174	2,898	3,623	4,347	5,072	5,796	6,038

4. The annual and cumulative planted area of woodlots is shown in Table 24.

Table 24. Forecast of WDL implementation in SACC project

Year	1	2	3	4	5	6	7	8	9	10	11
WDL planted area per year (ha)	92	92	184	184	276	276	276	276	276	276	92
WDL cumulative planted	92	184	368	552	828	1,104	1,380	1,656	1,932	2,208	2,300

area (ha)											

5. It has been assumed that 50% of the participating farmers (25,000) will implement the boundary planting system each planting 200 meters of boundary (i.e. a single line of trees which is 200 m long). The recruitment of farmers to implement the boundary planting system is shown in Table 25.

Table 25. Forecast of BND implementation in SACC project

Year	1	2	3	4	5	6	7	8	9	10	11
BND number of new farmers implementing this system per year	1,000	1,000	2,000	2,000	3,000	3,000	3,000	3,000	3,000	3,000	1,000
BND cumulative number of farmers	1,000	2,000	4,000	6,000	9,000	12,000	15,000	18,000	21,000	24,000	25,000

Based on these planting parameters a summary of the potential GHG emission reductions and removals forecast as a result of SACC group project AR implementation activities between 2012 - 2022 is shown in Table 26.

Table 26. GHG emission reductions and removals forecast as a result of 2012 - 2022 planting							
Year	Cumulative CO_2	CO_2 gain pa	Period gain (tCO_2)	Buffer removed in period	Credits released from buffer	Remaining cumulative buffer	Credits for sale in period
2012	-2,742	-2,742					
2013	-4,142	-1,400					
2014	-1,251	2,891					
2015	13,432	14,683					
2016	46,926	33,494	46,926	14,547	0	14,547	32,379
2017	111,282	64,356					
2018	208,002	96,720					
2019	354,444	146,443					
2020	542,465	188,021					
2021	765,143	222,678	718,217	222,647	2,182	235,012	497,752
2022	1,030,730	265,587					
2023	1,296,437	265,707					
2024	1,580,622	284,185					
2025	1,580,622	0					
2026	2,051,058	470,436	1,285,915	398,634	35,252	598,394	922,533
2027	2,219,102	168,045					
2028	2,361,082	141,980					
2029	2,462,971	101,889					
2030	2,521,429	58,458					
2031	2,578,596	57,167	527,539	163,537	89,759	672,172	453,761
2032	2,625,376	46,779					
2033	2,698,577	73,201					
2034	2,778,497	79,920					
2035	2,842,262	63,765					
2036	2,893,560	51,298	314,963	97,639	100,826	668,985	318,150
2037	2,941,337	47,778					0
2038	2,859,009	45,881					0
2039	2,774,779	43,978					0
2040	2,558,519	40,159					0
2041	2,338,437	36,336	214,132	66,381	100,348	635,018	248,099
2042	1,984,410	30,600					0
2043	1,624,645	24,862					0
2044	1,259,142	19,125					0
2045	887,902	13,387					0
2046	510,924	7,649	95,623	29,643	95,253	569,408	161,232

Total		3,203,314					2,633,906

The cumulative CO_2 is shown to start as negative value because of the baseline carbon stocks which are conservatively assumed to be removed at the time of implementation of AR activities. The cumulative CO_2 is shown steadily increase up to year 25 after which it decreases because the crediting period for each project instance is 25 years after which point we cease to include those carbon stocks in the accounting process e.g. carbon stocks as a result of planting in 2012 will no longer be included in the carbon accounting after 2037, carbon stocks as a result of planting in 2013 will no longer be included in the carbon accounting after 2038 etc.

G2.4 Effect of Baseline on Communities

The baseline scenario in the project area is having detrimental effects on the community of the lower and mid Nyando, in a number of ways. Evaluation of the baseline effect on communities has been completed using the CCBA Manual for Social Impact Assessment of Land-based Carbon Projects (2010)[42], so the project conditions created after the implementation of the SACC project can be compared to the baseline, or social reference scenario.

Using guidance from the manual described above, the baseline is contextualised according to three main groupings: social, environmental and economic (Table 27). A precise description of the likely baseline scenario has been developed in close liaison with stakeholders in the local community.

Table 27. Baseline effects on local communities	
Social Development	
Gender Equity	Access to opportunities and empowerment of girls and women are unlikely to develop under the baseline scenario. The male will still be viewed as the head of the household and hence there will be limited reduction of discrimination and inequalities based on gender.
Access to Education	Access to, engagement in, and attainment through education will

	continue as it has done previously. Indeed, the situation may worsen, as children are taken out of school to cultivate the land, as it suffers from the increasing effect of environmental degradation.
Access to Health and Sanitation	Access to medical treatment and improved sanitation, notably through access to clean water and the availability of sewage treatment will not improve under the baseline scenario. As agriculture yields so little profit in the area, there is little money to invest in improving facilities and infrastructure, so rural communities will remain without adequate health provisions.
Cultural Identity	Respect for self-determination, intellectual property, benefit-sharing, and religious tolerance will continue as previously. Tribal clashes may continue around times of political instability and social conditions may further deteriorate, inciting people to intolerance and potentially violence.
Environmental Integrity	
Water	Water resources will continue to be put at risk due to the effects of eutrophication from fertilisers in agricultural run-off. This will contaminate water used for drinking and may deplete fishing stocks in water bodies in or adjacent to the project area.
Soil Fertility	Maintenance of organic matter and conservation of soil will remain difficult under the baseline scenario. The removal of trees and increased erosion from rainfall events will reduce cohesion between soil particles, hence making them more susceptible to entrainment and removal. This will ultimately decrease soil fertility in the area.
Climate Change	Mitigation of greenhouse gas emissions and strengthening the resilience and adaptation capacity of people, their livelihoods, and ecosystems to climate change are low priorities in the project area. People are primarily concerned with maintaining fertile land to preserve their incomes. The link between climate change and increasing environmental degradation is not well established and hence people do not feel that they need to take action on the homestead scale to mitigate against this

	risk.
Natural Resource Management	Management of resources from production to post-consumption in order to support the integrity of ecosystem services is not embedded in the community mindset. There is need for a structured project to formalise management of natural resources in the project area, yet there are not community structures in place to facilitate this.
Economic Resilience	
Secure Livelihoods	Currently security of livelihoods in the project area is currently low, as agricultural yields are subject to variation according to climatic changes. Increasing land degradation is threatening livelihood security as crop yields lessen year upon year.
Social Capital	Social capital refers to connections among individuals – in the Nyanza province social structures are based around local communities and families, although between communities there is limited formal communication. This means that problems experienced between communities are not resolved on a higher level. Indeed, there is tension between different groups such as the Luo's and Kalenjin's across the project area.
Resilience to Economic Risk	There is limited ability to counter risk through economic diversification and access to finance. Traditionally, livestock have been kept as a form of immediately available payment in case of need to access finance. This relies upon continuation of agricultural land use and hence there is little economic diversification across the project area.

The above indicators demonstrate that the baseline scenario is not conducive to economic, environmental or social advancement of the citizens of the Nyando basin. The SACC project area is one of long term human activity, deforestation and land degradation. The historical trends regarding land use and land use change in the area indicate that the 'without project' scenario will be a continuation of deforestation and forest degradation of the lands as a result of unsustainable harvesting of forest products, overgrazing and burning in line with historical trends.The following are characteristic of the 'without project' scenario:

- No support to social problems and an absence of a framework to address community issues
- Community organisations that do exist lack structure and are driven by internal conflict
- Poor soil, unproductive farm land and high demand for additional inputs (e.g. fertilisers, pesticides) which leads to downstream water pollution
- Land is degraded and subject to erosive forces; common, non-native species of little conservation interest predominate
- Limited opportunity for economic diversification in the project area

G2.5 Effect of Baseline on Biodiversity

Biodiversity in the project area has been diminished since the deforestation initiated in the 1960s. There are no species with a high conservational value, with the exception of some pockets of *Terminalia*. Under the baseline scenario these pockets would be threatened as people continue to harvest timber for use in domestic activities such as charcoal making. This would further diminish biodiversity, with the combined influence of climate change eroding the soils which support naturally occurring plants in the lower and mid Nyando.

With the intervention of the SACC project, biodiversity across the area will not markedly increase, due to the controlled nature of the planting programme. However it is hoped that it will promote conservation as people realise the value of wooded biomass. Indeed, the trees used in planting schemes may encourage bats, birds and insects back to the project area, as they provide habitats for these animals.

G3. Project Design and Goals

G3.1 Major Climate, Community and Biodiversity Goals

CARE has many years of experience in environmental programming in Nyanza, Kenya. Over the last three years CARE has implemented the Agroforestry for Livelihood Enhancement (Aglive) project which planted 337,241trees with 2,250 farmers in Nyando/Kericho districts. The Sustainable Agriculture in a Changing Climate project is a sequel to this very successful project and aims to transform the landscape in Nyanza through carbon financing and other sources of funding that may be leveraged by carbon financing. Further donor funding will be sought to support the project.

The primary justification for the first phase (see Table 9) of the program is learning how carbon finance can be made to work for smallholder farmers in terms of enhancing farm production and building resilience of livelihoods, including adaptation to climate change. Within the constraints of financial viability and the difficulty of monitoring climate impacts from diverse land management systems, the approach that is being developed by the initiative aims to ensure effective participation of women in particular. Benefits derived from the project will be shared through a "fair trade approach" alongside other innovative approaches to counter barriers to the participation of poorer, marginalised groups.

Specific project objectives are:

- Empowering Communities to sustainably use their natural resources, adopt sustainable agricultural practices and increase land productivity (food security)
- Reducing land degradation, improving soil quality and vegetation
- Equitable sharing of resources within gender and empowering women and youths to be part of decision making and management structures
- Increasing carbon sequestration, conducting research and empowering communities to benefit from carbon finance

The project has been designed to achieve the four goals by focusing its activities around the following interventions, which will be rolled out across the lower and mid Nyando under a grouped project methodology:

1. **Agroforestry**. This is the use of trees and shrubs in agricultural crop and/or animal production and land management systems. In the SACC project, trees on farms are used in many forms, including improved fallows, home gardens, boundary planting, farm woodlots, orchards,

plantation/crop combinations, windbreaks, conservation hedges, and fodder banks. Farmers in the SACC project are encouraged to adopt some of these practices on their land depending on the need, size of land and interest. Most of the trees promoted by this project for agroforestry are meant either to meet the farmer's energy needs or to improve soil fertility. Currently, farmers in Nyando use agricultural waste as the main source of energy for cooking which should be otherwise left on the farm as mulch.

2. **Conservation agriculture.** Under SACC project guidance Farmers in the lower and mid Nyando plan to boost agricultural yields and increase food production by adopting conservation agriculture (CA). This practice also contributes to combating soil erosion and enhancing fertility, through the implementation of the three CA principles: minimal soil disturbance, permanent soil cover and crop rotations. The socio-economic and environmental benefits help poor households to rehabilitate and strengthen their livelihood capital base and ultimately help SACC farmers to build system resilience in the face of widespread poverty and increasing vulnerability that affect the basin.

3. **Crop diversification.** Farmers in the project area have already started to vary the crops that they grow. New species include butternut and green gram, which provide new sources of income to the farmers. Crop diversification ensures that farmers are not solely reliant on one species of crop for income generation and this means that they are more resistant to poverty that may result if a specific crop fails. This practice will be encouraged across the lower and mid Nayndo as the project commences and will further contribute to strengthening of SACC farmers livelihood capital base.

By improving the various components of food production systems, the efficiency, resilience, adaptive capacity and mitigation potential of the overall production systems can be greatly enhanced.

G3.2 Description of Major Project Activities

In order to achieve emission reductions three AR interventions, boundary planting, dispersed interplanting and woodlots, have been designed for implementation (See annex 1). The key elements of each one of these systems are presented in Table 28.

Table 28 AFOLU interventions					
Intervention	**Description**	**Tree species**	**Advantages**	**Disadvantages**	**Impact**
Boundary planting	Boundary planting involves the planting of trees along the perimeter of individual farmers or communal property with the objective of obtaining environmental and livelihood benefits including windbreaks, soil erosion control, shade/shelter, sale of poles and other timber products. The system may involve planting of both indigenous and exotic tree species.	*Grevillea robusta, Markhamia lutea, casuarina spp., Terminalia brownii.*	-Popular with farmers -Replicable across multiple sites -Allows for inclusion of famers with smaller land holding to tree planting programs and to carbon finance	-Viability of deriving carbon finance from tree planting system creating relatively small carbon sinks -Challenge of mapping very small areas of boundary planting	-Contributes to carbon sequestration -Provides source of timber when pruned
Dispersed interplanting	This system involves the planting of nitrogen fixing tree species and other typical agroforestry tree species at a low stocking density throughout the area of cultivated land. Crops can continue to be grown. Nitrogen fixing trees will increase and extend the expected productivity of the cultivated land. These species increase soil nitrogen by actively manufacturing nitrogen compounds through symbiotic bacteria located in the roots. Any litter will act as a green manure (organic fertiliser) and the tree roots will also help to preserve the soil structure by retaining moisture and preventing erosion.	*Grevillearobusta, Markhamialutea, Terminaliabrownii.*	-Dispersed interplanting may be widely adopted by individual farmers with small areas of landholding -Contribute to enhanced food production	-Untested system for many farmers -Relatively small carbon uptake per unit area planted	-Planted on a more limited scale than the other interventions and thus contributes to slightly lower levels of carbon sequestration -Provides source of timber when pruned -Will be planted in closest proximity to crops and thus will have the greatest effect on stabilising agricultural soils.
Woodlots	The system involves planting a variety of indigenous and naturalised tree species on fragmented land plots which farmers to provide multiple benefits such as timber, firewood, medicine and fodder.	*Grevillea robusta, Markhamia lutea, Terminalia brownii, casuarina spp., Eucalyptus spp.*	-Diversify farm production -Additional revenue stream -May establish woodlots on degraded or under-utilised land where in the long term this system may help to re-habilitate degraded lands -Carbon finance per unit area relatively high	-Land availability for farmers with smaller properties -Displacement of other food producing activities	-Planted on a large scale relative to other interventions and thus contributes to higher levels of carbon sequestration -Provides source of timber when pruned

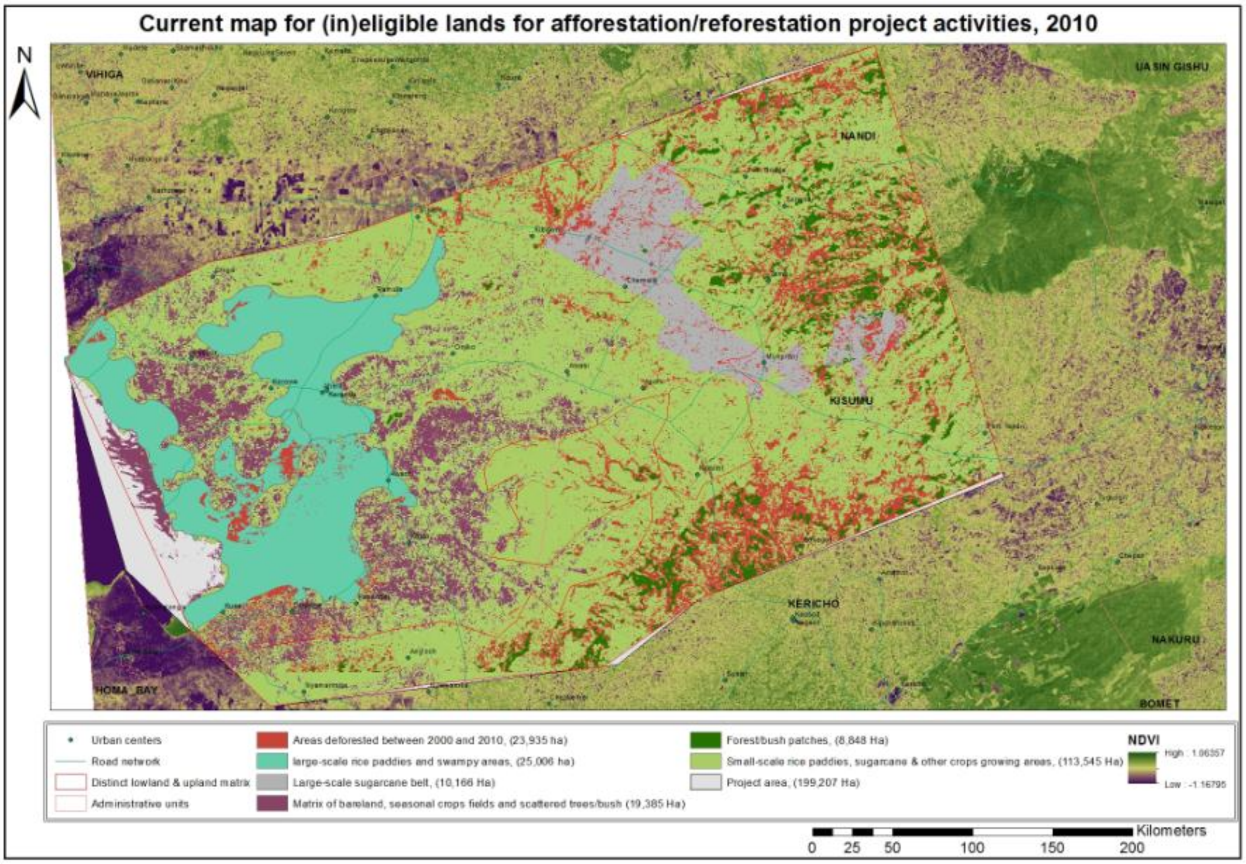
The project activities are primarily composed of planting enrichment schemes, using the tree species outlined in the above table. These species have been chosen because of the livelihood benefits they bring, with the added benefits of improving soil structure and carbon sequestration. There have been some problems surrounding the planting of *Eucalyptus spp.*in the project area, as it requires a lot of water and high rates of utilisation can result in the lowering of local water tables. However, by ensuring that this plant is correctly managed and is planted away from areas of crop cultivation, it should not cause the problems it has previously been associated with. Indeed, combined with the other proposed species, *Eucalyptus spp*. should result in the successful deliverance of carbon finance to local communities.

As stated previously, this is a pro-poor project which places emphasis on sustainable agriculture, improved livelihoods and the inclusion of women. Other project activities relevant to AR include:

- Reduction in livestock numbers. This may be achieved without impacting negatively on livelihoods by switching from having large numbers of local varieties of goats and cattle to having smaller numbers of improved (dairy) goats and cattle. Such a switch may yield a higher income to farmers as well as improving food security.
- Switch from goats (browse on trees) to sheep (which will only graze on grass)
- Introduction of zero grazing which may be achieved by maintaining 'women's' preferred fodder tree species on farms such as *Gliricidia* spp. and*Leucaena* spp.
- Reduced soil erosion through contour planting
- Introduction of improved varieties of food crops.

G3.3 Location of Project Activities

A map identifying the location and boundaries of the project area, where the project activities will occur and surrounding locations that are predicted to be impacted by the project activities is presented below. The map has been produced using remotely sensed imagery from Landsat 4 and each project location has a unique GPS identification number attached to it, to ensure that the project can be monitored after initial implementation.



The project activities will occur in the areas of seasonal/annual crops mixed with scattered trees/bushes and under small-scale rice paddies, sugarcane & other crops growing. This covers 132,629 hectares of the project area which represents 63.7% of the total project area, which covers a total area of 208,185 ha.

G3.4 Time Frame and Project Accounting

The project start date was September 2010. Given the grouped nature of the project it will extend over approximately 10 - 12 years before the target 50,000 households have been incorporated into the AR activities (Table 9). The initial phase will run over approximately 2 years, extending to approximately

1,000 households. After this first phase project validation will be conducted and the scale of the project will subsequently increase in phases two and three.

Table 29. Project scale to achieve by Year 15		
Phase	Years	Approximate number of households
I	1 and 2	100 – 1,000
II	3 to 5	10,000
III	6 to 10*	50,000

*The project time frame for the third phase of the SACC project may be adjusted, with extension of number of households to 50,000 before year 10

The project will run for an initial accounting period of five years, across which changes in GHG emissions from the project area will be assessed. After this AR activity responsibilities will be delegated to the project participants, who will maintain and manage the interventions outlined in project activities on a local scale. The crediting period for each project instance will continue for 25 years after project implementation. The entire project crediting period will last for 35 years however, the project benefits are expected to continue for at least 50 years, as the trees provide a source of timber for local farmers as they are seasonally pruned.

G3.5 Project Risks and Mitigation Measures

The VCS Tool for AFOLU Non-permanence Risk Analysis and Buffer Determination v3.0 has been used as a basis for determining project risk. In line with this tool, the following steps have been applied to assess likely internal, external and natural risks associated with the project.

Internal Risks

Sub-step a) Project Management

Project Management		
a)	Species planted (where applicable) associated with more than 25% of the stocks on which GHG credits have previously been issued are not native or	0

	proven to be adapted to the same or similar agro-ecological zone(s) in which the project is located.	
b)	Ongoing enforcement to prevent encroachment by outside actors is required to protect more than 50% of stocks on which GHG credits have previously been issued.	0
c)	Management team does not include individuals with significant experience in all skills necessary to successfully undertake all project activities (ie, any area of required experience is not covered by at least one individual with at least 5 years experience in the area).	0
d)	Management team does not maintain a presence in the country or is located more than a day of travel from the project site, considering all parcels or polygons in the project area.	0
e)	***Mitigation***: *Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (eg, individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs.*	−2
f)	***Mitigation***: *Adaptive management plan in place.*	0
Total Project Management (PM) [as applicable, (a + b + c + d + e + f)] Total may be less than zero.		-2

Sub-step b) Financial Viability

Financial Viability		
a)	Project cash flow breakeven point is greater than 10 years from the current risk assessment	0
b)	Project cash flow breakeven point is between 7 and up to 10 years from the current risk assessment	0
c)	Project cash flow breakeven point between 4 and up to 7 years from the current risk assessment	1
d)	Project cash flow breakeven point is less than 4 years from the current risk	0

	assessment	
e)	Project has secured less than 15% of funding needed to cover the total cash out before the project reaches breakeven	0
f)	Project has secured 15% to less than 40% of funding needed to cover the total cash out required before the project reaches breakeven	0
g)	Project has secured 40% to less than 80% of funding needed to cover the total cash out required before the project reaches breakeven	1
h)	Project has secured 80% or more of funding needed to cover the total cash out before the project reaches breakeven	0
i)	***Mitigation***: *Project has available as callable financial resources at least 50% of total cash out before project reaches breakeven*	0
Total Financial Viability (FV) [as applicable, ((a, b, c or d) + (e, f, g or h) + i)] Total may not be less than zero.		2

Sub-step c) Opportunity

Opportunity Cost		
a)	NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities; or where baseline activities are subsistence-driven, net positive community impacts are not demonstrated	
b)	NPV from the most profitable alternative land use activity is expected to be between 50% and up to100% more than from project activities	
c)	NPV from the most profitable alternative land use activity is expected to be between 20% and up to 50% more than from project activities	
d)	NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net positive community impacts are demonstrated	0
e)	NPV from project activities is expected to be between 20% and up to 50% more profitable than the most profitable alternative land use activity	

f)	NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity	
g)	***Mitigation***: *Project proponent is a non-profit organization*	-2
h)	***Mitigation***: *Project is protected by legally binding commitment (see Section 2.2.4) to continue management practices that protect the credited carbon stocks over the length of the project crediting period*	
i)	***Mitigation***: *Project is protected by legally binding commitment (see Section 2.2.4) to continue management practices that protect the credited carbon stocks over at least 100 years*	
Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g or h)] Total may not be less than zero.		0

Sub-step d) Project Longevity

Project Longevity		
a)	Without legal agreement or requirement to continue the management practice	= 24 - (project longevity/5)
b)	With legal agreement or requirement to continue the management practice	= 30 - (project longevity/2)
Total		19

Total

Internal Risk	
Total Internal Risk (PM + FV + OC + PL) Total may not be less than zero.	19

External Risks

Sub-step a) Land Ownership and Resource Access/Use Rights

Land Ownership and Resource Access/Use Rights		
a)	Ownership and resource access/use rights are held by same entity(s)	0

b)	Ownership and resource access/use rights are held by different entity(s) (eg, land is government owned and the project proponent holds a lease or concession)	
c)	In more than 5% of the project area, there exist disputes over land tenure or ownership	
d)	There exist disputes over access/use rights (or overlapping rights)	5
e)	***Mitigation***: *Project area is protected by legally binding commitment (eg, a conservation easement or protected area) to continue management practices that protect carbon stocks over the length of the project crediting period*	
f)	***Mitigation***: *Where disputes over land tenure, ownership or access/use rights exist, documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims*	-2
Total Land Tenure (LT) [as applicable, ((a or b) + c + d + e+ f)] Total may not be less than zero.		3

Sub-step b) Community Engagement

Community Engagement		
a)	Less than 50 percent of households living within the project area who are reliant on the project area, have been consulted	
b)	Less than 20 percent of households living within 20 km of the project boundary outside the project area, and who are reliant on the project area, have been consulted	5
c)	***Mitigation***: *The project generates net positive impacts on the social and economic well-being of the local communities who derive livelihoods from the project area*	-5
Total Community Engagement (CE) [where applicable, (a+b+c)] Total may be zero		0

Sub-step c) Political Risk

Political Risk		
a)	Governance score of less than -0.79	6

b)	Governance score of -0.79 to less than -0.32	
c)	Governance score of -0.32 to less than 0.19	
d)	Governance score of 0.19 to less than 0.82	
e)	Governance score of 0.82 or higher	
f)	***Mitigation***: *Country is implementing REDD+ Readiness or other activities, as set out in this Section 2.3.3.*	-2
Total Political (PC) [as applicable ((a, b, c, d or e) + f)] Total may not be less than zero.		4

Total

External Risk	
Total External Risk (LT + CE + PC) Total may not be less than zero.	7

Natural Risks

Natural Risks					
Significance	**Likelihood**				
	Less than every 10 years	Every 10 to less than 25 years	Every 25 to less than 50 years	Every 50 to less than 100 years	Once every 100 years or more, or risk is not applicable to the project area
Catastrophic (70% or more loss of carbon stocks)	~~FAIL~~	~~30~~	~~20~~	~~5~~	~~0~~
Devastating (50% to less than 70% loss of carbon stocks)	~~30~~	~~20~~	~~5~~	~~2~~	~~0~~

Major (25% to less than 50% loss of carbon stocks)	~~20~~	5	~~2~~	~~1~~	~~0~~
Minor (5% to less than 25% loss of carbon stocks)	~~5~~	~~2~~	~~1~~	~~1~~	~~0~~
Insignificant (less than 5% loss of carbon stocks) or transient (full recovery of lost carbon stocks expected within 10 years of any event)	~~2~~	~~1~~	~~1~~	~~0~~	~~0~~
No Loss	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~
LS Score	2				

Mitigation	
Prevention measures applicable to the risk factor are implemented	~~0.50~~
Project proponent has proven history of effectively containing natural risk	0.50
Both of the above	~~0.25~~
None of the above	~~1~~
Score for each natural risk applicable to the project (determined by (LS × M)	
Fire (F)	**2.5**
Pest and Disease Outbreaks (PD)	
Extreme Weather (W)	**2.5**
Geological Risk (G)	
Other natural risk (ON)	

Total Natural Risk (as applicable, F + PD + W + G + ON)	5.0

Overall Risk

Risk Category		Rating
a)	Internal Risk	19
b)	External Risk	7
c)	Natural Risk	5
Overall risk rating (a + b + c)		**31**

Where the overall risk rating is greater than 60, project risk is deemed unacceptably high and the project fails the entire risk analysis. The estimated risk for this project is 31 and hence is deemed acceptable when determined in line with the VCS procedure. The sum of risk ratings for each risk category is less than the thresholds designated in the risk tool.

The risk rating can be used to determine the buffer credits that shall be deposited in the AFOLU pooled buffer account. The overall risk rating is converted into a percentage, which is then multiplied by the net change in the project's carbon stocks. This is totalled at 31%.

G3.6 Maintenance of High Conservation Values

High Conservation Values will be maintained at in the lower and mid Nyando project area by:

1. Promoting bird and insect species through reforestation

Currently land degradation and deforestation in the lower and mid Nyando has resulted in a decrease in floral and faunal biodiversity (Section G1.8). The replenishment of tree species, including the naturally occurring *Terminalia spp*, within the project area will encourage bird and insect species (pollinators) back into the lower and mid Nyando, resulting in enrichment of biodiversity on a project-wide scale.

2. Conservation of soil

The project activities will result in the sequestration of carbon through planting schemes, which is quantified in the carbon stock estimation procedure. However the planting schemes will also result in additional, unquantified carbon sequestration in the project area through the effect of increased soil stability. The conservation of soil from the degrading effects of erosion will enhance the soil organic carbon (SOC) stores in the lower and mid Nyando. SOC is a globally important store of carbon that is currently threatened due to the increasing effect of soil erosion.

3.Protection of downstream ecosystems from eutrophication

Conservation of soil will reduce the volume of particle bound fertilizers that are exported to downstream aquatic ecosystems including Lake Victoria. This will subsequently reduce the effect of eutrophication in the lacustrine environment, which has in recent years had a detrimental impact on local fisherman, as fish stocks have been depleted. The preservation of such ecosystems will ensure that there is diversity in employment activities in the project area, hence reducing the pressure placed on land by grazing animals and plant cultivation.

G3.7 Measures to Enhance CCB Benefits beyond Project Lifetime

Residents in the lower and mid Nyando will be the beneficiaries of 25% of the carbon payments made through the sequestration of carbon, which will provide a small bonus to the farmers involved in the project. However, the major financial benefit will arise from the extra income generated from selling the forest products. The use of this SACC project associated carbon finance will allow for the improvement of local amenities. The sustainable nature of the SACC project ensures that the CCB benefits will continue into the future, as the benefits are directly related to the continued presence of trees on small scale farm holdings.

Specifically measures will be taken to maintain and improve:

Climate – through carbon sequestration by AR activities. This will lead to reduced CO_2 emissions from the project area and the proposed SACC project activities will have a positive net impact on global climate through increased vegetative uptake of carbon from the atmosphere. Currently the atmospheric carbon pool is increasing non-linearly due to anthropogenic forcing and hence the climate implications of this project are beneficial on a long-term, global scale. Trees will be routinely pruned and thinned, but not harvested until after the end of project crediting period. This means their climate benefits will extend over at least a medium term time horizon. After the crediting period trees in woodlots and boundary areas will be harvested on a rotational basis, and those used for dispersed interplanting will be thinned selectively.

Community – through carbon finance and improved local amenities. The carbon crediting scheme associated with the project will continue for 25 years after the project implementation. Bonus payments arising from carbon payments will provide a small supplement to local incomes. However the main benefit will result from the provision of a sustainable source of timber for local communities and the conservation of soil in the project area so it can be used for crop cultivation in a sustainable way. Extra income generated from harvesting of forest products will allow investment in local amenities for the benefit of all community members in the lower and mid Nyando that will extend beyond the project lifetime.

Biodiversity – through planting schemes. These will encourage birds and bats back into the lower and mid Nyando, which may have been forced to migrate out of the area during previous deforestation events (of the 1960s/1970s). The replenishment of vegetation in the area may also lead to the introduction of animal species and hence the SACC project will have a positive net effect on biodiversity that will continue after the outlined project lifetime, as long as the planting schemes remain sustainable.

G3.8 Stakeholder Involvement

CARE International has over twenty years of close working relationship with the communities in the Project Zone. The Aglive project began in 2008 which has now become known as the SACC project. Prior to project initiation CARE sought the permission of the local community and local authorities to undertake the project activities. Even though CARE is an NGO operating on humanitarian activities, they were told in those first meetings by the local administration that they did not need their permission because CARE are highly welcome given their track record. CARE has made every effort to seek administrative permission and that of the immediate communities, at every step of the project development. CARE know very well how critical it is to have local community support for any afforestation activity or development project, and therefore want to continue be a trusted partner within the community.

The idea for a SACC project in the Nyando Basin area only became possible in late 2009 when the idea of agroforestry in Nyando basin was seen to be successful under a CARE Kenya project called Aglive. This project promoted agroforestry trees with climate change resilience crops. CARE policy is not to introduce new ideas to the community until they are sure that they can implement them. Managing expectations in impoverished communities is critically important to achieving good long term relations. Therefore CARE waited until they had identified a donor to finance Phase I of the SACC project prior to introducing the idea to the community.

That funding arrived in late September 2010, and CARE was then under significant time pressure to develop PDs for VCS and CCB, as they had a finite financial resource from the donor and had to complete the AFOLU project before the funds were spent, so CARE commenced documenting the Forest Carbon Inventory in January 2011. The stakeholders were identified and a meeting was held to inform them of the new carbon project, the meaning of the carbon market and what it would mean to Nyando basin community.

CARE has since held a number of training sessions within the community to inform the local community of what benefits they can achieve through the agriculture and carbon markets and other sources of carbon finance. The communities were informed that carbon funds, if and when available, will be there to support the project activities and to make it sustainable. This has been done to avoid raising unnecessary expectation.

There has always been an open door policy at CARE International and members of the community interested in learning more, or with questions, suggestions and/or grievances can come to see CARE at any time. They have incorporated the community's ideas in the project development. A number of consultative meetings with the community have been held in the past to discuss issues to do with tree species choice, types of planting system, crops types and involvement.

Furthermore, given the speed at which this project has been initiated, and given the general lack of education in the community about Carbon projects, Care will commit to holding regular meetings within the community and soliciting feedback against the specific objectives of the Project Activities as well as general feedback. Care will record attendance at these meetings, document suggestions made, and resolution of whether or not any amendments to the Project Implementation Plan were made. The results of these meetings will form part of the project documents under the management of the project officer in Kisumu office.

The SACC project has also involved all the stakeholders within the project area including the government which is involved in supporting extension services and goodwill, VIRED International which supports the research work on social economic and environmental impact assessment, VI- Agroforestry who have been involved in a similar project for a while, the WRUA (Water resource users association) and Farmers associations. The farmer's association, community forest association, provincial administration and the WRUAs were the entry point of the project into the areas and have been reorganized into some sort of an organization to take the project over after CARE phases out. A number of workshops and training sessions have been organised to build capacity of stakeholders on the project goals and design as well as on climate change related issues.

G3.9 Publicisation of CCBA Public Comment Period

Whilst this project is undergoing validation the PDD and all supporting documents will be made available for public comment for a minimum period of one month on the CCBA website (http://www.climate-standards.org).Hard copies of all project documentation will be available from Camco's offices in Bath (UK) and Nairobi (Kenya).

G3.10 Conflict Resolution Process

The area has several formal and informal means of resolving land and resource use conflict. For instance where parents have denied their sons access to land some have resorted to either renting or buying land away from family land to avoid continued family feuds. Other methods noted include intervention by village elders, local administration (Chief and Assistant-chief) and government land adjudication office. Peace initiatives held between local politicians and elders have been used to resolve politically motivated inter-community land conflicts especially within the boundaries between the Luos and the Kalenjin tribes.

The project is adopting a community based conflict resolution mechanism and through awareness creation on the need for unity and togetherness will improve inter-household relationships and encourage pooling of resources. This will benefit both men and women. However, the project does place strong emphasis upon the inclusion of women and the resource poor within the community. Women and youths have numerous groups and group activities.

The project will also support joint tribal ventures and peace-building initiatives to reduce tensions during elections. The joint tribal ventures and peace-building initiative will ensure security of produce and activities for all groups and especially women and the poor. This will particularly benefit women and the poor who may not have extra resources to put into recovery of lost/ damaged produce and assets. Such activity includes organizing a joint field day within the project areas where the communities will share experiences.

The key areas where project management expect conflicts to arise include disputes over land/tree ownerships, livestock/trees conflict, style of project governance by VMCs or possibly issues arising between community and the Technical staff. The project has initiated the development of community based governance institutions from the village level (Village management committees), sub-location level management (SLMC) and up to the project management unit level (PMU). These institutions have developed a workable conflict resolution mechanism at their level. There exists a conflict resolution subcommittee within each management institutions to handle any arising issues. In the event that the VMC may not resolve an issue, they may seek the assistance of the SLMC and the SLMC may further consult on conflicts that they may not be able to handle with the Project Management Unit. Any further issues that may not be adequately handle at the project level will be referred to the government officers who will act as arbitrators.

G3.11 Project Financial Support

The project currently relies on donor funding for the initial 2 year phase of the project. The project is currently involved in fundraising to support the next phase but will rely on carbon sales for future funding. CARE will always be available to support where necessary and currently responsible for the project until it hands over the project to the community organization.

This is a project that has been running for almost one and half years, at significant cost to the CARE International donor, and full financials are available (both retrospective financial reports and forecasts that include the carbon revenues). This information is commercially sensitive and will be shared with the Validator at the site visit. All project initial costs associated with project design document have already been met by CARE International donor.

Details of the project finance can be seen in the CARE developed project financial analysis tool.

G4. Management Capacity and Best Practices

G4.1 Project Proponent Identification

The project has been working with community farmers association which has been used as an entry point to the community by the project and as a vehicle for farmer mobilization. The other private firms that will be involved include Equity Bank, which is hoped to finance seedling production through offering short-term soft loans for farmers who are interested in home based tree nurseries.

Homa Line limited, an organization based in mid- Nyando, is working on fuelwood plantation activity and has been involved to some extent in supporting the outgrower fuelwood plantations programme within this region with the understanding of supplying forest products. The project is in discussion to involve them to support farmers with seedling production and seed procurement. They can support farmers in this aspect as part of their corporate social responsibility.

The project is using the water resources users association and water resource management authority as part of the entry point into the region and uses their goodwill with the community to facilitate the training and awareness raising. The two, together with Kenya farm producer association (KENFAT) and community forest association, are being pulled together to form one umbrella organization to manage the project after CARE phases out.

The SACC project has CCAF and ICRAF as part of the technical team, supporting the project with research related activities. CARE International and the community organization are the main project proponent. Specific responsibility within SACC lies with Maina Njoroge of CARE Kenya. In addition CARE Kenya depends on the support of PECCN and an outside consulting company, Camco, to assist in the detailed preparation of the carbon accounting and of this design document.

Details of the main project proponent and contributing organisations are supplied below:

CARE	
Function	Farmer organization and training; monitoring of implementation of field implementation
Organisational Capacity	Private , non –profit organization(NGO)
Number of Employees	530
Core Business	Poverty alleviation and provision of relief in emergencies.
Relevant Experience	CARE Kenya has many years working experience with farming communities in Kenya, and particular in western Kenya where it has been involved in agroforestry and market led agriculture. CARE Kenya has just concluded a successful Payment for Environmental Services project.
Date of Registration	1968
Contact Person	Gary Mcgurk
Job Title	Assistant Country Director Programs
Email	gmcgurk@care.or.ke
Telephone Number	+254-20-2710069/2712374
Address	CARE international in Kenya, Mucai Drive , Off Ngong Rd. P.O. Box 43864-00200 GPO Nairobi ,Kenya
Website	www.care.or.ke

ICRAF	
Function	Agroforesty research for development, mitigation-related research, adaptation and livelihoods-related research, GHGs measurement in different landscapes

Organisational Capacity	The World Agroforestry Centre/ICRAF (International Centre for Research on Agroforestry) (http://www.worldagroforestry.org) is part of the alliance of the Consultative Group on International Agricultural Research (CGIAR) centres dedicated to generating and applying the best available knowledge to stimulate agricultural growth, raise farmers' incomes, and protect the environment. Headquartered in Nairobi, Kenya, ICRAF operates five regional offices located in India, Indonesia, Kenya, Malawi and Mali, and conducts research in eighteen other countries around the developing world. ICRAF receives funding from over 50 different investors; including governments, private foundations, international organizations and regional development banks. Our work is conducted with partners from a range of scientific and development institutions. Roughly 100 PhD level scientists are employed by ICRAF. The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) will address the increasing challenge of global warming and declining food security on agricultural practices, policies and measures through a strategic collaboration between the CGIAR and the Earth System Science Partnership (ESSP). Led by the International Center for Tropical Agriculture (CIAT), CCAFS is collaborating with all 15 CGIAR research centers as well as with the other thematic research programs of the CGIAR. CCAFS brings together the world's best researchers in agricultural science, climate science, environmental and social sciences to identify and address the most important interactions, synergies and trade-offs between climate change and agriculture. The management team of CCAFS consists of 10 senior scientists, based at international and regional agricultural centres and Universities around the world.
Number of Employees	700+
Core Business	Agricultural research for development; climate change, agriculture and food security research; agroforestry systems research
Relevant Experience	20+ years of general ag research 4 development; roughly 5-8 years of mitigation-related experience (payments for environmental services, REDD+, adoption of agroforestry, livelihood strategies, adaptation and mitigation practices on farm) across the world
Date of Registration	ICRAF was established in 1978; CCAFS in 2009 (still in the process of being registered as a separate organization)
Contact Person	Henry Neufeldt, ICRAF (h.neufeldt@cgiar.org); CCAFS – Lini Wollenberg (ewollenb@uvm.edu)

Job Title	Leader, Climate Change research at ICRAF; Pro-poor mitigation theme leader, CCAFS
Email	Henry Neufeldt, ICRAF (h.neufeldt@cgiar.org); CCAFS – Lini Wollenberg (ewollenb@uvm.edu)
Telephone Number	+254-20-422-3000
Address	ICRAF, PO Box 30677, Nairobi, Kenya 00100
Website	**www.worldagroforestry.org; www.ccafs.cgiar.org**

Camco	
Function	Carbon qualification, capacity building and awareness creation
Organisational Capacity	Private company
Number of Employees	274 globally, 15 in Nairobi, Kenya
Core Business	Climate change, energy, forestry and land use
Relevant Experience	Camco has more than 15 years experience developing land use and forestry carbon offset projects. Camco supported the design of the Plan Vivo Standard and has helped with registration of all four registered Plan Vivo projects. Camco has vast experience in the quantification and monitoring of carbon benefits from AR and REDD interventions. Camco has undertaken numerous studies relating to carbon finance opportunities for clients including UNDP, UNEP, ICRAF, Care International and WWF. Camco has developed tools and protocols to assist with carbon qualification.
Date of Registration	1989 (registered as Energy for Sustainable Development)
Contact Person	William Garrett
Job Title	Principal Consultant
Email	william.garrett@camcoglobal.com
Telephone	+254 20 387 5902

Number	
Address	P.O.Box 76406-00508 Muringa Road Off Elgeyo Marakwet Road Nairobi, Kenya
Website	http://www.camcoglobal.com/

G4.2 Technical and Management Expertise

The key technical skills required to implement the project successfully include community engagement and carbon measurement and monitoring skills. The following profiles demonstrate the technical skills possessed by key personnel.

CARE

Phil Franks

With an MSc in natural resource management, Phil Franks has 25 years experience working in agriculture, agroforestry and natural resource management in Africa. Since 2000 Phil has coordinated the Integrated Conservation and Development Network of CARE International which evolved into the Poverty, Environmental and Climate Change Network (PECCN) in 2008. PECCN is a global initiative that creates a platform across CARE International for learning and global advocacy. Since 2008 Phil has also served as the coordinator of the carbon finance theme programming theme of PECCN supporting REDD and other AFOLU programming with a strong pro-poor agenda. Based in Kenya, Phil will act as an advisor to this initiative and CARE's focal point for the partnership with CCAFS.

Geoffrey Onyango

With a BSc in forestry, Geoffrey Onyango has 15 years experience in the design and implementation of forest conservation and afforestation/reforestation projects, mainly in East Africa, including 6 years experience working with the carbon company CAMCO on the development of AFOLU and energy carbon projects. Geoffrey joined CARE in April 2010 with the responsibility to support the development of AFOLU projects, promote learning on AFOLU programming and build capacity of staff of CARE and its partners in AFOLU programming. Based in Kenya, Geoffrey will have overall responsibility for coordinating CARE's contribution to initiative, and will take the leading role in the carbon project design component.

Rosemary Ogolla

Project Officer. In charge of day to day activities in the field coordination and supervisor for the two Field Technicians. Rosemary has a Diploma in agriculture, with many years experience in management of field activities. Specific experience in agroforestry extension and market led agriculture.

Njoroge Maina

With a BSc in forestry Maina started his career with 7 years working in the Kenya Forest Department rising to the level of District Forest Officer. From government Maina moved to CARE Kenya in 1993, where has accumulated over 17 years of experience in the design and implementation of development projects with particular emphasis on agriculture and agroforestry extension and sustainable land management, including "pro-poor" payments for environmental services with communities in critical water catchment areas. Maina will take responsibility for coordinating CARE Kenya's contribution to the initiative and, in particular, the small-scale implementation component.

Robert McAyoo

Field technician- Main point of contact for the farmers. The Technician is responsible for training respective farmers in the block, material distribution and general follow up on implementation. Certificate in agriculture. McAyoo has many years of experience working communities much of which involve tree planting with farmers.

Sophie Juma

Field technician- same as with McAyoo above

CAMCO

William Garrett (WJG), Principal Consultant, Overmoor, UK

Will Garrett (MSc, MA, BA, NCH) is a Principal Consultant and Business Development Manager with Camco since 2004. He has twenty years experience in the forestry and environmental sector. The focus of his role at Camco has been on forestry, land use change and ecosystem services. He has helped to develop many community based land use carbon offset projects mainly in eastern and southern Africa, Latin America and the Far East. In Mozambique Will was instrumental in developing carbon baselines, technical specifications and achieving Plan Vivo registration for the Nhambita community forestry and carbon project. Will has also managed carbon qualification through Plan Vivo registration for projects in Tanzania (2010) and Malawi (2011). Will is managing REDD+ projects in Kenya and Tanzania targeting VCS registration and CCB validation and verification in 2011. Will is a Forest Certification specialist (UKWAS, PEFC & FSC) with experience in sustainable forest management and community development in Europe, Latin America, Africa and China. He speaks Spanish, Portuguese and Italian.

Emmanuel Ekakoro (EEE), Consultant, Nairobi, Kenya

Mr Emmanuel Emorut Ekakoro is a holder of a BSc. Degree in Wood Science & Technology from Moi University, Kenya, where he received professional training in sustainable forest products production and utilisation. He worked in the furniture industry for one year after which he enrolled for an MPhil Degree in Bioenergy & the Environment at the same university. He has received training in climate change and environmental management, sustainable energy production and utilisation technologies, and energy management, planning and policy development, with particular emphasis on biomass energy. He is also trained in biogas plant design and construction. Mr. Ekakoro is an accomplished researcher with three papers presented at international biomass energy conferences. He joined Camco in 2006 as sub-contract biomass specialist, from where he has gained hands-on technical experience in the science, technology, theory, policy and legislative issues regarding energy, environment and climate change, their implications and mitigation alternatives incorporating energy production, utilisation and conservation. Mr. Ekakoro currently works with Camco as a carbon modeling specialist under the Plan Vivo system, which is an Offset Project Method for small scale LULUCF projects with a focus on promoting sustainable development and improving rural livelihoods and ecosystems. Plan Vivo works very closely with rural communities, emphasises participatory design, ongoing stakeholder consultation, and the use of native species.

In his association with Camco, he has been involved in the formulation and development of a national policy on sustainable biomass energy and charcoal policy and environment in Kenya. Outside Camco, he has undertaken other significant energy projects, including a UNDP – GEF funded Biomass Energy Project whose goal was to remove barriers to the adoption of improved biomass stoves through knowledge transfer to institutions and Small and Medium Enterprises (SMEs) in Kenya. This project was implemented through RETAP – Renewable Energy Technology Assistance Project. Mr. Ekakoro has also worked as a research assistant in Moi University during which period he was involved in the formation of pilot charcoal production and tree growing associations in Nyanza Province of Kenya through Thuiya Enterprises Ltd & VI-Agroforestry. In addition, he has worked in private capacity as a consultant for local communities on energy crop production, efficient charcoal production technologies, and renewable energy alternatives in Uasin Gishu District of Kenya. He is a member of the Forestry Society of Kenya and writes as a part-time columnist for the East African Standard, a local daily newspaper.

Amy Pickard (AP), Analyst, Overmoor, UK

Amy Pickard (MSci) is an analyst with Camco. She recently completed a Masters degree in Geography at the University of Bristol, focusing her dissertation on the carbon sequestration potential of natural environments. She has extensive experience in carbon cycle modeling and has a solid understanding of carbon policies on both a national and international scale. Amy is an accomplished researcher, with her first scientific publication "Characterising substrate controls on organic carbon in subglacial environments" due to be released in the *Journal of Geophysical Research* in January 2012. She has previously worked for a solar energy company, where she initially developed her interest in clean energy and carbon markets.

G4.3 Capacity Building

Results show that attending appropriate training is a crucial prerequisite for the correct adoption of project activities. However, training is more effective when trainers pursue true participation and when social capital among farmers is stronger and CARE International has adopted this policy. Further important determinants of adoption are the level of education and the economic incentives provided to vulnerable households.

CARE International will continue to train its employees involved in the project and the community on climate change issues and managing carbon financed projects. There are more training activities lined up in the next phase on community awareness and climate change resilience crops within Nyando Basin.

G4.4 Community Employment Opportunities

The project has employed one project officer who is assisted by two extension officers. The extension staff are assisted by 2 interns and 56 lead farmers who are considered part of the project support staff. The project also has one vehicle driver.

In the long run, the project intends to employ in the roll out phase a further 4 extension staff and 300 lead farmers. When in full operation in year 10, the project should be able to employ at least 10 extension staff and over 6,000 lead farmers. Each lead farmer should have at least 15 to 25 farmers under their jurisdiction and one extension staff will have at least 600 lead farmers.

The lead farmers will be employed on contractual basis and their main role will be to support farmer mobilization and farmer training. The lead farmers will be given incentives in the form of cash and cash equivalents to facilitate transportation, lunches and time spend on project. The zonal project officers will be taking charge of all the administrative and technical issues within those zones. As the project progresses more officers will be employed depending on the need. The project policy is to employ as much as possible from the project zone unless those skills are not available locally.

Table 31 Summary of Job Creation

Title	Number
Project Officer	1
Extension Officer	2
Intern	2
Lead Farmer	6000
Vehicle Driver	1

G4.5 Relevant Employment Laws

Kenyan's constitution address labour rights in the bill of rights in chapter 6 and chapter 70 to 86 of the same constitution deals with fundamental rights of all Kenyans. The following Acts of parliament supports those two chapters; Employment Act (Cap. 226); Regulation of Wages and Conditions of Employment Act (Cap. 229), - Industrial Training Act (Cap. 237), - Workmen's Compensation Act (Cap. 236), - Shop Hours Act (Cap. 231), - Mombasa Shop Hours Act (Cap. 232), - Factories Act (Cap. 514), - Trade Unions Act (Cap. 233),- Trade Disputes Act (Cap. 234); Companies Act (Cap. 486); Bankruptcy Act (Cap. 53); Merchant Shipping Act (Cap. 389); Export Processing Zone's Act (Cap. 547); Immigration Act (Cap. 172); Pension Act (Cap. 189); Retirement Benefits Act (No. 3 of 1997); National Social Security Fund Act (Cap. 258); National Hospital Insurance Act (Cap. 255); Provident Fund Act (Cap. 191); Public Health Act (Cap. 242). In individual labor cases British common law is applicable up to now. The Judiciary Act (Cap. 16) of 1967, section 3(1) states: "The jurisdiction of the High Court and of all subordinate courts shall be exercised in conformity with;

a) The Constitution;

b) subject thereto, all other written laws; including the Acts of the Parliament of the United Kingdom (…);

c) subject thereto and so far as the same do not extend or apply, the substance of the common law, the doctrines of equity and the statutes of general application in force in England on the12th August 1897, and the procedure and practice observed in courts of justice in England at that date:

Provided that the said common law, doctrines of equity and statutes of general application shall apply so far only as the circumstances of Kenya and its inhabitants permit and subject to such qualifications as those circumstances may render necessary."

G4.6 Employee Safety Assessment

CARE International is committed to worker safety and has a very strong track record of safety. CARE self insures our medical plan so employees and their families are fully covered for any illness or injury they incur whether on the job or not. The employment document is CARE classified information which will be shared with the validator during the field visit.

G4.7 Financial Health of Implementing Organisations

CARE International has many years working with communities and has developed a clientele niche of Philanthropic donors supporting its project activities. CARE is an international NGO with a presence in almost 80 countries and has been in existence for over 50 years.

G5. Legal Status and Property Rights

G5.1 Relevant Laws and Project Compliance

Legal and institutional frameworks and statutes on environmental standards and sustainable use of natural resource legislation of direct relevance to the SACC project are described below:

Forest Management, Utilisation and Conservation

The primary legislation in the management, utilization and conservation of Forest and forest resources is the Forests Act (2005), supplemented by the Draft Forest Policy. The goals of the Forests Act (2005) and the Forest Policy are to enhance the contribution of the forest sector in the provision of economic, social and environmental goods and services. The specific objectives are to:

- Contribute to poverty reduction, employment creation and improvement of livelihoods through sustainable use, conservation and management of forests and trees.
- Contribute to sustainable land use through soil, water and biodiversity conservation, and tree planting through the sustainable management of forests and trees.
- Promote the participation of the private sector, communities and other stakeholders in forest management to conserve water catchment areas, create employment, reduce poverty and ensure the sustainability of the forest sector.
- Promote farm forestry to produce timber, woodfuel and other forest products.
- Promote dryland forestry to produce woodfuel and to supply wood and non-wood forest products.
- Promote forest extension to enable farmers and other forest stakeholders to benefit from forest management approaches and technologies.
- Promote forest research, training and education to ensure a vibrant forest sector.
- The key elements of the forest policy relevant to the project include (i) Involvement of forest adjacent communities and other stakeholders in forest management and conservation; (ii) Forest management planning based on an ecosystem approach; and (iii) Provision of appropriate incentives to promote sustainable use and management of forest resources. Section 41 (1) of the Act states that “All indigenous forests and woodlands shall be managed on a sustained yield basis for purposes of (a)

conservation of water, soil and biodiversity; (b) riverine and shoreline protection; (iii) cultural use and heritage; (iv) recreation and tourism; (v) sustainable production of wood and non-wood products; (vi) carbon sequestration and other environmental services; (vii) education and research purposes; and habitat for wildlife in terrestrial forests and fisheries in mangrove forests.

Land Tenure and Land Use

There are numerous statutes that specifically deal with rights of ownership and control of land. The Kenya constitution, which is the basic law of the land provides for protection of private property from deprivation without lawful compensation. The constitution also provides that such property may be 'acquired if it is necessary in the interest of defence, public security, and public morality'. Other statutes and acts include Government Lands Act (Cap. 280); Registration of Titles Act (Cap. 281), Land Titles Act (Cap. 282), Land Consolidation Act (Cap. 283), Land Adjudication Act (Cap. 284), Land (Perpetual Succession) Act (Cap. 286), Land (Group Representatives) Act (Cap. 287), Trust Land Act (Cap. 288), Mazrui Lands Trust Act (Cap. 289), Trusts of Land Act (Cap. 290), Land Acquisition Act (Cap. 295), Registered Land Act (Cap. 300) Land Control Act (Cap. 302),Agriculture Act (Cap 318), Physical Planning Act, Local Government Act, the Land Planning Act (Cap. 303), and EMCA (1999) under Part V on the Protection and Conservation of the Environment. The Land Planning Act makes provision for the planning and use of land in Kenya, and promotes public participation in the preparation of plans giving proper consideration to the potential for economic and social development. Section 9 of the subsidiary legislation (The Development and Use of Land Regulations, 1961) under the Land Planning Act requires that before the local authorities submit any plans to the Minister for approval, steps should be taken as may be necessary to acquire from the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should be submitted. This is intended to reduce conflict with the interest such as settlement and other social and economic activities.

Trust Lands Act Cap. 288 of 1962 (revised 1970)

At independence, all land that was not in private or government ownership became Trust Land, under the control of County Councils to be used for the benefit of the residents of the area (MENR, 1994)16. The Trust Land Act makes provision for rights in Trust Land and controls the occupation of land. The Act also sets out the procedures for the setting aside of land for a variety of purposes likely to benefit the persons ordinarily resident in that area or for transfer to the Government. Of particular relevance to forestry is the fact that the Act makes provisions for general conservation, protection and controlled utilisation of trees and other forest products on land, other than gazetted Forest Reserves.

Agricultural Act Cap 318 Laws of Kenya as revised in 1986.

The Agricultural Act promotes and maintains a stable agriculture, provide for soil and water conservation and good land husbandry and management. Section 48 of the Agriculture Act prohibits, regulates and controls agricultural activities (e.g. cultivation of river banks and slopes), which may lead to the siltation of watercourses. This ties in very closely with the Water Act (Cap 372) in terms of alteration of water quality in rivers and other receiving water bodies due to siltation. It also relates to Sections 10 and 11 of the Chief's Authority Act (Cap 128), which controls/forbids agricultural or other activities (such as grazing), which may interfere with the functions of catchment areas. This linkage is clearly demonstrated such that for a water permit to be granted to a user by the ministry responsible for water, a soil erosion certificate according to the Agricultural Act must be issued first, as an assurance that soil erosion considerations have been taken care of.

Physical Planning

Physical Planning is regulated by the Physical Planning Act (Cap 286), an Act of Parliament which provides for the development and control of construction of buildings and land development in Kenya regardless of land ownership. The Physical Planning Act was promulgated for the preparation and implementation of physical development plans and connected purposes. This Act, which was promulgated in 1996, requires the Proponent of a Project to submit an EIA to the respective local authority if in the opinion of the local authority the Project is anticipated to have adverse environmental impacts (Section 36 of the Act). Similarly, under the Act, project proponents are required to acquire a Compliance Certificate from the Director of Physical Planning to indicate that the proposed developments are in line with the physical development plan of the area in which such developments are proposed.

Wildlife, Fisheries and Marine Environment

Important pieces of legislation include (i) Wildlife (Conservation and Management) Act; (ii) the Fisheries Act; and (iii) Public Health Act. The Wildlife (Conservation & Management) (Amendment) Act No. 16 of 1989, Cap 376 Laws of Kenya provides for the protection, conservation, management and utilization of wildlife (fauna and flora) in all areas of Kenya.The Fisheries Act 1977, Cap 378 Laws of Kenya, aims to protect fisheries resources and provide for their proper exploitation. Sessional Paper No. 3 of 1975: Statement on Future Wildlife Management Policy in Kenya stipulates that it is important to protect important habitats and secure migratory routes of animals outside protected areas.

Local Government Act, Cap. 265 (revised 1986)

This Act allows Local Authorities to alienate, own and sell land within their jurisdiction under the Trust Lands Act or to purchase land within the jurisdiction of other local authorities. Under the Act, the Ministry of Local Government has a mandate to plan for the management of natural resources in their jurisdiction on behalf of the resident local community.

Environmental Management and Coordination

Environmental Management and Co-ordination Act No. 8 of 1999, provide a legal and institutional framework for the management of the environmental related matters. It is the framework law on environment, which was enacted on the 14th of January 1999 and commenced in January 2002. Topmost in the administration of EMCA is National Environment Council (NEC), which formulates policies, set goals, and promotes environmental protection programs. The implementing organ is National Environment Management Authority (NEMA). EMCA (1999) comprises of the parts covering all aspect of the environment, and aims at coordinating environmental protection activities in the country. This legislation is based on the principle that an understanding of the impact of our actions on the environment is a pre-requisite for sustainable development and a basis for our survival. Section 58 of the Act requires that all new development projects undertake Environmental Impact Assessment (E.I.A) while section 68 requires all on-going projects to have an Environmental Audit with a view to finding out if the processes and mitigation measures to counter such impacts. In analyzing the relevant statues on environmental management and coordination, reference has also been made to a number of other legislation including (i) Environmental (Impact Assessment and Monitoring) Regulations, 2003; (ii) Constitution (Trust Lands) Act; (iii) Agriculture Act; (iv) All land tenure and land use related legislation including (Land Acquisition Act, Land Adjudication Act, Government Lands Act, Registration of Titles Act, Trust Land Act and Land Control Act); (v) Fisheries Act; (vi) Forests Act; (vii) Irrigation act; (viii) Lakes and Rivers Act; (ix) Local Government Act; (x) National Water Conservation and Pipeline Corporation Act; (xi)

Physical Planning Act; (xii) River Basin Development Authorities Act; and (xiv) Wildlife (Conservation and Management) Act.

Other developments and legislation of importance to the SACC project

The East African Community (EAC) Protocol for the Environment and Natural Resources Management: Articles 111, 112, 114 and 116 of the East African Community Treaty established the guidelines on cooperation in environment, natural resources, wildlife and tourism management.

The *National Biodiversity Strategy and Action Plan* (NBSAP) (GoK 2000) identifies the necessary steps to take to conserve biodiversity in conformity with requirements of the CBD. The strategy specifies the trends and priority goals of environmental management and protection, and outlines the short-term and long-term tasks to be achieved. National Environmental Strategy proceeds from the traditional goal of environmental protection – which is to provide people with a healthy environment and natural resources necessary to promote economic development without causing significant damage to nature, and to preserve the diversity of landscapes and biodiversity while taking into consideration economic development. The priorities presented in the strategy are taken into account when planning environmental activities, developing international co-operation and allocating national funds.

The SACC project complies with all the national and local laws and regulations listed above and all relevant international treaties.

G5.2 Documentation of Legal Approval

CARE has signed contracts with the community organization seeking their approval in accepting to co-manage the SACC project and the community organization also signed contracts with households authorizing the organization to administer and manage the project on their behalf. See contracts at the project database in kisumu.

G5.3 Project Encroachment and Free, Prior and Informed Consent

Numerous consultations were undertaken prior to the implementation of the project, as described in detail in Section G3.8. The aim of these consultations and agreements was to provide assurance that the project will not encroach uninvited on private property, community property, or government property and has obtained the free, prior, and informed consent of those whose rights will be affected by the project. The most important area that needs adequate consultations and agreements are the land owners, as the AR activities will predominantly be taking place on private land, or land occupied by tenants. From the initial research in the project area, stakeholders were identified, and consultation allowed an assessment of their interests and potential roles in the project. Stakeholders are now consenting and well informed of the project interventions. As a result of this consultation, the farmers who have agreed to join the project are doing so voluntarily and signing up a contract indicating their consent.

G5.4 Involuntary Relocation

No involuntary relocations of the residing population have taken place or will take place as a result of the SACC project. Integral to this is that the prevailing pre project agricultural activities are not in any way displaced by the proposed AR scheme. This would cause displacement of food production and, as a direct result of this, people. The SACC project has been designed to complement existing practices in the lower and mid Nyando.

G5.5 Identification and Reduction of Illegal Activities in the Project Zone

The illegal activities that currently take place within the project zone include logging for timber, for construction poles, for firewood, for charcoal production and poaching for wild meat and fire. These activities impact upon the scarce timber resources in the project area that have been rapidly degraded since the 1960s.

The project will help to reduce these activities through the implementation of the project activities listed in G3.2 Description of Major Project Activities. Ensuring that timber resources are available on the homestead scale in a sustainable form will reduce pressure on existing timber supplies in the lower and mid Nyando and in protected areas such as the Tinderet Forest, which border the project area.

G5.6 Carbon Rights

Local communities in the lower and mid Nyando will be the beneficiaries of carbon payments directly through payment at a household level. Specifically, the rights to carbon credits will be owned by the people who are allowing their land to be incorporated into AR activities in the lower and mid Nyando. Farmers will receive 25% of the carbon finance from the SACC project, which will be distributed by a benefit sharing mechanism. The remaining 75% will fund the project and be put towards the purchasing of tree seedlings. The total amount of money received by farmers from carbon payments will be small relative to the extra income they will generate from co-benefits and the sale of forest products.

Carbon rights are distributed by a benefit sharing mechanism that performs both the functions of disbursing benefits to the farmers that are supplying the environmental service (i.e., carbon sequestration) in an equitable manner, and the function of aggregating supply and selling the agreed volume of credits (supply minus buffer) to a suitable buyer. In effect, this aggregation agency may perform a very similar role to that of an agricultural marketing cooperative, possibly including the provision of extension services. This initiative will draw extensively on the experience of such cooperatives, paying particular attention to identifying and addressing constraints to effective participation of women and other marginalized groups whose interests are not well addressed in some existing cooperative models.

A key dimension of the design of the benefit sharing mechanism is determining the form that benefits should take (cash or in-kind, communal or individual), taking into account the implications of different options in terms of gender equity. In designing the benefit-sharing mechanism, opportunities to leverage additional social impact must also be taken into account - for example small amounts of money can have much greater impact, particularly for women, if invested in a community-based group microfinance scheme such as the Village Savings and Loan Association (VSLA) model that CARE has developed and promoted in many countries in Africa.

Key methods to ensure the sharing of carbon rights include:

-Carbon value chain analysis and financial modeling of likely benefit flows;
-Facilitating design of the benefit-sharing/aggregation mechanism and associated institutional arrangements, ensuring the full and effective participation of both male and female stakeholders;
-Developing templates for simple contracts between farmers and the aggregation agency;
-Identifying and exploring options for leveraging additional social benefits, including climate change adaptation benefits.

III.CLIMATE SECTION

CL1. Net Positive Climate Impacts

CL1.1 Net Change in Carbon Stocks

Net change is equal to carbon stock changes with the project minus carbon stock changes without the project (calculated in G2.3).

CL1.2 Net Change in Non-CO_2 Emissions

There are no significant (>5%) increases in non-CO_2 GHG emissions (such as CH_4 or N_2O) in thewithout or with project scenarios.

CL1.3 Other Non-CO_2 GHG Emissions from Project Activities

There are no significant (>5%) increases in other non-CO_2 GHG emissions in thewithout or with project scenarios.

CL1.4 Net Climate Impact

Demonstrate that the net climate impact of the project is positive:
= net change in carbon stocks + net change in non-CO2 GHGs – other GHGs from project activities – project-related unmitigated negative offsite climate impacts (see Section G2.3)

CL1.5 Avoiding Double Counting

According to the VCS Association (http://www.v-c-s.org/topics/double-counting), "Double counting of GHG emission reductions and/or removals may occur in scenarios where there are multiple entities along a project's value chain who could claim ownership of such reductions/removals." It follows that establishing clear ownership of the reductions/removals will avoid double counting. G5.6 outlines the transparent benefit sharing mechanism adopted by the SACC project which demonstrates why the risk of double counting is considered to be insignificant.

CL2. Offsite Climate Impacts ('Leakage')

CL2.1 Types of Leakage and Offsite GHG Increases

Field research conducted in the lower and mid Nyando basin (September 2011) resulted in a comprehensive assessment of the potential for leakage to occur as a function of SACC project activities. Household surveying was the principal technique used to evaluate leakage potential and involved interviewing people in 126 randomly selected households. The spokesperson within the household was, selected based upon their knowledge of AR activities.

The results of the survey allow a solid conclusion to be drawn - leakage from the SACC project is insignificant. Minimal leakage is expected to result from the project. Three potential sources of leakage specific to the project are reviewed here along with reasons why these don't apply to the project, which were first identified by the household surveys.

Leakage due to conversion of land to cropland

The field survey demonstrated that, other than the *Grevillea robusta* tree seedlings supplied to farmers in the project (ranging between 50-100 trees per project participant), there is a wide range of existing trees that project participants have planted on their farms, either along the boundaries, on woodlots, or as dispersed interplantings on homesteads and on grazing lands. The most prevalent tree types are displayed in the table below.

Table 32 Tree species in the study area (Source: Camco field data)	
Species	**Percentage**
Eucalyptus species	71%
Grevillea	14%
(*Cupressus lusitanica* and *Pinus patula*	4%
Markhamia lutea	4%
Jatropha curcas	3%
Cassia siamea, Croton species, Jacaranda mimosifolia, Terminalia brownie, Casuarina spp Spathodea campanulata, Sesbania sesban and fruit trees(mango, orange, and Avocado)	4%

Household surveys demonstrated that the planting of tree species outlined above do not restrict the continuation of agricultural practices. There has been no displacement of cropping activities to other areas as a result of AR projects because firstly, the trees under existing AR projects in the lower and mid Nyando were planted along farm boundaries, separate from land used for crops. 93% of project participants who were surveyed planted trees introduced by AR projects along farm boundaries. Secondly, project participants planted woodlots on idle land, some of which was degraded and not fit for cropping activities but was instead suitable for tree planting. The remaining 7% planted trees in these areas. This means that SACC project interventions would have no effect on cropping activities on project participant farmland and in fact would utilize land that would otherwise remain idle.

Leakage due to displacement of fuel-wood collection

A high percentage (66%) of the project participants use firewood as the main source of cooking energy, with 32% using a combination of both charcoal and firewood. A minimal percentage (2%) uses a combination of firewood, charcoal and Liquefied Petroleum Gas (LPG). Fuel wood is generally obtained from private farms in the project area, as detailed below, and there is temporal consistency in the acquisition of fuel wood from these property types.

Table 33 Duration of obtaining firewood from source (Source: Camco field data)			
Source	**Duration**		
	1 - 5 years	5 - 10 years	> 10 years
Own farm	19%	8%	73%
Private/neighboring farms	10%	10%	80%

No fuelwood collection has been displaced from the project area as nothing has changed with regard to firewood collection; the project participants continue to collect firewood from either their own farms or private farms. The few who do not purchase their fuel wood, and hence there is no risk that there will be displacement of fuel wood collection.

Leakage due to conversion of land to grazing land

Land owners in the project area keep animals on their land, which require room for grazing. These animals include Zebu Cattle (*Bos primigenius indicus*) and small stock such as goats, sheep and poultry[24]. A study in 2005 placed the total stock of cattle, sheep and goats in the district at 388,000 animals[32]. The average number of animals per household in the project area are detailed below.

Table 34 Livestock population currently and in the last 5-10 years (Source: Camco field data)				
Period	**Cows**	**Goats**	**Sheep**	**Chicken**
Average livestock population over the last 5-10 years	5	10	6	14
Current livestock population	3	2	2	8
Change (%) in average livestock holding over the previous 10 years	-40%	-80%	-67%	-43%

Animal ownership in the project area is shown to be decreasing from the results of the field survey. No land outside the AR project area has been converted to grazing land to allow AR activities on-farm. Results showed that there were insignificant relocations of livestock to areas outside the project area, but relocations were instead isolated to existing idle grazing land under control of the property owner, and that trees were planted on degraded sites deemed unfit for livestock grazing.

CL2.2 Leakage Mitigation

Since no leakage sources have been identified, no leakage mitigation is necessary. However, plans have to be put in place to ensure that:

- There is adequate fodder for livestock on farm through establishment of fodder crops and fodder trees. Project participants should be encouraged to do zero grazing as it takes up smaller sections of land compared to free range system, however, capacity building on animal husbandry and fodder management is mandatory
- There are adequate trees on farm and promotion of alternative sources of cooking energy. The SACC project should think of supporting farmers in increasing tree cover on-farm, introducing energy efficient cook stoves, and development of clean cooking energy sources such as biogas (the average number of livestock kept by these farmers is adequate and especially if the animals are caged), among others.
- There is an improved farming activity such as introduction of integrated farming system which is efficient and profitable production system that is environmentally responsible, and includes activities such as Agroforestry.

CL2.3 Unmitigated Negative Offsite Climate Impacts

There is no expected leakage, consequently the amount to be subtracted from the net climate impact of the project is zero (See equation 19 in AR-AMS0001 V.6.).

CL2.4 Unmitigated Negative Offsite Non-CO_2 Climate Impacts

None have been identified during the comprehensive field research that was conducted in the SACC project area.

CL3. Climate Impact Monitoring

CL3.1 Plan for Selecting and Monitoring Carbon Pools and Non-CO_2 GHGs

The purpose of the monitoring plan is to set a framework for quantifying and documenting changes in project-related carbon pools (within and outside the project boundaries) and project emissions.

Carbon Pools to Monitor: The carbon pools selected for the SACC project are those found in above and below ground woody biomass. These are the pools which should be monitored.

Location of Monitoring: Climate impact monitoring will be done in the project areas. As it has been determined that there is negligible leakage associated with the SACC project, there is no requirement for monitoring outside the project area.

Initial Monitoring: The first monitoring will occur during validation in 2012.

Specifically the following parameters will be measured at validation:

Table 35 Data Available at Validation

Data Unit / Parameter	Data unit	Description	Source of data	Value applied:	Purpose of the data
Location	Latitude and longitude	Single point location of the area where project activity has been implemented	GPS	Geo-reference number	Baseline
Project area	ha	Size of the area where the project activity has been implemented	GPS	Geo-reference number	Baseline
Ownership	Name	Ownership of land of project area	Project registration data		Baseline

The following parameters will be measured subsequent to validation, over varying time scales:

Table 36 Data to be monitored

Data Unit / Parameter	Data unit	Description	Source of data	Description of measurement methods to be applied	Frequency of monitoring/recording:	Value monitored	Monitoring equipment	QA/QC procedures applied
Number of trees	Trees	Number of trees in a project area by strata	Physical counts	Physical counts of trees in each stratum by quantifiers	Ongoing measurement taken by quantifiers as they visit project areas. Each PA could be visitedas much as once per year		Transcript or handheld computer to record data	Part of overall QA/QC procedures discussed at end of section
DBH	cm	Diameter of tree at 1.3m	Physical measureme nts	DBH of up to 20 representative trees of each age/species stratum	Ongoing measurement taken by Quantifiers as they visit project areas		Measuring tape	As above
Total CO_2	Tonnes	Total CO_2 sequestered by trees	Calculation	Allometric equations are assigned to each stratum. DBH values are applied to the allometric. Average biomass of a tree in each stratum is calculated and multiplied by number of trees in each stratum. Biomass is converted to CO_2e and the CO_2e of the stratum are totaled	Calculation takes place with each monitoring report		Computer and data base	As above
Area displaced	ha	Area of cropland displaced due to	Survey	Project participants asked whether cropland has	Monitoring only in first crediting period		Survey	Use of survey

		project activity		been displaced				
Grazing animals displaced	Head of cattle	Number of domesticated grazing animals within the project boundary displaced due to the project activity	Survey	Project participants asked whether grazing animals have been displaced	Monitoring only in first crediting period		Survey	Use of survey

CL3.2 Commitment to Monitoring Plan

The monitoring plan will be adhered to strictly. Monitoring will take place every five years for the duration of the 25 year crediting period (full project period of 35 years). Full responsibility for project monitoring lies with CARE. They have sole responsibility for recording the parameters detailed in the above tables.

The project proponents, CARE, will adopt the following QA/QC procedures to ensure monitoring is thorough and to the standards required by VCS:

Quantifier Training: Quantifiers will receive explicit training so that quantifications are performed in a standard and regular fashion.

Staff Audits: Staff members will periodically audit peer quantifiers, including an independent sampling of tree counts and circumference measurement.

Multiple Tracks: In order to ensure that the location and perimeter of each discrete project area is accurate, each GPS track of the parcel will be measured at least twice.

Data Quality: Quantifiers will count every tree in each discrete project area. Counting each tree is 100% sampling and provides greater than 1% precision at the 95% confidence level.

Desk Audit: Quantifiers will develop analytical tools for reviewing data as it comes in from the field to look at track data, tree counts, and completeness of data.

Transparency: By providing the quantification data online and available to anyone with an internet connection, the project proponents will be subject to constant data scrutiny. This transparency and the actual visits that have already taken place provide further motive to make sure the field data is correct.

IV. COMMUNITY SECTION

CM1. Net Positive Community Impacts

CM1.1 Impacts on Communities

The proposed project activities will have a positive net impact on communities in the lower and mid Nyando. Specific impacts derived from the project are outlined below, in relation to pre-designated Social Carbon indicators, in alignment with the Social Carbon Standard Version 4.2 June 2011, a participatory method of monitoring the co-benefits of a project.

This methodology compares the 'with project' scenario to the 'without project' scenario, in order to ensure that the project interventions have a net positive effect on the recipient communities. Annex 4 of the Application Manual: SOCIAL CARBON for Forest Projects, Draft Version 0.01, 2010 lists the indicators applicable to forest projects for six resources, namely Social, Human, Financial, Natural, Biodiversity and Carbon. According to the standard guidelines, data used to score the indicators should be collected through participative methods, for example group work, interviews and questionnaires. Extensive research has been conducted in the SACC project area by the project proponents and this information has been used to complete the Social Carbon assessment.

Methodology for Scoring the Social Carbon Indicators

The scoring of the indicators from Annex 4 of the Application Manual: SOCIALCARBON for Forest Projects (2010) adheres to the following Social Carbon guidelines:

1. The researcher should compare the characteristics of the project with the six scenarios available for the indicator and select the one that best represents the characteristics of the project and the respective index should be attributed to the indicator. The indicators receive scores ranging from the worst scenario (level 1) to the ideal situation (sustainable use of resource – level 6), according to the following guidelines:

Scores	Classification	Characteristics
1 and 2	Critical	Existence of irregularities; high socio-environmental risk; significant levels of social and environmental degradation; or situation of extreme hardship, which significantly compromises the quality of life of the population.
3 and 4	Satisfactory	Meets all the legal requirements relating to its activities; surpasses them through the adoption of good practices and voluntary actions in some cases; or the quality of life reaches the minimum acceptable standard but requires improvement.
5 and 6	Sustainable	Exceeds its legal obligations and/or common practice in the market, in many cases adopting the best-possible practices for the sector; or communities have reached a sustainable livelihood, with adequate access to material and social goods, are capable of recovering independently from situations of stress, and are not causing the deterioration of basic environmental resources through their activities.

2. Select at least three and a maximum of ten indicators for each one of the six resources.

3. When an indicator does not apply, the research should identify the indicator as "Not Applicable." No value should be agreed upon in this case.

4. If the information necessary to evaluate the indicator does not exist or is not available: a) In the case the absence of information is due to lack of evidence, Index 1 should be applied; b) If the absence of information is justified by confidentiality reasons, the indicator should be considered "Not Applicable".

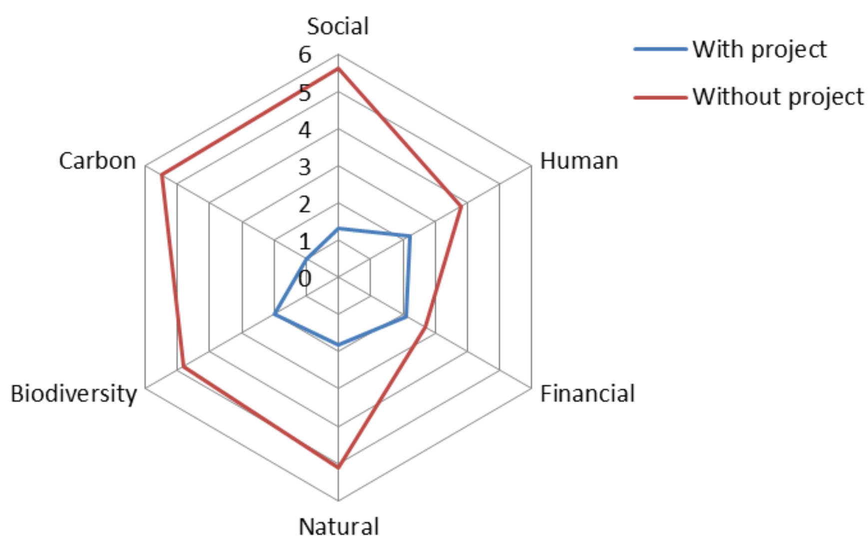
5. If the characteristics presented match more than one possible scenario, always select the scenario with the smaller index.

6. The average of all indicators for each resource should be plotted on the hexagon graphic

Indicator Scores

A table of the selected indicators, their scores and supporting evidence is included as an Annex 5 to this PDD. The following table presents a summary of the six resources and the average score across the selected indicators for each resource.

	Average Score Across Indicators	
Resource	**Without Project**	**With Project**
Social	1.3	5.6
Human	2.2	3.8
Financial	2.1	2.7
Natural	1.8	5.1
Biodiversity	2	4.8
Carbon	1	5.5



The radar diagram illustrates the difference in the six resources between the “without” and “with” project scenarios. It illustrates the positive effects the project has on communities living within the project zone. Project benefits include:

- The adoption of improved farming technology
- The adoption of improved livestock management
- Increased forest product availability through agroforestry and woodlots
- Improved soil fertility and management
- New revenue from sale of carbon offsets
- Job creation for project development, implementation, administration and MRV

None of the above benefits would exist without the project. The absence of carbon revenues means there would be no livelihood diversification or new employment opportunities, a reduction in ecosystem services and watershed quality and deforestation and forest degradation would continue to occur.

CM1.2 Negative Impacts on High Conservation Values

Areas that provide critical ecosystem services

A number of studies have focused on the impact that current land use practices in the Nyando basin are having on the quality of land in the SACC project area[3,25]. The consensus is that intensive agriculture and historical deforestation have left the area in a state of degradation, with poor, infertile soils and diminished natural resources. The reliance of local communities on the land for agricultural purposes means a continuation of the current land use scenario is to the significant detriment of the area as a whole. Any activity that introduces woody biomass back to the SACC project area will have only positive implications for the local people and the land that they rely on for income generation.

Areas that are fundamental for the livelihoods of local communities

The project will prevent harvesting of forest products and community engagement in other drivers of land degradation including excessive grazing of animals. However agricultural land, which is the main source of income for 73% of people in the project area, will be protected by the project interventions. Interventions such as boundary planting and dispersed interplanting involve the strategic planting of trees across land under crop which will serve to bind the soil and reduce erosional losses. Hence agricultural land, which is fundamental for the livelihoods of local communities in the SACC project area is protected by the project, with no negative impacts identified.

Areas that are critical for the traditional cultural identity of communities

The project will look to address some cultural issues, such as the treatment of women in society. Traditionally they have never been viewed as heads of households and were excluded from agricultural activities such as sowing of crops. The SACC project looks to address this sensitive cultural issue through the inclusion of women in project interventions from the outset. This will have a positive net effect on society, as women take steps to participating in a community free of gender stereotypes.

CM2. Offsite Stakeholder Impacts

CM2.1 Negative Offsite Stakeholder Impacts

As it was determined that leakage caused by the SACC project is negligible, the offsite impacts of the project are believed to be limited. The project interventions are implemented on the homestead scale within the project area and hence their effects on the surrounding land are minimal.

The only expected effect of the SACC project outside the project area that would arise as a result of AR activities in the lower and mid Nyando is an increase in interest surrounding agroforestry interventions in neighboring communities. There is potential for another similar project to be implemented in the Homabay region, dependent on the success of the SACC project, and it is likely that project participants in future schemes would be fully receptive to AR activities.

CM2.2 Mitigating Negative Offsite Social and Economic Impacts

Negative offsite stakeholder impacts are negligible and thus mitigation of the project impacts on offsite stakeholders is not necessary.

CM2.3 Net Impacts on Stakeholder Groups

As demonstrated in CM.1 the SACC project has numerous benefits to stakeholders. No negative offsite stakeholder impacts have been detected and the project activities cannot be attributed to a decrease in the well-being of other stakeholders. Indeed the environmental benefits of the project will be felt by downstream communities as runoff from agricultural land reduces, and water quality in aquatic ecosystems will improve.

CM3. Community Impact Monitoring

CM3.1 Develop Community Monitoring Plan

The table on the following page summarises the section of the projects's monitoring plan that focuses on impact versus the projects overall development objectives which are expressed in terms of improving food security and, more broadly, reducing poverty. In the case of food security the indicator and means of verification have been predefined based on standard methods used by CARE in Kenya. In the case of poverty reduction the indicators will be defined by communities themselves with some examples given of indicators that are likely to be proposed. This monitoring plan will be reviewed and finalised and then the necessary baselines established within 6 months of validation.

CM3.2 Develop High Conservation Value Monitoring Plan

Develop initial plan for assessing the effectiveness of measures used to maintain or enrich HCV related to community well-being present in the project zone:

Areas that Provide Critical Ecosystem Services: River Nyando

The positive impact that reforestation and increased tree density in the project area has on the River Nyando is well understood. Under the 'without project' scenario, the river condition will deteriorate as there are an insufficient number of trees to bind and stabilize soils. Conversely, AR activities in the 'with project' scenario will improve groundwater recharge, soil structure and will regulate stream flow, as the rate of rainfall to runoff is reduced. It therefore follows that monitoring the condition of trees planted in the SACC project area will give a strong indication of the condition of the River Nyando. As such, the monitoring plan for G1.8.4 follows the biodiversity monitoring plan for trees outlined in Section B3.1.

Areas that are Fundamental for the Livelihoods of Local Communities: Agriculture

Agriculture employs over three quarters of the people living in the SACC project area. Improvements in crop yields are expected as the project continues, as the trees will serve to bind the soil, and over time

SACC Community impact monitoring plan

Indicator	Means of Verification			
	Source of information	Method of collection	Frequency	Baseline
Poverty reduced ▪ Locally defined poverty indicators (which may differ by location and change over time) e.g. land ownership, livestock ownership, ability to afford school fees	Community members grouped by well-being and gender	Participatory impact assessment tool	Every 5 years	Reflexive counter-factual (i.e. no baseline needed)
	Community members grouped by well-being and gender	Most significant change	Every 5 years	Reflexive counter-factual (i.e. no baseline needed)
Improved food security ▪ Hungry months	Households in participating villages	Questionnaire	Every 2.5 years	Before project: • Lower Nyando already done • Mid Nyando to be done ASAP
	Community members grouped by well-being and gender	Focus group discussion (especially for attribution)	Every 2.5 years	Reflexive counter-factual (i.e. no baseline needed)

this will allow fertility to increase. Food security is a good indicator of agricultural yields, as farmers in the area use their own crops to supplement their food intake and to sell on for profit. Both would result in increased food security and hence this is an excellent indicator of agriculture in the lower and mid Nyando. Food security will be measured in household surveys and community focus groups.

Areas that are Critical for the Traditional Cultural Identity of Communities: Gender roles

The dominance of males in some agricultural activities, such as the sowing of seeds, has led to the exclusion of women from agricultural practices historically in the lower and mid Nyando basin. The SACC project involves women from the commencement of the interventions and CARE envisage their involvement throughout the project. This will be assessed routinely through household surveys and the formation of women's groups.

CM3.3 Commit to Monitoring Plan

CARE commits to developing a full monitoring plan and completing the necessary baselines within 6 months of project validation and to disseminate this plan and the results of monitoring to the communities, stakeholders and wider public. This level of scrutiny will ensure that the monitoring plan is completed to a high standard, with all aspects of community effects considered and explored on a consistent basis.

V. BIODIVERSITY SECTION

B1. Net Biodiversity Impacts

B1.1 Project Impacts on Biodiversity

Biodiversity maintenance and improvements are expected to be a positive outcome of the proposed SACC project activities. Biodiversity benefits linked with the project include the following:

- Protection of water courses – reduced siltation – breeding ground for most fish in Lake Victoria
- *Terminalia brownii* – threatened species
- Return of bat and bird species
- Protection of naturally occurring plants

Although the project primarily aims to benefit the local community, the project will also have numerous biodiversity benefits. Biodiversity impacts are clearly shown below, as specified in the Biodiversity Carbon impact assessment tool.

B1.2 Demonstrate No HCVs Negatively Impacted

Globally, regionally or nationally significant concentrations of biodiversity values

There are no (a) protected areas (b) threatened species (c) endemic species (d) areas that support significant concentrations of a species in the project area.

Globally, regionally or nationally significant large landscape-level areas

The SACC project will not negatively impact any of the remaining pockets of forest, shown by the remote sensing analysis to account for less than 5% of the project area. The project promotes the planting of trees on the homestead scale, which over time will become a timber resource as the trees are pruned. This new source of timber will reduce pressure on existing woody biomass resources and hence the project will have a positive impact on areas supporting indigenous forests.

Threatened or rare ecosystems

The Tinderet Forest is a threatened ecosystem adjacent to the SACC project area. For reasons stated previously, pressure on this resource will be minimized as a result of the project interventions and hence the SACC project will support and contribute to the sustentation the remaining section of the Tinderet Forest.

B1.3 Identification of Species Used by the Project

The following species have been proposed for use in the SACC project:

- *Grevillea robusta*
- *Markhamia lutea*
- *Casuarina spp.*
- *Terminalia brownii.*
- *Leucaena Leucocephala*
- *Eucalyptus spp.*

No known invasive species will be introduced into any area affected by the project. It is therefore certain that the population of any invasive species in the lower and mid Nyando will not increase as a result of the project.

B1.4 Effect of Non-native Species Use

The use of *Eucalyptus* in agroforestry initiatives has been previously critiqued as it has been documented to result in lowered water tables in semi-arid areas due to its high demand for water. However, *Eucalyptus* spp. also has excellent credentials for use in small scale woodlots, as it is fast growing and can sequester carbon over reduced time scales. As long as the plant is properly managed and kept separate from areas used for crop cultivation, there should be no detrimental effects associated with its use in the SACC project. Indeed, in correctly managed woodlots *Eucalyptus* will be an integral part of the carbon finance programme. Similarly *Grevillea robusta, Casuarina spp*. and *Leucaena leucocephala* are non native species which are promoted by this project because they are multi-purpose trees, preferred by the project participants which have a high level of suitability for agroforestry systems

B1.5 No GMO Guarantee

We guarantee that no GMOs have or will be used in the course of the project. As a consequence, GMOs will not be used to generate emissions reductions or removals.

B2. Offsite Biodiversity Impacts

B2.1 Potential Negative Offsite Biodiversity Impacts

Given that biodiversity in the area surrounding the lower and mid Nyando is similar to the biodiversity within the project area it is unlikely that the project will have negative offsite impacts on biodiversity. The negative off-site biodiversity impacts that may result from the SACC project are outlined below, in combination with the corresponding mitigation method.

Table 37. Potential negative impacts of project

Project impact	Negative biodiversity impact	Mitigation method
Eucalyptus plantation	The planting of Eucalyptus in the project area may result in the spreading of this often invasive plant to outside the lower and mid Nyando. This may lead to the displacement of other plant species, particularly crops used for food, outside of the project zone.	Although management issues have been observed in past Eucalyptus planting schemes, lessons have been learned from previous mistakes. For example ensuring that Eucalyptus are used only in woodlots, rather than in planting schemes near areas of crop cultivation will mean it is spatially constrained in terms of coverage of the project area.
Livestock relocation	The project activities require that large herds of goats and sheep are prevented from grazing on plants implemented for AR purposes. This means that they could be moved to areas outside the project boundaries, where land degradation would intensify due to increased populations of grazing livestock.	Ensure that steps are taken to inform the community about the benefits of keeping lower numbers of higher yielding species. This will lead to a project wide transition to keeping lower numbers of livestock, hence reducing the problem of leakage.

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

B2.3 Evaluate Potential Negative Offsite Impacts on Biodiversity

Given the mitigation methods explained in B2.1 it is thought that the offsite negative impacts on biodiversity will be negligible.

B3. Biodiversity Impact Modelling

B3.1 Develop Biodiversity Monitoring Plan

Biodiversity monitoring is designed to measure changes in plants and animals, their habitats, ecosystems and the stress factors on ecosystem functions. In the SACC project this means identifying the current status, distribution and trends of habitats and species populations and the underlying factors affecting these. CARE has initiated plan for selecting biodiversity variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's biodiversity objectives and to anticipated impacts (positive and negative) as shown in table 38.

Table 38. Biodiversity monitoring variables

Class	Indicator	Data Set	Method	Comments
Vegetation structure	Change in crown cover percent	SACC manager will estimate Canopy cover in % at upper canopy level (whether tree, shrub, grass, etc.)	Standard canopy cover methods, done least annually	Significant disturbance/ARR is generally indicated by changes in canopy cover and dominant species. However, records will be long term to take into account short-term fluctuations due to factors such as tire and weather patterns.
Habitat distribution	Change in vegetation along watercourses	Area of riparian Vegetation type. Boundary of riparian vegetation, etc.	Remote sensing or transect, survey	Changes in riparian vegetation can have significant effects on aquatic biodiversity through direct (change in water temperature and light availability) and indirect (increased run-off, siltation, etc.) impacts.
Animals distribution	Increase in number and introduction of new ones	Numbers, or presence/increase or absence depends	General Observations and also stories from the communities.	Can provide early warning of impacts on species before changes in numbers become obvious.
Invasive species	Change in presence, location, area, numbers of invasive plant or animal	Survey, transect or results, patrol reports, reports from community members	Transects, or interviews	The significance of the invasive species for the biodiversity values.

B3.2 Develop HCV Monitoring Plan

The purpose of this HCV monitoring is to make sure that any changes in the identified HCVs are noticed. This then allows action to be taken if the change is negative, which in turn means that the requirement to maintain or enhance the value can be met. CARE has developed an initial plan for assessing the effectiveness of measures used to maintain or enhance High Conservation Values related to globally, regionally or nationally significant biodiversity(G1.8.1-3) present in the project zone as below.

Management and monitoring

Activity	Guidance
• G1.8.1: Globally, regionally or nationally significant concentrations of biodiversity values, including protected areas, threatened species, endemic species and areas that support significant concentrations of a species during any time in their lifecycle	• Riparian areas protection are significant because the rivers act as breeding ground for fish in lake Victoria • Regeneration and ARR is being encouraged in those areas • Conservation agriculture and contour/terracing farming is been protect to support soil erosion control and reduce siltation into the lake/rivers
• G1.8.2: Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance	• Protection of the riparian areas against degradation. • Control of fires • Control of overgrazing on these areas. Constantly monitoring through community leaders • Controlled logging to reduce further degradation as generations and ARR is encouraged.
• G1.8.3: Threatened or rare ecosystems – Terminalia forests and their status.	• Encourage ARR of T. brownie on farm and regeneration where possible especially on the areas bordering

	Kisumu and Kericho counties. • Encourage use of thinning and pruning from other tree species for timber than cut down T. brownie trees

B3.3 Commit to Monitoring Plan

CARE commit to developing a full monitoring plan at the point of project validation and to disseminate this plan and the results of monitoring to the communities, stakeholders and wider public. This level of scrutiny will ensure that the monitoring plan is completed to a high standard, with all aspects of biodiversity effects considered and explored on a consistent basis.

GL2. Exceptional Community Benefits

GL2.1 Demonstrate the Project Zone is in a Low Human Development Country

Kenya as a nation is just above the threshold for classification as a LDC, with approximately 46% of the population living below food poverty line (Kenya Integrated Household Budget Survey, 2006). However there is significant differentiation between rural and urban areas, with a higher percentage of people living in poverty in rural environments. The poverty headcount in rural areas is 50%, which is the percentage necessary for the SACC project to qualify for Gold Level status.

On a local administrative level the Nyando basin is classified primarily as a rural area, with a high incidence of consumption poverty. This has been estimated at 66% and 65% in two separate studies, produced by ICRAF[40] and Verchot *et al* (2008)[41] respectively. Such a high level of poverty indicates that the area targeted by the SACC project is a low human development zone. The project activities will extend to households considered very poor on a global scale and beneficiaries of the project will be able to use the resultant carbon finance to improve social, economic and environmental conditions in the lower and mid Nyando.

GL2.2 Benefits to Poorest Households

The SACC project aims to extend to 50,000 households in the lower and mid Nyando and aims to include 50% of the poorest members of society in AR activities proposed by CARE, in order for the project to truly be classified as pro-poor. Based off of participatory well-being rankings, in the Lower Nyando, the percentage of SACC project participants identified as poor and very poor closely matches the percentage of the poor and very poor households in the Lower Block. As the project is projected to reach 50% of the farmers in the target area, it can be assumed that it will reach 50% of the very poor and poor households in the Lower Block.

In Middle Nyando, the participatory well-being rankings show a slight skew towards the participants classified as middle. The very poor and poor make up a smaller percentage of the SACC project, as compared to their percentage in the Middle Nyando population.

However, research currently underway is identifying the constraints that prevent the very poor from participating in the Middle Nyando, as well as strategies that communities have used to enable poor and very poor households to participate. The learning from this research and ongoing impact monitoring will be incorporated into project activities to meet the goal of reaching 50% of the poorest households.

Well Being Category	Estimated % in Lower Nyando	% of Participants in Lower Nyando	Estimated % in Middle Nyando	% of Participants in Middle Nyando
Very Poor	9.1	10.2	12.54	2.3
Poor	73.6	72.2	51.6	58.7
Middle	17	16.7	28.9	38.0
Rich	1.3	0.85	6.8	1.0

GL2.3 Identifying and Addressing Barriers to Benefits Reaching Poorer Households

Land availability

Poorer farmers have very small farms. Thus, some smallholders feel that they do not have the room to plant woodlots or incorporate the required 50 trees within fields. The project is attempting to reduce this barrier by encouraging smallholders to plant boundary trees, which is, in fact, the most popular planting configuration. In the future, SACC can organize study visits or field days at very small, well-organized farms to demonstrate their potential.

Supply of tree seedlings

Although most farmers including the very poor appreciate the benefits of tree-planting a major constraint to tree-planting by the very poor is access to tree seedlings. They cannot afford to buy seedlings from commercial suppliers and even the cost of raising them (buying seeds and water during the dry season) is well beyond their means. For this reason the project has opted to supply each farmer with up to 100 seedlings free of charge.

Benefit sharing

The risk of poorer farmers failing to get an equitable share of carbon revenues due to elite capture is being addressed through a strong focus on long term governance structures of the project, ensuring that poorer, more vulnerable households, and women as a specific social group, are effectively represented in these governance structures, especially at village level which is the level at which decisions on how carbon revenues are spent will be made.

Need for Short-Term Benefits

Many of the smallholders in Lower and Mid-Nyando have suggested that they cannot make the long-term investments in tree-planting as they need to see immediate benefits. The SACC project is addressing this barrier by integrating an agricultural component to the project which provides farmers with extension services and experimental quantities of seed for short-term cash crops. Farmers regard these rapid-return agricultural development activities as a key benefit of the carbon project.

GL2.4 Project Impacts on Poor and Vulnerable Individuals and Households

As part of the project design process an ex ante social impact assessment was conducted which included identification of potential negative social impacts on poorer more vulnerable groups within the community, and appropriate measures to avoid or mitigate these potential negative impacts.

Potential negative impacts

- **Distribution of benefits**. Men are in most cases control land and its associated assets hence women and youth may be marginalized in the sharing of benefits unless strategies are put in place to ensure equity in distribution of benefits. Activities that are presently in women's hands (access) but not in their control and which will start to generate income as a consequence of carbon sequestration may be taken from them. The type and severity of the present day situation of the dominance of men over women make this a very likely scenario.

- **Food production.** Food production may be compromised as family resources are channeled towards tree planting if the returns prove to be good. Food production may be relegated to leased out farms or sufficient attention may not be given to food production if the returns from planting trees are deemed good by men.
- **Reduced demand for labour.** If substantial areas that are currently under agriculture are switched to woodlots demand for agriculture labour may be reduced which could impact on poorer households who tend to be more dependent on labour as a source of income. It seems unlikely at this point that this will be a significant risk given that the area of land likely to switch from agriculture to woodlots is relatively small in relation to the total farmed area, and given other factors affecting the labour market. Hence rather than develop specific mitigation measures at this point the project will monitor this risk (e.g through monitoring average labour rates in the project area versus outside) and develop a response if/when this proves necessary – for example alternative income generating activities.

Proposed mitigation strategies

- **Gender relations**. The project will include awareness raising activities with both men and women to encourage change in attitudes to gender defined roles, enabling women to have greater control over assets and increased influence in decision-making.
- **Accurate information:** It is important that accurate information is provided to community members on the potential levels of income from carbon so that farmers make informed choices and avoid inappropriate decisions based on un-realistic expectations

GL2.5 A Differentiated Approach to Community Impact Modelling

As indicated in the monitoring plan in section CM3.1, the participatory methods that will be used to monitor social impacts will be applied to separate well-being groups, i.e. community members will be sub-divided into 4 separate groups by well-being/poverty status and the method applied to each group separately. In the case of questionnaires, well-being indicators will be included in the questionnaire that then allow for disaggregation of data by well-being group during the analysis.

List of Acronyms

AFOLU	Agriculture, Forestry and Other Land Use
AIDs	Acquired Immune Deficiency syndrome
AR	Afforestation/Reforestation
CARE	Cooperative for Assistance and Relief Everywhere
CCB	Climate, Community & Biodiversity
CERs	Certified Emission Reductions
CDM	Clean Development Mechanism
CR	Critically Endangered
EAC	East African Community
EN	Endangered Species
GHG	Greenhouse Gas
GPS	Geographical Positioning System
HIV	Human Immunodeficiency Virus
ICRAF	World Agroforestry Centre
LDC	Low Development Country
NBSAP	National Biodiversity Strategy and Action Plan
REDD	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
TIST	The International Small Group and Tree Planting Program
SACC	Sustainable Agriculture in a Changing Climate
SOC	Soil Organic Carbon
VCS	Voluntary Carbon Standard
VU	Vulnerable Species

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Annexes

Annexes are not attached to this document but are included as separate documents.

Annex 1. Technical specifications

Annex 2. Historical analysis of land use /land covers changes & definition of eligibility of lands for afforestation and reforestation activities of the Western Kenya CARE/AFOLU Project

Annex 3. Making Carbon Finance for Sustainable Agriculture Work for the Poor

Annex 4. Social carbon indicators for forest projects

Annex 5 - Indicator Scores and Evidence - Social Carbon