

MAÍSA REDD+ PROJECT

MONITORING REPORT OF GHG EMISSIONS REDUCTIONS FROM AVOIDING UNPLANNED DEFORESTATION TITLE IN 2012/2013



Document Prepared By Rebeca Lima and Rogério Marinho

Contact Information: contato@biofillica.com.br

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Prepared By	Rebeca Lima and Rogério Marinho
Contact	Rua Dr. Renato Paes de Barros. 714 – Cj. 62 08275-420 – Itaim Bibi - São Paulo. SP – Brasil www.biofillica.com.br / +55 11 3073-0430 Plínio Ribeiro – plinio@biofillica.com.br Rebeca Lima – rebeca@biofillica.com.br

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Maísa REDD+ Project is a partnership between Biofilica, Fazenda Maísa and Sipasa-Moju to promote forest conservation and reduction of emissions from unplanned deforestation and forest degradation, through the valuation of the "standing forest" by integrating Sustainable Forest Management activities and marketing environmental services.

Project's actions to climate aim to reduce emissions due to unplanned deforestation, controlling leakage and mitigating the risk of non-permanence. The following strategies were designed accordingly: prospection of economic alternatives to add value on the standing forest and to different forest products from the project area, greater efficiency and effectiveness in property surveillance within the project area along with the use of satellite images for forest cover monitoring and promotion of profitable, high employment, low emission activities at leakage management areas.

On this first monitoring period, from the project start date (May 21th 2012) to May 21th 2013, great part of the implemented activities under those mentioned strategies focused on basic assessments (socioeconomic, flora, fauna, forest's carbon stock and baseline projections), activities' design, sustainable forest management execution and monitoring, strengthening of property surveillance and analysis of satellite images to monitor unplanned deforestation and leakage. In these regard, technologies applied were, basically, those required by the sustainable forest management activities, SIG software, satellite images, digital SIG data, spreadsheets and general data analysis. As a result Maísa REDD+ Project avoided an amount of 64,331.7 tCO₂eq, from which 52,108.7 tCO₂eq will be tradable.

Besides actions to promote climate benefits, Maísa REDD+ Project also have developed actions to promote benefits to surrounding communities and regional biodiversity. The social and biodiversity components of the Project, though, are not subject of this report, because their activities focused, mostly, on basic assessments and activities design and not on their implementation.

1.2 Sectoral Scope and Project Type

- Sectorial Scope: 14 – Agriculture, Forestry and Other Land Uses (AFOLU)
- Reducing Emissions from Deforestation and Degradation (REDD)
- Methodology for Avoided Unplanned Deforestation (AUD)
- This is not a grouped Project

1.3 Project Proponent

Organization name	Biofíllica Investimentos Ambientais S.A.
Contact person	Plínio Ribeiro
Title	Executive Director
Address	Rua Dr. Renato Paes de Barros. 714 – Cj. 62 08275-420 – Itaim Bibi - São Paulo, SP – Brasil
Telephone	+55 11 3073-0430
Email	plinio@biofillica.com.br

Organization name	Maisa-Moju Agroindustrial Ltda.
Contact person	Márcio Pinheiro
Title	Land owner
Address	Rodovia PA-150, Km-240, Estrada do Projeto Seringueira, Km-50 - Município de Moju, Pará - Brasil
Telephone	+55 91 3250-3212
Email	maisa.marciopinheiro@hotmail.com

Organization name	Sipasa-Seringa Industrial do Pará S/A
Contact person	Maurício Batista da Silva
Title	Forest Manager
Address	Rodovia PA-150, Kn-122, Estrada do Projeto Seringueira, Km- 42 - Município de Moju, Pará - Brasil
Telephone	+55 91 3752 2158
Email	ma_gbsilva@hotmail.com

1.4 Other Entities Involved in the Project

Organization name	Instituto Peabiru
Role in the project	Mobilization and coordination with local communities and stakeholders, implementing social activities in partnership with Biofilica and developing studies related to the social aspects of biodiversity and behavior of deforestation agents and drivers in the project area.
Contact person	João Meirelles Filho
Title	General Director
Address	Rua Ó de Almeida, 1083 – CEP 66053-190 – Belém, Pará - Brazil
Telephone	+55 91 3222 6000
Email	jmeirelles@peabiru.org.br

Organization name	Eco-lógica Consultoria Ambiental
Role in the project	Development of project baseline studies and deforestation projections.
Contact person	Carlos Souza Junior
Title	Executive Director
Address	Rua Antônia Barreto, 130 – Sala 1307 – CEP 66055-050 – Belém, Pará - Brazil
Telephone	+55 91 3223 2256
Email	carlos@ecologica.com.br

Organization name	Amazônia Gestão Ambiental
Role in the project	Completion of the forest inventory and measurement of carbon stock.
Contact person	Cristian Rau Stoltenberg
Title	Executive Director
Address	Rodovia BR 174, Km 86,6, s/n, Zona Rural – CEP 6904-0891 - Rio Preto da Eva, Amazonas - Brasil
Telephone	+55 92 3304 0891
Email	cristian@amazoniagestaoambiental.com.br

1.5 Project Start Date

May 21th 2012.

1.6 Project Crediting Period

The Project has a crediting period of 30 years. Beginning on May 21th 2012 and ending on May 21th 2042.

1.7 Project Location

Geographical Boundaries

Fazenda Maísa is located in the municipality of Mojú, in the lower Tocantins region, state of Pará. The project area is also nearby and within the area of direct influence of Baião, Mocajuba, Tailândia, Goianésia and Breu Branco municipalities. Relatively close to the project area, across the Tocantins River, there is also the Ipaú-Anilzinho Extractive Reserve (RESEX) established in 2005 in the municipality of Baião. **Figure 1** lets you view the project and influence area mentioned previously.

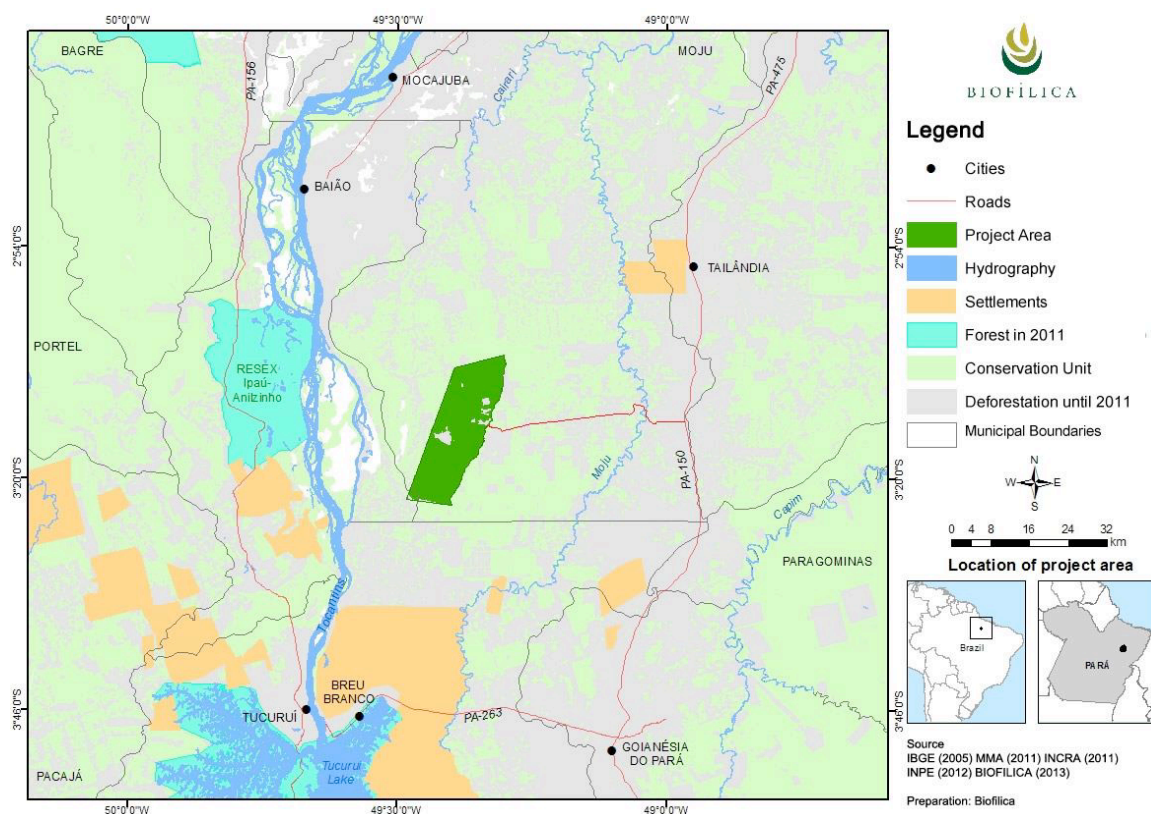


Figure 1. Project's geographical boundaries.

Access

Fazenda Maísa may be accessed through three main roads:

- Leaving from Belém, the state capital, one must take the PA 150 highway until km 122, and then other 42 kilometers on Projeto Seringa's back road until the main entrance of Fazenda Maísa;
- On the south side of the farm, through the PA 263 highway, passing through the city of Breu Branco and using the back roads owned by Dow Corning to Fazenda Maísa; and
- There is also a northwest access via a port on the right bank of the Tocantins River, built to ensure production outflow, then crossing the Ituquara community to the boundaries of the farm.

Project Area

The REDD+ Maísa Project corresponds to an area of 28,752 hectares of forest cover under the control of Mojú Agroindustrial S.A. where the proposed conservation activities will be held. The following geodetic coordinates define the limits of the Project:

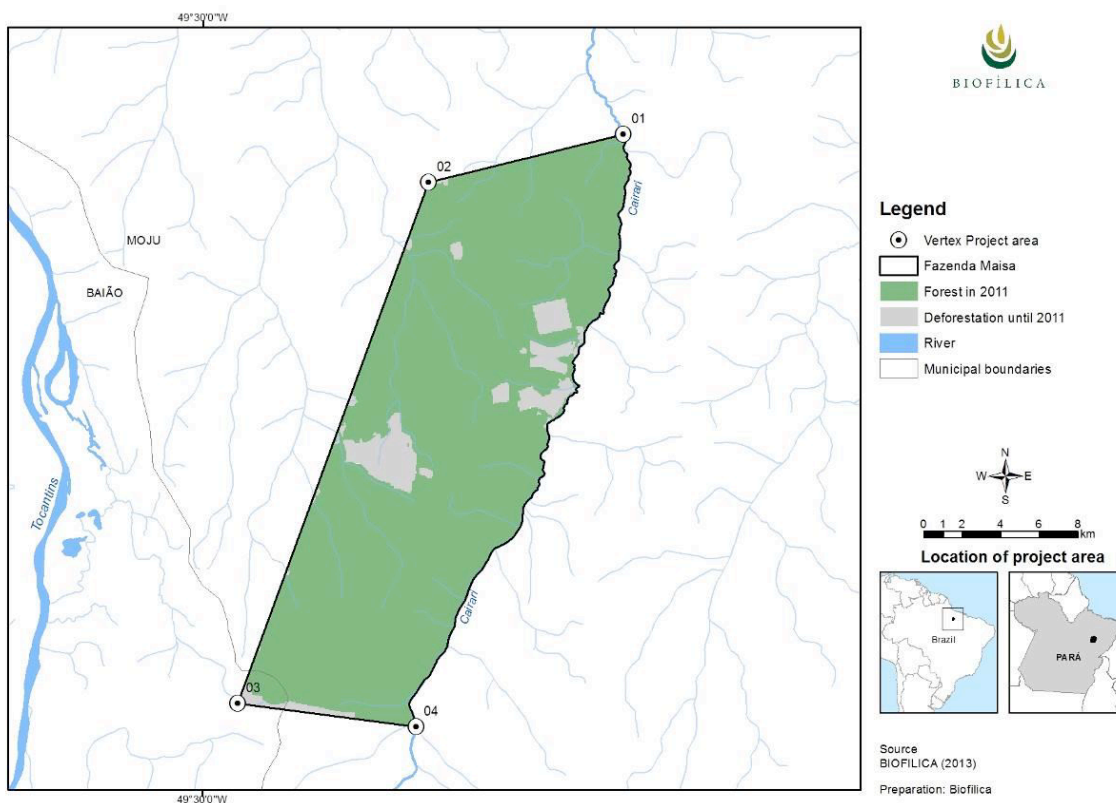


Figure 2. Vertices that define Project Area.

Table 1. Geodetic coordinates of Project Area's vertices.

Vertices	X	Y
01	688.530.63	9.656.879.45
02	678.399.14	9.654.369.60
03	668.474.29	9.627.169.49
04	677.741.05	9.625.965.27

1.8 Title and Reference of Methodology

- Approved VCS Methodology VM0015 for Avoided Unplanned Deforestation, version 1.1.
- Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, VT001, version 3.0.
- VCS Non-Permanence Risk Tool, VCS version .2.

1.9 Other Programs

- Emission Trading Programs and Other Binding Limits: As Brazil is a non-Annex I country under the Kyoto Protocol, it has no national commitments to reducing emissions of greenhouse gases under the UN Framework Convention on Climate Change (UNFCCC, English). Furthermore, the REDD+ Maísa Project has no current connection or history of involvement with any initiative to generate credits within the Clean Development Mechanism (CDM) or other regulatory or voluntary schemes.
- Other Forms of Environmental Credit: The REDD+ Maísa Project neither has nor intends to generate any other form of environmental credit related to the reduction of GHG emissions or removals claimed under the VCS Program.
- Participation under Other GHG Programs: The REDD+ Maísa Project was not registered nor seeks registration in any other GHG program, in addition to the submission of the project to validation and verification under VCS (Verified Carbon Standard) and CCBS (Climate, Community and Biodiversity Standard) standards. As VCS is mainly responsible for the certification of the benefits to the climate and carbon accounting, making the project eligible to generate credits, and CCB certifies the generation of co-benefits to the climate, community and biodiversity.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Implemented activities under the “Climate” component

During this first monitoring period, from the project start date (May 21th 2012) to May 21th 2013, the implemented activities focused on basic assessments (socioeconomic, flora, fauna, forest's carbon stock and baseline projections), activities' design, sustainable forest management execution and monitoring, strengthening of property surveillance and analysis of satellite images to monitor unplanned deforestation and leakage.

Under the Sustainable Forest Management during the monitored period the Annual Production

Unit 10 (UPA 10, from Portuguese “Unidade de Produção Anual”) was logged. The logging of UPA 10, authorized by the State Environment Secretariat under the authorization protocol AUTEF 2128/2012, occurred on 1,281.24 hectares, 1,28% of this area was opened due to necessary infrastructure and 16,019.78 m³ were harvested. More information can be accessed through the UPA 10’s Post-harvest Report, available to the VVB.

Figure 3 shows the location of all Annual Productions Units (UPAs), including the location of UPA 10, where planned activities of the sustainable forest management occurred.

Besides actions to promote climate benefits, Maísa REDD+ Project also have developed actions to promote benefits to surrounding communities and regional biodiversity. The social and biodiversity components of the Project, though, are not subject of this report, because their activities focused, mostly, on basic assessments and activities design, not on their implementation.

Table 2 describes Project’s general activities encompassed by this monitoring period, their status and duration.

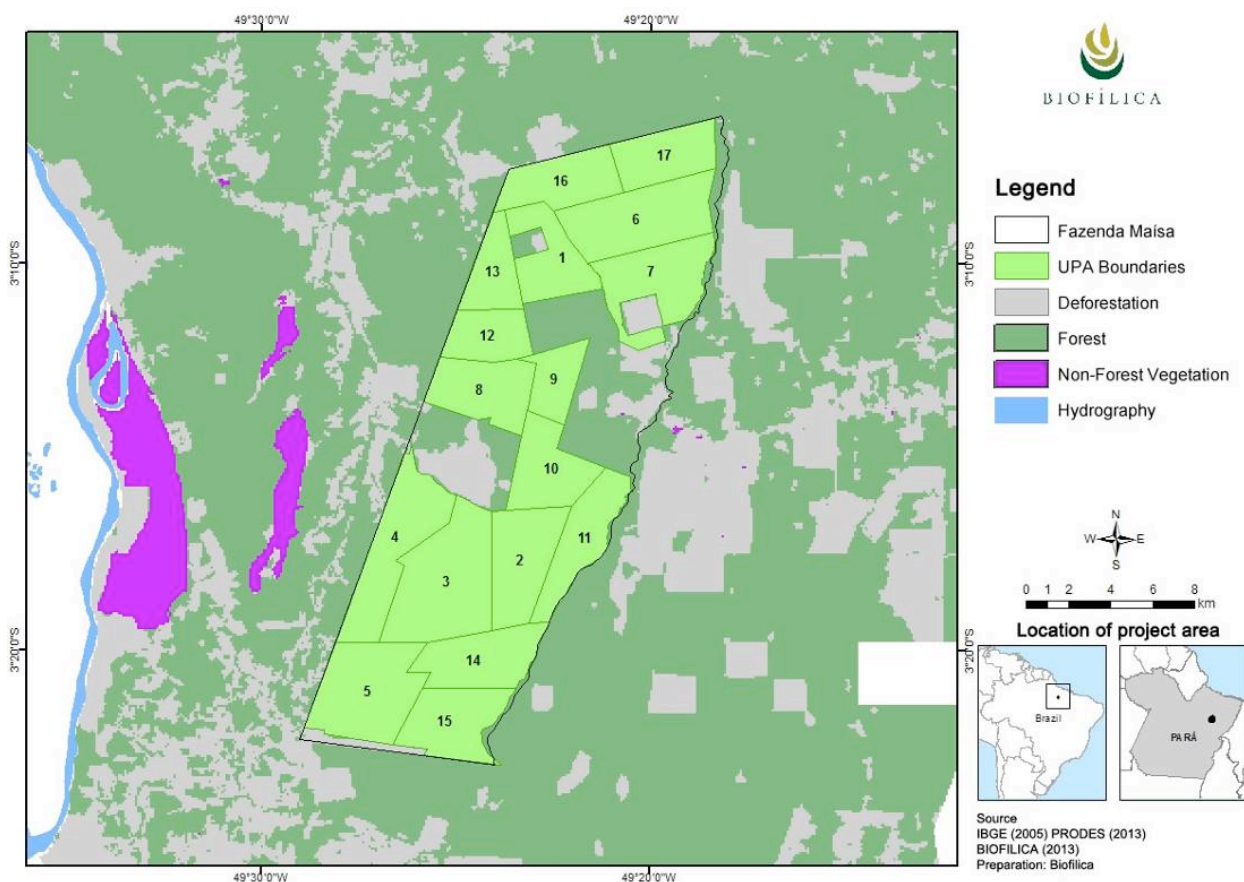


Figure 3. Location of UPA 10.

Monitoring of leakage and management of non-permanence risk factors

The monitoring of leakage was realized through satellite images, allowing the mapping of the forest cover in the leakage belt, as described in section 4.3 of the monitoring report. As a result of the monitoring of deforestation in the leakage belt through satellite images, it was possible to verify that no leakage has occurred.

Regarding the non-permanence risk factors, the main risks are related to the Internal Risks, and they have been monitored as follows:

- No illegal activities were identified in the Project region. And, even though, SIPASA was prepared to take the necessary measures, such as registering the occurrence at the competent government institution. Related documents are filed by Biofílica Investimentos Ambientais was to access related documents and make them available to the VVB.
- Stakeholders mapping and assessment of condition prior to the project initiation were carried out between January 2013 and February 2013 directly with surrounding communities: Branquelândia, Baixo Apeí, Ituquara, Açaizal Novo, Açaizal Centro, Flexal, Maçaranduba e Nossa Senhora do Perpétuo Socorro (8 communities on total). These assessment aimed to characterized deforestation dynamics on the reference region and understand historical, socioeconomic and cultural conditions of the surrounding communities in order to design the best measures to mitigate main drives of deforestation and avoid leakage.
- At the same period, between January 2013 and February 2013, governmental stakeholders and civil society organizations were identified and consulted, focusing on their influence on the surrounding communities above-mentioned. Municipalities of Baião, Breu Branco, Mocajuba and Tucuruí were visited in order to better understand public services, e.g. rural assistance services, that are made available to surrounding communities and to determine possible partnerships with the Project. As a result 4 municipalities offices (mostly Agriculture and Environment Secretariats), 2 public companies with great influence on project region, 2 workers union and 1 public rural assistance body were contacted.

Table 2. Description, status and duration of which project activity encompassed by this monitoring period (from May 21th 2013 to May 21th 2013).

Activity	Description	Status	Duration/ Schedule
1. Planning			
1.1. Planning	Meeting of proponents for planning the Project activities, from conception to validation and first verification.	Performed	From June to September 2012
1.2. Coordination with institutions and identification of partnerships	Survey and identification of local partners such as consultants, researchers and institutions to develop the Project.	Performed	From June to October 2012
2. Studies and Assessments			
2.1. Workshops on the coordination with partner institutions	Meetings between project partners to discuss the guidelines and progress of the first steps of the studies	Performed	From October 2012 to March 2013
2.2. Implementation of Socioeconomic and Environmental Assessment (DSEA)	The DSEA was developed in partnership with Instituto Peabiru in order to characterize the project region in the historical, socioeconomic and environmental context, conduct a preliminary assessment of potential project impacts, propose mitigation measures for the drivers and underlying causes of deforestation, and to submit an initial monitoring proposal.	Performed	From October 2012 to July 2013
2.3. Study of the flora and carbon stock estimates	Study implemented in partnership with Amazônia Gestão Ambiental in order to conduct phytosociological surveys and acquire estimates of forest carbon stocks from primary inventory.	Performed	From October 2012 to August 2013
2.4. Determination of deforestation base line	Developed in partnership with Eco-lógica and consultants of IMAZON (Instituto do Homem e Meio Ambiente da Amazônia) for determining the deforestation base line in the reference region and project area.	Performed	From October 2012 to October 2013
3. Design			
3.1. Design-Related Technical Visits	Visits to the project area to collect information and documents relevant to the design of activities and alignment with those responsible for implementing the sustainable forest management.	Performed	From February 2012 to August 2013

4. Validation/Verification

4.a. VCS

4.a.1. Definition of the standard and appropriate methodology to be adopted.	Selection of the standard and methodology suitable to the context of the project and to be used in its design, implementation, management, monitoring, validation and verification.	Performed/Planned	From June 2012 to October 2012
4.a.2. Selection and hiring of the Validating and Verifying Body (VVB)	Prospecting and contacting of validating and verifying bodies accredited by the chosen standard. Negotiation and selection of the most appropriate VVB (compliant with the rules of the standard).	Performed/Continuous	Validation and 1 st verification: From July 2013 to December 2013. Further verifications: Periodically throughout the project lifecycle.

5. Management and Monitoring

5.1. Climate

5.1.a. Adding Value to the Standing Forest	Activities focused on the quality and efficiency of sustainable forest management and the prospection of new business for the standing forest.	Performed/Continuous	Sustainable Forest Management started at 2002. REDD+'s complementary activities started with design of activities. And have been occurred since then. The collection of data of the SFMP related to this monitoring period was carried during the last semester of 2013 (after the harvest).
5.1.b. Property Security and Monitoring of Vegetation Cover	Consolidation and efficiency of procedures for property security and satellite monitoring of forest cover.	Performed/Continuous	Started with the studies and performed until the first verification. From then on, it is continuous and periodic. The collection and analysis of deforestation, within AP, through remote sense data during this monitoring period was carried during the beginning of 2014.
5.1.c. Leakage Management	Mitigation activities to be developed in the leakage management areas, aiming at generating income and jobs.	Continuous	Started with studies for the designation of areas and activities. From then on, it is continuous. The collection and analysis of deforestation, within LK, through remote sense data during this

			monitoring period was carried during the beginning of 2014.
5.4. Adaptative Management			
5.4. Adaptive management and continuous improvement	Based on the monitoring of the implementation and impacts of activities, redesign and/or better tailor the planned activities.	Planned/Continuous	To be started after the validation. Continuous activity.
5.5. Updating and complementation of the studies	With project maturation, production and gathering of new information, update and complement previous studies. Provides grants for adaptive management and continuous improvement.	Planned	To be started after the validation. Continuous activity.

2.2 Deviations

2.2.1 Methodology Deviations

In order to calculate the annual deforestation rate it was applied Puyravaud's (2003) Equation instead of equation (3) suggested by VM0015. This methodological deviation was a conservative caution to project the quantity of change. Puyravaud's Equation is an exponential decay model derived from formula used by Food and agriculture Organization (FAO) and the Compound Interest Law. The details and assumptions considered to derive the Equation were published in the journal Forest Ecology and Management in the paper "Standardizing the calculation of the annual rate of deforestation". In the other hand, the Equation 03 from VM0015 Methodology is a much simpler and less conservative linear model. During a comparison of the cumulative and annual deforestation rates using the two equations, the cumulative change calculated using Equation 03 was 1,120 hectares higher when compared with the result provided by Puyravaud's formula, which corroborates the selection of the more conservative approach.

2.2.2 Project Description Deviations

Not applicable.

2.3 Grouped Project

Not applicable.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Description of data and parameters available at validation:

Parameter:	Deforestation:
Project Component:	Climate/Unplanned deforestation avoided
Unity:	Hectare (ha)
Description:	Maps of forest cover areas converted into non-forest areas.
Data source:	Measured through data from PRODES/INPE project ¹ .
Value applied:	2.12% ha/year on average (2000-2011).
Justification of choice of data or description of measurement methods and procedures applied:	The data from PRODES Digital (Official Satellite responsible for mapping deforestation in the Brazilian Amazon forest) was used for mapping deforestation and producing the Forest Cover Benchmark Map. A total of 48 Landsat images were used during the analyzed period. The ISOSEG non-supervised classification method was used in the classification of the images to map forest classes, non-forest vegetation, hydrography and deforestation.
Data purpose:	• Definition of the baseline scenario • Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments:	See documents: • Câmara et al., 2006). Methodology for the annual calculation of deforestation within the Legally-defined Amazon • www.obt.inpe.br/prodes

Parameter:	Ctot
Project Component:	Climate/Unplanned deforestation avoided
Unity:	tCO ₂ e ha ⁻¹
Description:	Average carbon stock per hectare in all carbon pools in the initial Forest class used in the baseline scenario.
Data source:	Calculated by allometric equations, expansion factors from literature and field measured data.
Value applied:	453.1 tCO ₂ e ha ⁻¹
Justification of choice of data or description of measurement methods and procedures applied:	Above- and below-ground biomass estimates were carried out using forest inventory data and allometric equations developed in areas similar to the project area (SILVA, 2007).

¹ Available on: < <http://www.obt.inpe.br/prodes/index.php> >

Data purpose:	• Definition of the baseline scenario • Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments:	See documents: • Section 5.3 of "Project Description" • Stock calculation log spreadsheet • Carbon Stock Inventory Report

Parameter:	DBH
Project Component:	Climate/Unplanned deforestation avoided
Unity:	Cm
Description:	Diameter at Breast Height (130 cm) for each tree with DBH equal or higher than 15 cm in each plot of the forest inventory.
Data source:	Measured in the field by Amazônia Gestão Ambiental.
Value applied:	See spreadsheet with field data.
Justification of choice of data or description of measurement methods and procedures applied:	Application of the VCS VM0015 methodology. Forest inventory data collected less than 10 years ago through multiple plots as a suitable spatial distribution.
Data purpose:	• Definition of the baseline scenario • Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments:	Main variable for the REDD+ Maisa Project carbon estimates.

Parameter:	$PF = 2.7179 * (DBH)^{1.8774}$
Project Component:	Climate/Unplanned deforestation avoided
Unity:	Kg (fresh weight of biomass)
Description:	Equation to convert the DBH of each tree in fresh biomass.
Data source:	SILVA, 2007
Value applied:	$PF = 2.7179 * (DBH)^{1.8774}$
Justification of choice of data or description of measurement methods and procedures applied:	Equation developed on dryland forest with characteristics that are similar to those of the reference region.
Data purpose:	• Definition of the baseline scenario (AFOLU projects only) • Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments:	

Parameter:	CF
Project Component:	Climate/Unplanned deforestation avoided
Unity:	T
Description:	Carbon contained within the dry biomass
Data source:	Nogueira, E.; Fearnside, P.; Nelson, B., et al., 2008. Estimates of forest biomass in the Brazilian Amazon: New allometric equation and adjustments to biomass from wood-volume inventories. Forest Ecology and Management, 256 (11), pp.1853-1867.
Value applied:	0.485
Justification of choice of data or description of measurement methods and procedures applied:	Value found in scientific literature.
Data purpose:	Definition of the baseline scenario Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments:	

Parameter:	44/12
Project Component:	Climate/Unplanned deforestation avoided
Unity:	tCO ₂ e
Description:	Carbon mass to CO ₂ e mass conversion factor.
Data source:	Scientific literature: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 AFOLU.
Value applied:	44/12 (3,666666667)
Justification of choice of data or description of measurement methods and procedures applied:	IPCC standard value
Data purpose:	Definition of the baseline scenario (AFOLU projects only) Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments:	

Parameter:	Exploited Wood Volume
Project Component:	Climate/Sustainable Forest Management
Unity:	m ³ /ha
Description:	Volume of wood harvested by each Annual Production Unit.
Data source:	Post-harvest Report
Value applied:	Maximum of 20 m ³ /ha
Justification of choice of data or description	Volume set out on the Sustainable Forest Management

of measurement methods and procedures applied:	Plan
Data purpose:	These data are collected in the field during the packing list and wood extradition. Calculation of project emissions Correlation with the financial performance of the sustainable forest management Analysis of sustainable forest management impacts.
Comments:	The annual volume of wood exploited also should preferably be compared with the historical average.

Parameter:

Opening of area for management infrastructure

Project Component:	Climate/Sustainable Forest Management
Unity:	Percentage
Description:	Area cleared for building the infrastructure required for Sustainable Forest Management activities, such as patios, primary and secondary roads.
Data source:	Post-harvest Report
Value applied:	Maximum 5% of the Annual Production Area
Justification for the choice of data or description of measurement methods and procedures applied:	Maximum volume permitted by law.
Data purpose:	The data is collected in the field after the harvesting activity. Calculation of project emissions Analysis of sustainable forest management impacts.
Comments:	The annual clearing of areas for management infrastructure should also be compared with the historical average.

Parameter:

Acquisition/maintenance of legality verification (LHV or similar)

Project Component:	Climate/Sustainable Forest Management
Unity:	Not applicable
Description:	Acquisition and maintenance of the legality verification seal
Data source:	Verification Report of the certifying institution
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
Data purpose:	Specific certification by an independent third party on the compliance with all laws and regulations related to sustainable forest management activities.
Comments:	

Parameter:

Number of monitoring stations

Project Component:	Climate/Property Monitoring
Unity:	Number
Description:	Number of active monitoring stations within the limits of the farm
Data source:	Interviews with monitoring employees and field visits
Value applied:	3
Justification for the choice of data or description of measurement methods and procedures applied:	Current number of monitoring stations
Data purpose:	Supervision of property integrity
Comments:	Based on subsequent verifications, this information should also be contained in property security reports.

Parameter:

Number of patrols

Project Component:	Climate/Property Monitoring
Unity:	Number
Description:	Number of patrols responsible for performing the watch
Data source:	Interviews with monitoring employees and field visits
Value applied:	3
Justification for the choice of data or description of measurement methods and procedures applied:	Current number of monitoring stations
Data purpose:	Supervision of asset integrity
Comments:	Based on subsequent verifications, this information should also be contained in property security reports.

Parameter:

Surveillance Frequency

Project Component:	Climate/Property Monitoring
Unity:	Time interval
Description:	Time interval in which the same area is patrolled
Data source:	Interviews with monitoring employees and field visits
Value applied:	2 times/day
Justification for the choice of data or description of measurement methods and procedures applied:	Current frequency of watches
Data purpose:	
Comments:	Based on subsequent verifications, this information should also be contained in property security reports.

Parameter:

No. of new businesses prospected

Project Component:	Climate/Leak Management in Farm
Unity:	Number

Description:	Number of new businesses prospected to gain scope in the Project Area.
Data source:	Project Monitoring Report
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
	Monitor:
Data purpose:	Diversification of the enterprise's income sources Project's decreased financial risk Generation of employment and income
Comments:	

Parameter: **No. of prospected alternative uses for the soil**

Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	No. of prospected alternative uses for the soil for the Leakage Management Areas within the limits of Fazenda Maísa.
Data source:	Project Monitoring Report
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
	Monitor:
Data purpose:	Diversification of the enterprise's income sources Project's decreased financial risk Generation of employment and income
Comments:	

Parameter: **No. of new businesses implemented**

Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	From the new business prospected, how many were actually implemented?
Data source:	Project Monitoring Report
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
Data purpose:	Monitor:

Comments:	Diversification of the enterprise's income sources Project's decreased financial risk Generation of employment and income
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Parameter:	No. of different land uses within the limits of Fazenda Maísa
Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	Number of different land uses developed within the limits of Fazenda Maísa
Data source:	Project Monitoring Report
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
	Monitor:
Data purpose:	Diversification of the enterprise's income sources Project's decreased financial risk Generation of employment and income
Comments:	

Parameter:	Number of employees for each land use within the limits of Fazenda Maísa
Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	Employability of different land uses within the limits of Fazenda Maísa
Data source:	Project Monitoring Report
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
	Monitor:
Data purpose:	Diversification of the enterprise's income sources Project's decreased financial risk Generation of employment and income
Comments:	

3.2 Data and Parameters Monitored

Parameter:	Deforestation in the Project Area and Leakage Belt
Project Component:	Climate/Unplanned deforestation avoided
Unity:	Hectare (ha)
Description:	Forest cover areas converted into non-forest areas inside the REDD+ Maisa Project area and the leakage belt.
Data source:	Calculated through remote sensing images together with GPS data collected in the field.
Description of measurement methods and procedures to be applied:	The monitoring of the forest cover in the project area and leakage belt will be carried out through satellite image analysis. When data from the PRODES system is not available, forest cover monitoring will be carried out by the automatic classification and visual interpretation of images from other optical sensors or SAR data.
Frequency of monitoring/recording:	Annual
Value monitored	0 ha in project area 0 ha in leakage belt
Monitoring equipment:	Remote sensing images from digital processing software, geographic information systems and navigation GPS.
Quality control and quality assurance procedures to be applied:	Images with spatial resolution of 30 m or more will be used in the mapping. The minimum mapping unit is 1ha. The assessment of the classifications will be carried out through data collected in the field using GPS navigation. The minimum accuracy of the land use and land cover classification map is 80%.
Data purpose:	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Calculation method:	The Shapefile of areas detected as unplanned deforestation was used by the update of the Shapefile of Forest Cover Benchmark Map by the algebraic operations map.
Comments:	Project PRODES Digital: http://www.dpi.inpe.br/prodesdigital/prodes.php More information on control and quality assurance available in: • (CÂMARA et al., 2006). <i>Methodology for the annual calculation of deforestation within the Legally-defined Amazon</i>

Parameter:	Ctot
Project Component:	Climate/Unplanned deforestation avoided
Unity:	tCO ₂ e ha ⁻¹
Description:	Average carbon stock per hectare in all carbon pools in the Forest class used in the baseline scenario.
Data source:	Calculated by allometric equations, expansion factors from scientific literature, and data measured in the field by Sipasa.
Description of measurement methods and procedures to be applied:	Above- and below-ground biomass estimates will be carried out using forest inventory data and allometric equations developed in areas similar to the project area (Silva, 2007). The dead wood pool will be estimated by reference on the work of Feldpausch et al (2005).
Frequency of monitoring/recording:	One year before harvest. At one, three and five-year intervals after the harvesting of the Annual Production Unit.
Applicable monitored	N/A
Monitoring equipment:	N/A
Quality control and quality assurance procedures to be applied:	Information regarding quality assurance and control available in the Sustainable Forest Management Plan.
Data purpose:	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Calculation method:	Comparison between the average stock value contained in the forest class used in the baseline scenario and the measurements analyzed after harvest.
Comments:	Mandatory requirement of the VM0015 methodology for areas with forest harvesting.

Parameter:	DBH
Project Component:	Climate/Unplanned deforestation avoided
Unity:	Cm
Description:	Diameter at Breast Height (130 cm) for all trees with DBH equal to or higher than 15 cm in the plots of the forest inventory.
Data source:	Calculated from the circumference at breast height (CBH) measured in the field by SIPASA.
Description of measurement methods and procedures to be applied:	The DBH is calculated based on circumference at breast height (CBH) data of each tree measured in the field.
Frequency of monitoring/recording:	One year before harvest. At one, three and five-year

Value monitored	intervals after the harvesting of the Annual Production Unit.
Monitoring equipment:	N/A
Quality control and quality assurance procedures to be applied:	Calculated based on circumference at breast height data (CAP) measured in the field by means of a tape measure.
	Mandatory monitoring according to the VM0015 Methodology. Data coming from forest inventory collected in periods of up to 10 years from multiple plots. For information on control procedures and quality assurance, see Section 8, item 8.1.
Data purpose	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Calculation method:	The DBH is calculated based on circumference at breast height (CBH) data of each tree measured in the field.
Comments:	Main variable used on the carbon stock change estimates for the REDD+ Maísa Project.

Parameter:

Planned deforestation for Forest Management infrastructure

Project Component:	Climate/Unplanned deforestation avoided
Unity:	Hectare (ha)
Description:	Map of forest cover areas converted into non-forest areas due to the construction roads, trails and forest patios required in sustainable forest management.
Data source:	Remote sensing images, technical maps and specific field records to monitor the construction of roads, trails and patios for the sustainable forest management activities.
Description of measurement methods and procedures to be applied:	Forest cover monitoring will be carried out through satellite images, road construction maps, trails and patios for forest management, and field verifications. If planned deforestation occurs, the Forest Cover Benchmark Mapping will be updated through the algebraic map. The reduction in carbon stocks within the project area will be reported during the verification processes.
Frequency of monitoring/recording:	During the management year of each Annual Production Unit.
Value monitored:	16.40
Monitoring equipment:	Field records and geographic information systems.
Quality control and quality assurance procedures to be applied:	For information on control procedures and quality assurance, see Section 8, item 8.1.

Data purpose:	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Calculation method:	If planned deforestation areas are identified, the Forest Cover Benchmark Map will be updated through the algebraic map.
Comments:	

Parameter:

$\Delta\text{CabBSLLK}_t$

Project Component:	Climate/Unplanned deforestation avoided
Unity:	tCO ₂ -e
Description:	Total carbon stock changes in the Leakage Belt area.
Data source:	Calculated
Description of measurement methods and procedures to be applied:	• The leakage prevention activities will be listed; • A map showing areas of intervention and type of intervention will be prepared; • The areas where leakage prevention activities impact carbon stock will be identified; • The non-forest classes present within these areas, in the baseline scenario, will be identified; • The carbon stocks will be measured according to the classes identified, or conservative literature estimates will be used; • Carbon stock changes in leakage management areas under the project scenario will be reported using table 30b of the VM0015 methodology; • The net carbon stock changes caused by leakage prevention measures during the fixed baseline period and, alternately, during the project crediting period, will be calculated; • The results of the calculations will be reported on table 30.c of the VM0015 methodology.
Frequency of monitoring/recording:	To be determined depending on the activity
Value monitored:	N/A
Monitoring equipment:	To be determined depending on the activity
Quality control and quality assurance procedures to be applied:	To be determined depending on the activity
Data purpose:	• Calculation of leakage

Calculation method:	To be determined depending on the activity
Comments:	N/A

Parameter: **Emissions of methane (CH₄) and nitrous oxide (N₂O) arising from herds**

Project Component:	Climate/Unplanned deforestation avoided
Unity:	tCO ₂ -e yr ⁻¹
Description:	Emissions from grazing animals in leakage management areas at year t
Data source:	Reports of project activities within the leakage management areas.
Description of measurement methods and procedures to be applied:	- The areas within the leakage management areas which hold annual grazing activities will be specified; - Both the manure management and type of fodder will be briefly described. Table 31 of VM0015 will be used to report the key parameters required to perform the calculation of GHG emissions; - The number of animals in the baseline case and under the project scenario will be determined based on available areas and fodder. The difference will be considered for the calculation of the increase in GHG emissions; - The methods described in appendix 4 of the VM0015 will be used to estimate emissions from enteric fermentation and manure management; the final calculations will be performed using equation 18 of the VM0015 methodology and the results will be reported on table 32 thereof.
Frequency of monitoring/recording:	Annually
Value monitored:	N/A
Monitoring equipment:	Interviews, field checking and calculation spreadsheets
Quality control and quality assurance procedures to be applied:	N/A
Data purpose:	- Calculation of project emissions - Calculation of leakage
Calculation method:	Equation 18 of the VM0015 will be used.
Comments:	N/A

Parameter:

Exploited Wood Volume

Project Component:	Climate/Sustainable Forest Management
Unity:	m ³ /ha
Description:	Volume of wood harvested by each Annual Production Unit.
Data source:	Post-harvest Report
Value monitored:	12,50 m ³ /ha
Justification of choice of data or description of measurement methods and procedures applied:	Volume set out on the Sustainable Forest Management Plan These data are collected in the field during the packing list and wood extradition. Calculation of project emissions
Data purpose:	Correlation with the financial performance of the sustainable forest management Analysis of sustainable forest management impacts.
Comments:	The annual volume of wood exploited also should preferably be compared with the historical average.

Parameter:

Opening of area for management infrastructure

Project Component:	Climate/Sustainable Forest Management
Unity:	Percentage
Description:	Area cleared for building the infrastructure required for Sustainable Forest Management activities, such as patios, primary and secondary roads.
Data source:	Post-harvest Report
Value monitored:	1,28%
Justification for the choice of data or description of measurement methods and procedures applied:	Maximum volume permitted by law. The data is collected in the field after the harvesting activity.
Data purpose:	Calculation of project emissions Analysis of sustainable forest management impacts.
Comments:	The annual clearing of areas for management infrastructure should also be compared with the historical average.

Parameter:

Regeneration rate of permanent plots

Project Component:	Climate/Sustainable Forest Management
Unity:	m ³ /ha/year
Description:	Inventory conducted in permanent plots of each Annual Production Unit one year before the harvest, one year later, three years later and then every 5 years.
Data source:	Post-harvest Report
Description of measurement methods and procedures to be applied:	See Sustainable Forest Management Plan

Frequency of monitoring/recording:	One year before harvest. At one, three and five-year intervals after the harvesting of the Annual Production Unit.
Value monitored:	N/A
Monitoring equipment:	See Sustainable Forest Management Plan
Quality control and quality assurance procedures to be applied:	For information on control procedures and quality assurance, see Section 8, item 8.1.
Data purpose:	Impact evaluation of the Sustainable Forest Management
Calculation method:	See Sustainable Forest Management Plan
Comments:	Parameter first measured after this monitoring period. To be accounted on the next verification event.

Parameter:

Assessment of crop damage

Project Component:	Climate/Sustainable Forest Management
Unity:	m ³ /ha
Description:	Assessment carried out by sampling at the UPAs during and after the harvesting operation.
Data source:	Post-harvest Report
Description of measurement methods and procedures to be applied:	See Sustainable Forest Management Plan
Frequency of monitoring/recording:	Yearly, after completion of the harvesting operations of each annual production unit.
Value monitored:	N/A
Monitoring equipment:	See Sustainable Forest Management Plan
Quality control and quality assurance procedures to be applied:	For information on control procedures and quality assurance, see Section 8, item 8.1.
Data purpose:	Impact evaluation of the Sustainable Forest Management
Calculation method:	See Sustainable Forest Management Plan
Comments:	Parameter first measured after this monitoring period. To be accounted on the next verification event.

Parameter:

Acquisition/maintenance of legality verification (LHV or similar)

Project Component:	Climate/Sustainable Forest Management
Unity:	Not applicable
Description:	Acquisition and maintenance of the legality verification seal
Data source:	Verification Report of the certifying institution
Value monitored:	SIPASA achieves the SCS - Legal Harvesting Verification

Justification for the choice of data or description of measurement methods and procedures applied:	on April 23 th 2013.
Data purpose:	Not applicable
Comments:	To certify the compliance with all laws and regulations related to sustainable forest management activities.

Parameter:

Acquisition/maintenance of robust forest management certifications.

Project Component:	Climate/Sustainable Forest Management
Unity:	Does not apply.
Description:	Acquisition and maintenance of robust certification standards for sustainable forest management.
Data source:	Auditing Report of the certifying institution
Description of measurement methods and procedures to be applied:	Does not apply.
Frequency of monitoring/recording:	Annual
Value Monitored	0
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Does not apply.
Data purpose:	To certify the compliance with all laws and regulations related to sustainable forest management activities, execution of sustainable forest management best practices, and social and environmental responsible management.
Calculation method:	Does not apply.
Comments:	

Parameter:

Number of monitoring stations

Project Component:	Climate/Property Monitoring
Unity:	Number
Description:	Number of active monitoring stations within the limits of the farm
Data source:	Interviews with monitoring employees and field visits
Value monitored:	8
Justification for the choice of data or description of measurement methods and procedures applied:	Current number of monitoring stations

Data purpose:	Supervision of forest integrity
Comments:	Based on subsequent verifications, this information should also be contained in property security reports.

Parameter:

Number of patrols

Project Component:	Climate/Property Monitoring
Unity:	Number
Description:	Number of patrols responsible for performing the watch
Data source:	Interviews with monitoring employees and field visits
Value monitored:	8
Justification for the choice of data or description of measurement methods and procedures applied:	Current number of monitoring stations
Data purpose:	Supervision of forest integrity
Comments:	Based on subsequent verifications, this information should also be contained in property security reports.

Parameter:

Surveillance Frequency

Project Component:	Climate/Property Monitoring
Unity:	Time interval
Description:	Time interval in which the same area is patrolled
Data source:	Interviews with monitoring employees and field visits
Value applied:	1 times every 2 days
Justification for the choice of data or description of measurement methods and procedures applied:	Current frequency of watches
Data purpose:	Supervision of forest integrity
Comments:	Based on subsequent verifications, this information should also be contained in property security reports.

Parameter:

Number of occurrences

Project Component:	Climate/Property Monitoring
Unity:	Number
Description:	Number of times an occurrence is detected
Data source:	Property Monitoring Reports
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Monthly
Value monitored:	None
Monitoring equipment:	Does not apply.
Quality control and quality assurance	To be established.

procedures to be applied:	
Data purpose:	Supervision of forest integrity
Calculation method:	Does not apply.
Comments:	The Property Monitoring Reports will be implemented based on the validation of the project.

Parameter:

Status of occurrences

Project Component:	Climate/Property Monitoring
Unity:	Not applicable
Description:	What happens once the occurrence is detected?
Data source:	Property Monitoring Reports
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Monthly
Value monitored:	N/A
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
Data purpose:	Supervision of forest integrity
Calculation method:	Does not apply.
Comments:	The Property Monitoring Reports will be implemented based on the validation of the project.

Parameter:

No. of new businesses prospected

Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	Number of new businesses prospected to gain scope in the Project Area.
Data source:	Project Monitoring Report
Value monitored:	One: Açai berry management.
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
	Monitor:
Data purpose:	- Diversification of the enterprise's income sources - Project's decreased financial risk - Generation of employment and income
Comments:	

Parameter:	No. of prospected alternative uses for the soil
Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	No. of prospected alternative uses for the soil for the Leakage Management Areas within the limits of Fazenda Maísa.
Data source:	Project Monitoring Report
Value monitored:	0
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
Data purpose:	Monitor: • Diversification of the enterprise's income sources • Project's decreased financial risk • Generation of employment and income
Comments:	

Parameter:	No. of new businesses implemented
Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	From the new business prospected, how many were actually implemented?
Data source:	Project Monitoring Report
Value monitored:	0
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
Data purpose:	• Diversification of the enterprise's income sources • Project's decreased financial risk • Generation of employment and income
Comments:	

Parameter:	No. of different land uses within the limits of Fazenda Maísa
Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	Number of different land uses developed within the limits of Fazenda Maísa
Data source:	Project Monitoring Report
Value monitored:	6
Justification for the choice of data or description of measurement methods and	Not applicable

procedures applied:	
Data purpose:	Monitor: - Diversification of the enterprise's income sources - Project's decreased financial risk - Generation of employment and income
Comments:	

Parameter: **Number of employees for each land use within the limits of Fazenda Maísa**

Project Component:	Climate/Leak Management in Farm
Unity:	Number
Description:	Employability of different land uses within the limits of Fazenda Maísa
Data source:	Project Monitoring Report
Value monitored:	May 2012 – 42 employees
	May 2013 – 38 employees
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
Data purpose:	Monitor: - Diversification of the enterprise's income sources - Project's decreased financial risk - Generation of employment and income
Comments:	

Parameter: **Net income of each land use within the limits of Fazenda Maísa**

Project Component:	Climate/Leak Management in Farm
Unity:	R\$
Description:	Net income (gross revenue - costs) from each type of land use within the limits of Fazenda Maísa
Data source:	Project Monitoring Report
Description of measurement methods and procedures to be applied:	Consultations with project proponents and to accounting documents of the project.
Frequency of monitoring/recording:	Annual
Value monitored:	Sustainable Forest Management: - R\$3,299,204.92
	Others uses: Not significant during the monitored period.
Monitoring equipment:	Does not apply.
Quality control and quality assurance	Validation of systematic information on the draft report of

procedures to be applied:	Project Monitoring with the proponents before its official publication.
Data purpose:	
Calculation method:	Does not apply.
Comments:	

3.3 Monitoring Plan

The Project comprises three components to be monitored:

- I. **Climate:** monitoring of GHG emissions reductions and changes in carbon stocks over the project life cycle due to land use changes within the project area and leakage belt. The climate component also includes, in the context of this project, the monitoring of aspects related to sustainable forest management, property surveillance and activities developed in leakage management areas within the boundaries of Fazenda Maísa.
- II. **Communities:** the monitoring of interventions in the social component of the project aims to evaluate the actions, results and impacts of activities related to the engagement of players and stakeholders, the strengthening of organizational aspects and articulation for access to technical assistance and rural extension (ATER) and other public services, which are the base of leakage management actions implemented outside the boundaries of Fazenda Maísa.
- III. **Biodiversity:** monitoring in this component involves the access to actions, results and impacts of the activities related to the monitoring of impacts of Sustainable Forest Management and indicator species, monitoring of species of relevance and activities developed in partnership with education and research institutions. It also incorporates the monitoring plan to access the effectiveness of measures designed to maintain or improve the HVCs identified in the Project (HCV 1 and 2).

This report focuses on monitoring of the Climate component. Monitoring plan of Community and Biodiversity Impacts will not be presented on this document.

Monitoring Plan of Climate Impacts

The Monitoring Plan of Climate Impacts on the Climate will be presented in two parts. The first containing the essentials for demonstrating the reduction of emissions from deforestation and degradation due to avoided unplanned deforestation (according to the VM0015 applied methodology) and the second containing the supplementary and specific aspects of the approach of the REDD+ Maísa Project. The first will contain: the monitoring of GHG emissions reductions and changes in carbon stocks over the project life cycle due to changes in land use within the project area and leakage belt. And the second: the monitoring of aspects related to sustainable forest management, property monitoring and activities developed in leakage management areas within the boundaries of Fazenda Maísa.

Part 1 - Application of the VM0015 Methodology

TASK 1: MONITORING OF CARBON STOCK CHANGES AND GHG EMISSIONS FOR PERIODICAL VERIFICATIONS

- Monitoring of actual carbon stock changes and GHG emissions within the Project area

a) Technical description of the monitoring tasks

The monitoring of carbon stock changes and GHG emissions within the Project Area was carried out through the monitoring of avoided unplanned deforestation. The process to monitor the effectiveness of REDD+ activities aimed at avoiding unplanned deforestation was developed by Sipasa and Biofilica through the monitoring of forest cover areas from satellite imagery and field checks in the Project Area.

b) Data to be collected

Table 3. Data to be collected for the monitoring of carbon stock changes and GHG emissions for periodical verifications.

Component	Data/Parameter	Description	Unit	Source	Frequency
Unplanned deforestation avoided	$AUDPA_{icl,t}$	Areas of unplanned deforestation in forest class icl at year t in the Project Area	Hectares (ha)	Calculated through remote sensing images.	Annual
	$APDPA_{icl,t}$	Areas of planned deforestation in forest class icl at year t in the Project Area	Hectares (ha)	Calculated through remote sensing images, technical maps and data, field information and handling post-exploitation info.	Annual
	$\Delta CPLdPA_t$	Total decrease in carbon stocks due to planned harvesting activities at year t in the Project Area	Ton of carbon dioxide equivalent (tCO_2-e)	Calculated	Annual
	$ACPA_{icl,t}$	Annual area within the Project Area affected by catastrophic events in class	Hectares (ha)	Calculated through remote sensing images.	Each time a catastrophic event occurs

		icl at year t			
	$\Delta CUCdPA_t$	Total decrease in carbon stock due to catastrophic events at year t in the Project Area	Ton of carbon dioxide equivalent (tCO ₂ -e)	Calculated	Each time a catastrophic event occurs
	$\Delta CUDdPA_t$	Total change in carbon stock due to unavoided planned deforestation at year t in the Project Area	Ton of carbon dioxide equivalent (tCO ₂ -e)	Calculated	Annual

c) Summary of the data collection procedure

Monitoring of land-use and land-cover changes:

The main activities carried out by the project to collect and process data were:

- Selection of optical satellite images with less cloud coverage, shooting date close to the Amazonian dry season and adequate radiometric quality;
- Georeferencing of satellite images with topographic charts in a 1:100.000 scale or NASA images in MrSID orthorectified format;
- Generation of a spectral mixture model to estimate the percentage of vegetation, soil and shadow component for each pixel of the image;
- Application of the segmentation technique that identifies, in the satellite image, spatially adjacent regions (segments) with similar spectral characteristics;
- Classification of segments to identify forest classes, non-forest vegetation and deforestation.

Monitoring of carbon stocks and non-CO₂ emissions:

To monitor changes (reduction) in carbon stocks it was performed a forest inventory during the project's validation, through the measurement of Diameter at Breast Height (DBH = 130 cm), for each tree with DBH equal or higher than 15 cm in each plot of the forest inventory. DBH is the main variable used to estimate carbon stock and changes in the carbon stocks of the REDD+ Maísa Project. This forest inventory shall be redone every 10 years after validation. The monitoring of carbon stocks in forest management (MP) areas will be also carried through the installation and pre-harvest measurement of permanent inventory plots in each unit Annual Production Unit. Each plot under monitoring will be measured post-harvest at intervals of one (immediately after harvest), three (three years after harvest) and 5 years (after the three-year inventory, at every 5 years), according to the Sustainable Forest

Management Plan. The permanent plot on the MP was first measured after this monitoring period, and therefore will be accounted on the next verification event.

d) Quality control and quality assurance procedures

Monitoring of land-use and land-cover changes:

In order to validate the information obtained from satellite images, the mapped information on the occurrence of deforestation was checked through data collected in the field with a handheld GPS. The minimum accuracy of the land-use and land-cover classification is 80%. For areas with cloud cover, SAR sensor images, such as RADRSAT-2, Cosmo SkyMed or TerraSar-X will be used.

The original (raster) and processed (vector) digital data from satellite images, coordinates, technical maps, field photos and records was stored by Biofíllica Investimentos Ambientais throughout the project. Maps showing the installed infrastructure, satellite images and deforestation reports are available to the verification body at each verification event.

Monitoring of carbon stocks and non-CO2 emissions:

Sipasa, although not explicit in the Sustainable Forest Management Plan (SFMP), controls the quality assurance control procedure, during the pre-harvest inventory, and during and after harvest through field checks on the information contained on the lists and with the aid of software to check the data already scanned. The reports and original field records were stored by SIPASA and Biofíllica keeps a copy of these documents. The reports and spreadsheets of inventory and monitoring of permanent plots will be provided to the verification body at each verification event.

e) Data archiving

All data and reports of the REDD+ Maísa Project were stored by Biofíllica Investimentos Ambientais in digital files. Original (physical) reports and field records produced by the forest management activity were stored by Sipasa. All documents related to the monitoring of the REDD + Maísa Project will be gathered in physical and/or virtual files and provided to the verification staff at each verification event.

f) Organization and responsibility of parties involved in the information described above.

All monitoring activities are responsibility of Biofíllica Investimentos Ambientais, Maísa-Moju Agroindustrial and Sipasa. The personnel involved are described on “REDD+ Maísa – Non-Permanence Risk Report” from April 24th 2014, presented to validation and verification body. Activities’ schedule can be found on section 2.1 of this document, table 2.

1.1 Monitoring of Project Implementation

The monitoring of implementation and enforcement of forest management activities was developed in accordance with Sipasa's procedures in all its phases and aspects - operational, environmental and social - so as to meet the requirements of SEMA-PA (State Department of Environment Conservation). The implementation of REDD+ activities was monitored through financial spreadsheets, performance and quality reports, social management reports, maps of vegetation cover, meeting reports, property invasion occurrence reports, and other relevant documents.

1.2 Monitoring of land-use and land-cover changes within the Project area

The monitoring of planned and unplanned deforestation was done through forest cover mapping in the Project Area using 30-meter or higher spatial resolution satellite images. The monitoring of the deforestation for the implementation of forest management infrastructure was carried out through specific field records for the construction of roads, trails and storage yards inside the project area (reported on Post-exploratory reports), and through maps and satellite images containing information on forest cover areas converted into non-forest areas.

Data on deforestation events was compared to the baseline scenarios. Emission reduction values for the monitored period was based on the comparison between forecasted and actual deforestation.

1.3 Monitoring of changes in carbon stocks

Within the Project area:

The ex ante carbon stock estimate per forest class is not expected to change during the baseline period. However, VCS Methodology VM0015 requires the monitoring of carbon stocks in the project area subjected to significant decreases in carbon stocks in the project scenario according to the ex ante assessment due to controlled deforestation and planned harvest activities, or areas subjected to unplanned and significant carbon stock decrease in the baseline scenario.

Total carbon stock change due to unavoided unplanned deforestation within the project area was calculated the following way:

$$\Delta\text{CUDdPA}_t = \sum_{y=1}^t \left(\sum_{icl=1}^{icl} \text{AUDPA}_{icl,y} * \Delta\text{Ctot}_{icl,t-y} - \sum_{fcl=1}^{fcl} \text{AUDPA}_{fcl,y} * \Delta\text{Ctot}_{fcl,t-y} \right)$$

Where:

ΔCUDdPA_t Total carbon stock change due to unavoided unplanned deforestation within the project area at year t:

$\text{AUDPA}_{icl,y}$ Area of unplanned deforestation in the initial forest class icl at year t within the Project Area in the project scenario.

$\Delta\text{Ctot}_{icl,Ac}$ Carbon stock loss in the initial forest class icl at age of change AC (# of years after LU/LC change).

$\text{AUDPA}_{fcl,y}$ Area of non-forest class fcl at time t within the project area after unplanned deforestation in the project scenario.

$\Delta\text{Ctot}_{fcl,Ac}$ Carbon stock gain in the final non-forest class icl at age of change AC (# of years after LU/LC change).

All reduction in carbon stock due to sustainable forest management activities, was reported in this verification processes using Table 27 of the VCS methodology VM0015 version 1.1, or Table 8 of this document.

Within Leakage Management Areas:

No areas will be subject to planned carbon stock decrease within Leakage Management Areas in the project scenario.

Monitoring of non-CO2 emissions from forest fires

Emissions due to biomass burning are not accounted in this project.

1.4 Monitoring of impacts of natural disturbances and other catastrophic events

Decreases in carbon stocks and increases in GHG emissions due to natural disturbances or catastrophic events was controlled by monitoring the forest cover through satellite, using the same methods applied in monitoring the forest cover at the project area (section 1.1.2).

The main activities carried out by the project to collect and process data were:

- Selection of optical satellite images with less cloud cover, taken at times near the Amazonian dry season and with adequate radiometric quality;
- Georeferencing of satellite images with topographic charts in a 1:100.000 scale or NASA images in MrSID orthorectified format;
- Mapping the affected forest cover areas.

Emissions due to natural disturbance or catastrophic events will be estimated by multiplying the area of forest loss mapped by the average of forest carbon stock. During this monitoring period no significant reduction in carbon stock due to natural disturbance or catastrophic events were identified during the forest cover monitoring.

2 Leakage Monitoring

a) Technical description of the monitoring tasks

The REDD+ Maísa Project involved two leakage source monitoring activities:

- i. Monitoring of decrease in carbon stocks and/or increase in GHG emissions associated with leakage prevention measures if the project proponents implement activities such as tree planting, agricultural intensification, fertilization, fodder production and/or other measures to enhance cropland and grazing areas. If these activities caused reductions in carbon stocks and/or increase in GHG emissions in Leakage Management areas, such as carbon stock changes and/or GHG emissions, would be estimated by Biofíllica Investimentos Ambientais. During this monitoring period project proponents carried none of the interventions mentioned out. Therefore carbon stock changes and GHG emissions associated to leakage prevention activities were not accounted.

- ii. Biofilica Investimentos Ambientais performed the monitoring of forest cover in the Leakage Belt via satellite images to account for carbon stock decrease and increases in the GHG emissions due to leakage displacement.

b) Data collected

Table 4. Data to be collected for leakage monitoring.

Data	Description	Unit	Source	Frequency
$\Delta CLPMLK_t$	Carbon stock decrease due to leakage prevention measures	tCO ₂ -e	Calculated	Annual
$EgLK_t$	Emissions from grazing animals in leakage management areas at year t	tCO ₂ -e	Calculated	Annual
$ELPMLK_t$	Total annual increase in GHG emissions due to leakage prevention measures at year t	tCO ₂ -e	Calculated	Annual
$\Delta CabBSLLK_t$	Total carbon stock changes in the Leakage Belt area	tCO ₂ -e	Calculated	Annual

c) Overview of data collection procedures

Monitoring of carbon stock decrease and increases in GHG emissions due to leakage displacement:

Monitoring of changes in carbon stock

The data collection procedures were the same applied to monitor deforestation in the project area (section 1.2).

Monitoring of increase in GHG emissions

Emissions from forest fires are not accounted at the baseline.

d) Quality control and quality assurance procedures

Monitoring of carbon stock decrease and increases in GHG emissions due to leakage displacement:

The quality control and assurance procedures were the same applied to monitor deforestation in the Project Area (section 1.2).

e) Data archiving

The original (raster) and processed (vector) digital data from satellite images, coordinates, technical maps and records are stored by Biofilica Investimentos Ambientais throughout the project lifecycle. The annual map of deforestation areas, satellite images and reports will be provided to every verification body at each verification event.

f) Organization and responsibility of parties involved in the information described above.

All leakage monitoring activities are the responsibility of Biofilica Investimentos Ambientais, Maísa-Moju Agroindustrial and Sipasa. The personnel involved are described on “REDD+ Maísa – Non-Permanence Risk Report” from April 24th 2014, presented to validation and verification body. Activities’ schedule can be found on section 2.1 of this document, table 2.

2.1 Monitoring of carbon stock changes and GHG emissions associated to leakage prevention activities

The decrease in carbon stocks due to activities developed in Leakage Management areas are not expected, since no activity for improved farming techniques, or management of grazing areas that could alter carbon stocks and increase GHG emissions, as compared to the baseline scenario, has been planned for implementation. And such kinds of activities were not implemented during this monitoring period.

However, if it is decided that such activities are necessary, then, the ex ante carbon stock changes and GHG emissions associated to such activities would be estimated through step 8 of the VM0015 methodology, and, if meaningful, they would be monitored and data would be provided to the verification body at each verification event through tables 30b, 30c, 31, 32 and 33 of VM0015 methodology, version 1.1.

2.2 Monitoring of carbon stock decrease and increases in GHG emissions due to leakage displacement

Monitoring of changes in the carbon stock

The activity data for the area of the leakage belt were determined using the same methods applied to monitor deforestation in the project area (section 1.2). None deforestation event greater than expected for the baseline scenario was identified within the leakage belt.

The total carbon stock change due to unavoided unplanned deforestation within the area of the Leakage Belt was calculated as follows:

$$\Delta CBSLLK_t = \sum_{y=1}^t \left(\sum_{icl=1}^{icl} AUDLK_{icl,y} * \Delta Ctot_{icl,t-y} - \sum_{fcl=1}^{fcl} AUDLK_{fcl,y} * \Delta Ctot_{fcl,t-y} \right)$$

Where:

$\Delta CBSLLK_t$ Total carbon stock change due to unavoided unplanned deforestation within the area of the Leakage Belt at year t:

$AUDLK_{icl,y}$ Area of unplanned deforestation in the initial forest class icl at year t within the area of the Leakage Belt in the project scenario.

$\Delta Ctot_{icl,Ac}$ Carbon stock loss in the initial forest class icl at age of change Ac (# of years after LU/LC change).

$AUDL_{fcl,y}$ Non-forest area fcl at time t within the area of the Leakage Management Belt after unplanned deforestation in the project area.

$\Delta C_{tot_{fcl,Ac}}$ Carbon stock gain in the final non-forest class icl at age of change Ac (# of years after LU/LC change).

2.3 Total Estimated ex post Leakage

The results are presented to the verification body at each verification event through table 35 of the VM0015 methodology.

3 Ex post net reductions of GHG gases

a) Technical description of the monitoring tasks

In the verification process, the results are presented using Table 36 of the VM0015 approved methodology, version 1.1, along with the spatial data (deforestation maps).

b) Data collected

Table 5. Data collected for the monitoring of ex post net reductions of GHG gases.

Data	Description	Unit	Source	Frequency
$\Delta REDD_t$	Net reduction of anthropic GHG emissions attributed to AUD project activities at year t	tCO2-e	Calculated	Annual
$VCU_{t,t}$	Number of Verified Carbon Units (VCUs) to be placed as available for trading at time t	tCO2-e	Calculated	Annual

c) Overview of data collection procedures

The number of Verified Carbon Units (VCUs) to be generated by the activities of Fazenda Maisa REDD+ Project at year t were calculated using equation 19 and 20 of VM0015 approved methodology, version 1.1.

d) Quality control and quality assurance procedures

All tasks and tools indicated in part 2 of VM0015 methodology was used to ensure that the data are adequate for the verification process and the number of VCUs is reliable.

e) Data archiving

Biofíllica Investimentos Ambientais stored all data and reports of the Fazenda Maísa REDD+ Project. All documents related to Project monitoring will be compiled and provided to the verification staff at each verification event.

f) Organization and responsibility of parties involved in the information described above.

These activities were the responsibility of Biofíllica Investimentos Ambientais.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Total emissions in the baseline scenario for year 2012 are 73,128 tCO₂e as presented in **Table 7**.

Table 6. Total net baseline carbon stock change in baseline scenario in the Project Area (table 21b of VCS VM0015).

Carbon stock changes per initial forest class <i>icl</i>		Total carbon stock change of initial forest class in the project area		Carbon stock changes per post-deforestation zone <i>z</i>		Total carbon stock change of post-deforestation zones in the project area		Total net carbon stock change of the project area	
ID _{icl} >	1	$\Delta\text{CBSLPA}_{icl,t}$	$\Delta\text{CBSLPA}_{icl}$	ID _z >	1	$\Delta\text{CBSLPA}_{z,t}$	ΔCBSLPA_z	ΔCBSLPA_t	ΔCBSLPA
Name>	Forest	annual	cumulative	Name>	Zone 1	annual	cumulative	annual	cumulative
Project Year <i>t</i>	tCO ₂ -e	tCO ₂ -e	tCO ₂ -e	Project Year <i>t</i>	tCO ₂ -e	tCO ₂ -e	tCO ₂ -e	tCO ₂ -e	tCO ₂ -e
2012	73,065.4	73,065.4	73,065.4	2012	1302.9	1,302.9	1,302.9	71,762.5	71,762.5

4.2 Project Emissions

Emissions due to planned deforestation

Emissions associated to planned deforestation were developed in the Project area from 21 May 2012 to 21 May 2013. Total of emissions related to planned deforestation is 7.840,6 tCO₂e.

Emissions due to planned logging activities

No emissions associated to planned logging activities were developed in the Project area from 21 May 2012 to 21 May 2013. All logging activities were executed in order to obtain long-lived wood products.

Emissions due to planned fuel-wood and charcoal activities

No emissions associated to planned fuel-wood and charcoal activities were developed in the Project area.

Removals due to carbon stock increase of planned activities

Carbon stock increase due to planned activities in areas that would be deforested in the baseline case was omitted.

Total ex post carbon stock decrease in the Project area

Carbon stock decrease associated to Project activities has occurred in the Project area from 21 May 2012 to 21 May 2013.

Emissions due to unavoidable unplanned deforestation

No emission associated to unavoidable unplanned deforestation was observed within the Project area in this monitoring period.

Emissions due to forest fires and catastrophic events

No emissions associated to forest fires and catastrophic events have occurred in the Project area from 21 May 2012 to 21 May 2013.

Ex post estimated net carbon stock change in the Project area

Total ex post estimated carbon stock change in Project area under the Project scenario in this monitoring period is presented in **Table 8**.

Table 7. Ex post estimated net carbon stock change in the Project area under the Project scenario (Table 27 of VCS VM0015).

Project Year t	Total ex post carbon stock decrease due to planned activities		Total ex post carbon stock increase due to planned activities		Total ex post carbon stock decrease due to unavaoided unplanned deforestation		Total ex post net carbon stock change	
	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative
	ΔCPAdPA_t	ΔCPAdPA	ΔCPAiPA_t	ΔCPAiPA	ΔCUDdPA_t	ΔCUDdPA	ΔCPSPA_t	ΔCPSPA
	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e
2012	7,430.8	7,430.8	0.0	0.0	0.0	0.0	7,430.8	7,430.8

Non-CO2 emissions from forest fires

Not subject to monitoring and accounting

4.3 Leakage

One source of leakage was monitored: leakage due to displacement activity.

Leakage due to displacement activity was monitored by mapping forest cover change in the leakage belt. As defined in the VCS Methodology VM0015, deforestation above the baseline in the leakage belt area will be considered activity displacement leakage. Activity data for the leakage belt area was determined using the same methods applied to deforestation mapping in the Project area.

Total ex post estimated leakage

Ex post total net carbon stock changes in the leakage belt due to displacement of activity in this monitoring period are presented in **Table 9**. Leakage was calculated as the difference between the ex post and ex ante the assessment. As the result is <0, total ex post leakage was set to zero.

Table 8. Total net ex ante and ex post baseline carbon stock change in the leakage belt (Table 35 of VCS VM0015).

Project Year t	Total ex ante decrease in carbon stocks due to displaced deforestation		Total ex post decrease in carbon stocks due to displaced deforestation	
	annual	cumulative	annual	cumulative
	$\Delta CADLK_t$	$\Delta CADLK$	$\Delta CADLK_t$	$\Delta CADLK$
	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e
2012	7.312,9	7.312,9	0,0	0,0

4.4 Net GHG Emission Reductions and Removals

The net anthropogenic GHG emissions reductions were calculated following the equation 19, equation 20 and equation 21 of VCS VM0015 version 1.1. The risk factor used to calculate VCS buffer credits (VBC) is 19%, as calculated in Non-permanence Risk Report. The calculated ex post GHG emissions reductions are presented in **Table 10**.

Table 9. Ex post estimated net anthropogenic GHG emission reductions and Verified Carbon Units (Table 36 of VCS VM0015).

Project Year t	Baseline carbon stock changes		Ex post project carbon stock changes		Ex post leakage carbon stock changes		Ex post net anthropogenic GHG emission reductions		Ex post VCUs tradable		Ex post buffer credits	
	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative
	$\Delta CBSLPA_t$	$\Delta CBSLPA$	$\Delta CPSPA_t$	$\Delta CPSPA$	ΔCLK_t	ΔCLK	$\Delta REDD_t$	$\Delta REDD$	VCU_t	VCU	VCB_t	VCB
	tCO ₂ -e	tCO ₂ -e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e
2012	71,762.5	71,762.5	7,430.8	7,430.8	0.0	0.0	64,331.7	64,331.7	52,108.7	52,108.7	12,223.0	12,223.0

5 ADDITIONAL INFORMATION

Digital files used for the mapping (satellite images and shapefiles) were presented to verification team as evidence of monitoring land-use and land-cover within the project area and leakage belt area.

APPENDIX 1: MAP SHOWING CUMULATIVE AREAS CREDITED WITHIN THE PROJECT AREA

