

**MONITORING REPORT FORM (F-CDM-MR)**
Version 02.0**MONITORING REPORT**

Title of the project activity	Uganda Nile Basin Reforestation Project No. 3
Reference number of the project activity	1578
Version number of the monitoring report	Version 01
Completion date of the monitoring report	6 th May 2012
Registration date of the project activity	21 st August 2009
Monitoring period number and duration of this monitoring period	1 st monitoring period (01/04/2007 – 05/04/2012)
Project participant(s)	The National Forestry Authority Spain Japan Italy Canada France Luxembourg The International Bank for Reconstruction and Development as the Trustee of the BioCarbon Fund
Host Party(ies)	Uganda
Sectoral scope(s) and applied methodology(ies)	Small-Scale Afforestation/Reforestation (A/R). Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on grasslands or croplands: AR-AMS0001 / Version 05 .
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	29,795.0 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	1,936 tCO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

This small-scale CDM A/R project is implemented by the National Forestry Authority (NFA) in cooperation with a local community group, KADA (Kanywamaizi Development Association)¹. It is one of five similar projects aimed at providing a new financing mechanism to overcome the current barriers to establishing timber plantations in Uganda, and to enable communities to benefit from the CDM. The project activities cover 341.9 ha within Rwoho Central Forest Reserve (CFR)² in which pine (*Pinus caribaea*) forest plantations are being established. The project's forest management practices including tree nursery technology, planting, tending and harvesting regimes are based on the *Tree Planting Guidelines* developed by the Sawlog Production Grant Scheme, freely available at:

http://www.sawlog.ug/index.php?option=com_content&view=article&id=64&Itemid=74

The plantations will be managed on a 22-year rotation cycle (rotation age for timber production) or until the target diameter i.e. 45 cm is reached.

The project started in April 2007, with the first planting undertaken in the March-May planting season of the same year. The seed of the chosen plantation species: *P. caribaea* is sourced from Brazil. The total area planted by May 2012 was 276.9 ha; 266.1 ha belonging to the NFA, and 10.8 ha to the community group, KADA. The group signed a formal agreement with the NFA (Collaborative Forest Management Agreement) in 2012.

The project was registered in August 2009. It has a 60-year operational timeline and 20-year renewable crediting periods. Its calculated net anthropogenic GHG removals in this monitoring period is 1,936 tCO₂e, while the cumulative ex-ante net anthropogenic GHG removals was originally estimated as 29,795.0 tCO₂e by 2012.

Details of rights, entitlements and responsibilities in the implementation of the project and emissions reductions are outlined in the project PDD. Carbon revenues that accrue to the community group will be determined and remitted in this and future monitoring periods according to the *Carbon Revenue Distribution and Budgeting Procedure*.

A.2. Location of project activity

Host Party(ies):

Uganda

Region/State/Province etc.:

The project area is located in south-western region of Uganda in parts of Mbarara, (Rwampara county) Isingiro, (Isingiro county) and Ntungamo (Ruhama county) districts and is covered by Uganda Department of Lands and Surveys map sheet 86/3 series Y732 at 1:50,000.

¹ The NFA is the statutory manager of this and all other CFRs in Uganda as mandated by the National Forestry and Tree Planting Act No. 8/2003 although the land title is by law (Land Act Cap 227 - revised 2000) held by the Uganda Land Commission in trust for the people of Uganda. The community group's rights and ownership are provided for by the National Forestry and Tree Planting Act under the collaborative forest management arrangement.

² The entire Forest Reserve covers in total an area of 9,100 ha.

**City/Town/Community, etc.:**

The closest town is Mbarara, which is approximately 70 km away from the planting site.

Physical/Geographical location:

The coordinates of the project boundaries are:

Easting	Northing
230,484.6	9,900,132.0
233,065.2	9,901,244.0

Projection: UTM Zone 36 S (central Meridian E 33)

Datum (Spheroid): WGS84 (or ARC 1960)

Scale: 0.9996

False Easting: 500,000

False Northing: 0

A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Uganda (host country)	National Forestry Authority (NFA)	No
Italy Spain Japan Italy Canada France Luxembourg	International Bank for Reconstruction and Development as the trustee of the BioCarbon Fund	Yes

A.4. Reference of applied methodology

Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on grasslands or croplands: **AR-AMS0001 / Version 05.**

A.5. Crediting period of project activity

20-year crediting period, renewable twice, adding up to a total maximum crediting period of 60 (sixty) years from start date: 01 April 2007. The first crediting period is from 01 April 2007 to 31 March 2027.

SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity**

Tree planting began in April 2007. The initial planting schedule was as follows: 138.1 ha planted in 2007; 123.9 ha in 2008; 3.5 ha in 2010; and 11.4 ha in 2011. However, the planted crops were affected by poor survival and fire outbreaks, which burnt down 6.9 ha in August 2009 and 6.7 ha in August 2011. As a

result, 3.5 ha were replanted in 2011 and 24.9 ha were replanted in 2012. In addition, due to financial constraint, the total of area effectively planted by March, 2012 was 276.9 ha, which is less than the plantable area anticipated in the project PDD (341.9 ha). This unplanted area is expected to be planted in the coming planting seasons (2012/2013).

The planted stands have been weeded regularly depending on weed growth mainly by slashing. Firelines have been established around the planted stands and are maintained annually by removing combustible biomass in order to protect trees from fires. Furthermore, fire patrol and fighting teams are employed every fire season (December-March and June/July) to guard the planted stands from fire. The management activities carried out in each planted stand are outlined in the *Activity list* of the *SMART Tool* (extended version).

Besides fire, no other significant events e.g. pests, diseases or drought have occurred. The fire occurrence, however, does not affect the applicability of the project methodology.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

There has been one temporary deviation. The precision level in the actual estimation of the mean carbon stock in the project during this monitoring period has been larger than the 10% threshold required by the applied methodology. Thus, based on the clarification provided at EB 55 (*“Conservative reduction of the required precision levels of GHG removals at monitoring and verification by reducing the mean carbon density”* AR_AM_CLA_0010), a conservative calculation approach was applied to the project GHG removals. See Section E.2 for the calculation steps.

B.2.2. Corrections

There are no corrections made after project registration.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

There are no permanent changes from the registered monitoring plan or applied methodology.

B.2.4. Changes to project design of registered project activity

There are no changes to the project design of the registered project activity

B.2.5. Changes to start date of crediting period

There are no changes to the start date of the crediting period

B.2.6. Types of changes specific to afforestation or reforestation project activity

The changes that occurred in the project activity are:

- Planting schedule (years of planting) deviating from the planned schedule (in the project PDD)
- The area planted annually deviating from the planned area (in the project PDD).
- The physical shape of sample plots has been changed - from square (area = 400m²) stipulated in the monitoring plan - to two concentric circles: inner circle (area = 113m²) and outer circle (area = 452m²).

These changes do not require prior approval by the Executive Board according to the guideline: *EB 66 Annex 24 Guidelines on accounting of specified types of changes in A/R CDM project activities from the description in registered project design documents, Version 2*

SECTION C. Description of monitoring system

The organizational structure, responsibilities and processes in the monitoring system are presented in Figure 1 and Figure 2. Monitoring is undertaken for both day-to-day management of the project and for the 5-yearly verifications. The NFA uses the Monitoring Guidelines (laid out in the Forest Management Plan), the *CDM Monitoring Process*, and the *CDM Operations Plan* to guide the monitoring of the project. The *CDM Monitoring Process* describes the relevant work processes involved in the monitoring; and the *CDM Operations Plan* is a standard for ensuring that the monitoring is in line with the World Bank requirements for CDM projects.

Monitoring of project activities

The progress of project activities such as planting, weeding, etc., and incidences such as fire outbreaks are recorded in the *SMART Tool* “Activity list” by the Field Office staff - comprising a Sector Manager, Plantation Manager and three Field Forestry Supervisors in charge of the area. They also submit the data in electronic format e.g. GPS waypoints and/or paper format to the NFA headquarters. The data are used to update the project GIS files, and for writing the project implementation status reports.

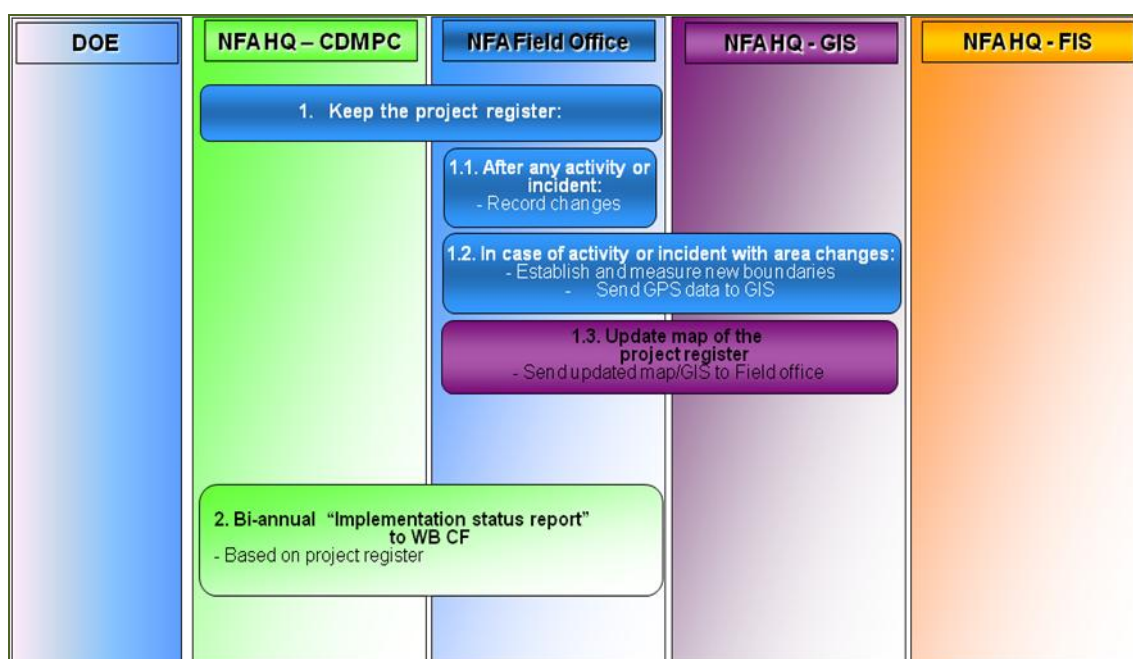


Figure 1. Monitoring of project activities: organisational structure and responsibilities.

Colour indicates the responsible unit/office, CDM PC = CDM Project Coordinator; FIS = Forest Inventory unit

Carbon monitoring

Carbon monitoring for the project verification is conducted by the NFA inventory and GIS units. The units are responsible for data capture, storage, and analysis and reporting. Electronic data are stored in the *SMART Tool* (extended version) of the World Bank - BioCarbon Fund and in GIS files. All hard copies of

monitoring data are stored in the Inventory unit, while electronic (soft copies) are stored on a dedicated Server at the NFA headquarters. The procedures followed for conducting the necessary forest inventory are laid down in the *Field Carbon Inventory and Monitoring Manual*. The procedures followed for area measurements are contained in the *GPS Owners Manual*, while those for data entry, analysis and quality checks (based on the use of the *SMART Tool* – extended version) are contained in the *Data Analysis and Reporting Manual*.

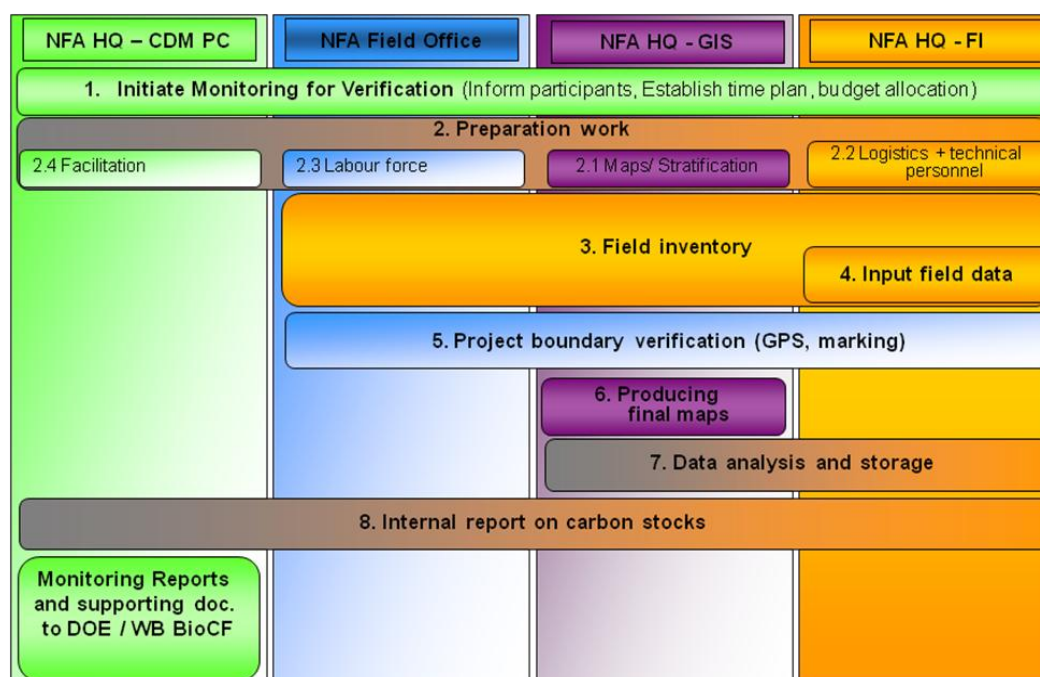


Figure 2. Carbon monitoring for project verification: organisational structure and responsibilities. Colour indicates the responsible unit/office, CDM PC = CDM Project Coordinator; FI = Forest Inventory unit

The parameters that are measured for the carbon monitoring and the tools/methods used are outlined in the table below.

Table 1. Parameters measured

Parameter	Tool/Method
1. Location of the project areas	Global Positioning System (GPS) measurement
2. Location of permanent sample plots	GPS measurement
3. Size of the project areas	GPS and Geographical Information System (GIS)

	measurements
4. Tree diameter at breast height – DBH	Measurement of diameter at breast height for each tree that falls within the sample plot using diameter tapes/calliper
5. Tree height	Measurement of height for each tree that falls within the sample plot using hypsometer

The above parameters are used to calculate the project ERs as illustrated in Figure 3.

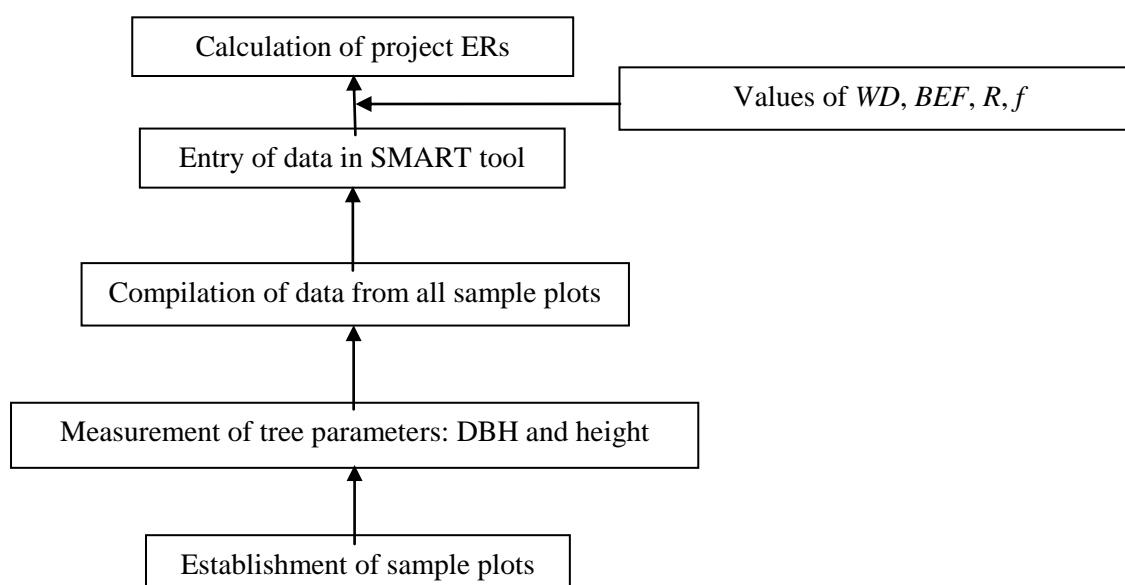


Figure 3: Calculation steps for project ERs

The value for wood density (WD) is taken from Table 3A.1.9-2 of the IPCC LULUCF GPG (2003), and those for root to shoot ratio (R), and biomass expansion factor (BEF) from Tables: 3A.1.8 and 3A.1.10 of IPCC LULUCF GPG (2003) respectively; the form factor f is taken from a local study (Alder *et al.*, 2003). The actual procedures for calculations carried out in this monitoring period are outlined in Section D.3 and Section E of this monitoring report.

Project impacts monitoring



In accordance with national legislation (National Environment Act, 1995; Environmental Impact Assessment Regulations, 1998), the National Environment Management Authority will carry out monitoring (auditing) of the impacts of the project activities at time intervals to be determined by the Authority to check if the NFA has addressed the issues identified in the project's Environmental Impact Assessment.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	Wood density
Unit	Ton dry matter/m ³
Description	Wood density measured in tons of dry weight per m ³ of fresh volume
Source of data	Table 3A.1.9-2 of the IPCC LULUCF GPG (2003)
Value(s) applied	0.51 for <i>Pinus caribaea</i> , 0.41 for <i>Maesopsis eminii</i>
Purpose of data	Calculation of project's net anthropogenic GHG removals
Additional comment	None

Data/Parameter	Domesticated grazing animals within the project boundary
Unit	Number
Description	Number of domesticated grazing animals within the project boundary displaced due to the project activity
Source of data	Baseline survey
Value(s) applied	665 animals
Purpose of data	Leakage calculation
Additional comment	This parameter is not monitored for the reason given in Section E.3 leakage calculation.

Data/Parameter	Grazing area
Unit	Hectare (ha)
Description	Area available for grazing including areas adjacent parish (outside project area)
Source of data	Baseline survey
Value(s) applied	10,000
Purpose of data	Leakage calculation
Additional comment	This parameter is not monitored for the reason given in Section E.3 leakage calculation.

Data/Parameter	Grazing time
Unit	Hours
Description	Average number of hours per day animals spend grazing in the project area
Source of data	Baseline survey
Value(s) applied	14
Purpose of data	Leakage calculation
Additional comment	This parameter is not monitored for the reason given in Section E.3 leakage calculation.

**D.2. Data and parameters monitored**

Data/Parameter	Location of project area
Unit	UTM co-ordinates
Description	Location of the project area on earth defined in projected co-ordinates
Measured/Calculated/Default	Measured
Source of data	Field survey of the NFA inventory and GIS units
Value(s) of monitored parameter	See Project GIS files.
Monitoring equipment	Garmin GPS receiver (± 3 m accuracy) calibrated in UTM Zone 36S.
Measuring/Reading/Recording frequency	Every 5 years
Calculation method (if applicable)	Not applicable
QA/QC procedures	The project boundary is marked with physical markers e.g. trenches/planted trees whose GPS waypoints are recorded. The physical locations of these markers are re-checked in the field by identifying the markers with the help of a GPS.
Purpose of data	Monitoring of project emissions reductions/implementation status
Additional comment	None



Data/Parameter	Location of sample plots
Unit	UTM co-ordinates
Description	Location of sample plots on earth defined in projected co-ordinates
Measured/Calculated/Default	Measured
Source of data	Field survey of the NFA inventory and GIS units
Value(s) of monitored parameter	See Project GIS files.
Monitoring equipment	Garmin GPS receiver (± 3 m accuracy) calibrated in UTM Zone 36S.
Measuring/Reading/Recording frequency	Every 5 years
Calculation method (if applicable)	Not applicable
QA/QC procedures	The centre of the sample plots, whose GPS coordinates have been recorded) are marked with a metal peg for easy and correct identification. On-the-ground re-checking (with a GPS and metal detector) of the locations is done for 10 % of sample plots (see <i>Field Carbon Inventory and Monitoring Manual</i> and QC report).
Purpose of data	Monitoring of project emissions reductions/ implementation status
Additional comment	None

Data/Parameter	Project area size
Unit	Ha
Description	Size of the area where the project activities are being implemented
Measured/Calculated/Default	Measured
Source of data	Field survey of the NFA inventory and GIS units
Value(s) of monitored parameter	See Project GIS files
Monitoring equipment	Garmin GPS receiver (± 3 m accuracy) calibrated in UTM Zone 36S.
Measuring/Reading/Recording frequency	Every 5 years
Calculation method (if applicable)	Not applicable
QA/QC procedures	The boundary of the project area had been initially recorded as GPS waypoints, and used to estimate project area. The physical locations of the boundary waypoints are randomly re-checked in the field with the help of a GPS.
Purpose of data	Monitoring of project emissions reductions/ implementation status
Additional comment	None



Data/Parameter	DBH (diameter at breast height)
Unit	Centimetre (cm)
Description	Diameter of trees within the sample plot measured at 1.3 m along the longitudinal axis of the tree stems
Measured/Calculated/Default	Measured
Source of data	Field survey of the NFA inventory and GIS units
Value(s) of monitored parameter	Individual values are reported in the World Bank-BioCarbon Fund <i>SMART tool</i> (extended version)
Monitoring equipment	Diameter tapes
Measuring/Reading/Recording frequency	Every 5 years
Calculation method (if applicable)	Not applicable
QA/QC procedures	10 % of sample plots have been re-visited and tree DBH re-measured and compared with the original measurements (see <i>Field Carbon Inventory and Monitoring Manual</i> and QC report)
Purpose of data	Monitoring of project emissions reductions
Additional comment	None

Data/Parameter	Tree height
Unit	Metre (m)
Description	Height of all trees within the sample plot measured along the longitudinal axis from tree base to top.
Measured/Calculated/Default	Measured
Source of data	Field survey of the NFA inventory and GIS units
Value(s) of monitored parameter	Individual values are reported in the World Bank-BioCarbon Fund <i>SMART tool</i> (extended version)
Monitoring equipment	<i>Suunto</i> (height measuring device)
Measuring/Reading/Recording frequency	Every 5 years
Calculation method (if applicable)	See <i>Field Carbon Inventory and Monitoring Manual</i>
QA/QC procedures	10 % of sample plots have been re-visited and tree height re-measured and compared with the original measurements (see <i>Field Carbon Inventory and Monitoring Manual</i> and QC report)
Purpose of data	Monitoring of project emissions reductions
Additional comment	None

Data/Parameter	Total CO ₂ e
Unit	Tons
Description	Amount of CO ₂ e sequestered by the project activity
Measured/Calculated/Default	Calculated
Source of data	Field survey of the NFA inventory and GIS units
Value(s) of monitored parameter	1,936 tCO ₂ e
Monitoring equipment	Not applicable
Measuring/Reading/Recording frequency	Every 5 years
Calculation method (if applicable)	Excel calculation - see <i>SMART Tool</i> (extended version)
QA/QC procedures	Complete re-check of data entries against field data recording sheets; use of control figures e.g. comparing total of sample plots entered in the <i>SMART Tool</i> against known field records (see <i>SMART Tool</i> extended version and <i>Data Analysis and Reporting Manual</i>).
Purpose of data	Monitoring of project emissions reductions
Additional comment	None

D.3. Implementation of sampling plan

The sampling plan used was based on the guidelines provided in the project methodology. Stratified random sampling procedures were applied; the strata were defined based on managing entities (NFA or community), species planted, and planting season.

A total of 36 sample plots were measured. The total number of sample plots was determined using the A/R Methodological Tool: Calculation of the number of sample plots for measurements within A/R CDM project Activities - Version 02.1.0. The sample plots were placed randomly on the area map of the planted stands using random point generation functionality of ArcGIS functionality, and located on the ground with the help of a Global Positioning System (GPS), and their centre points marked with a metal peg so that they can be easily found using a metal detector. Details of the physical design of the sample plots can be found in the *Field Carbon Inventory and Monitoring Manual*.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

Baseline emissions was estimated in the baseline survey (see calculation in the PDD), and was set to zero in line with the methodology. Therefore, baseline has not been calculated in this monitoring period.

E.2. Calculation of project emissions or actual net GHG removals by sinks

Applying the guidelines provided in the project methodology, the project's emission reductions (t CO₂-e) was estimated according to the following equation:

$$P(t) = \Sigma(P_{A(t)i} + P_{B(t)i}) * A_i * (44/12)$$

where:

$P_{(t)}$ = carbon stocks within the project boundary at time t achieved by the project activity (t CO₂e)

$P_{A(t) i}$ = carbon stocks in above-ground biomass at time t of stratum i achieved by the project activity during the monitoring interval (t C/ha)

$P_{B(t) i}$ = carbon stocks in below-ground biomass at time t of stratum i achieved by the project activity during the monitoring interval (t C/ha)

A_i = project activity area of stratum i (ha)

i = stratum i

The calculations below were performed for each stratum:

Above-ground biomass carbon - PA(t)

$PA(t)$ was calculated per stratum i as follows:

$$PA(t) = E(t) * 0.5$$

where:

$PA(t)$ = carbon stocks in above-ground biomass at time t achieved by the project activity during the monitoring interval (t C/ha)

$E(t)$ = estimate of above-ground biomass at time t achieved by the project activity (t dm/ha)

0.5 = carbon fraction of dry matter (t C/t dm)

$E(t)$ was calculated as follows:

$$E(t) = SV * BEF * WD$$

where:

$E(t)$ = estimate of above-ground biomass at time t achieved by the project activity (t dm/ha)

SV = stem volume (m³/ha)

WD = basic wood density (t dm/m³), value used = 0.51 for *Pinus caribaea*, 0.41 for *Maesopsis eminii* (IPCC LULUCF GPG (2003): Table 3A.1.9-2)

BEF = biomass expansion factor (over bark) from stem volume to total volume (dimensionless): value used = 1.3 for *Pinus caribaea*, 3.4 for *Maesopsis eminii* (IPCC LULUCF GPG (2003): Table 3A.1.10).

SV was estimated from measured DBH and height values using the equation (national study: Alder *et al.* 2003):

$$SV = f * q * d^2 * h$$

where:

f = form factor; value 0.42 from local study: Alder *et al.*, 2003.

q = is a constant (=3.14/40000)

d = measured diameter at breast height

h = measured tree height

Below-ground biomass carbon - PB (t)

$PB(t)$ was estimated for each stratum i as follows:

$$PB(t) = E(t) * R * 0.5$$

where:

$PB(t)$ = carbon stocks in below-ground biomass at time t achieved by the project activity during the monitoring interval (t C/ha)

R = root to shoot ratio: value used = 0.46 for conifer plantation (< 50 tonnes dry matter/ha) and 0.42 for *Maesopsis eminii* (< 125 tonnes dry matter/ha) (IPCC LULUCF GPG (2003): Table 3A.1.8)
0.5 = carbon fraction of dry matter (t C/t dm).

The actual calculation of the net anthropogenic GHG removals by sinks was implemented in the *SMART Tool* (extended version).

The project actual net anthropogenic GHG removals was estimated at 2,041.6 tCO₂e with a precision level of 15%. As a result of the low precision level, the project net anthropogenic GHG removals was adjusted based on the clarification provided at EB 55, using the “Conservative reduction of the required precision levels of GHG removals at monitoring and verification by reducing the mean carbon density” (AR_AM_CLA_0010) calculation approach, where:

Conservatively reduced mean = actually estimated mean*(100-precision level achieved [15%] + precision level required [10%]),

This resulted into net anthropogenic GHG removals of 1,936.8 tCO₂e (the calculation is provided in *Precision Calculation Excel* file)

Thus,

Total baseline emissions: 0.0 tCO₂e

Total project emissions: 0.0 tCO₂e

Total leakage: 0.0 tCO₂e

Total emission reductions: 1,936 tCO₂e

E.3. Calculation of leakage

Leakage calculation was not carried out because leakage in the project is not monitored for the following reason: In the baseline survey (see the project’s PDD), the ratio of the maximum sustainable number for grazing livestock in the project area to the grazing capacity of the project land area – denoted by R below – was estimated to be less than 10%. Thus, according to the project’s methodology, leakage was considered to be negligible (equal to 0.0 tCO₂e). A complete (100%) displacement of the grazing livestock as a result of implementing the project activities was assumed. The estimation of R based on the 2006 survey data is shown below:

$R = (n/A * f_{\text{day}})/0.5$. R is expressed as a percentage.

n = number of grazing animals in the project area = 665

A = Grazing area including adjacent parishes = 10,000 ha

$f_{\text{day}} = t_{\text{day}}/24$, where t_{day} = average time animals spend grazing in the area = 14 hours/24 hours

0.5 = default value grazing capacity IPCC LULUCF GPG (2003)

Thus,

$R = (665/10,000 * 14/24)/0.5 = 8\%$

In addition, there were no croplands (crop cultivation) within the project to be displaced due to the project activities. Therefore, due to its negligible size, the complete displacement of animals initially grazing inside the project area, and no displacement of cropland or agricultural activity occurring from the project area, leakage is not monitored. Thus leakage = 0.0 tCO₂e

**E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks**

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO ₂ e)
2012	0.0	0.0	0.0	1,936 tCO ₂ e

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO ₂ e)	29,795	1,936 tCO ₂ e

E.6. Remarks on difference from estimated value in registered PDD

It was anticipated in the project design that the entire project area (341.9 ha) would be planted in 2007. This has not been the case; only 276.9 ha had been effectively planted by March 2012. In addition, some planted areas were burnt down, and in others the trees died out, and had to be re-planted. These factors reduced the project's net anthropogenic GHG removals in this monitoring period.
