MAÍSA REDD+ PROJECT

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Project Title	Maísa REDD+ Project
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Project Name	Projeto REDD+ Maísa
Project Location	Brazil, Pará State, "Low Tocantins" Region, Moju city
Project Proponents	• Biofílica Investimentos Ambientais: Plínio Ribeiro, plinio@biofílica.com.br, +55 11 3073-0430 • Maísa-Moju Agroindustrial: Márcio Pinheiro, maisa_marciopinheiro@hotmail.com, +55 91 3250-3212 • Sipasa-Seringa Industrial do Pará: Maurício Batista, ma_gbsilva@hotmail.com, +55 91 3735-2158
Auditor	• Rainforest Alliance: Campbell Moore, cmoore@ra.org, +1 (202) 903-0717 • IMAFLORA – Instituto de Manejo e Certificação Florestal e Agrícola: Bruno Brazil de Souza, bruno@imaflora.org, +55 19 3429-0848
Project Start Date	May 21th 2012
Project Lifetime	30 years
GHG accounting period	From May 21th 2012 to May 21th 2042
Full validation or gap validation	Full validation
Edition of the CCB Standards	CCB Standards Second Edition
Brief Summary of Project's expected Climate, Community and Biodiversity	• "Climate": An amount of **2.023.743,8** tCO_2eq emissions will be prevented by project's activities, while 2.342.920,8 tCO2eq would be emitted at Project absence. On average, 67.458,1 tCO2eq yearly will be prevented by the Project activities**.** • "Community": Empowerment of local communities on the regional decision making process and public policies; Development of communities organizational aspects; and development of more sophisticate business chains for small scale agriculture and grazing sector through rural technical assistance and market studies. • "Biodiversity": The maintenance of the project's area forest cover will guarantee habitats protection, ecosystem balance and best practices applied on the low impact logging techniques will favor the habitats quality. Moreover the project will benefit the regional biodiversity by mitigating landscape fragmentation aspects since it will behave as an "ecological corridor or springboard" to biodiversity on the landscape level.
Gold Level criteria being used	Gold Level criteria *GL3. Exceptional Biodiversity Benefits*. Projects conserve biodiversity at sites of global significance for biodiversity conservation selected on the basis of the Key Biodiversity Area (KBA) framework of vulnerability (Project Zone includes critically endangered species according with IUCN Red List).
Date and version of the PDD	December 12th 2014, version 2.1
Expected schedule of verification	First verification under CCBS two years after validation, and then ever two years during Project's lifetime.

"In the lower Tocantins, vegetation is dense and compact as if water and woods were combined upon the edge of ravines to prevent the profane entrance of men. Wetland of the rubber tree, the cocoa, the ubuçu; palm whose fiber the regional wide brim hat is made, the Buriti, which produces quite tasty fruits, the wild arrack, the açaí, the jupati, the piquiá, the ucuuba, which produces a fatty fruit used in the manufacture of candles, the andiroba tree, the pau-mulato, the aninga, the aturia. But upon the rising of Baião, city on the right bank, the thirty meters above river level disclose the higher regions far beyond. The chestnut trees begin to build up their impressive size, accompanied by the green retinue of less thick wild genipa forests, kapok, cassie, itaúba, pink lepacho, salmwood, cedar, rosewood" **(Leandro Tocantins, 1973).**

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1 GENERAL

1.1 Summary Description of the Project (G3)

The Maísa REDD+ Project is a partnership between Biofílica, 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 Stewardship activities and marketing environmental services.

The Project is located in the State of Pará, Brazil, in the Lower Tocantins, between the Tocantins and Moju Rivers. The Project Area is located within the municipality of Moju and surrounded by the municipalities of Baião, Mocajuba, Tailândia, Goianésia and Breu Branco, which exert influence on the conditions of the project. There are eight surrounding communities that are directly or indirectly affected by the project, either by being geographically downstream of the Project Area or providing manpower to Fazenda Maísa, with no communities residing within the Project Area or depending on its natural resources. These communities are: Alto Apeí, Açaizal Novo, Açaizal Centro, Branquelândia, Ituquara, Flexal, Maçaranduba and Nossa Senhora do Perpétuo Socorro.

Historically, the region is marked by land conflicts started in the 70s with disputes between farmers, land grabbers, squatters and illegal loggers. The ease of access through the PA-150 highway, lack of public policies, weak law enforcement in controlling deforestation and land regularization, and the beginning of real estate speculation have placed the region within the "Arc of Deforestation".

The physical and climatic characteristics are typical of tropical regions and the hot and humid equatorial climate, with average rainfall ranging from 1,800 to 2,300 mm/year and average daytime temperatures between 26 and 29ºC. The most rainy season is from December to June and the temperature reflects the same seasonality, being associated to the migration of the intertropical convergence zone. The Reference Region is part of the sub-basin Guamá-Capim-Moju and the Project Area is located in the drainage basin of the Cairiri River, a tributary of the Moju River.

Within a context of relevance for the Biodiversity, the Project Zone (also corresponding to the Reference Region) is in the midst of Belém's Center of Endemism, one of the eight Amazonian centers of endemism and the most degraded of all, with 76.4% of its forest cover compromised. The region consists primarily of Dense Lowland Ombrophilous Forest with Emergent Canopy, also known as "dryland forest", typical of hot and humid climate regions, with large emergent trees that stand out from the uniform tree canopy. There are still patches of Wooded Campinarana vegetation, although geographically insignificant.

A flora survey conducted identified a total of 128 tree species in the Project Area, consisting of 49 families, and among these species, 8 are listed as endangered species at national and state level. As for wildlife, a survey was conducted on mammalian fauna, avifauna, herpetofauna, ichthyofauna and entomofauna through direct sampling methodologies within the Project Area and through interviews with the surrounding communities for the Project Zone and at least 29 of the species identified are at some level and threat of extinction according to international lists (IUCN, 2010, Version 3 and CITES, 2013), national (IBAMA'S official list) and state (SEMA/PA's official list). Two of these are in a critical period of extinction according to IUCN's Red List of Endangered Species: Chiropotes satanas (known locally as cuxiú-preto) and Cebus Kaapori (Known locally as cairara), two endemic primates from Belém's the Center of Endemism.

Based on studies conducted on the additionality analysis and identification of agents, drivers and underlying causes of deforestation, the components of the projects were designed to establish activities in three areas of the project: climate, community and biodiversity.

The action on the climate aims at reducing emissions due to unplanned deforestation, controlling leakage and mitigating the risk of non-permanence. The following strategies are designed accordingly: the search for addingvalue to the standing forest and to the different forest products in the project area, greater efficiency and effectiveness in property security within the limits of the project area along with satellite monitoring of the forest cover and promotion of profitable, high employment, low emission activities at leakage management areas.

The social component aims at mitigating the agents and drivers of deforestation and maximizing the positive social impacts with the project. The main strategies in this sense are: engaging local players and stakeholders, strengthening the association and promotion of rural technical assistance. Within the social component the first task (phase 1) will be focused on the consolidation of communications channels with surrounding communities and other stakeholders, in order to inform, mobilize and engage them with the project's causes. An especial attention will be given on the improvement and assurance of the best labor practices and conditions.

Regarding biodiversity, the goal is to monitor and assess the positive impacts of the REDD+ intervention and sustainable forest management for the conservation of biodiversity and endangered species within the Arc of Deforestation, also seeking to maximize the positive impacts of the management for the climate. The strategies consist of monitoring the impacts and the relevant species, and formalizing long-term partnerships with research and education institutions for the promotion and dissemination of knowledge. The prospection of educational and research institutions will constitute the first task of the biodiversity goal.

Despite being in a context of major deforestation pressures and within a region of considerable historical degradation, the Maísa REDD+ Project has incredible potential to set up a regional model to be followed, demonstrating that sustainable practices and businesses implemented based on maintaining the "standing forest" can be economically feasible and still generate numerous benefits to the local biodiversity and socioeconomics.

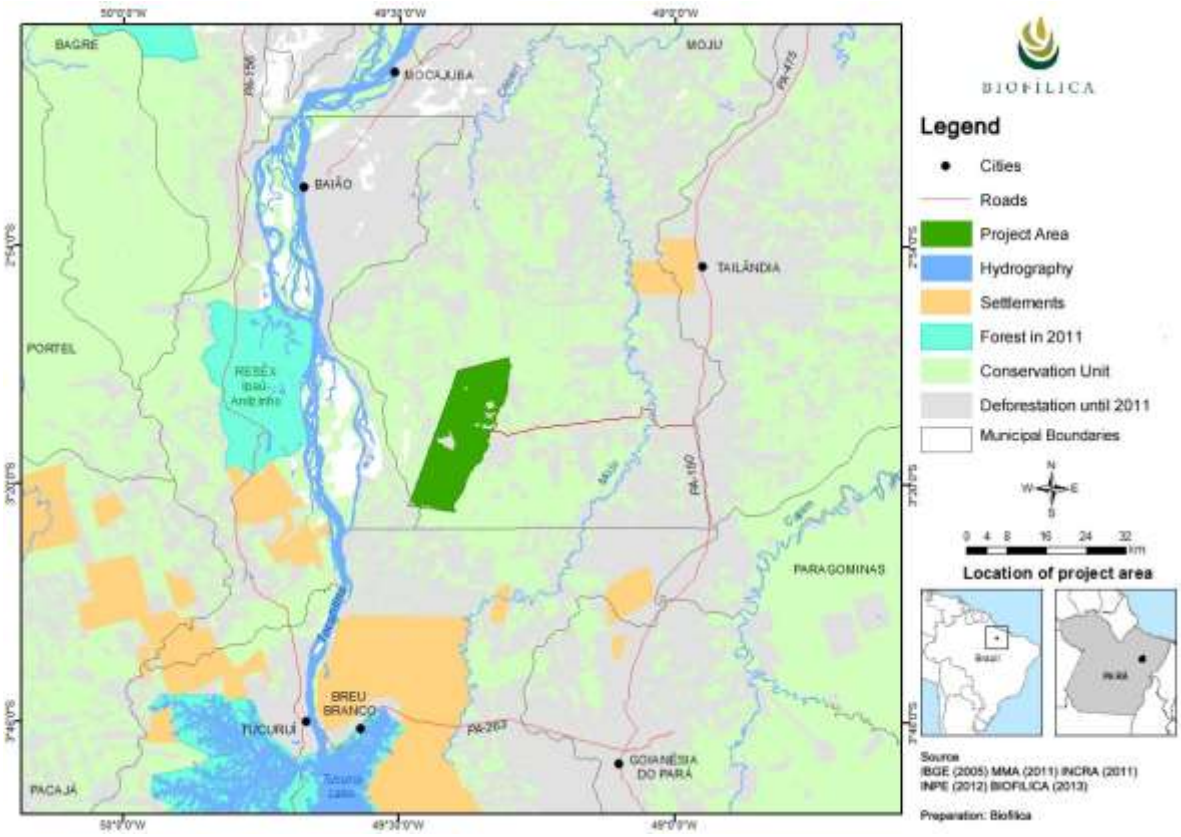
Table 1. Project summary information.

Project Summary	
Project Proponent	Biofílica Investimentos Ambientais S.A. Maísa-Moju Agroindustrial Ltda. Sipasa-Seringa Industrial do Pará S.A.
Executioners	Biofílica Investimentos Ambientais S.A. Sipasa-Seringa Industrial do Pará S.A.
Partners	Instituto Peabiru Eco-lógica Consultoria Ambiental S.S. Ltda. Amazônia Gestão Ambiental ME.
Country	Brazil
Region	Lower Tocantins River
State	Pará
Owner	Maísa Agroindustrial Ltda.
Project Area	28,752 hectares
Reference Region	658,148 hectares
Project start date	May 21, 2012
Project crediting period start date	May 21, 2012
Crediting Period	30 years
Emissions at baseline scenario	2,342,920.4
Deforestation at baseline scenario	6,103 ha
Estimation of Emissions Prevented by the Project	2,023,743.8
Average Annual Estimation of Emissions Prevented by the Project	67,458.1
Deforestation at Project scenario	96 ha
Emissions at Project scenario	189,211.4
REDD+ standards	Verified Carbon Standard (VCS) and Climate Community and Biodiversity Standard (CCB)
Methodology	Approved VCS Methodology VM0015 for Avoided Unplanned Deforestation, version 1.1
Communities in the Project Area	Alto Apeí, Açaizal Novo, Açaizal Centro, Branquelândia, Ituquara, Flexal, Maçaranduba and Nossa Senhora do Perpétuo Socorro.
Other Activities	Sustainable management of açaí and other forest crops, such as Brazil-nut and latex.

1.2 Project Location (G1 & G3)

Geographical Limits

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. Relativelyclose 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. Map 1 lets you view the project and influence area mentioned previously.



Map 1. Location of the project area. Geographical boundaries and access roads.

Access Roads

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.

Regional Context of the Project

The municipalities of the reference region are within the so-called "Arc of Deforestation" or "Arc of Fire" in the Amazon. This region has suffered, and still suffers, the pressure effects of high environmental impact activities - especially illegal logging, charcoal production from native forest, extensive cattle ranching, or even deforestation to identify ownership.

- **Project Zone, Reference Region and Project Area**

The following concepts were considered:

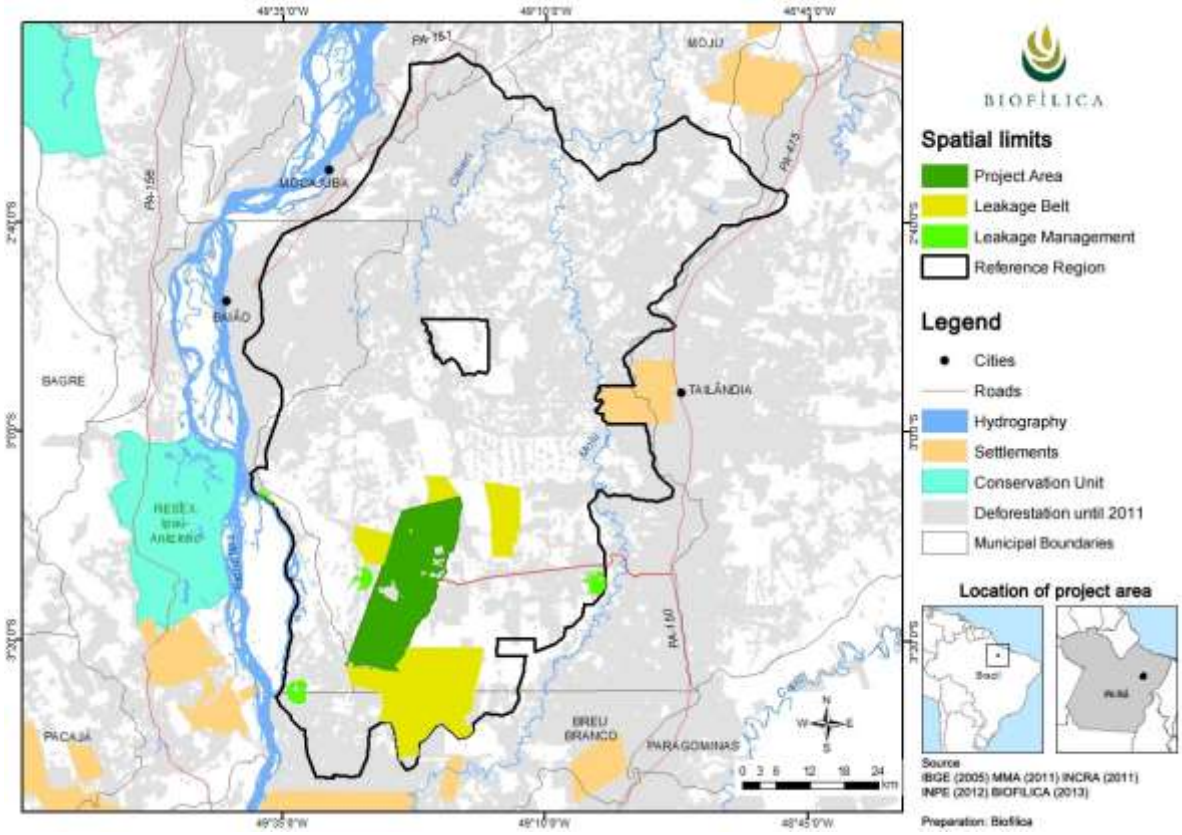
- Reference Region: "Spatial delimitation of the analytic domain from which information on fees, agents, drivers, and land-use and land-cover patterns (LU / LC-change) is obtained, designed and monitored." (VM0015)
- Project Zone: "Area encompassing the Project Area in which project activities, that directly affect the land and associated resources, including activities related to the provision of community development and livelihood alternatives, are implemented." (CCBA)
- Project Area: "Area or areas under the control of the project proponent in which it will develop the activities. On the project start date, the area must include only "(VM0015)" forest area and "area where project activities aim at generating net benefits for the climate" (CCBA).

As the spatial delimitation used to obtain information on fees, agents, drivers and land-use and land-cover patterns (LU/LC-change) also incorporates the areas where project activities may affect the land and associated resources, including the provision of community development and livelihood alternatives, the spatial limits used for delimiting the Reference Region (Section 4 - Application of Methodology) were also used in determining the Project Zone, that is, for practical purposes, the Project Zone is compatible with the Reference Region. Moreover, all studies for regional project contextualization, drawing activities and impact studies were conducted based on these limits. It is noteworthy that, for studies of historical and socioeconomic nature, the authors considered data and information on the municipalities that are wholly or partly within this delimitation.

The Project Area (Section 4 - Application of Methodology) was delimited based on the forest cover area on the project start date, under the proponent's control and from which positive net benefits are to be acquired for the climate (reduced emissions).

It is noteworthy that, although geographically, the "Reference Region" presents the same delimitation as the "Project Area", in this document, whenever the reference or subject matter relates to the VCS or the VM0015 methodology, the term "Reference Region" will be used; and when the subject relates to the CCBA, the term "Project Zone" will be referenced.

The spatial limits of the project area are represented on the map below (**Map 2**).



Map 2. Spatial limits used in the Project.

- **Economic, Social, Environmental and Historical Coverage Area**

The Project Area includes six municipalities of the State of Pará: Baião and Mocajuba (micro-region of Cametá), Breu Branco (micro-region of Tucuruí), Goianésia do Pará (micro-region of Paragominas) and Moju and Tailândia (micro-region of Tomé-Açu). The first record of a settlement in the region dates from the second half of the seventeenth century, when there were land grants (sesmarias) aimed at encouraging the settlement and strategic control along the Tocantins River.

In this context, the first of said municipalities to be established was Baião, in 1833, which soon excelled in the regional economy. Following, Vila de Mocajuba was established and then considered a city in 1895, and was marked by intense urbanization and black pepper cultivation. After a troubled administrative history that lasted nearly a century, Moju became a municipality under the current settings in 1935, and the other municipalities originate only from 1980 (IBGE, 2012; IDESP, 2011).

Especially the latter (Breu Branco, Goianésia do Pará and Tailândia) have their origins marked by land conflicts started in the 70s involving land dispute between farmers, land grabbers and squatters. These players had easier access to the region with the construction of the PA-150 highway, the beginning of real estate speculation and triggering event in the region which constituted the "Arc of Deforestation". Nevertheless, the municipality of Tailândia is a direct result of these conflicts since the Government of the State of Pará created in 1978, as a land conflict intervention measure, Tailândia's Managed Settlement, which, in 1989, became a municipality (INSTITUTO PEABIRU, 2013).

The opening of access roads such as the PA-150 and, more recently, the PA-236 highway, and the installation of other infrastructure projects such as the Tucuruí Hydroelectric Power Plant, kept attracting

people to the region, enabling rapid population growth, with an average annual growth of 4.63% per year between 2000 and 2010, and a total of 295,857 inhabitants residing in the project area in 2010. The demographic dynamics is reflected as changes in the production system. The average per capita Gross Domestic Product (pcGDP) estimated for the concerned municipalities increased from R$1,726.00 in 2000 to R$4,024.00 in 2009 (IBGE, 2012; IDESP, 2011).

The economic activities are historically linked to the timber production chain (mainly from illegal and predatory backgrounds) and extensive cattle ranching. Temporary crops are also noteworthy, such as rice, beans, cassava and maize agriculture, targeting the livelihood of families and local businesses. Certain perennial crops are also noteworthy, such as banana, cocoa, Bahia's coconut, black pepper and, more recently, the palm oil, supplying raw materials to the domestic and international agribusiness (INSTITUTO PEABIRU, 2013).

The historical, social and economic context leads to an environmental framework of continued deforestation. Between 2000 and 2009, 3532 km^2 were deforested in the six municipalities, showing a growth rate of 32.20% for the period, whereas, in the same period, the municipalities of Moju and Tailândia stood out, with deforestation rates of 50,15% and 46.25%, respectively. Until 2010, these two municipalities were part of the critical list of the Federal Government's Ministry of Environment and classified as "Class 1" priority by *Programa Municípios Verdes* of the State of Pará due to the high rates of deforestation (INSTITUTO PEABIRU, 2013; IMAZON, 2011).

Physical Parameters

- **Climate**

The reference region in which Fazenda Maísa is located has a hot and humid equatorial climate, classified as Amw according to Köppen (Martorano et al, 1993). The average rainfall is 1800-2300 mm/year, with a coefficient of variation of 20% to 25% and a relative interannual variability index of 25-30%, which can be considered relatively high, striking features of tropical regions. The rainy season lasts from December to June, when more than 80% of the annual rainfall normally occurs (National Water Agency and National Institute of Meteorology).

Regarding the temperature, the daily average for the region (Moju, Goianésia, Mocajuba, Baião and Tailândia) in the last ten years has ranged between 26°C and 29°C. The temperature also reflected the rainfall seasonality, which is linked to migrations of the intertropical convergence zone (ITCZ), The highest temperatures are observed from August to December, and the lowest from March to May.

Despite the seasonal and interannual variations in precipitation and temperature (which can be seen in **Chart 1**), as well as extreme rainfall or severe droughts, the maintenance of vegetation, maintenance of vegetation cover through sustainable forest management activities, and complementary activities developed by the REDD+ project reduce the risk of such events, prevents erosion during extreme rainfall, and contributes to regional thermal regulation.

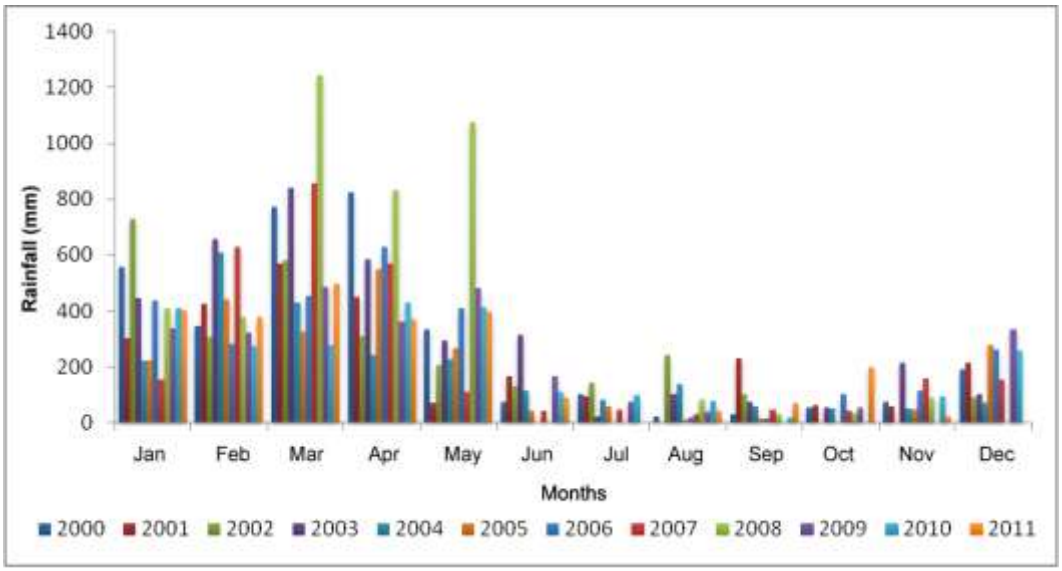
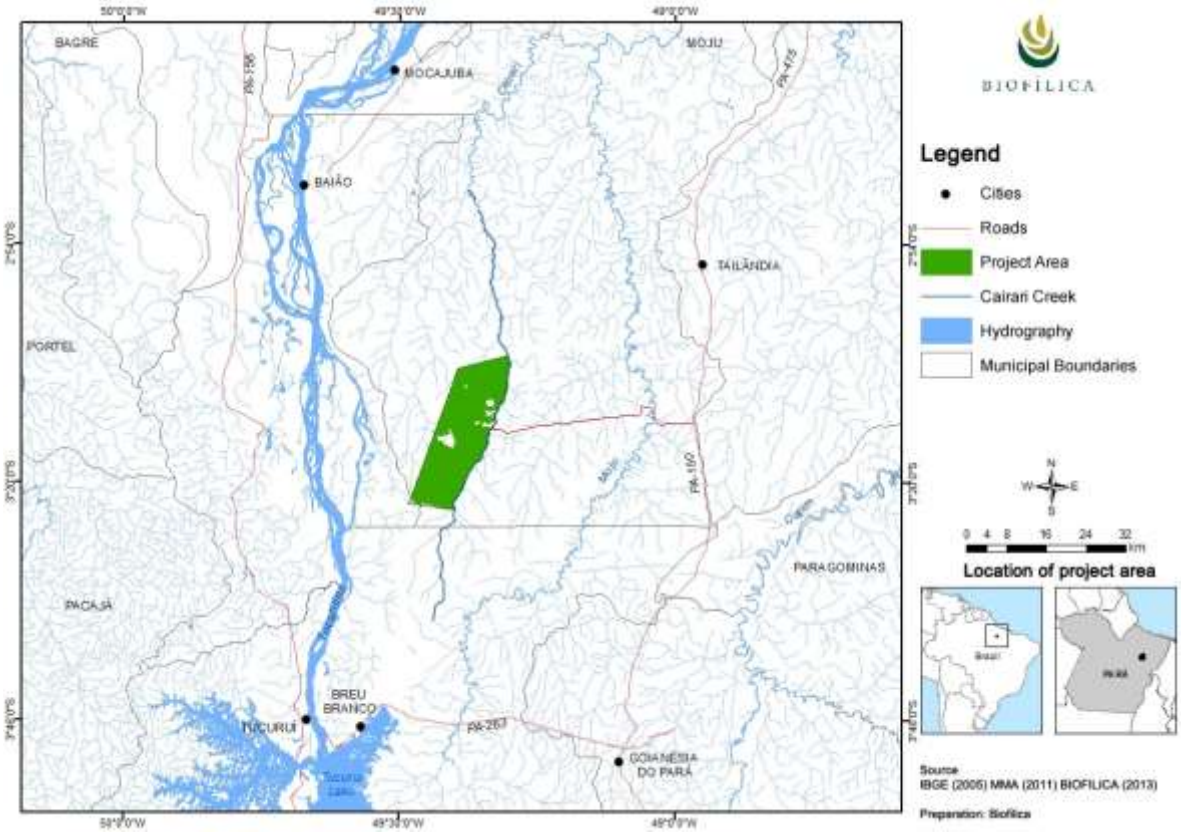


Chart 1. Monthly rainfall for the city of Baião between 2000 and 2011. Source: Instituto Peabiru, 2013.

- **Hydrography**

The Reference Region is part of the sub-basin Guamá-Capim-Moju, within Basin 3 of the North-Northeast Atlantic Basins, where Fazenda Maísa is located in the drainage basin of the Cairiri River, a tributary of the Moju River.

The farm lies on the west bank of the main branch of the Cairiri river, which limits it to the east. In this sense, the farm has slightly higher areas in its central portion towards its longer axis (N-S), acting as the dividing line between the two main branches of the Cairiri river, being located in the main interfluve of the Cairiri River basin. On the following **Map 3**, refer to the representation of the Project Hydrography.

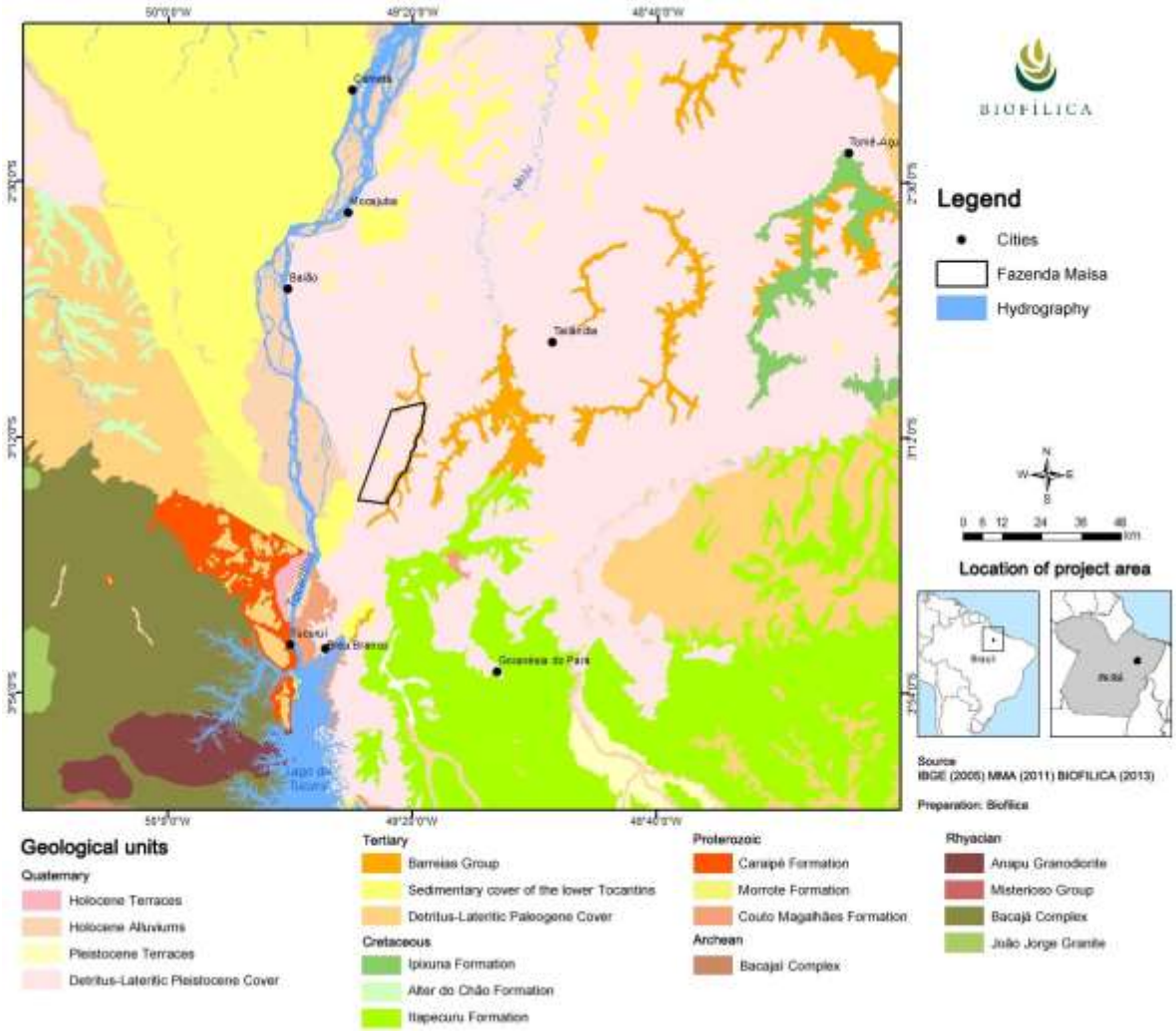


Map 3. Hydrography in the Project Area

- **Geology**

The project area is mainly composed of sedimentary formations and sedimentary and metasedimentary rocks, predominantly from the Tertiary and Cretaceous ages. In the area of Fazenda Maísa, the unconsolidated sediments of the Barreiras Group are noteworthy, for they present layers of fine to coarse sand, layers of claystone and siltstone, including conglomerate lenses and coarse grained sand (CPRM, 2000; SCHOBBENHAUS, et al., 2004). To the south, there is the Itapecuru Formation, composed basically of sandstones, siltstones and shales, essentially lacustrine and fluvial. Moreover, others may be remarked, such as the latest alluviums associated with the Tocantins river, and sea level variations during the Quaternary period..

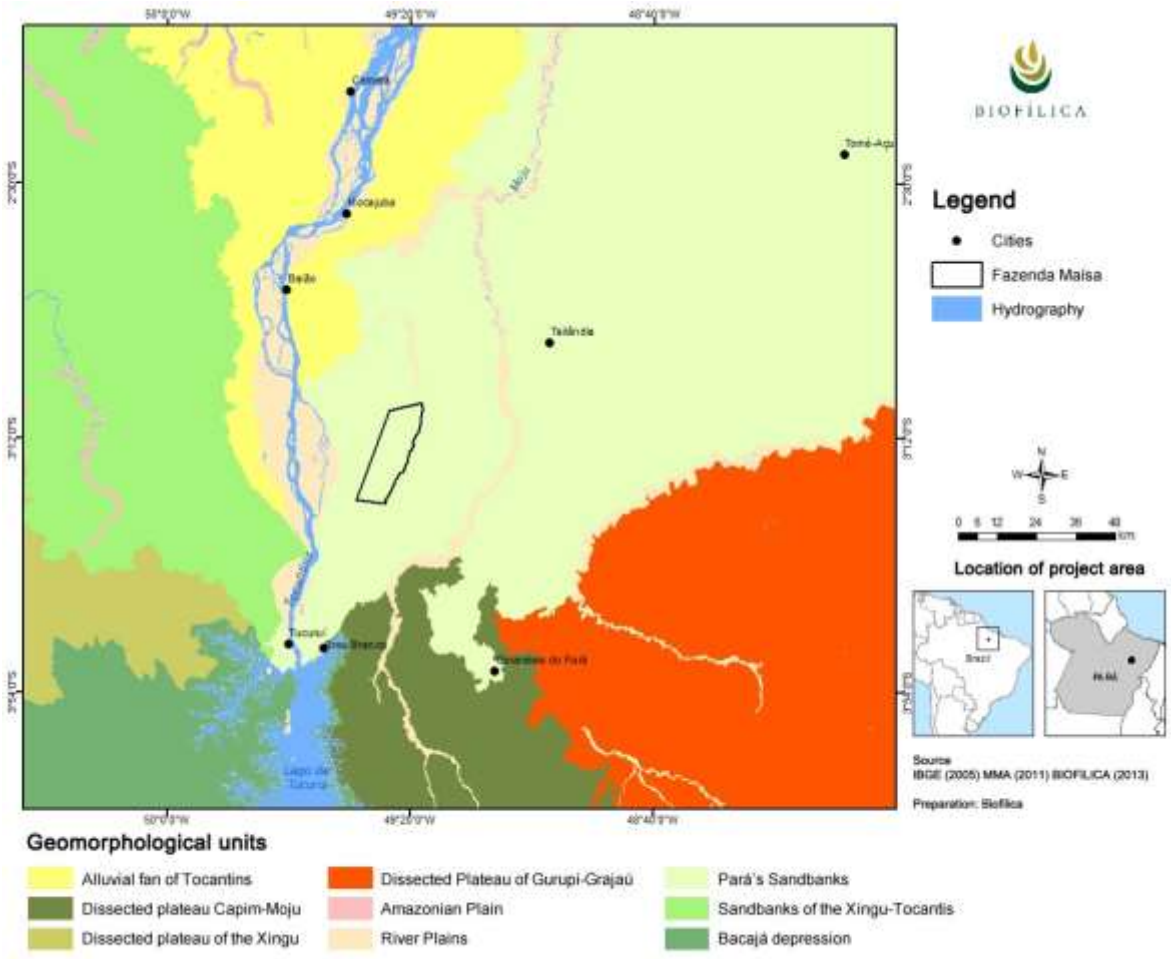
The project area lies almost entirely within the so-called Pleistocene terraces, which feature a typical elevation of around 100 meters and low steepness characteristics. Note the Geology of the Project on **Map 4**.



Map 4. Geology in the Project Area

- **Geomorphology**

From the geomorphological point of view (Map 5), Fazenda Maísa lies almost entirely within Pará's sandbank area. This area is characterized by having low to intermediate elevations (typically 100 m above sea level), with no major topographic or slope variations, reinforcing the low geological risk mentioned above. Even with low slopes, the deforestation in the area represents a risk when associated with the geomorphology, triggering erosion, to which these areas of unconsolidated sediments are vulnerable.

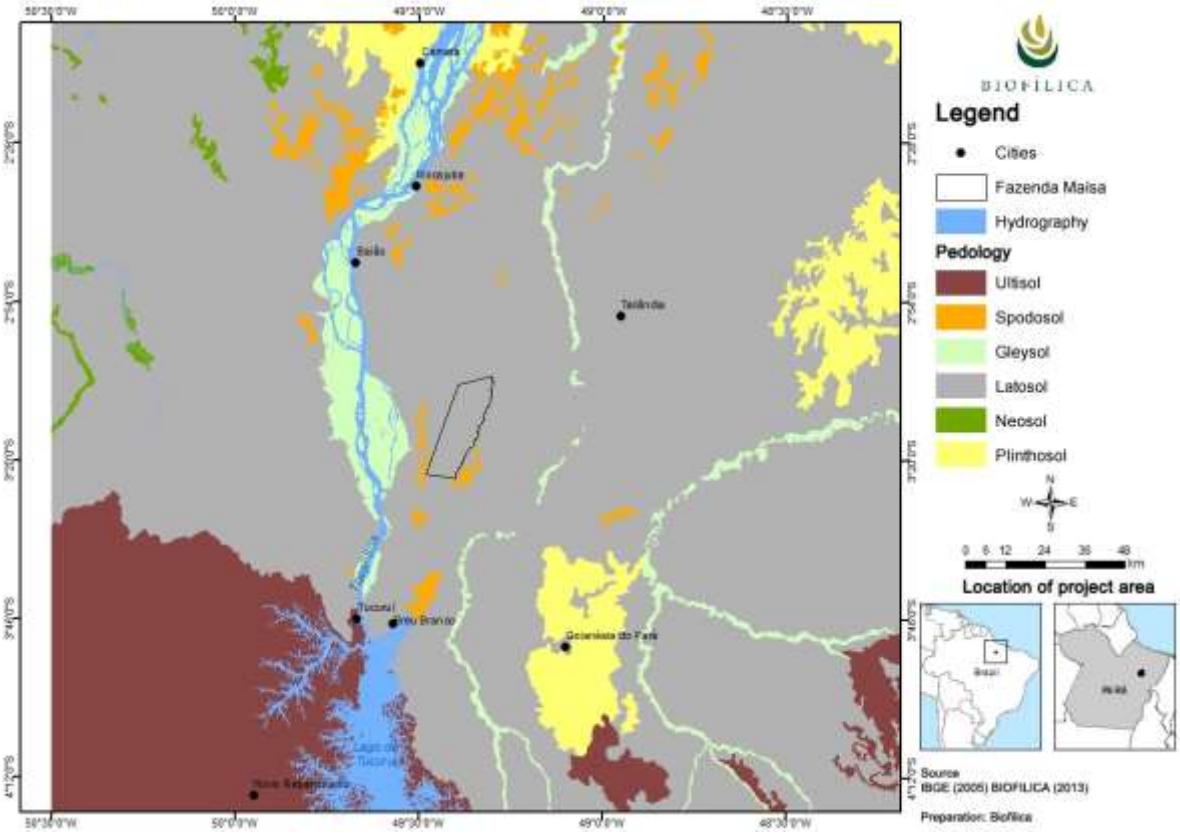


Map 5. Geomorphology in the Project Area.

- **Pedology**

The presence of Latosols (Oxisols) prevails in the reference region. Quartzipsamments also occur, especially associated with gravelly-sandy deposits of fluvial origin, and hydromorphic soils (Gleysols), in wetland areas, associated with watercourses. In addition to isolated occurrences of laterite outcrops, originally associated with the B Horizon (IBGE, 2004).

The predominance of Latosol in the area of Fazenda Maísa indicates a poor soil, with low nutrient availability, which is typical of the region and climate. In this regard, preserving the vegetation is critical to the integrity of the physical environment. The Project Area Pedology is spatialized in **Map 6**.



Map 6. Pedology in the Project Area

- **Mineral resources**

As to the mineral resources, Aluminum mining (Bauxite) stands out in the reference region, not directly affecting the area of the farm. Moreover, in the region's 3rd and 4th order streams and their alluviums, pebble and sand mining is common.

The area is also not too far from the most important mineral province of Brazil: Carajás, which includes Iron, Gold, Copper and Manganese mining. However, as they (Fazenda Maísa and Carajás) are in different basins, there are no direct interrelationships between these areas and the activities within them.

1.3 Conditions Prior to Project Initiation (G1)

Other GHG Programs

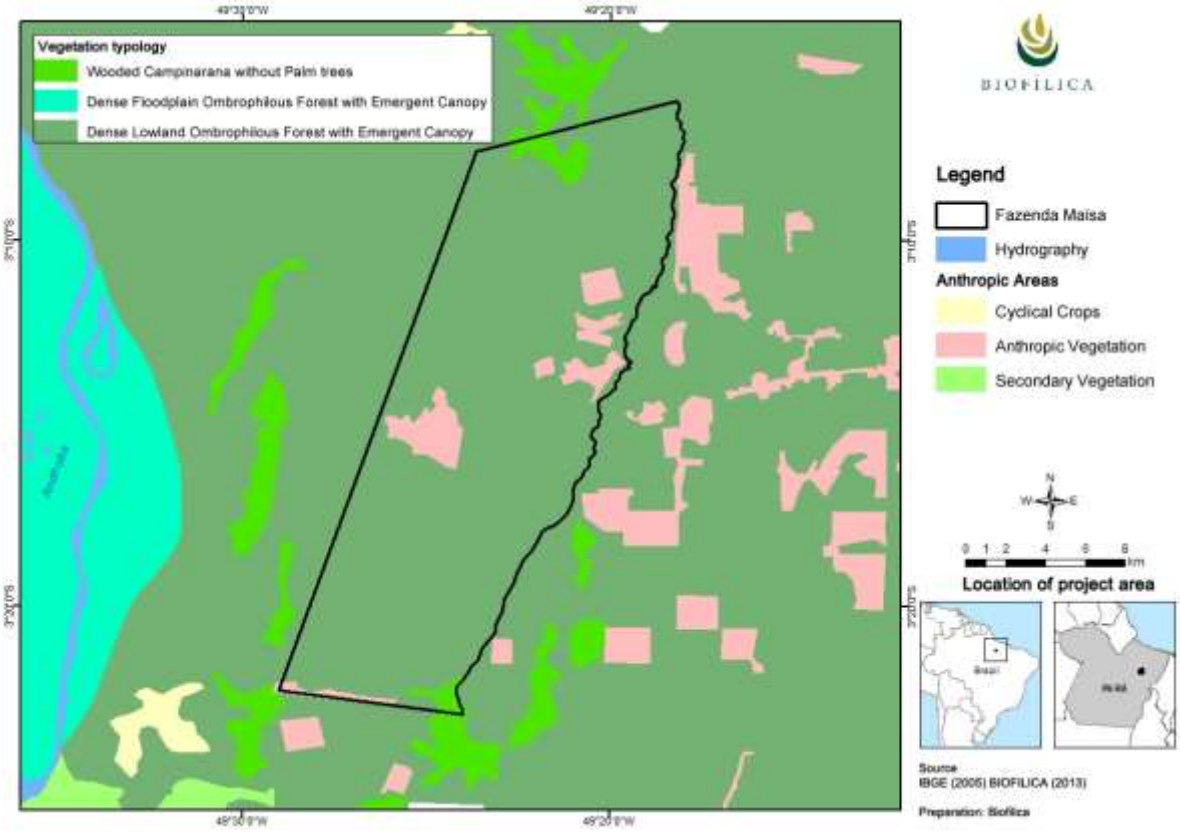
Brazil is a non-Annex I country under the Kyoto Protocol and does not have any GHG reduction commitments under the Convention. Moreover, the Maísa REDD+ Project does not have any project related to carbon credit generation under the CDM or other regulatory scheme within the project area. The project was also not registered in any other greenhouse gases (GHG) emissions program.

Another important point is that, currently, there is still no national regulatory scheme for REDD+ initiatives, and in the international scenario, the most significant progress so far has been the establishment of the

Warsaw Framework (section 3) in the Conference of the Parties of the United Nations Framework Convention, in 2013, in Poland. However, even in solid and clear regulatory frameworks, the Maísa REDD+ Project is being developed to integrate and meet possible future regulatory schemes..

Vegetation type and condition

Within the different forest types that make up the Amazon biome, the project area consists essentially of two types: the wooded Campinarana without Palm Tree and the Dense Lowland Ombrophilous Forest with Emergent Canopy - Map 7.



Map 7. Vegetation type and conditions.

According to IBGE (2012) and RADAMBRASIL (1974), the Campinarana usually occurs in floodplains with elevations below 50 meters and in podzolic latosol, dystrophic and hydromorphic, sandy, shallow soils, with high or low aluminum content. It is characterized by a xeromorphic vegetation with tubers, and may remain only as shrub-tree layer depending on edaphoclimatic conditions, such as availability of water and nutrients. In the project area, however, the formation originally determined as Wooded Campinarana without Palm Tree proved to be rather a transitional vegetation type to Lowland Ombrophilous Forest with Emergent Canopy than a classic Wooded Campinarana without Palm Tree.

The Dense Lowland Ombrophilous Forest with Emergent Canopy is typical of hot and humid and/or super-humid climate, with a clear rainfall decrease at certain times of the year. As to the vegetation type, it can be identified by its large emergent trees, often over 50 meters high, jutting from the uniform 25-35 meter high tree layer. It usually forms at high or low sedimentary areas. It is also known as dryland forest (RADAMBRASIL, 1974; IBGE, 2012).

The forest class considered in the project consists mainly of Dense Lowland Ombrophilous Forest with Emergent Canopy with 98% representativeness in the project area. The remaining 2% are considered by IBGE (2012) in its distribution maps as Wooded Campinarana without Palm Tree, but on the field, it showed strong characteristics of Lowland Ombrophilous Forest with Emergent Canopy. Therefore, because of the minor representativeness of the latter, its high field similarity with Lowland Ombrophilous Forest with Emergent Canopy, and the non-significant differences found in the inventory, it was considered a single forest class, consisting of Dense Lowland Ombrophilous Forest with Emergent Canopy. **Table 2** shows the vegetable type in the Project Area (hectares and %).

Table 2. Vegetation types in the Project Area.

Vegetation Type	Area (ha)	Area (%)
Wooded Campinarana without Palm Tree	709.37	2.4
Dense Lowland Ombrophilous Forest with Emergent Canopy	23405.93	97.6

Current Carbon Stock

To be better described and detailed in Section 5, the current carbon stock was calculated based on a forest inventory via stratified sampling conducted in the project area, in 2012, according to the recommendations contained in Appendix 3 of the VM0015. To calculate the biomass, after testing a few other equations, a simple input equation was used, with diameter at breast height (DBH) as dependent variable. With the equation, Silva (2007) estimated the fresh biomass above and below ground, and based on the fresh biomass, a conversion factor developed by Nogueira (2008) was used to calculate the dry biomass. However, for the dead wood stock estimate, a literature value from Feldpausch et al (2005) was used, incorporating the disturbances of sustainable forest management.

The forest inventory and the resulting calculations indicated a living biomass stock above and below ground of 123.58 (± 7.57) tones of carbon per hectare. By converting to tons of carbon equivalent per hectare (conversion factor of 44/12) and considering the ratio found by Silva (2007) between living biomass above and below ground, whereas 72.9% (± 6.9) are biomass above ground, we acquired a stock per hectare of:

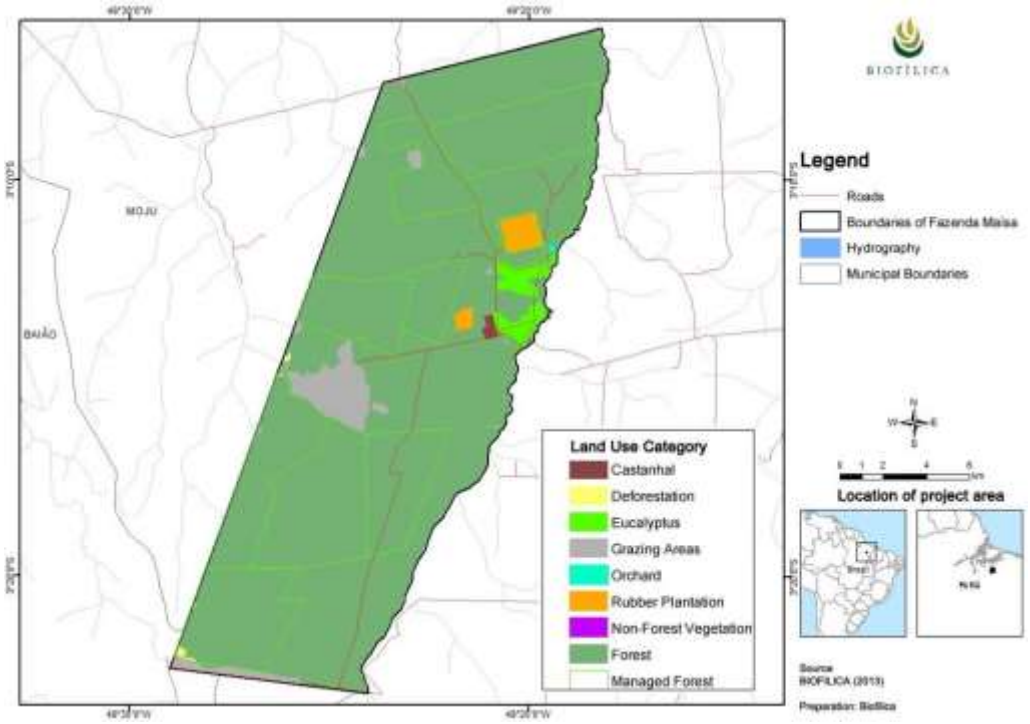
- 330.8 tons of carbon equivalent in above-ground live biomass;
- 122.3 tons of carbon equivalent in below-ground live biomass;
- **A total of 453.1 tons of carbon equivalent (± 27.8);**

Other land uses

Fazenda Maísa was acquired from the State of Pará in the early 1970s by the father of Mr. Márcio Pinheiro aiming at developing logging extraction activities via sustainable forestry and cattle ranching. Currently, in addition to the sustainable management of the native tropical forest, there are about 500 hectares of eucalyptus originally managed through a forest-grazing system (not accounted for reduced/removed emissions), a few hectares used in unmanaged rubber tree and chestnut plantations and remaining cattle ranching. There is no more interest in developing livestock activities in the project area, in addition to livelihood livestock.

It is also important to remark that, in the course of its history, the venture has also had a sawmill, to add value to tropical timber, and charcoal production plants to reuse the waste from the sawmill and that

arising from forest exploitation. Due to market issues, the sawmill and, consequently, the charcoal plant are both deactivated. The categories of land use are spatially represented in Map 8.



Map 8. Land uses throughout Fazenda Maísa.

Biodiversity Conditions

- **Belém's Center of Endemism**

Of the 8 centers of endemism present in the Amazon– Belém, Xingu, Tapajós, Rondônia, Inhambari, Napo, Imeri and Guiana – the project area lies within one of the three totally Brazilian centers, which are located in the state of Pará - Xingu, Tapajós and Belém - Fazenda Maísa is within Belém's center of endemism. This center is located between Gurupi and Tocantins rivers and, in addition to being one of the smallest centers in extension, 76.4% of its total area has already been deforested. Thus, the Maísa REDD+ Project is located in one of the most critical regions for the conservation of the Amazon, having the largest number of endangered animals and plant species, according to the Emílio Goeldi Museum and Conservation International (SILVA et al, 2005; GARDA et al, 2010).

- **Flora**

A primary survey was conducted by Amazônia Gestão Ambiental to delineate the specific floristic and phytosociological conditions for this initiative's design. A total of 128 tree species of 49 families were sampled, presenting results that were similar to others conducted in the region such as Soares (1999) who found the occurrence of 169 species and 45 families and Costa et al. (1998) who found 78 species

and 24 families. The data collected were also similar to those found by Solomon et al. (2007) for Dense Ombrophilous Forest.

Of the species inventoried, 5 stood out with regard to the Importance Value Index, coverage and dominance, namely, the Matá-Matá (Eschweilera sp.), Acapú (Vouacapoua americana Aubl.), Abiu/Abiurana (Pouteria sp.), Farinha or Casca Seca (Couepia guianensis Aubl. Miq. Prance) and Tachi (Tachigali sp.). Species with low relative representativeness to these same indicators were maçaranduba (Manikara sp.), maparajúba (manikara sp2.), ipê (Tabebuia sp.), jatobá (Hymenea sp.) and angelis among some others. Also inventoried with relative importance were species such as embaúba (Cecropia sp.), periquiteira (Trema sp) and lacre (Vismia sp.), typical of vegetations undergoing regeneration stages.

Thus, the relatively high importance of species with low interest for the logging industry, low importance of species that are targeted by the logging industry, and the presence of species that are typical of regeneration areas indicate the opportunity for the design and implementation of techniques and practices to improve forest management and better control its impact. Activities to be proposed as main drivers in this project.

With regard to endangered species, according to the National List of Endangered Plant Species of the Brazilian Ministry of Environment (MMA), two species are considered endangered:

- Bertholletia excelsa H.B.K. better known as Castanheira-do-Pará, or Brazil nut tree; and
- Swietenia macrophylla King – Mahogany.

In the regional lists of Pará's Environment Secretariat (SEMA-PA), the situation is even more critical with regard to the following endangered species:

- Bertholletia excelsa H.B.K. better known as Castanheira-do-Pará, or Brazil nut tree;
- Swietenia macrophylla King – Mahogany.
- Manilkara sp - Maçaranduba;
- Cedrela sp - Cedar
- Aspidosperma álbum (Vahl) R. Ben. - Peroba
- Aspidosperma desmanthum - Araracanga
- Euxylophora paraenses - Pau amarelo
- Ptychopetalum olacoides Benth. - Muirapuama

Analyzing other national and international lists, such as IBAMA, IUCN and CITES, three species are highlighted:

- Bertholletia excelsa H.B.K. better known as Castanheira-do-Pará, or Brazil nut tree;
- Swietenia macrophylla King – Mahogany.
- Cedrela sp - Cedar

The recurrence of Brazil nut tree, Mahogany and Cedar in different lists suggest the need for the development of a future Plan of Action for the specific Conservation of these three species.

Among the many risks posed by deforestation and fragmentation for flora conservation in the project area, a few are especially noteworthy, such as increased edge effects, vegetation's greater susceptibility to fire, decreased degree of resilience of forest fragments, genetic erosion for certain taxa, among others,

resulting in an overall decrease in flora biodiversity, not only in the project area but also throughout the relevant region.

- **Fauna**

For the design of this initiative, a primary survey was specifically conducted with the fauna in the project area, approaching the main conservation interest taxa, which are under potential pressure or risk, and also those that should be monitored as indicators, namely: mammalian fauna, avifauna, herpetofauna, ichthyofauna, entomofauna with focus on social bees.

Mammalian fauna

Mammals were chosen because they are usually the most affected by habitat fragmentation and destruction, leading to serious damages to the functioning of ecosystems, as many of them act as seed dispersers, preys or even species at the top of the food chain (predators), regulating the populations of other species (PERES, 1990; CULLEN, et al., 2001). Moreover, they may specially interesting depending on their relevance to the local hunting and contribution as a source of minimal animal protein (PERES, 1990).

44 species of medium- and large-size mammals were identified in the project area, similar to the result of other studies developed for Belém's center of endemism, even taking into account the differences in the extent of forest area sampled, type and intensity of anthropogenic pressure (INSTITUTO PEABIRU, 2013; LOPES & FERRARI, 2000; AZEVEDO-RAMOS, et al., 2006; STONE, et al., 2009).

Among the registered species, nine deserve special attention and require specific conservation work, for they are in IUCN's red list of endangered species, namely:

- Saguinus niger (vulnerable);
- Alouatta belzebul (vulnerable);
- Panthera onca (nearly endangered);
- Tapirus terrestres (vulnerable);
- Myrmecophaga tridactyla (vulnerable);
- Chiropotes satanás (critically endangered);
- Cebus kaapori (critically endangered);
- Atelocynus microtis (nearly endangered); and
- Tayassu pecari (vulnerable).

Avifauna

The avifauna composition is one of the most commonly analyzed aspects when studying the biodiversity of a region. This is because birds are more easily observed in their natural environment, are mostly terrestrial and diurnal, and occupy many ecological and trophic niches in the forest, fully reflecting the conservation status of an ecosystem (SICK, 1997; VIELLIARD, 2000). Moreover, they are sensitive to ecosystem, natural or anthropogenic disturbances, which, along with other characteristics, make birds an

essential aspect to the study of communities and as bio-indicators (JOHNSON & JEHL-JR, 1994; (KESSEL & GIBSON, 1994)).

In the study, 152 species of birds have been registered, whereas psittacines were found at higher frequencies, among them: Amazona amazonia, A. Farinhosa, Pionus menstruus, P. Fuscus and Pyrrthura lepida. The latter is considered endemic to the state and "endangered" by IBAMA's national list of endangered species. The frequent identification of these species is a good indicator, as psittacines have a long and delicate reproductive process (few nestlings are slow to emancipate), however, it comes along with a call for attention to the monitoring of such species during the project activities (INSTITUTO PEABIRU, 2013).

The project area also includes rare species, such as Guaruba guarouba (Golden Parakeet), Aegolius harrisii (a species of owl), Ara ararauna (Blue-and-yellow macaw) and Granatellus pelzelni for this center of endemism (INSTITUTO PEABIRU, 2013).

From "vulnerable" to "critically endangered" according to regional and national lists, certain endangered species were also identified, as well as species pressured by illegal hunting and trade, namely:

- Pteroglossus bitorquatus;
- Dendrocolaptes certhia;
- Sporophila Angolensis;
- Euphonia chlorotica;
- Cyanerpes caerules;
- Sporophila americana;
- Sporophila nigricollis;
- Crypturellus cinereus;
- Crypturellus strigulosus;
- Crypturellus variegatus;
- Carina moschata;
- Dendrocygna autumnalis;
- Aburria cujubi;
- Pauxi tuberosa; and
- Penelop superciliaris.

Herpetofauna

Amphibians are generally better as bio-indicators than reptiles because they have a more intense relationship with their natural habitat, which often occurs in a single location; therefore, in disturbed landscapes, their diversity is halved (TOCHER, GASCON, & ZIMMERMAN, 1997; READ, 2002).

A total of 43 snakes, 3 crocodilians, 27 lizards, 2 amphisbaenians, 3 turtles and 43 amphibians were identified. And among those, 2 lizards, 1 turtle and 4 amphibians were recorded in the region for the first time. This data indicates the need for expanding primary herpetofauna studies for the project area (INSTITUTO PEABIRU, 2013).

Three of the identified species are listed as endangered by illegal trade and consumption (CITES, 2013):

- Chelonoidis carbonária;
- Chelonoidis denticulata; and
- Adelphobates galactonotus.

However, the Chelonoidis denticulata is classified as "vulnerable" on the national lists.

By analyzing the list of endangered species for the state, two other species can be considered:

- Stennocrcus dumerilii (Endangered); and
- Colobosaura modesta (Vulnerable).

Ichthyofauna

The diversity of fish in the Amazon basin is of great importance and concentrates the largest resource of freshwater fish in the world, estimated between 3,500 and 5,000 species (BOHLKE, WEITZMAN, & MENEZES, 1978). However, most of the studies developed so far consider only the major rivers and commercially exploited species and still lack studies covering small streams and creeks, which can lead to an underestimated figure related to the Amazon Ichthyofauna resources (INSTITUTO PEABIRU, 2013).

Through a field survey within the Boundaries of Fazenda Maísa, 17 species were identified among three major Orders: Characiformes, Perciformese Siluriformes, the first being the most representative.. None of the species identified are listed as extinction endangered aquatic species, however, it is worth mentioning the need for further studies in the region (INSTITUTE PEABIRU 2013)

Entomofauna

In Brazil, there are over 300 known species of native bees and they consist of the main group of visitors and pollinators of the national flora, and between 38% and 90% of plant species in the Amazon depend on them for their reproductive success (KERR, 2002; KERR, CARVALHO, SILVA, & ASSIS, 2001). Despite their recognized importance for ecosystem services provided by pollination, gene flow assurance, maintenance of a healthy plant community and food resources for other ecosystem components (through the formation of fruits), these bees have been drastically threatened by human activities, mainly by the action of deforestation, fires and predatory exploitation for honey harvesting (RAMALHO, 2004).

As compared to other studies in nearby regions that showed 34 species, a relatively low diversity of only 16 species of native social bees was found in this survey. (Flona do Amapá) and 70 species (RESEX Cajari). There is an evident need for a specific monitoring and joint analysis with the floral richness and the landscape conditions for the design of effective conservation measures (INSTITUTO PEABIRU, 2013).

Ethnozoological Knowledge

The following table (Table 3) presents information collected from the communities by Instituto Peabiru (2013), during field surveys conducted for socioeconomic assessment, with the presentation of a guide Identifying Mammals of the Amazon-Cerrado Transitional Forest, developed by *Instituto de Pesquisa*

Ambiental da Amazônia - IPAM, through which, the respondents were able to identify, by viewing the guide, the animals present in the communities and highlighted the status of the species.

The communities closest to the farm, such as Apeí and Branquelândia, present greater animal diversity and frequency, on the other hand, communities that are more distant, such as Flexal and Maçaranduba, or within anthropic areas (farms), such as the community of Nossa Senhora do Perpétuo Socorro, already have a low occurrence or no sighting of animals found with the aid of the guide. In other communities, such as Vila Ituquara and Açaizal Novo, hunting is apparently not a constant activity, because their way of life is more connected to fishing; on the occasion, the respondents in these communities claimed a lack of more details on occurring species. But in the city of Baião, which is a fishing hub in the region, it was noted the occurrence of extensive turtle egg and even turtle meat trading, due to the natural occurrence of turtles that have spawning routes in the beaches of the Tocantins river, becoming easy prays for the wildlife trafficking, with little or no state presence enforcing environmental education and inspection campaigns.

During the interview on the item Hunting, some species that are targeted by predatory activities were reported, but were not represented in the guide, such as the tortoise (Chelonoidis spp) and the howler monkey (Alouatta spp), especially in the communities of Ituquara and Açaizal Novo.

Table 3. Results of the Ethnozoological survey conducted in the communities influenced by the Project.

SPECIES	COMMUNITIES							
	Açaizal Centro	Açaizal Novo	Apeí	Branquelândia	Flexal	Ituquara	Maçaranduba	Nª Sª do Perpétuo Socorro
Tapir								
Peccary								
Capybara								
Agouti								
Jaguarundi								
Tayra								
Ocelot								
Crab-eating fox								
Maned wolf								
Cougar								
Jaguar								
Paca								
Porcupine								
Coati								
White-lipped peccary								
Giant anteater								
Lesser anteater								
Giant armadillo								
Nine-								

banded armadillo								
Six-banded armadillo								
Red Brocket								
Pygmy Brocket								

Legend: ( ) Species with high frequency of visualization; ( ) Species with low frequency of visualization; ( ) Species rarely sighted; ( ) Species no longer sighted; ( ) Species never sighted; ( ) Unable to answer.

- **Areas of High Conservation Value**

The context of highly fragmented and deforested landscape, in which the project area is inserted, and the fact that the project is one of the largest forest blocks within the reference region make Fazenda Maísa a place of significant regional biodiversity.

The impacts of business as usual to the wildlife in the REDD+ project area at Fazenda Maísa are fearful. Considering the history of deterioration and degradation observed in the region, the trend is a regional reduction in species diversity and the loss of several ones. Within several areas already studied in the region of Moju and at neighboring municipalities, the destruction of amphibian breeding sites by dams and degradation of vegetation caused the local extinction of several species (INSTITUTO PEABIRU, 2013). Poorly managed forests or replacement of secondary forests for Palm plantations or pasture has a profound impact on species composition. This impact occurs both for known species and species not yet described by science. Due to severe environmental degradation in the region, the deforestation in the project area would be a loss to science, given the great potential in studying the implications of preserving a forest block like this in a highly fragmented landscape in the Arc of Deforestation of the Brazilian Amazon.

It is noteworthy that the communities closest to the farm, Alto Apeí and Branquelândia, have an increased frequency of animals sighted, probably because the farm is a refuge for such animals. On the other hand, communities not as close to Fazenda Maísa, such as Flexal and Maçaranduba, or which are in anthropic areas, such as the community of Nossa Senhora do Perpétuo Socorro, have low occurrence or no sighting of said animals.

In understanding the above scenario and the framework for "vulnerable", "endangered" and "critically endangered" species, it is possible to absorb the importance of the area for biodiversity conservation at a regional and landscape level, **probably related to nature HCV 1 and 2,** with significant concentrations of important species at a regional level and a highlight on the importance of the Project Area to the regional landscape context. It is also noteworthy that these are preliminary results, to be better discussed, studied and mapped during the project, and are identified here as a precautionary measure. The preliminary results of access to the Attributes of High Conservation Value are in the following table (Table 4) (RAYDEN, 2008).

Table 4. Presentation of preliminary results for the existence of High Conservation Values in the Project Area.

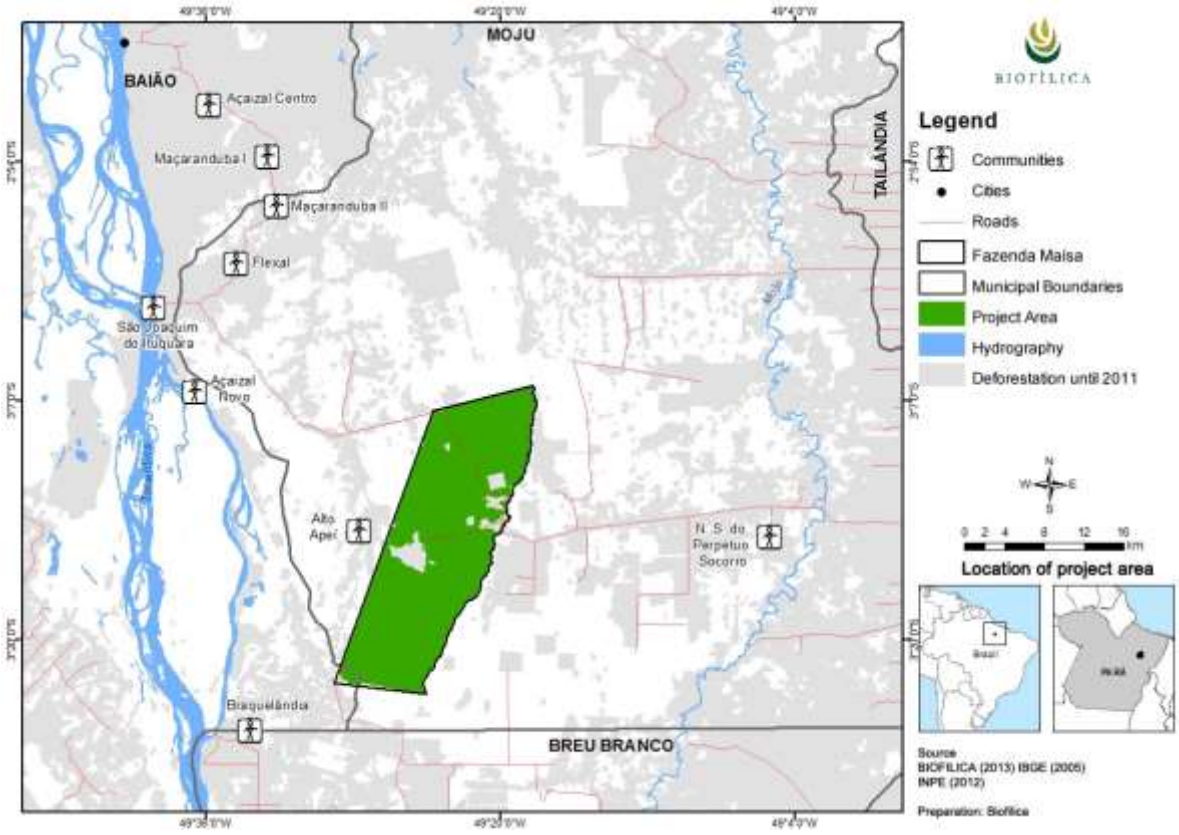
Value	Present	Potential	Absent	Rationale
High Conservation Value 1 (HCV 1): Value of the species.	X	-	-	All or part of the project area contains or may contain different species considered vulnerable (VU) or Critically Endangered (CR), according to IUCN. Two endemic species of the region are possibly present in the Project Area.
High Conservation Value 2 (HCV 2): Forests at the level of major landscapes.	X	-	-	The Project Area is a relatively conserved block and of significant dimension to the landscape in the Project Zone.
High Conservation Value 3 (HCV 3): Rare, threatened or endangered ecosystems.	-	-	X	Considering the scale of the Project's eco-region, no ecosystem fragment is considered significantly threatened (such as mangroves, swamps, or specific and rare types of forests).
High Conservation Value 4 (HCV 4): Ecosystem services.	-	-	X	Considering the scale of the Project's eco-region, there is no protection of ecosystem services in critical states, for example, major slope indices are not present, and it is not located in areas considered critical for the maintenance of water resources.
High Conservation Value 5 and 6 (HCV 5 and 6): Cultural and social values.	-	-	X	Local communities do not depend on the natural resources present in the Forest Management Unit and it does not contain sites that are culturally significant for local communities.

Surrounding Communities

With the intention of characterizing populations, traditional communities and families in the region, an in loco socioeconomic assessment was conducted to understand the social and cultural dynamics of the communities around Fazenda Maísa or those that are, somehow, related to it, even if not in its immediate surroundings (providing labor or other types of relationships). Based on this characterization, it was possible to instigate the discussion about the pressures they exert on the natural resources available in the vicinity of Fazenda Maísa, explained in section 4 hereof.

Within Fazenda Maísa's coverage area, eight (8) communities were identified in the project's area of influence and were impacted directly or indirectly, as follows: Branquelândia, Alto Apeí, Ituquara, Açaizal Novo, Açaizal Centro, Flexal, Maçaranduba (I and II) and Nossa Senhora do Perpétuo Socorro (Map 9). Considering only the communities visited, there are about 7,000 (seven thousand) families residing in the area, whereas 90% belong to Ituquara, which is characterized as a village.

Common to all surveyed communities, the lack of basic public services, such as sanitation, high schools, health centers, trafficable roads and, in some cases, electricity, configure a poverty scenario and high social vulnerability in the region.



Map 9. Communities identified in the Project's zone of influence.

- Branquelândia

The history of the community begins with the invasion, in 2002, of a farm that belonged to loggers known only as Nelson and Edvaldo. At the time, this was a contingent of eight families consisting of landless rural workers. The group squatted the land in four occasions, which even resulted in an armed conflict with the deaths of a few landless individuals. This ceased when the "owner" granted the land as long as he removed all the wood beforehand. He also demanded its name to be Branquelândia. At the same time, the closing of several sawmills in Breu Branco attracted residents to the place.

Officially located in the municipality of Baião, the community is mostly serviced by Breu Branco, due to the proximity and access (about 50 km). This fact raises several performance gaps of the government, given that Breu Branco sometimes does not meet all demands of the community, using the Organic Law of the Municipality as a deterrent, and Baião hardly considers it as its territory for being too distant.

The Community presents an association of settlement residents, named Associação dos Agricultores em Agricultura Familiar de Baião – AAAFB.

The main activity of the community is the production of charcoal for sale. Thus, most households engage in this activity, and agriculture is a secondary or livelihood activity. Due to the irregularity of the product, the community has been struggling as a supplier. There are reports affirming that some families have permits for such, reusing waste from sawmills, but, nevertheless, the forest is still being cut down for charcoal production. Figure 1 shows Charcoal kilns in the community of Branquelândia.

Figure 1. Charcoal kilns in the community of Branquelândia.

The income from the main activity is as follows: a load of 60m³ is sold at R$ 3,500.00 in the winter (rainy season), and R$ 2,000.00 in the summer (drought period).

Although in 2004, INCRA performed the first survey in the area, the settlement regularization process was submitted to Instituto de Terras do Pará (ITERPA). Anyway, INCRA would send market baskets to the squatters. Currently, the Settlement has 232 regularized families and 1,952 people registered.

- Ituquara

The history of community begins with the formation of a fishing village associated to Baião. It is common belief that it has occurred by the end of the eighteenth century, however, until mid-1980s it was no more than a cluster of 70-80 houses. Currently, there are approximately 6000 families residing in Ituquara, which consists of a small urban area. Ituquara recently filed a request to be emancipated from Baiao, municipality to which it belongs.

Certain reports show that there are 6 associations in the community, whereas 3 of them is formalized (a church, the fishermen and the women's Association). The Women's Association has been very active, but now faces financial and management difficulties.

The research highlighted the social vulnerability to which the youth in the community is subjected due to the lack of employment opportunities and continued education.

The local economy depends both on fishing and on family farming. In the latter, it is noteworthy that the cassava flour is traded through middlemen who will take it to Baião. The community says that the cassava production area is declining due to the lack of incentives and low added value. Even so, in 2012, the sack value was higher as compared to previous years, reaching up to R$ 250.00/sack.

The extraction of non-timber products is almost nonexistent. Only the açaí is marketed on a small scale.

Fishing has an intrinsic relationship with the old deforestation history of the community. However, such activity represents very little in the income of families. Many justify this reduction with the dam of the Tucuruí Hydroelectric Power Plant, which directly affected the Tocantins River, and the competition with fishermen from other places.

- Açaizal Novo

Located and serviced by the municipality of Baião, the community is in this place for just three years. Families are coming from a nearby island, on the Tocantins River - the island of Açaizal (hence the name Açaizal Novo). The reason for the change was the floods which have historically resulted in great harm to families. Another reason was the risk to the lives of children, who, at any moment, could fall into the river, as often occurred. Although this is an old issue, the change only occurred when the generation of Mr. Zeca (resident of the community) started to have more decision-making power.

The Association of the community, named Associação de Desenvolvimento Comunitário Sustentável do Assentamento de Novo Açaizal (ADECOSA), is in default according to residents, and has little community participation.

The internal rules are the highlights among the surveyed communities: they do not admit outsiders, only if married to members of families residing there. They also will not allow more than one lot per family. Pigs must be confined and the removal of timber for marketing is not allowed, only for their own constructions and fishing materials.

Agriculture is performed only as a livelihood activity, consisting mainly of the production of cassava flour. The extraction of açaí has been a source of income for families, which market it in Ituquara, for a basket (about 14 kg) price of R$ 25.00.

Historically, the community's main activity is fishing. In this sense, they have their own fish division (usually two men go out fishing) and resource distribution organization, whereas, 10% is destined to family consumption and 90% to marketing. The mean household income with the fish is R$1,000.00/month (one thousand Reais) in summer, and about $ 700.00/month (seven hundred Reais) in winter (in the draught period).

According to the respondents of the survey, the land, with about 88 ha, would be under a regularization process at the ITERPA for the installation of an Agro-Extractive Settlement Project - PAEX. In turn, the families have already promoted the distribution of plots, on their own, where each family would be entitled to a plot of 50m in length by 50m deep. **Figure 2** exemplifies the typical housing in the Açaizal Novo community.

Figure 2. Typical Housing in the Açaizal Novo Community.

- Nossa Senhora do Perpétuo Socorro

The community of Nossa Senhora do Perpétuo Socorro is located in the municipality of Mojú, about 25 Km from Fazenda Maísa's headquarters, through the road that connects the farm to Tailândia, and at the same distance from the municipality's headquarters. As usual in other communities, it is serviced mostly by the municipality of Tailândia.

The history of the community begins in 1991 with the arrival of Mr. Zelito. It was only in 1994, with the arrival of several families, that the community was actually formed, with families occupying the area of what is called "Projeto Seringa". The community currently consists of about 150 families.

There is an association formed with the intention of developing palm oil cultivation. It is named Associação dos Moradores que Plantam Mandioca e Dendê (AMANDENDÊ).

Most families support themselves with the income from the provision of services to cattle ranches in the region. However, the cassava flour contributes significantly to the income of the families, as well as cattle ranching and milk production. The marketing of flour is made in bags of 60 kg, whose crop value reaches R$ 100.00/sack and, in between harvests, it may reach R$ 300.00/sack.

The community of Nossa Senhora do Perpétuo Socorro stands out for having abolished the slash and burn system, having already mechanized its farms (loan of machinery from Tailândia's municipality). Another interesting fact is the associative organization of the community, with a strong influence of the trade union movement. In dialogues established thus far, this seems like the community with greater social empowerment.

The land tenure of families is of peaceful occupation. Some have receipts of purchase and sale (between squatters). Most are in the plots since the invasion in 1990.

- Maçaranduba

The community of Maçaranduba is located partly in the Municipality of Baião (Maçaranduba I), and partly in the Municipality of Mojú (Maçaranduba II), about 20 km from Baião's headquarters. Access is achieved through the PA-151 highway, which connects Baião to Breu Branco. The community was founded in

1978, with the migration of several families, the majority of which were migrants from Maranhão. As stated before, a few families were already there, but the installation of the Catholic Church, "to baptize the children", is the event considered as the community establishment, which occurred in 1978. Currently, there are about 73 families living in the community.

The social capital stands out in this community, due to reports of union among locals, especially as a collective effort, which is unusual among other communities.

In this community, the Women's Association (Headquartered at Figure 3) is very active and the 26 members develop various activities. Among these, there is an annual festival, the Domingo Alegre, in addition to courses held for the members, in partnership with SEBRAE, such as the course for the manufacture of nut biscuits. The Association also participates in Marcha das Margaridas.

Figure 3. Headquarters of the Women's Association of Maçaranduba.

The cassava flour is the primary product, followed by black pepper. The community explains that the low diversification of its production is due to the difficulties in accessing the market. The flour was sold last year for R$ 220,00/kg.

There is no title deed among the members of the community. Many families only have a land purchase and sale receipt, and peacefully keep their plots, as a concession of use. Many pay the ITR and a few have filed the regularization process at INCRA.

- Açaizal Centro

The community of Açaizal Centro is part of the municipality of Baião and is situated on the sides of the PA-151 highway, where approximately 80 families live, in plots of 25 ha in average, and whose main source of income is the cassava flour.

With respect to the history of this community, it may be noted that, in 1992, the farmers were trained on cassava processing, which enabled them to acquire, in 1998, a mill to produce flour, financed by Caixa

Econômica Federal. In 2002, the community received support from a project, whose name they could not say, known to locals as "projeto mandioca", implemented by SEBRAE, which was also focused on cassava processing. In 2006, they managed to enlarge the flour mill. "Projeto Mandioca" lasted 5 years and involved 20% of the households in the community in training courses that took place twice a year.

There is a Residents Association whose has achieved the purchased of a tractor for tillage, which is rented to those engaged or not in the community, for differentiated values between residents and non-residents.

As a consequence, the primary product is the cassava flour, sold to middlemen or directly at Baião's market for R$70/sack. Families usually grow rice, beans and cassava for home consumption.

With respect to the extraction of non-timber forest products, the cashew-nut had a significant weight in the household income.

- Flexal

The community of Flexal is located along the BP-151 highway, in the municipality of Mojú, at about 30 km from Baião's headquarters. However, due to the ease of access, residents have a greater relationship with this municipality, from the origin of residents to certain public services. Concerning the origin of the inhabitants, it was observed that the majority came from the State of Maranhão as migrants in the 1970s in search of land and employment opportunities. The population increased by 30% between 2008 and 2012. The community went from 60 to 80 families, highlighting that, between the years 2009 and 2010, there was a large migration of people from the municipality of Capitão Poço, of the Micro Region of Guamá, State of Pará.

As a form of social organization, the residents formed, between 1998 and 1999, an association of farmers and, years later, a neighborhood association. The first, aimed at facilitating the access to credit, and the second, at assisting in the management of the community, especially with the arrival of new residents in the last five years. There is also a committee responsible for the distribution of plots, and that establishes the deadline of one year for the newcomer to build his house, otherwise the plot is returned to the heritage of the community.

The community consists of family farmers, who mainly grow rice, beans, cassava and black pepper. Fruit trees are usually grown for family consumption and the Brazil-nut is marketed in some cases for R$15/can. The cassava flour maintained its high price in 2012 and was sold at R$ 250.00/sack.

The primary product is the cassava flour, which, in many cases, is sold directly without any middlemen.

- Alto Apeí

The community of Alto Apeí is located in the municipality of Baião, along the PA-151 highway, one of the roads with the worst trafficability conditions according to the socioeconomic survey conducted in the region. This community, as well as the community of Branquelândia, is the closest to Fazenda Maísa, located about 3 km from the boundaries of the property.

Living in the community, there are about 70 families, whose main source of income is the sale of black pepper (sold for R$ 11/kg), followed by flour, rice and maize.

The poor trafficability of the road during the rainy season practically prevents the flow of production, and an internal exchange system is maintained among residents (beef for cassava flour).

The presence of loggers is common, who reach out the community to negotiate the removal of timber from the property of the families. Given all provided scenarios, the Table 5 summarizes the main activities carried out by these communities.

Table 5. Main activities carried out by the communities influenced by the Project.

Main activities	COMMUNITIES							
	Açaizal centro	Açaizal novo	Apeí	Branquelândia	Flexal	Ituquara	Maçaranduba	Nossa Senhora do Perpétuo Socorro
Coal								
Livestock								
Slash and burn system								
Illegal sale of wood								

Legend: ( ) Hardly developed activities; ( ) Undeveloped activities; ( ) Well developed activities; ( ) Non-performed activity.

1.4 Project Proponent (G4)

Table 6. Description of project proponents and their responsibilities.

Project Proponent	
Biofílica Investimentos Ambientais S.A.	**Description:** Biofílica is a Brazilian company focused on the management and conservation of forests through the marketing of environmental services, research investment, and socio-economic development of people and communities living in managed areas. **Responsibilities:** Overall coordination of the environmental and socioeconomic assessment (DSEA) as well as baseline and carbon stock studies; development and financing of the PDD (Project Design Document); validation/verification and trading of credits; co-management of the project throughout its duration. Responsible for the design and implementation of the project. **Contact information:** Plínio Ribeiro – Executive Director Telephone: +55 11 3073 0430 E-mail:plinio@biofilica.com.br Website: www.biofilica.com.br
Maísa-Mojú Agroindustrial Ltda.	**Description:** Fazenda Maísa was acquired from the State of Pará in the early 1970s with the goal of developing sustainable forest management activities for the production of tropical wood used in sawmills. Currently, the main activity remains the sustainable forest management. This is a family company that holds the land rights. **Responsibilities:** Holder of the title deed, infrastructure maintenance, land monitoring and project co-management. **Contact information:** Márcio Pinheiro – Owner Telephone: +55 91 3250-3212 E-mail: maisa.marciopinheiro@hotmail.com
Sipasa-Seringa Industrial do Pará S/A	**Description:** Part of the same economic family group, SIPASA is responsible for operating the sustainable forest management and for relevant investments. **Responsibilities:** Operation of sustainable forest management and implementation of techniques for improving maintenance and enhancing forest carbon stocks. **Contact information:** Maurício Batista da Silva – Forest Engineer Telephone: +55 91 3752 2158 E-mail: ma_gbsilva@hotmail.com

1.5 Other Entities Involved in the Project (G4)

Table 7. Description of other entities involved in the project and their responsibilities.

Other Institutions Involved	
Instituto Peabiru	**Description:** Instituto Peabiru is a civil society organization of public interest (OSCIP), which is engaged in biodiversity conservation and as a facilitator of social mobilization processes to ensure that traditional and rural populations, as well as indigenous and maroon communities, have the right to citizenship, with an emphasis on the inclusion of women and youths. **Responsibilities:** Mobilization and coordination with local communities and stakeholders, implementing social activities in partnership with Biofílica and developing studies related to the social aspects of biodiversity and behavior of deforestation agents and drivers in the project area. **Contact information:** João Meirelles Filho Telephone: +55 91 3222 6000 E-mail: jmeirelles@peabiru.org.br Website: peabiru.org.br
Eco-lógica Consultoria Ambiental	**Description:** It is an environmental consulting company that aims to develop sustainable projects and businesses, working with strategic partnerships and with a network of experts to develop innovative environmental solutions. **Responsibilities:** Development of project baseline studies and deforestation projections. **Contact information:** Carlos Souza Junior Telephone: +55 91 3223 2256 E-mail: carlos@ecologicacsa,com.br Website: www.ecologicacsa.com.br
Amazônia Gestão Ambiental	**Description:** Consulting firm that provides environmental solutions and specialized technical assistance for forestry and environmental sectors. **Responsibilities:** Completion of the forest inventory and measurement of carbon stock. **Contact information:** Cristian Rau Stoltenberg Telephone: +55 (92) 3304-0891 E-mail: cristian@amazoniagestaoambiental.com.br Website: www.amazoniagestaoambiental.com.br

1.6 Project start date (G3)

May 21, 2012. Contract execution date.

1.7 Crediting Period (G3)

Crediting period of 30 years. Beginning on May 21, 2012 and ending on May 21, 2042.

The activities to be undertaken during the crediting period and the detailed implementation schedule are presented in Section 2.2.

2 DESIGN

2.1 Sectoral Scope and Project Type

- Sectoral 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

2.2 Description of the Project Activities (G3)

The project activities were designed to achieve positive net benefits throughout the project's life cycle in the three main areas: climate, community and biodiversity. For business purposes each of these areas was regarded as a management sphere and the activities fall within the strategies designed for each sphere.

Climate

In the climate sphere, which aims to reduce emissions from unplanned deforestation, leakage control and mitigation of non-permanence risks, there are three distinct strategies: adding value to the forest and different forest products in the project area (scope gain), having greater efficiency and effectiveness in property security within the boundaries of the project area, along with the monitoring of forest cover and development of profitable, high employment activities, that produce low emissions in leak management areas.

- **Valuation of the standing forest**

In the logic of Payment for Ecosystem Services (or Environmental, in more widespread terminology) and those related to a Green Economy, there are development alternatives deemed "friendly to the forest", that is, activities that protect the natural capital of tropical forests, but also provide economic benefits. In this approach, there is the promotion of economic development, jointly with the conservation of tropical forests and containment of deforestation and forest degradation through the valuation of the standing forest (FEARNSIDE, 2010; OAKES, LEGGETT, CRANFORD, & VICKERS, 2012).

Arising from these concepts to prevent deforestation, the project activities mainly involve the quest for **consolidation, value addition** and **diversification** of economic activities that lead to the conservation of forest cover. In this sense, the maintenance and improvement of sustainable forest management (SFM) and reduced-impact harvesting practices is essential.

Since 2002, Sipasa – Seringa Industrial do Pará owns and operates the Sustainable Forest Management Plan for Fazenda Maísa, approved by the competent environmental agency. Despite the difficulties, shared by other enterprises for sustainable forest management in the Amazon, it has always shown commitment and engagement with the best practices and, in April 2013, it obtained the Legal Harvesting Verification certificate.

As a strategy for the maintenance and improvement of proper management, enhancing the efficiency of operations and processes and shielding the carbon stocks, the REDD+ Maísa project will reference the requirements of the strictest forest certification standards, such as, for example, the Forest Stwardship

Council (FSC). To this end, a gap analysis will be conducted based on existing documents, such as a voluntary assessment for SmartStep, carried out by Imaflora in 2006, and a survey report produced by the Department of Environment of the State of Pará (SEMA/PA) in 2009, to be supplemented with current field management information.

This gap analysis will be used for the implementation of an **Action Plan for Continued Management Improvement** to be enforced throughout the project. This activity will also enable Fazenda Maísa's SFM to further obtain more robust certification standards, if so desired and appropriate.

The strategic decision that consists of acquiring more robust accreditation seals must be accompanied by a **value chain and market analysis** related to the wood produced on the farm. Market studies should include a detailed access on the responses of consumer niches chosen based on market certification and/or inspection standards, so as to ensure the cost efficiency of project investments and to avoid phenomena such as the "wood downgrading", which has already been identified in Brazil (LENTINI, GOMES, & SOBRAL, 2012).

With the aim of enhancing the scope, the value chains of non-timber products will be assessed, supported and developed (Figure 4). The first product that has already been identified is the açaí, because it is a fruit of great importance in the states of the Brazilian Amazon, consisting of an essential item in the diet of families living in the region and, in recent years, it has gained ground both in national and international markets (NOGUEIRA et al., 2013). Some other potential products were also identified, such as Andiroba and Copaiba oils, and seeds of forest species. During the project life cycle, these and other chains will be evaluated and, if deemed feasible and sustainable, they will be developed.

Figure 4. First survey of the potential for the management and production of açaí in the project area.

- **Property Security and Monitoring of Forest Cover**

Despite being present and in operation since the consolidation of Fazenda Maísa's boundaries, the property security procedures will be formalized. Then, a process of continuous improvement and adaptive management begins, seeking to improve the efficiency and effectiveness of the monitoring procedures, throughout the project life cycle.

A periodic monitoring will be jointly conducted on the Farm's forest cover and other land uses, by means of satellite images, also aiming to identify possible sources of unplanned deforestation occurring within the project area. See Section 4 - Application of Methodology and 8 - Monitoring.

- **Leakage Management**

The leakage management areas (**Map 2**), were allocated partly within the boundaries of the farm and partly in the areas of surrounding communities identified in the environmental assessment as communities that are more susceptible to deforestation agents and drivers.

In leakage management areas located within the project area, activities related to crop-livestock-forest integration will be encouraged and developed, clearly showing a regional vocation, enabling the generation of income and jobs. These activities that enable the integration of crop, livestock and the forest, also known as agroforestry systems, enable the intensification and increase in the long-term sustainability of production systems; as a consequence, they lead to improved income, through an enhanced scope, greater security against financial market fluctuations, integrated property management and, due to the diversification of land uses in a same area, to be more "environmentally friendly".

In Fazenda Maísa, there is already a history of investment in integration of production systems, such as, for instance, the implementation of an eucalyptus forest-grazing system with cattle ranching. The goal is to take advantage of this vocation in order to further diversify the project's sources of revenue. Specifically through the allocation and management of the farm's rubber plantation, Brazil-nut and fruit orchard areas, and implementation, in some areas, of agricultural activities of regional potential.

With respect to the relationship with the surrounding communities, located within the leakage management areas, rural and forestry institutions will be coordinated to facilitate access of the surrounding communities to public policies and programs relevant to rural development.

Communities

The community-related actions aim at mitigating the agents and drivers of deforestation and maximizing the positive social impacts of the management to the climate. In this context, there are also three strategies: engaging local players and stakeholders, strengthening the association and promotion of rural technical assistance.

- **Engagement of players and stakeholders**

Given that the set of agents and drivers of deforestation rely on a chain of events fueled by the lack of access to public policies, rural development and basic services, the involvement of the Project in coordination activities with local, regional and state institutions for inclusion of the surrounding communities in a dialogue and for attracting improvements to regional rural development is extremely important for mitigating the causes of deforestation. It is interesting to encourage the dialogue between the communities themselves, as some have already managed to overcome some barriers and can serve as a model for others. It is important to highlight that we will have a “phase 1” of engagement od players

and stakeholders in order to consolidate communication channels and feedback procedures, and also assuring workers rights and safety.

- **Strengthening the Associations**

According to the environmental assessment and the information collected during the pre-consultation, the strengthening of local organizations and associations, aiming at intensifying the coordination to provide access to public policies and programs, is a demand from the surrounding communities and a first step to regional development.

This scope would also include the encouragement and strengthening of associations for productive purposes (cooperatives) aimed at organizing rural and agro-extractive producers to enter the market and have an income improvement as a result. This strengthening will occur through institutional coordination, as well as the dissemination of information and capacity building initiatives in partnership with local and regional institutions.

The work on strengthening the associations directly contributes to mitigating the main drivers of deforestation as it enhances the diversification and increases the family income.

- **Technical Assistance and Rural Extension**

Access to technical assistance and rural extension (ATER) is key to increased productivity, greater efficiency of production systems, implementation of more sustainable techniques and production technologies, and crop-livestock-forest coordination towards a more efficient land use. With adequate access to the ATER, the local communities would have better living conditions and income to resist deviant incentives provided by illegal loggers and charcoal producers in the region.

The ATER also enables discussion of alternatives to traditional cultivation techniques based on the "slash and burn" system, proposing and allowing the adoption of more efficient and profitable production systems, with lower rates of GHG emissions due to the opening of new forested areas.

Biodiversity

Regarding biodiversity, the goal is to monitor and assess the impacts of the REDD+ intervention and sustainable forest management in the context of the Arc of Deforestation, maximizing the positive impacts of the management for the climate. The strategies consist of monitoring the impacts and the relevant species, and formalizing long-term partnerships with research and education institutions for the promotion and dissemination of knowledge.

- **Impact Monitoring**

The highly fragmented landscape and anthropic context of the "Arc of Deforestation" provides a multitude of potential impacts to biodiversity conservation. The impacts may be direct, through vegetation suppression and interference with the wealth and abundance of species, or indirect, due to fragmentation and impacts caused on key biodiversity groups, which consequently alters the entire chain of ecological relationships among living organisms. Sustainable forest management itself, albeit based on reduced-impact practices and sustainable use of the forest, has direct impacts on the forest's plant community. (See Section 7 - **Biodiversity**)

To analyze the impacts of forest management, the main tools are the measurement of permanent plots and monitoring of harvesting impacts (damage assessment). Permanent plots are installed by the

management area and allow the study of the rate of regeneration of plant communities, post-harvest. By succinctly monitoring the impacts of harvesting, it is possible to calculate the damage caused by wood chopping and log extraction in the forest, which indirectly interferes with the regeneration rates. These two activities are to be consolidated and regularly monitored with a view to continued improvement and adaptive management of reduced-impact practices.

To analyze the overall impacts of activities on biodiversity as a result of forest cover conservation, the indicator species or taxa should be chosen and monitored. The taxa most commonly used in this type of analysis is the avifauna, the mammalian fauna and some classes of insects. Indicator species are those that are sensitive and provide efficient responses to impacts on their habitats. Given the importance of this type of monitoring and the need for development of additional studies and scientific knowledge, partnerships with educational and research institutions should preferably be pursued for the implementation and study of this monitoring. An initial analysis indicated the avifauna as a cost-efficient taxon, consisting of a great option for the follow-up implemented during the first years, whereas, in better financial situations, more complete biodiversity analyses may be developed.

- **Monitoring of species of relevance**

Pursuant to Section 1 - Overall; in the project region, threatened and/or endemic species were identified in the Project Area. The monitoring of these species throughout the lifecycle of the project will be of great importance considering the inclusion of the project area in Belém's Center of Endemism, one of the eight centers of endemism whose original forest cover is about 70% deforested and that has greater concentration of threatened species (GARDA et al., 2010).

This monitoring will also be conducted, preferably, through a partnership held with research and educational institutions, integrating the participation of workers of Fazenda Maísa and the surrounding communities to develop lines of action for monitoring and conservation. This activity is the key measure for monitoring species that add high conservation value related to the value of the species (HCV 1) to the project area. Certain species considered priorities in this item, such as the Chiropotes satanas (locally known as Cuxiú-preto) and the Cebus Kaapori (locally known as cairara), two primates considered critically endangered (CR) by IUCN's List of Threatened Species and Belém's Center of Endemism.

- **Development of partnerships with research and education institutions**

The project actions related to the monitoring and analysis of biodiversity impacts will be based on partnerships with non-governmental organizations (NGOs) and research and education institutions. These partnerships are a win-win for they allow the monitoring of impacts and of indicator and threatened species for the REDD+ initiative and sustainable forestry purposes, but also allow the production and dissemination of scientific knowledge in Belém's Center Endemism and in the Landscape context of the Arc of Deforestation. The prospection and engagement od educational and research institutions is the “phase 1” of developing biodiversity activities.

This activity is the key measure for the monitoring and study of species behavior and landscape conditions that add high conservation value, related to the landscape level (HCV 2), to the project area. Because, given the partnership with other institutions and funding agencies, major education and research institutions and non-governmental organizations have a much broader range, at landscape level, for the development of studies and mobilizations necessary to maintain this high value to conservation.

Among the institutions already prospected for the development of potential partnerships, at regional level, we have Museu Paraense Emílio Goeldi and Embrapa Amazônia Oriental (Belém-PA), at national level, we have Universidade Federal de Lavras and Escola Superior de Agricultura “Luiz de Queiroz” of

Universidade de São Paulo(ESALQ/USP), and at international level, we have the Lancaster University and CIRAD (Centre de coopération internationale en recherche agronomique pour le développement).

Table 8 bellow summarizes the project activities, the status of each activity, and their duration,

Table 8. Project activities, execution planning and duration for the project lifecycle.

Activity	Description	Status	Duration
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 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 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
3.2. Meeting with project proponents	Meeting between project proponents for returning the results of studies and design of activities.	Performed	October 2013
3.4 Meeting with workers	Meeting with sustainable forest management officials in the project area to return the results of studies, to have a pre-consultation, and to seek input for the design of activities.	Performed	From November to December 2013
3.5 Meeting with the surrounding communities	Workshops with community residents and government bodies around the project area to return the results of studies, to have a pre-consultation, and to seek input for the design of activities.	Performed	From November to December 2013
3.6 Consolidation of the Project Design Document (PDD)	Consolidation and formalization of the results acquired through studies, strategies designed to reduce emissions from deforestation and forest degradation, and from operation, implementation, monitoring, project evaluation and management design.	Performed	From August to December 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 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 1st verification: From July 2013 to December 2013. Further verifications: Periodically throughout the project lifecycle.
4.a.3. Monitoring of the audit process	Collaboration with the audit process to be conducted by the VVB.	Planned	Periodically throughout the project lifecycle.
4.a.4. Project Update/Record	Record or update of the Project on the registry platform and generation of verified carbon units (VCUs)	Planned	Periodically throughout the project lifecycle.
4.b. CCB			
4.b.1. Definition of standard adoption	Selection of the standard as to the social and environmental approach of co-benefits suitable to the context of the project and to be used in its design, implementation, management, monitoring, validation and verification.	Performed/Planned	From June to October 2012
4.b.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/Planned	Validation: From July 2013 to December 2013. Further verifications: Periodically throughout the project lifecycle.
4.a.3. Monitoring of the audit process	Collaboration with the audit process to be conducted by the VVB.	Planned	Periodically throughout the project lifecycle.
4.a.4. Project Update/Record	Record or update of the Project on the registry platform as a CCB project	Planned	Periodically throughout the project lifecycle.
5. Management and Monitoring			
5.1. Climate			
5.1.a. Forest Valuation	Activities focused on the quality and efficiency of sustainable forest management and the prospection of new business for the standing forest.	Performed/ Continuous	Started with design of activities. Expected to occur more intensely in the first 5 years.

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.
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.
5.2. Communities			
5.2.a. Engagement of players and stakeholders	Implementation of the pre-consultation and collection of contributions and demands for project activities. Consolidation od communication channels and feedback procedures. Engagement of stakeholders and other local authorities for sustainable rural development in the project area.	Ongoing/ Continuous	Begins with the studies of DSEA and to be developed continuously and adaptively throughout the project life cycle.
5.2.b. Strengthening the Associations	Coordination with communities and governmental and nongovernmental organizations for strengthening the associations.	Planned/Continuous	Planned for implementation as the maturation of stakeholder engagement. From then on, it is continuous.
5.2.c. Conjunction for Technical Assistance and Rural Extension	Conjunction with communities and governmental and non-governmental organizations to increase the access to technical assistance and rural extension services.	Planned/Continuous	Planned for implementation as the maturation of stakeholder engagement. From then on, it is continuous.
5.3. Biodiversity			
5.3.a. Impact Monitoring	Monitoring the impact of the project based on the species/taxa, which are indicators of biodiversity conservation in the project area.	Planned/Continuous	To be started after the validation. Continuous activity.
5.3.b. Monitoring of Species of Relevance	Monitoring of impacts on endangered and endemic species present in the project area.	Planned/Continuous	To be started after the validation. Continuous activity.
5.3.c. Conjunction with research and education institutions	Conjunction and facilitation with educational and research institutions for the production and dissemination of knowledge.	Ongoing/Continuous	Started with the studies. Continuous activity.
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.

2.3 Management of Risks to Project Benefits (G3)

The risks to the project's climate benefits were accessed through the "AFOLU Non-Permanence Risk Tool v3.2" culminating in the "Non-permanence Risk Report of the REDD+ Project" provided to the validating and verifying body.

There may be certain risks to the benefits expected for the communities and the biodiversity if the following scenarios are present throughout the project life cycle:

- **The non-alignment of synergies between private entities, communities and government institutions in the pursuit of a sustainable development logic**

The misalignment between the private, non-governmental and governmental organizations operating in the region to promote the green economy may be a limiting factor to the benefits provided to the community and biodiversity. Most of these benefits are based on the development of sustainable agro-extractive practices and products that balance the economic development of small and medium landowners whilst maintaining the standing forest, for example, through the management and marketing of non-timber forest products.

For the success of this approach, different sectors are required to collaborate. The primary mitigation measure is the strengthening of regional cooperatives and associations. Once strengthened, empowered and coordinated, the associations and cooperatives would be empowered and more likely to pursue the interests of small and medium producers, even after the end of the project life cycle.

Another measure would be to create a space for dialogue and referrals for promoting rural and agro-extractive development or coordination and mobilization in existing spaces with this same end, for example, the Seminar on Cooperatives and Sustainable Rural Development of Breu Branco promoted by EMATER, Technical Assistance and Rural Extension body of the State of Pará These spaces would be open to all stakeholders, could be extended even after the end of the project life cycle, would not be linked to any partisan cause and would transcend political mandates, also mitigating problems related to political instability.

- **Non-involvement of Education and Research Institutions**

Arisk to the benefits, especially those related to biodiversity, is the non-interest or non-involvement, for various reasons, of education and research institutions, for example, due to the lack of funds and resources for research in public institutions. The involvement of educational and research institutions is key to maximize the positive benefits, not only for their collaboration in the monitoring and evaluation of project impacts, but also for the production of knowledge and its availability to regional, national and international society. The REDD+ initiatives are just being implemented and consolidated throughout the globe and all quality knowledge produced contributes to building the success of this mechanism.

As a mitigation measure, different educational and research institutions were identified as potential regional and national partners to be contacted and coordinated with that purpose. A complementary measure is the training of the team responsible for the operation of the farm's forest management in implementing and executing biodiversity monitoring within the project area.

- **Market Risk**

Another major risk for the delivery of positive net benefits expected from the REDD+ Maísa Project is the market risk. This risk is associated with fluctuations in the selling prices of verified carbon units (VCUs) in the voluntary market, with unstable demand from buyers, with the potential oversupply of credit in the market and the absence of a regulated market. These factors increase the risk of not selling the generated credits and directly influence the capacity to reinvest in project activities in the medium and long term, and, therefore, pose a risk to the delivery of expected positive net benefits.

The main mitigation strategy is the search for new business and activities, synergistic to the maintenance of the standing forest, which can be implemented in the Project Area and at Fazenda Maísa, making the project's positive net benefits less susceptible to the market risk of not selling (or risk of selling for an insufficient price) the credits generated. The sustainable management of Açaí and the establishment of Environmental Reserve Quotas (CRA) are among the already prospected new projects. The interesting point here is that the CRAs have a commitment to maintaining forest cover in areas that exceed the Legal Reserve (where sustainable forest management is enforced) and thus, through a measure to mitigate market risk and increase the profitability of the project (helping ensure the delivery of positive net benefits to communities and biodiversity), there is a strengthening in the commitment to maintaining forest cover and delivering the expected positive net benefits to the climate.

2.4 Measures Used to Maintain Areas of High Conservation Value (G3)

The activities described in Item 2.2 – **Description of the Project Activities (**G3) within the framework of activities for biodiversity, describe how the partnership with education and research institutions and non-governmental organizations will be key to the development of monitoring processes and biodiversity studies. These studies provided information for decision making aimed at maintaining the attributes of high conservation value (HCV 1 and 2).

Moreover, in the case of the REDD + Maísa project, all Forest Management Units contain (value for the species) or are deemed as (landscape level) the attributes identified as specific project activities that aim to benefit the climate, through the conservation of the vegetation cover and application of best practices in sustainable forest management and reduced impact, directly contribute to the maintenance of high conservation value attributes (value for the species and landscape level).

2.5 Project Financing (G3 and G4)

In order to develop project preservation activities, Biofílica makes investments with its own capital until the first emission reduction verification is carried out, which is estimated to occur within 2 years. This initial investment covers the pre-operating expenses of developing studies and assessments, consulting and engaging with the communities, planning the project, and other initial project activities. For continuity of these activities, the project relies on the revenue from the sale of generated emission reductions. It is estimated that, depending on the prevailing price of carbon and reductions sold, the project will achieve an average total revenue of nearly R$ 50 million over its 30 years. The financial projections containing the details of the planned expenditures will be provided to the auditors.

2.6 Employment Opportunities and Worker Safety (G4)

Since its inception, Fazenda Maísa has always sought to offer job opportunities to local residents and the surrounding communities, which currently **form most of the project's workforce**. Considering the

context of population growth observed in the region over the past decade, with rates higher than that of the state, and the diminishing importance of the agricultural sector as an employer, the employment opportunities generated by the project are even more relevant (INSTITUTO PEABIRU, 2013). Considering the importance of the PA to local job opportunities, the Project also aim to help the hiring process to be carried out on a more inclusive, equally and accessible way. Partinig with local NGOs the Project has embraced on it Communication Strategy tools and procedures to communicate jobs opportunities through impartial and with a better reach ways, for instance local radio stations and posters on strategic spots.

The group and outsourced companies to develop activities within the boundaries of the farm take trainings and capatitation courses. Some are related to the key risks of each function, for example, the correct use of each personal protective equipment (PPE), special tree cutting techniques and forest management safety. Others are taught to all teams, regardless of the function they perform, such as ergonomics and importance of body fitness, the company's rules of conduct, sexually transmitted diseases and AIDS, alcoholism, and interpersonal relationships. These trainings may be taught by internal staff members properly trained in the area (for example, by the safety technician in charge), in partnership with qualified institutions or they can be outsourced.

The Project has aprimorated the Training and Capacitation Plan to cover three main issues: Workers Safety and Health; Sustainable Forest Management with Low Impact Logging; and Other forest Services.. The first one aims to implement all health and safety measures and procedures, such as Programs to Avoid Environmental Risks and Programs to Monitor Workers Health. The second one consists on technical training on best practices of sustainable managing the forest. And the third one inform and discuss issues related with the REDD+ projects itself and other sustainable forest uses, for instance non-timber forest products.

Due to the vocation of the project, the operations that offer more risk are those related to forest harvesting, involving felling, logging, extraction and transportation. These operations involve the use of chainsaws and heavy machinery and the main exposed occupations are chainsaw operators, their helpers and tractor drivers. These professionals are exposed to various risks from accidents during tree felling and chainsaw use to risks from noise and excessive vibration.

The risks to workers are prevented and mitigated through the training and capacitation on all the relavant issues, availability of required safety equipment, permanent presence of a skilled technician for that purpose in the training in order to carry out the activities, distribution, and provide guidance on the correct use of safety equipment.

2.7 Stakeholders (G3)

As a project of relative importance for the region, Fazenda Maísa already communicates with the surrounding communities and neighboring properties, since the good relationship with them is one of the central issues for the farm, specially because of the surveillance on the boundaries of the area. The REDD+ Maísa Project aims at formalizing these relationships so they can be planned, continuous and long-term, in addition to bringing them close together to the state and municipal agencies of rural technical assistance, which are potential partners in social activities.

- **Identification and engagement of stakeholders**

Identification of communities and other stakeholders

In early 2013, researchers from Instituto Peabiru, along with Biofílica's staff, visited the surrounding communities of Fazenda Maísa, the municipal headquarters and departments of environment and agriculture of Baião, Breu Branco, Mocajuba and Tucuruí in the state of Pará, state companies Eletronorte and Petrobrás Biocombustível, and EMATER from Breu Branco, in order to identify these stakeholders and potential relationships with the company and the Project, as this information is essential for the Management Plan.

First, Mr. Bené was approached, person in charge at Fazenda Maísa and interlocutor responsible for interacting with the communities, for an early assessment and local identification. From there, the research was conducted with questionnaires (interview guides - **Figure 5**) with semi-structured questions and georeferencing, in the communities mentioned in item 1.3 **Conditions Prior to Project Initiation (***G1)*, through key informants.

Figure 5. Mr. "Bené" indicating the locations, extensions and providing the names of the key community leaders.

Not intentionally, from the eight communities visited, half provided women as key informants and holders of greater knowledge on the dynamics of the community (***Figure 6***). In two of them, women are community leaders and have a prominent role in the pursuit of the rights of residents. In general, women were noticed both in agriculture and in the role of social assistants, as a community health worker or leader in the process of ensuring vacancies in local schools for the children of the communities.

Figure 6. Residents of the communities influenced by the Project participating in fieldwork.

On the occasion, the identified communities could indicate their main economic and cultural activities, associative organization, and structural, educational and social needs faced by them.

In the research held with the municipalities, an initial dialogue was sought with rural service agencies, environmental and agriculture departments and municipalities, directing the subject to the current and expected use of land in the region, and the assistance provided to communities surveyed at that time, identifying potential synergies with the REDD+ Maísa Project. It was evident that, although some communities are in the territory of a particular municipality, the dynamics of social and economic assistance lies with the nearest municipal headquarters or with that of easier road access.

In state enterprises, Petrobrás Biocombustível and Eletronorte, the dialogue was guided by existing projects in the region and the influence they have on the project's communities of interest.

The Venn diagram below (*Figure 7*) exemplifies the mapping done, as well as the relationships between the stakeholders.

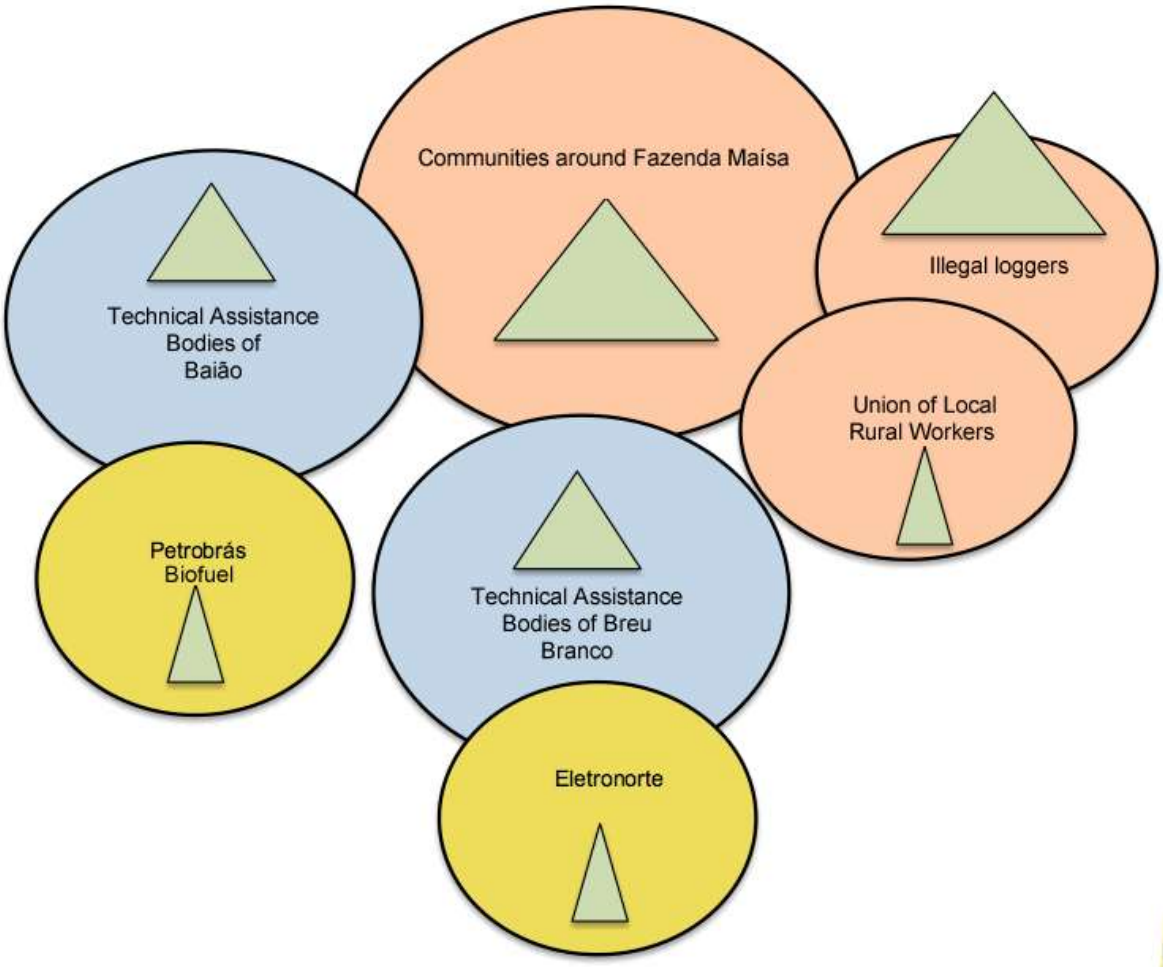


Figure 7. Venn Diagram of identified Stakeholders. The scale of the size of the circles represents the importance of stakeholders for the Project, and the size in the triangle is their influence on the success of the Project.

Feedback of the Socioeconomic and Environmental Assessment and engagement in the Project design

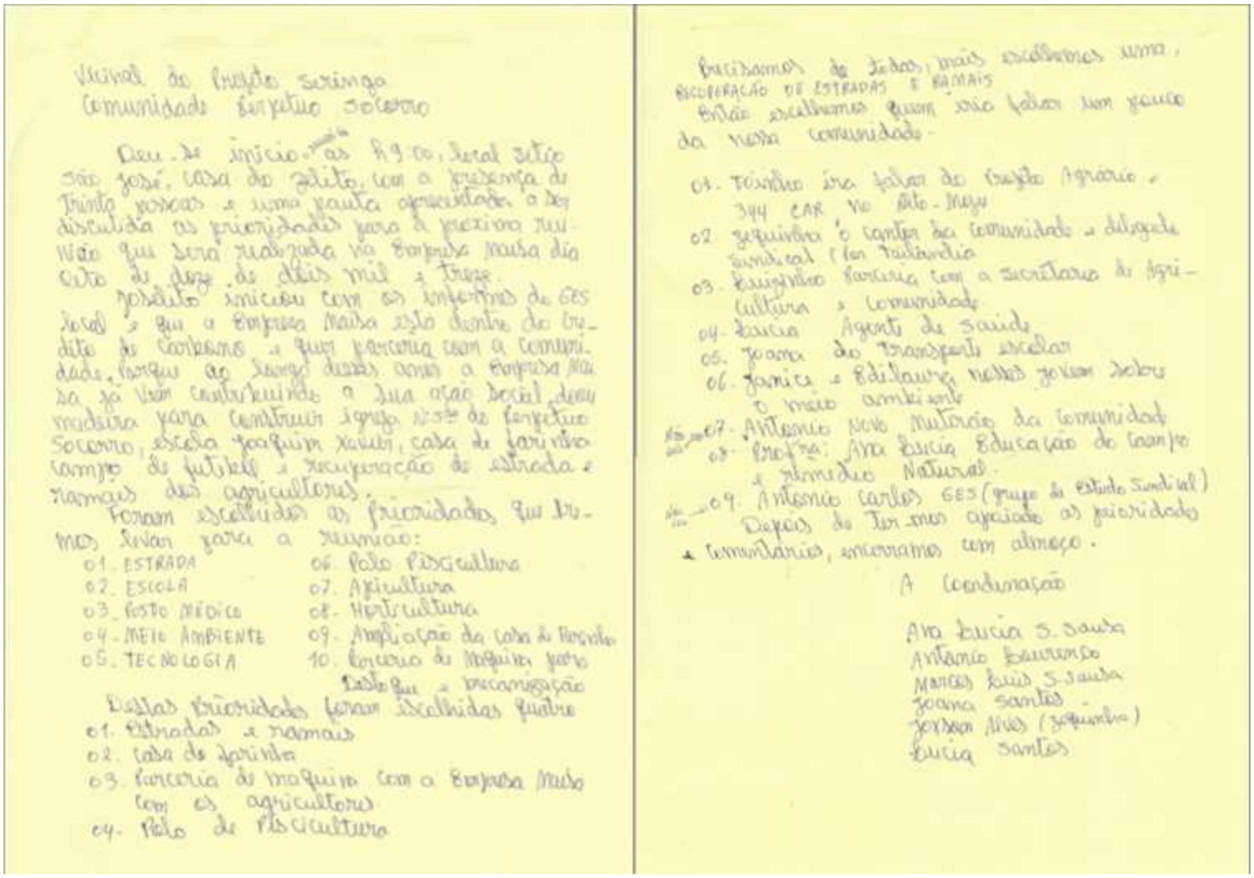
A series of meetings were held between November/December 2013 involving the communities of the Socioeconomic Assessment. On the occasion, the municipality of Baião was invited, as well as Breu Branco's technical assistance bodies.

These meetings were primarily aimed at providing feedback on the study carried out with the communities, presenting the concept of REDD+ and the proposal of the REDD + Maísa Project. On the occasion, the communities already had some demands and synergies with the Project, and were engaged in the early design of the activities listed in item 2.2. Another important aspect was the validation of the data presented in the feedback studies, whereas, some points needed to be updated according to the information provided by the community members.

When the invitation to the meeting on the project was received by certain communities, they discussed it beforehand and internally in the community, as the case of Nossa Senhora do Perpétuo Socorro, which, in the context of the Project, listed the priorities for the community.

Based on these previous meetings or on their own leadership, certain doubts and demands emerged on the REDD+ Maísa Project. In simple terms, the questions were answered and the way they fit into the context of the Project was exposed. The major contribution of the communities was mapping the demands they consider priority and that, somehow, are embedded in the context of the project zone.

As stated in item 1.3 **Conditions Prior to Project Initiation (***G1)*, the demands are highly related to the absence of public policies for social inclusion. As rural farmers, issues such as production modernization have emerged consistently, as well as investment in cultures that they already have some affinity, but still suffer from a lack of market and technical assistance. Hence, logistical demands arise, since the flow of products, sometimes highly perishable, depend on trafficable roads. The following **Figure 8** is a statement of the contribution of communities to the minutes of the meeting.



Vicinal do Igarapé Seringa
Comunidade Perpétuo Socorro

Deu-se início às 9:00 h, local sítio São José, casa do [illegible], com a presença de trinta pessoas e uma pauta apresentada a ser discutida as prioridades para a próxima reunião que será realizada na Empresa Maísa dia oito de dezembro de dois mil e treze.
[illegible] iniciou com os informes do GES local e que a Empresa Maísa está dentro do crédito de carbono e quer parceria com a comunidade, porque ao longo desses anos a Empresa Maísa já vem contribuindo a sua ação social, deu madeira para construir igreja N. Sra. do Perpétuo Socorro, escola Joaquim Xavier, casa de farinha, campo de futebol e recuperação de estrada e ramais dos agricultores.
Foram escolhidos as prioridades que iremos levar para a reunião:

01. ESTRADA
02. ESCOLA
03. POSTO MÉDICO
04. MEIO AMBIENTE
05. TECNOLOGIA
06. Polo Piscicultura
07. Apicultura
08. Horticultura
09. Ampliação da casa de farinha
10. Parceria de máquina para destoque e mecanização

Dessas prioridades foram escolhidas quatro
01. Estradas e ramais
02. Casa de farinha
03. Parceria de máquina com a Empresa Maísa com os agricultores
04. Polo de Piscicultura

Precisamos de todas, mais escolhemos uma, RECUPERAÇÃO DE ESTRADAS E RAMAIS
Então escolhemos quem vão falar em nome da nossa comunidade.

01. [illegible] vai falar do Crédito Agrário e 344 CAR no Alto-Mojú
02. [illegible] o cantor da comunidade e delegado sindical (Ion [illegible])
03. [illegible] parceria com a secretaria de agricultura e comunidade
04. Lucia Agente de saúde
05. Joana do transporte escolar
06. [illegible] e Edilauro [illegible] jovem sobre o meio ambiente
07. Antonio Novo [illegible] da comunidade
08. Profª: Ana Lucia Educação do Campo e remédio Natural
09. Antonio Carlos GES (grupo de Estudo Sindical)
Depois de termos agraciado as prioridades e comentários, encerramos com almoço.

A Coordenação

Ana Lucia S. Souza
Antonio Lourenço
Marcos Luis S. Souza
Joana Santos
[illegible] Alves ([illegible])
Lucia Santos

Figure 8. Minutes of the internal meeting of the community Nossa Senhora do Perpétuo Socorro.

A significant event was the exchange of information between the communities, due to their different stage of social empowerment, resulting in a few instant solutions to problems already overcome by others, as well as access institutions for the preparation of CAR (rural environment registration) and the Luz para Todos program. With proper coordination, these moments of interaction are of utmost importance to the project, as they strengthen the conjunction for the improvement and implementation of public policies and the strengthening of social capital.

Meeting 1:

Place: Community Center of Vila de Ituquara

Date: December 07, 2013

Agencies represented: Communities of Ituquara, Açaizal Novo, Açaizal Centro, Maçaranduba, Flexal, the Company Biofílica, Fazenda Maísa and Instituto Peabiru.

Figure 9. Members of the community at the meeting held at Ituquara.

Meeting 2:

Place: Fazenda Maísa

Date: December 08, 2013

Agencies represented: Fazenda Maísa's staff, communities of Alto Apeí and Nossa Senhora do Perpétuo Socorro, the company Biofílica and Instituto Peabiru.

Figure 10. Members of the community at the meeting held at Fazenda Maísa's headquarters.

Meeting 3:

Place: Department of Agriculture in the municipality of Breu Branco

Date: December 10, 2013

Agencies represented: Community of Branquelandia, Breu Branco's Department of Agriculture, Breu Branco's EMATER, COMEL (Cooperativa Agropecuária do Entorno do Lago da Usina de Tucuruí), Biofílica and Instituto Peabiru.

Figure 11. Members of the community at the meeting held at the municipality of Breu Branco.

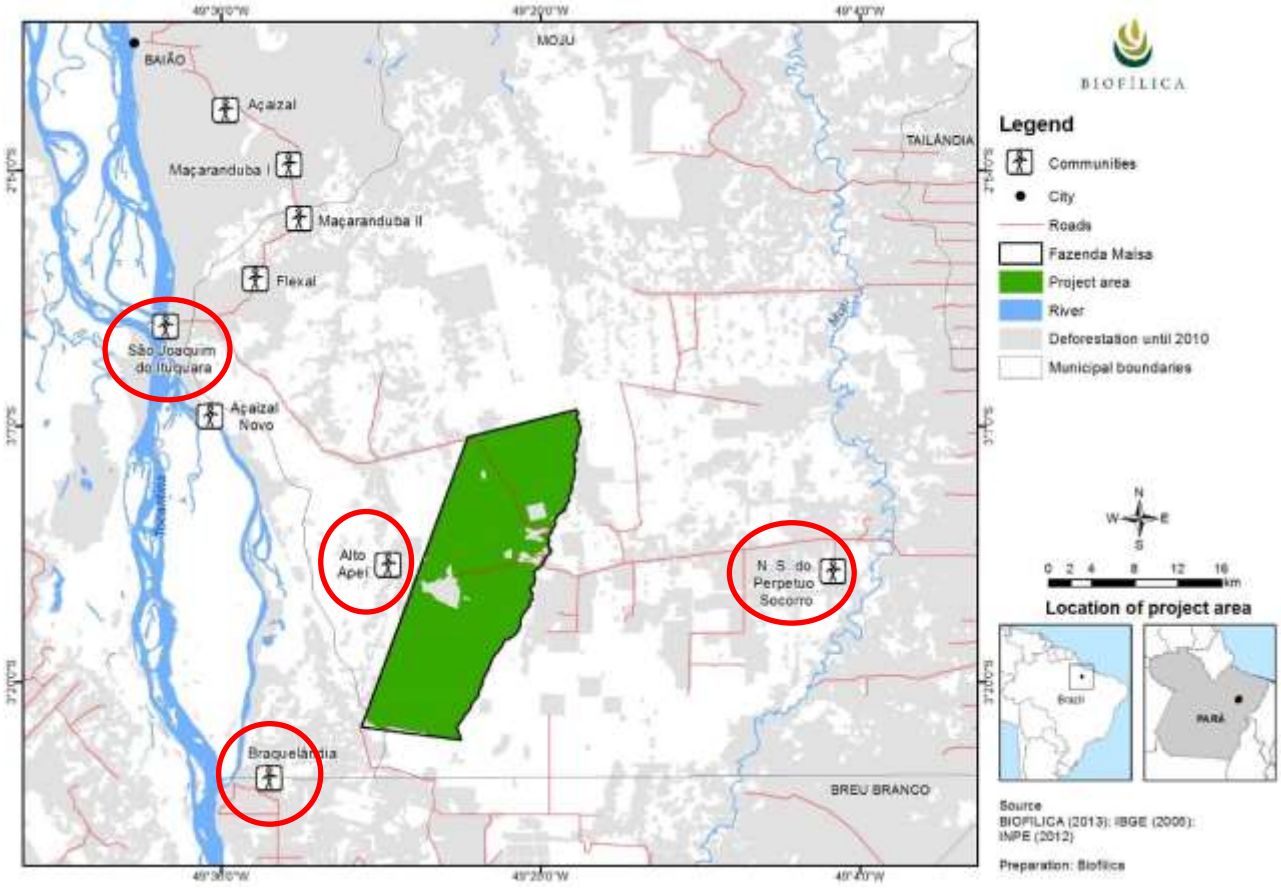
Engagement of stakeholders in the implementation of Project activities

After the first moment of interaction for the Project design, presented above, the second step is the allocation and definition of activities, within the scope defined in item 2.2 **Description of the Project Activities (***G3)*, actually starting the implementation of social activities.

With the discussion of the first activities, it was necessary to choose the surrounding communities to be developed, as their success would provide an extension of the social long-term benefits to other communities.

Therefore, the communities were chosen as follows (***Map 10****):*

- Vila Ituquara
- Alto Apeí
- Branquelandia
- Nossa Senhora do Perpétuo Socorro



Map 10. Location of communities affected by Project REDD + Maísa

This choice was based on some criteria, which is presented below:

Geographic Location: communities that are in the immediate vicinity of the Project area, and preferably with easy road access. Except for those under influence of other enterprises and under influence of specific policies for the Conservation Units;

Relation with the natural resources and the Project Area: communities that develop subsistence or small-scale commercial agriculture. Medium and large producers, residents of urban areas, and having commercial scale agricultural/cattle ranching activities in areas adjacent to the Project area are not comprised in this category;

Predisposal for social organization: communities with initiatives or interest in establishing community organizations, associations, cooperatives or other social centers;

Existence of institutional intervention initiatives: communities that benefit from the performance of public and/or related institutions. As examples, we have Environment Secretariats, Public Ministry and others;

Productive Potential: communities developing economic activities related to the sustainable use of land, focused on agriculture and extractive activities, or that have interest and potential to develop them.

While the environmental and social activities are implemented, there are certain moments of interaction to occur with the communities, especially regarding the potential impacts. The institution to implement the social activities in partnership with Biofílica and Fazenda Maísa will make constant revisions in the

strategy adopted for the social activities, by monitoring the actual impacts and making adjustments, when necessary.

The communities will provide a great contribution in this adaptive social management, through joint workshops held for disclosing the results and the progress of the Project's social activities. Government representatives who take part in the activities of the Project will also be invited to participate and contribute to the project activities.

Equally effectively, Fazenda Maísa's employees who are constantly in touch with the communities (often inhabiting thereof) shall be entitled to receive the perception and opinion of residents about the Project activities.

- **Procedure for submission of reviews on the public consultation on the audit process (VCS and CCB)**

In the public consultation period of the CCB, said stakeholders will have access to an executive summary of the document in Portuguese, delivered to one or two community representatives. They will be briefed on the document content and the purpose of the query, and a PD exposure workshop will be held with all interested residents, emphasizing the importance of involving as much people in the process as possible, seeking an internal organization so that the document and its understanding are accessible to all.

After this process of presentation, representatives of the communities will be trained to directly transcribe the comments on CCB's website, and this may aldo be performed at Fazenda Maísa itself due to the difficult access to internet in the region. If the resident of the community is not able to perform this action, they can put their comment on a “feedback little box”, to be displayed on strategic spots to the communities (churches, community centers, etc) or they may communicate directly with a Project’s collabolator or partner. Thoses collaborators and partners will be trained to receive the comment take notes and then follow the Project’s “Feedback and Conflict resolution Procedure”. All the comments received will be fully transcribe and posted on CCB's public consultation page. The comments received by the communities in writing will be stored for future reference. The public consultation period and its proceduers will be discloused also through local radio stations.

If the above method is not well accepted, twenty days past the distribution of the executive summary, Fazenda Maísa's employee, Mr. Bené (or other nominee) will visit the communities collecting their comments, preferably in written. If comments are made orally, the employee in charge must be able to take note and forward it to CCB's public consultation.

Local government representatives will receive an invitation letter for public consultation, requesting their presence directly through CCB's website (http://www.climate-standards.org/).

- **Procedure for communication and conflict resolution**

As part of a participatory and adaptive management for social activities, a permanent channel of communication is needed, particularly with regard to potential conflicts that may arise with stakeholders and other players who directly or indirectly fall within the project over time. The REDD+ Maísa Project provides for the development and implementation of a formal procedure for solving conflicts with the communities and other stakeholders, taking into account the local reality.

The system until now is used by community members to communicate directly with Fazenda Maísa's representative, Mr. Bené. This communication is usually performed through requests, such as wood for

construction of schools, and the motor grader (Patrol) for improvement of roads and branches. Therefore, a letter with the request containing the data of the community is delivered directly to Mr. Bené, which, in turn, takes it to the owner of Fazenda Maísa, who examines the requests.

The Project has developed a “Feedback and Conflict Resolution Procedure” in order to stabelish a methodology to receive, manage and propriately address stakeholders comments, questions, suggestions, requests and complains.This methodology aim to address all issues and to propose a solution for all cases in the most pacific and appropriate manner.

The procedure relies on three different ways of receiving a feedback: “Feedback Little Boxes”, seald boxes displayed on strategic spots for the communities (Churches, community centers, etc) to collect feedback from stakeholders, even anonymously; Direct verbal communications, through visitis on the communities, meetings, workshops, trainings and any other form of direct contact; Virtual Comunication, through email, phone calls, letters, etc.

The employees of Fazenda Maísa and other partners who are directly in contact with the surrounding communities will undergo training on these issues and on the attitude to be adopted in case of any conflict and the implementation of the procedure itself.

2.8 Commercially Sensitive Information

The following information were made available to validation/verification bodies:

- Project Financial Performance Spreadsheet and other related documents;
- Plan for Sustainable Forest Management - Fazenda Maísa and additional documents related to MFS;
- Agreement between Biofílica Investimentos Ambientais, Maísa-Moju Agroindustrial and Sipasa;
- Forest inventory;
- Descriptive Memorial;
- Operating and Environmental Procedures of Maísa-Moju and Sipasa;
- Estimate of opening areas in the UPAs of the PMFS; and
- Minutes of the REDD + Maísa Project and Biofílica's board meetings.

3 LEGAL STATUS

3.1 Compliance with the Laws, Statutes, Property Rights and Other Regulatory Frameworks (G4 and G5)

The compliance with the laws, statutes and other regulatory frameworks relevant to the Project is mostly linked to the forest management activity. In the state of Pará, the activities of the enterprise are licensed by IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) with some involvement of the State Department of Environment (SEMA-PA), therefore, the suitable laws are enforced at federal and state levels. However, the state law is enforced as an alternative to the federal legislation.

Sipasa has recently acquired the SCS Legal Harvest™ seal, which is a program that specifically checks the legality of forest management, demonstrating commintiment with the compliance of the project with the relevant management laws, in addition to consolidating a solid step toward the compliance with more complex scopes, such as the FSC (TFT 2013). Unfortunately, great part of forestry enterprises operating on the Brazilian Amazon have challenges to face on the path for the full compliance with labor laws. The Project considers this a priority and it has been working with specialized lawyers in order to identify all the compliances gaps and solve them. As part of “phase 1” of social activities a especial attention will be given to work sisteatically on the identifications of compliances gaps and proposing appropriate solutions, seeking always for the best practices on labor law enforcement.

With regard to laws and agreements that may specifically regulate the REDD+ activities, thus far, there is nothing to officially set up or adjust the initiatives in any area. There is a history of construction and negotiation of the concept and configuration of these initiatives based on the United Nations Framework Convention on Climate Change – UNFCCC.

At the national level, the most significant effort to date was the submission of the Draft Law No. 195/2011 that "establishes the national system for reducing emissions from deforestation and degradation, conservation, sustainable forest management, maintenance and enhancement of forest carbon stocks (REDD+) and gives other provisions", which is still in progress.

The main relevant laws and regulations of federal and state levels are listed and described below, although the legal compliance is not restricted to them. Moreover, a brief analysis has been performed on international climate agreements that have been guiding the creation, concept and development of REDD+ initiatives.

Although Brazil and the state of Pará have no designated authority to approve REDD + projects, the information and consent by formal and traditional authorities were sought along with the identification, consultation and engagement for participation in the project design. At this moment, as described in section 2, the goal was to consult the surrounding communities impacted by the project, the municipalities and departments of Baião, Breu Branco, Mocajuba and Tucuruí. Approval by formal and/or non-formal authorities.

- **International Agreements**

FCCC/CP/2005/Misc.1: Reducing emissions from deforestationin developing countries: approaches to stimulate action. Submission from Parties.

FCCC/CP/2007/6/add.1: Report of the Conference of the Parties on its thirteenth session, held in Bali from 3 to 15 December 2007. Addendum. Part two: Action taken by the Conference of the Parties at its thirteenth session, which occurred in Bali from December 3 to 5, 2007.

FCCC/CP/2009/Add.1: Report of the Conference of the Parties on its fifteenth session, held in Copenhagen from 7 to 19 December 2009. Addendum. Part Two: Action taken by the Conference of the Parties at its fifteenth session.

FCCC/CP/2010/7/Add. 1: Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010. Addendum. Part Two: Action taken by the Conference of the Parties at its sixteenth session.

FCCC/CP/2011/9/Add. 1: Report of the Conference of the Parties on its seventeenth session, held in Durban from 28 November to 11 December 2011. Addendum. Part Two: Action taken by the Conference of the Parties at its seventeenth session.

FCCC/CP/2012/8/Add.1: Report of the Conference of the Parties on its eighteenth session, held in Doha from 26 November to 8 December 2012. Addendum. Part two: Action taken by the Conference of the Parties at its eighteenth session.

FCCC/CP/2013/Add.1: Warsaw Framework for REDD-plus, held in Warsaw, Poland, from 11 to 22 November 2013, particulary the following decisions:

- **Decision9/CP.19:** Work program on results-based finance to progress the full implementation of the activities referred to in decision 1/CP. 16, paragraph 70.
- **Decision10/CP.19:** Coordination of support for the implementation of activities in relation to mitigation actions in the forest sector by developing countries, including institutional arrangements.
- **Decision12/CP.19:** The timing and the frequency of presentations of the summary of information on how all the safeguards referred to in decision1/CP.16, appendix I, are being addressed and respected.
- **Decision13/CP.19:** Guidelines and procedures for the technical assessment of submissions from Parties on proposed forest reference emission levels and/or forest reference levels.
- **Decision14/CP.19:** Modalities for measuring, reporting and verifying.
- **Decision15/CP.19:** Addressing the drivers of deforestation and forest degradation.

CITES, de 03/03/1973: “Convention on International Trade in endangered Species of Wild Fauna and Flora”, signed in Washington D.C. on March 3, 1973, changed in Bonn, July 22, 1979.

Convention of the International Labor Organization, No. 29, 1930, ratified by Brazil on 4/25/1957: Provides for the abolition of forced labor.

Convention of the International Labor Organization, no. 87 of 1940: Provides for trade union freedom.

Convention of the International Labor Organization, No. 97, 1949, ratified by Brazil on 06/18/1965: provides for migrant workers.

Convention of the International Labor Organization, No. 98, 1949, ratified by Brazil on 11/18/1952: provides for the right to join a trade union and collective negotiation.

Convention of the International Labor Organization, No. 100, 1951, ratified by Brazil on 4/25/1957: Provides for equal pay between men and women.

Convention of the International Labor Organization, No. 105, ratified by Brazil on 6/18/1965: Provides for the abolition of forced labor.

Convention of the International Labor Organization, No. 111, 1958, ratified by Brazil on 3/1/1965: Provides for discrimination with regard to employment and occupation.

Convention of the International Labor Organization, No. 131, 1970, ratified by Brazil on 5/4/1983: Provides for the setting of a minimum wage, especially in developing countries.

Convention of the International Labor Organization, No. 138, 1973, ratified by Brazil on 6/28/2001: Provides for the minimum age for admission.

Convention of the International Labor Organization, No. 142, 1975, ratified by Brazil on 11/24/1981: Provides for the development of human resources.

Convention of the International Labor Organization, No. 183, 1975: Provides for immigration under abusive conditions and the promotion of equal opportunities for migrant workers.

Convention of the International Labor Organization, No. 155, 1981, ratified by Brazil on 5/18/1992: Provides for the safety and health of workers.

Convention of the International Labor Organization, No. 169, 1989, ratified by Brazil on 7/25/2002: Provides for indigenous and tribal rights.

Convention of the International Labor Organization, No. 182, ratified by Brazil on 2/2/2000: Provides for the prohibition of the worst forms of child labor and immediate action for their elimination.

- **Laws and Federal Regulations**

Law n. 12.651, 5/25/2012 Provides for the protection of the native vegetation; amends Laws in 6.938, of August 31, 1981, 9.393, of December 19, 1996, and 11.428 of December 22, 2006; repealing Laws 4.771, of September 15, 1965, and 7.754, of April 14, 1989, and the Provisional Measure 2.166-67, of August 24, 2001; and suggests other measures.

Law n. 12.187, 12/29/2009: Establishes the National Policy on Climate Change - NPCC and other measures.

Provisional Measure No. 571, of 5/25/2012: Amends Law no. 12.651, of May 15, 2012, which provides for the protection of the native vegetation; amends Laws in 6.938, of August 31, 1981, 9.393, of December 19, 1996, and 11.428 of December 22, 2006; repeals the Laws 4.771, of September 15, 1965, and 7.754, of April 14, 1989, and the Provisional Measure 2.166-67, of August 24, 2001.

Decree no. 58.054, of 3/23/1966: Enacts the Convention for the protection of flora, fauna and scenic beauties of the countries of America. .

Decree no. 96.944, of 10/12/1988: Creates a program to protect the Complex of Ecosystems of the Legally-defined Amazon and suggests other measures.

Decree no. 2.661, of 7/8/1998: Regulates the sole paragraph of art. 27, Law No. 4.771, of September 15, 1965 (Forest Code), by establishing standards of caution regarding the use of fire in forest and agricultural/cattle ranching practices, and other measures.

Decree no. 2.959, of 2/10/1999: Provides for measures to be implemented in the Legally-defined Amazon, for monitoring, prevention, environmental education and forest fire fighting.

Decree no. 5.975, of 11/30/2006: Regulates art. 12, final part, 15, 16, 19, 20 and 21 of Law No. 4.771, of September 15, 1965, Art. 4, item III, of Law No. 6.938 of August 31, 1981, Art. 2 of Law No. 10.650, of

April 16, 2003, amends and adds provisions to Decrees 6.514/08 and 3.420/00, and provides other measures.

Decree no. 7.390, of 12/9/2010: Regulates arts. 6, 11 and 12 of Law No. 12.187, of December 29, 2009, establishing the National Policy on Climate Change - NPCC and other measures.

Decree-Law No. 5.452, of 5/1/1943: Approves the Consolidation of Labor Laws.

CONAMA Ordinance no. 16 of 12/7/1989: Establishes an integrated program to environmentally assess and control the Legal Amazon.

CONAMA Ordinance no. 378 of 10/19/2006: Defines the projects that may potentially cause national or regional environmental impact for purposes of subsection III, § 1, Art. 19 of Law No. 4.771, of September 15, 1965, and other provisions.

CONAMA Ordinance no. 379 of 10/19/2006: Creates and regulates data and information on forest management under the National Environmental System - SISNAMA.

IBAMA Ordinance 218 of 5/4/1989: Provides for the cutting and exploitation of native forests and preceding forests, such as the Atlantic Forest, and suggests other measures.

IBAMA Ordinance 37-N of 4/3/1992: Recognizes the Official List of Endangered Flora Species in Brazil provided in the Ordinance.

MMA Ordinance 103 of 4/5/2006: Provides for the implementation of the Document of Forest Origin - DOF, and defines other measures.

MMA Ordinance 253 of 8/18/2006: Establishes, as from September 1, 2006, under IBAMA (Brazilian Institute of Environment and Renewable Natural Resources), the Document of Forest Origin - DOF, replacing the Authorization to Transport Forest Products - ATPF.

Ordinance 1.896, of 12/09/2013: Changes the Standard no. 31.

MMA Normative Instruction n. 1, of 05/09/1996: Establishes provisions on the Mandatory Forest Recovery and the Integrated Forest Plan.

MMA Normative Instruction n. 07, of 27/04/1999: Establishes provisions on the authorization for deforestation in Legal Amazon states.

MMA Normative Instruction n. 02, of 10/05/2001: Provides for the economic exploitation of forests, on farms located within the Legally-defined Amazon, including areas of Legal Reserve, and protecting permanent preservation areas set out in the legislation in force, which will be addressed through multi-use practices of sustainable forest management.

IBAMA Normative Instruction no. 30, of 12/31/2002: Controls the calculation of the standing trees' geometric volume, through a volume equation that specifies and suggests other provisions.

IBAMA Normative Instruction no. 112, of 8/21/2006: Regulates the Document of Forest Origin - DOF, established by MMA/Ordinance/no. 253, of August 18, 2006. (Amended by IBAMA Normative Instruction no. 134, of 11/22/2006)

MMA Normative Instruction n. 06, of 12/15/2006: Provides for reforestation and consumption of forest raw materials, and other measures.

IBAMA Normative Instruction no. 178, of 6/23/2008: Defines the guidelines and procedures, on the part of IBAMA, for consideration and compliance with the issuing of permits for the suppression of forests and other forms of native vegetation in an area greater than two thousand hectares within rural properties

located in the Amazon, and one thousand hectares in rural properties located in other regions of the country.

Standard no. 31 of 03/03/2005: Approves the Standard for Occupational Safety and Health for Agriculture, Livestock, Forestry and Aquaculture activities.

- **Laws and State Regulations**

State Law n. 7.389, of 4/1/2012: Defines the activities of local environmental impact in the state of Pará and provides other measures.

State Law n. 7.381, of 3/19/2010: Provides for the restoration of vegetation cover in the riparian forests of the State of Pará

State Law n. 6.745, of 6/6/2005: Establishes the Ecological/Economic Macro-zoning of the State of Pará and other measures.

State Law n. 6.506, of 12/2/2002: Establishes the basic guidelines for the implementation of the Ecological/Economic Zoning (EEZ) in the state of Pará and defines other measures.

State Law n. 6.462, of 7/4/2002: Provides for the State Forest Policy and other forms of vegetation.

State Law n. 5.977, of 7/10/1996: Provides for wildlife protection in the State of Pará.

State Law n. 5.887, of 5/9/1995: Provides for the State Environmental Policy and suggests other measures.

State Decree n. 518, of 9/5/2012: Establishes the *Fórum Paraense de Mudanças Climáticas* and suggests other measures.

State Decree n. 216, of 9/22/2011: Provides for the environmental permitting of agroforestry activities carried out in altered and/or underutilized areas, outside the legal reserve and permanent preservation areas in the rural properties of the State of Pará

State Decree n. 2.436, of 8/11/2010: Regulates the actions connected, directly or indirectly, to agroforestry activities carried out within the areas of alternate land use, considered to be of low environmental impact.

State Decree n. 2.099, of 1/27/2010: Provides for the maintenance, restoration, control of natural regeneration, compensation and composition of the Legal Reserve area of rural properties in the state of Pará and suggests other measures.

State Decree n. 1.697, of 6/5/2009: Establishes the Plan for Prevention, Control and Alternatives to deforestation carried out in the state of Pará, and suggests other measures.

State Decree n. 1.148, of 7/17/2008: Provides for the Rural Environmental Registry - CAR-PA, Legal Reserve area and suggests other measures.

State Decree n. 58, of 11/27/2006: Establishes the Register of Explorers and Consumer Forest Products of the State of Pará - CEPROF-PA and Marketing of Forest Products and Transportation System of the State of Pará SISFLORA-PA and its operating documents and other matters,

State Decree n. 56, of 3/31/2006: Regulates provisions of State Law No. 6.462 of July 4, 2002, that provides for the State Policy on Forests and other forms of vegetation and suggests other measures, aimed at encouraging the recovery of altered and/or degraded areas, and at the restoration of the legal

reserve, for energy, timber or fruit production, industrial use or otherwise, through forestry and agroforestry restocking with native and exotic species, and suggests other measures.

State Decree n. 856, of 1/30/2004: Regulates the Forestry Activity Register.

Resolution No. 54, of 10/24/2007 (APPENDIX1): Approves the list of endangered species of flora and fauna present in the State of Pará

3.2 Evidence of Right of Use (G5)

The project activities will be developed in accordance with Maísa-Moju Agroindustrial's right of ownership and use over the area of Fazenda Maísa, whereas, from the right of use demonstration alternatives posed by the VCS Standard v3.2 (page 17), the following applies:

> *"4) A right of use arising by virtue of a statutory, property or contractual right on the land, vegetation or conservation or management process that generates GHG emission decreases and/or removals (...)."*

The right of ownership (and use) is given through the title deed for the 29,906 hectares in the municipality of Moju, state of Pará These areas originate from public lands, as in much of the Amazon, and were initially transacted through a provisional titling in favor of Maísa-Moju Agroindustrial in 1981, through the Land Institute of Pará (ITERPA) with final registration (provisional titling) notarized in 1982. In 1988, the final titling was granted, authorizing the plenitude of the domain, and the title issued by ITERPA had its registration (final titling) notarized.

An additional documental study concluded the regularity of the property, and there are no encumbrances, liens or limitation to its full use, and so there are no impediments to the completion of the REDD + Maísa Project, such as locks, liens, mortgages, foreclosures or land disputes. The proof of this legitimacy can also be evidenced by obtaining the LHV Certification Seal, which certifies the legality of the project, as explained in the previous section.

In addition to the regularized land tenure for the legal viability of the REDD+ Maísa Project, Biofílica Investimentos Ambientais entered into a contractual agreement with Maisa-Moju Agroindustrial, owner of the properties, and Sipasa, operator of sustainable forest management, so that Biofílica is the unique and exclusive developer of the project with regard to the environmental services and other co-benefits.

Regarding potential risks to property rights, as already noted, there are no records of disputes with third parties for the possession of property, nor the existence of disputes over the access to natural resources or use of the property. There is a good relationship with the surrounding communities, including the permission to make controlled use of items considered traditional by the communities, such as, for example, collecting medicinal plants in the project area if any specific disease occurs in the community.

Moreover, there is a certain control and a land monitoring team aimed at containing unplanned deforestation driven by squatters and illegal loggers, as usual in this region of the Amazonian frontier, and to be better described by the session of agents and drivers of deforestation.

3.3 Emission Trading Program and Other Binding Limits (CL1)

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.

3.4 Participation under Other GHG Programs (CL1)

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.

3.5 Other Forms of Environmental Credit (CL1)

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.

3.6 Projects Rejected by Other GHG Programs (CL1)

The REDD+ Maísa Project has not been submitted for validation/verification under any other GHG program and, therefore, has not been rejected by any other GHG program.

3.7 Respect for the Rights and No Involuntary Relocation (G5)

The implementation of the project does not involve the relocation of people or communities, voluntarily and involuntarily, and does not affect any legal and/or customary rights of third parties related to the project resources. This is due to the history and maturity of the forestry activity in the project area and clarity on the rights of possession and use of resources.

3.8 Illegal Activities and Project Benefits (G5)

Potential illegal activities that may negatively impact the project proposal consist mostly of illegal logging, hunting and exploitation of predatory species of fauna and flora.

The project aims at precisely controlling and fighting these illegal activities commonly found in the region covered by the project through land interventions related to the strengthening of the monitoring, coordination and engagement of other local stakeholders and players to foster the regional socio-economic development and suitable law enforcement.

4 APPLICATION OF THE METHODOLOGY

4.1 Title and Reference of the Methodology

The methodology used in the project is the Methodology for Avoided Unplanned Deforestation, VM0015, version 1.1, of December 03, 2012.

4.2 Applicabillity of the Methodology

The VCS VM0015 methodology is applicable to the REDD+ Maísa project because it meets the following applicability criteria:

- The project baseline activities include unplanned deforestation as a result of cattle ranching and agricultural activities, according to the latest version of the VCS AFOLU Requirements.
- The Project activities include forest protection with controlled and selective extraction of timber, in accordance with the description of scope "D", which is part of the methodology (for details, see page 12, Table 1 and Figure 2-B of document VCS VM0015)
- Different forest types may be found in the area of the REDD+ Maísa Project, especially old deforestation forests that meet the definition of "forest" according to the Designated National Authority.
- The Project area includes only land classified as “forest” for a minimum of 10 years prior to the Project start date (see **Map 11**).
- The forest types found in the project area do not include rainforests in swampy areas ("forested wetlands") or common forested areas in peatlands ("peat swamp forests").

4.3 Methodology Deviations

For the execution of step 4.1.2.1, equation 3 on page 44 of the VM0015 was replaced by equation 04 available in Puyravaud (2003). This deviation from the methodology represents an increase in accuracy and does not negatively impact the conservatism of the quantification on the GHG emission reductions.

4.4 Project Boundary **(G1)**

Step 1.1 of VM0015 - spatial boundaries for the Project.

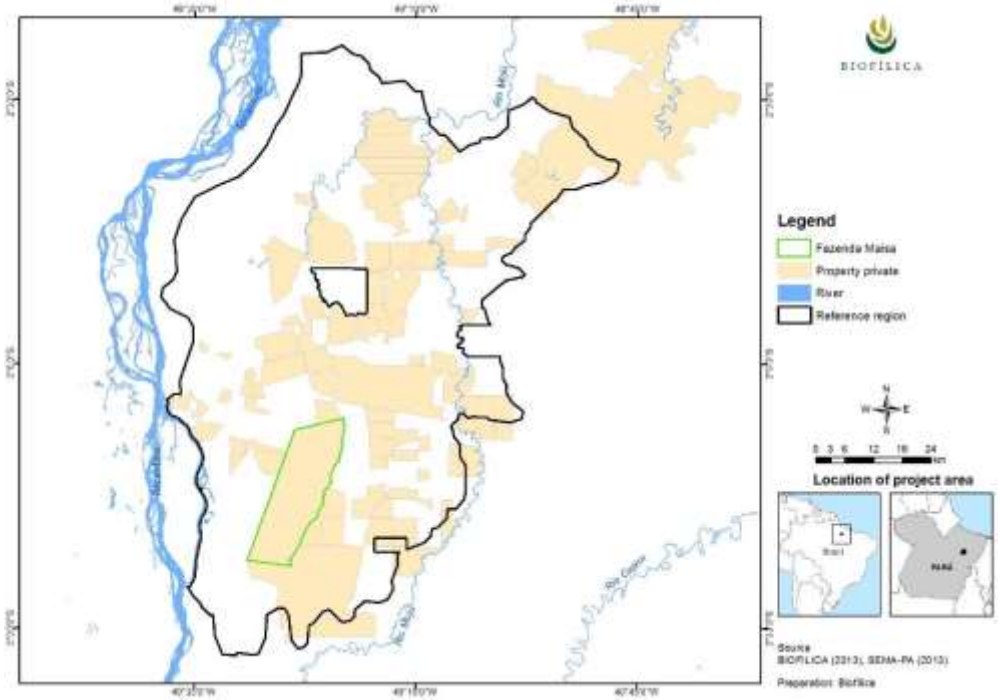
Reference Region

The reference region is the largest spatial limit and includes the Project Area, the leakage belt and the leakage management areas (**Map 2**, Item 1.2 – **Project Location (G1 & G3)**). The information about fees, agents and drivers of deforestation were obtained in this area, which is the location where future deforestation was designed.

For the REDD+ Maísa Project, the reference region corresponds to an area of 658,151 hectares and has a deforestation rate of 7,579 hectares per year (2.122% per year with regard to the forest cover remaining in 2011).

The reference region was defined by considering the relevant geographic limits in order to determine the project baseline, and in compliance with the criteria set out on pages 18 and 19 of document VM0015, listed below.

- **Agents and causes of** deforestation: small, medium and large rural producers integrate the primary group of deforestation agents present in the region. The main infrastructure driver capable of increasing the risk of deforestation is the proximity of official and unofficial roads (BRANDÃO et al., 2007). Another spatial driver of deforestation that may influence future deforestation in the reference region is the ecological-economic zoning of the State of Pará, in the part corresponding to step 3 of the VM0015, as described in this document.
- **Landscape configuration and ecological conditions:** 100% of the project area has the same classes of vegetation found in the reference region; 100% of the project area is within the range of elevation of the reference region; 100% of the slope of the Project area is within the range of slope of the reference region.
- **Social-economic and cultural** conditions: the prevailing land tenure within the reference region consists of private properties according to **Map 11**; the land tenure in the project area (private property) may be found in other areas of the reference region; the land-use and land-cover classes, current and projected in the Project area, are the same over the entire reference region; the project area is controlled by the same laws and regulations applied throughout the reference region.

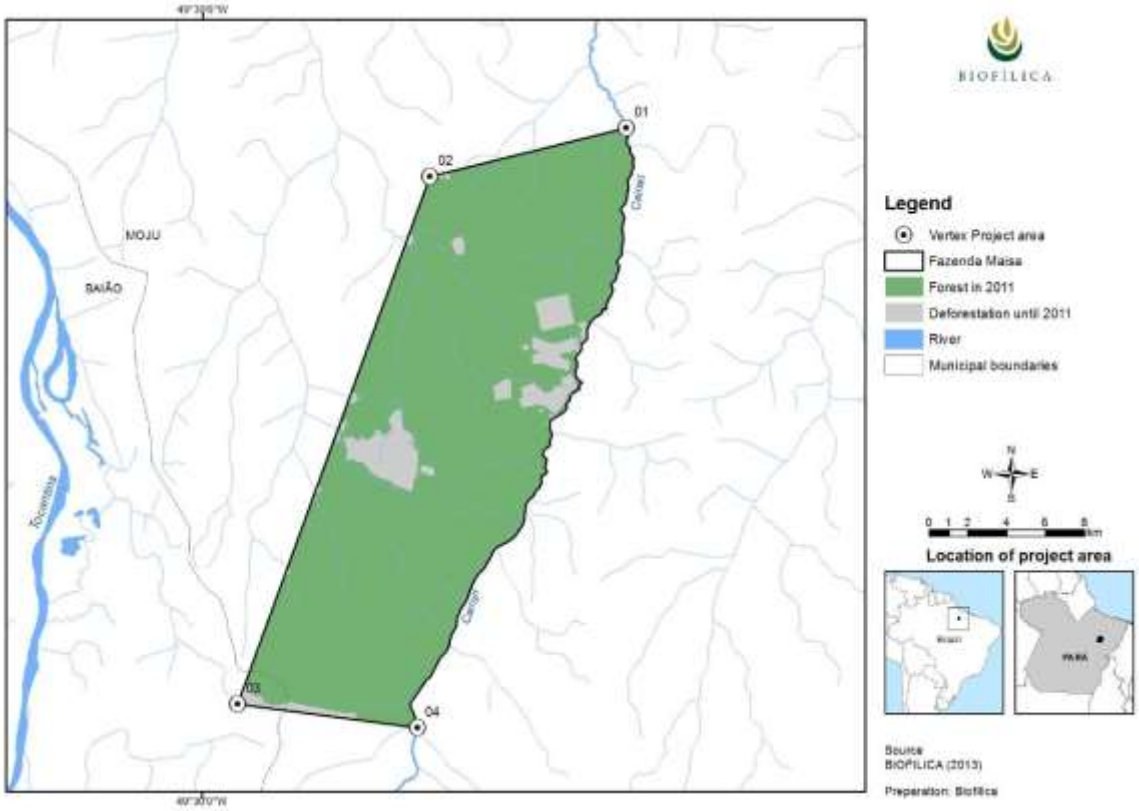


Map 11. Private properties in the Reference Region.

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 limits of the Project area have been defined as follows:

- Name of Project area: Fazenda Maísa.
- Physical limits are shown in the Figure (location), in **Map 12** (vertex Map) and in **Map 9**.
- The description of property and land tenure is described in item 3.2 herein.
- The description of the participants and their responsibilities in the Project are described in item 2.2 herein.



Map 12. Coordinates of the physical limits of the Project Area (UTM - Zone 22S. Datum WGS. 1984).

Table 9. Vertices and coordinates of the Project Area polygons.

Vertex	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

Leakage belt

The leakage belt was defined using the mobility approach (option II available in the VCS VM0015 Methodology). This option was selected because, during the historical reference period analyzed, no data was acquired or studies conducted in the reference region showing that economic gain is an important driver of deforestation.

A multi-criteria approach was used to define the spatial limits of the leakage belt, which matched the deforestation risk map and the map of private properties near the Project Area.

Based on this approach, the leakage belt was allocated in areas with high risk of deforestation and in private properties with characteristics that were similar to those of Fazenda Maísa.

Leakage Management Area

The areas in which the project intends to develop activities to reduce the risks of deforestation are located within Fazenda Maísa and its surrounding communities (**Map 2**).

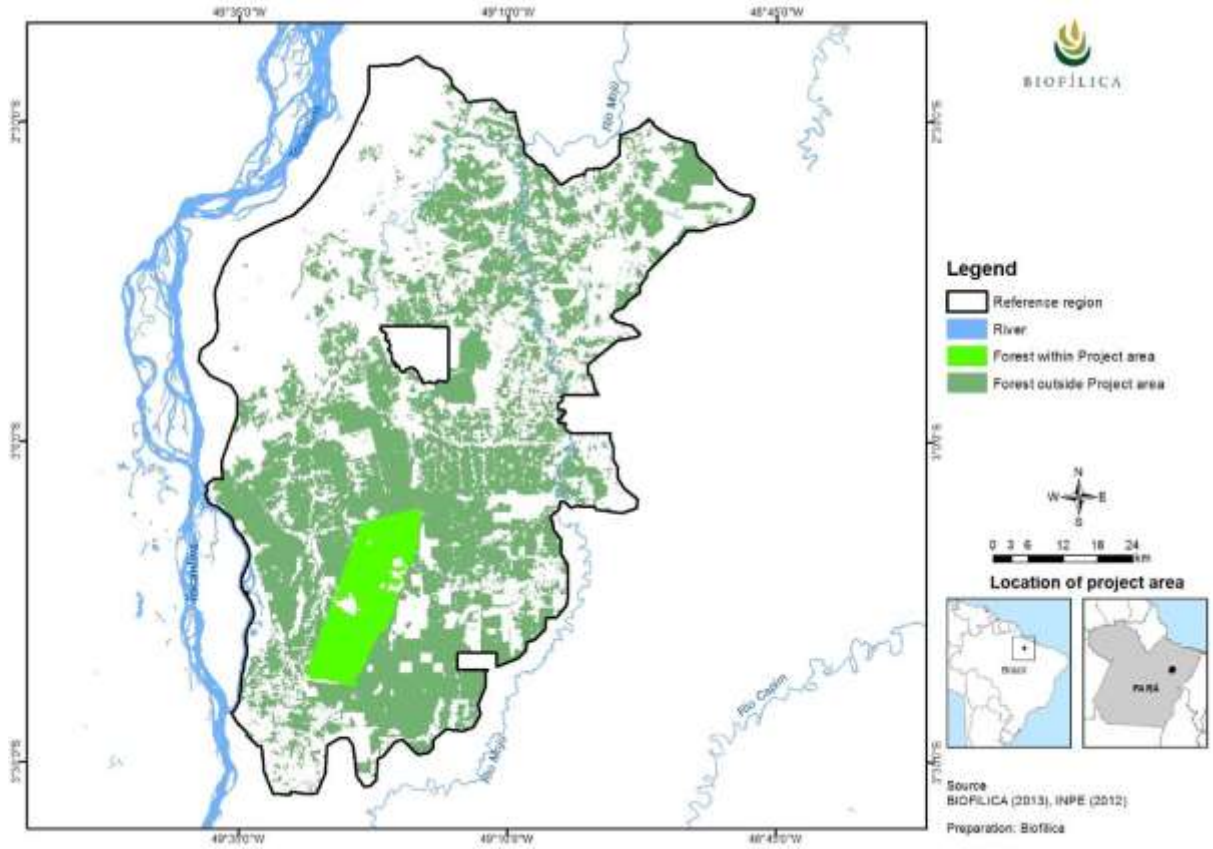
The main criteria for selecting these areas were: areas deforested until 2011, located near the Project Area, and whose families are predisposed to develop the proposed activities. Section 2 contains the activities to be undertaken by the REDD+ Project in the leakage management areas.

Forest

The definition of "Forest" used by the Project is in accordance with resolution number 2 of the Inter-ministerial Commission on Global Climate Change (CIMGC[1]). Data from the Deforestation Monitoring System in the Legally-defined Amazon (PRODES[2]), prepared by the INPE, was used to produce the Reference Map of the Forest Cover (Step 1.1.5 VM0015) presented in Map 13. The smallest mapping unit (MMU) of the PRODES Digital system is 1 hectare (GOFC-GOLD, 2011).

[1] Definition of forest by the Brazilian Designated National Authority: minimum area of 1 hectare with 30% of the surface covered by trees with the potential to reach heights of at least 5 m.

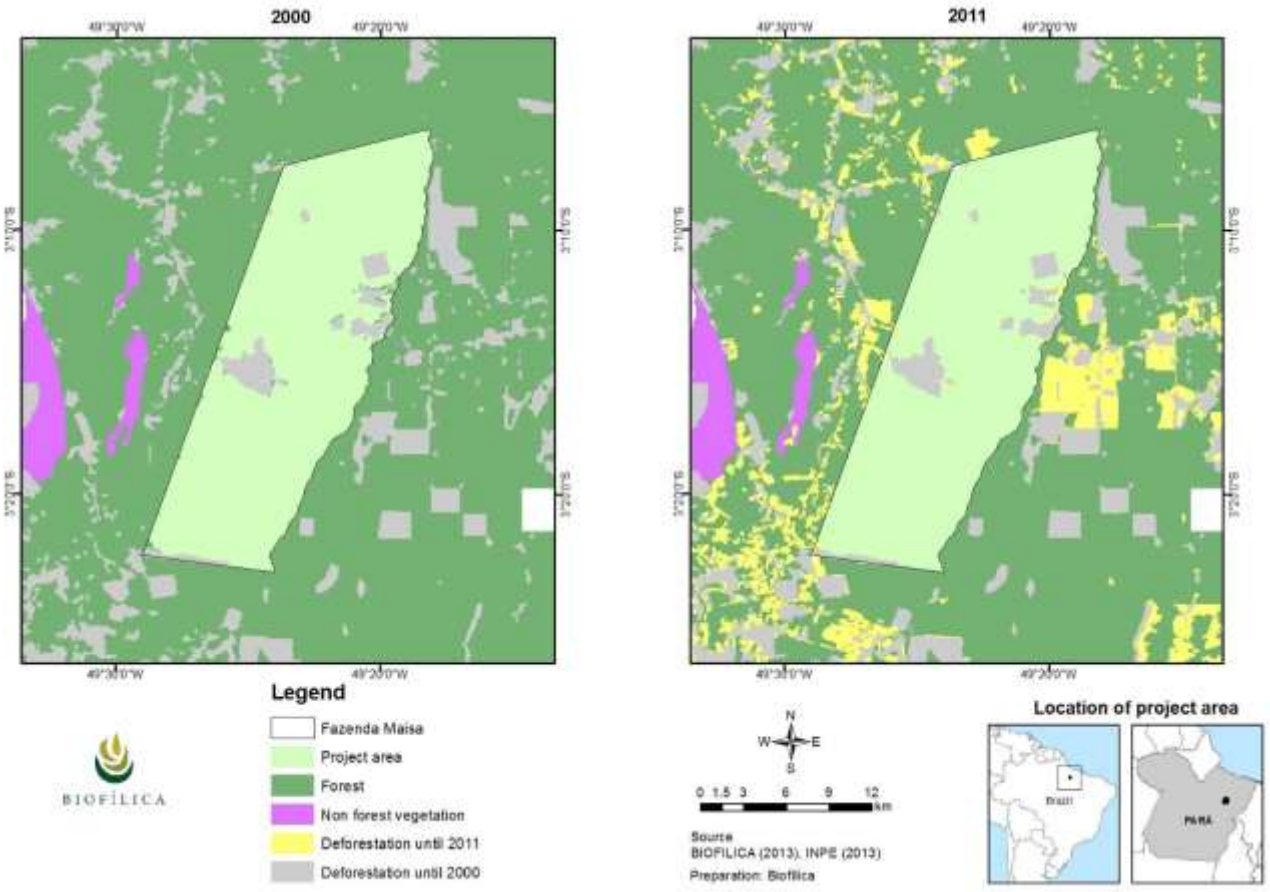
[2] www.obt.inpe.br/prodes



Map 13. Reference forest cover in the Reference Region.

Step 1.2 of the VM0015 - temporal boundaries of the REDD + Maísa Project

- Start date of the Project's conservation activities: 5/21/2012.
- Start date and end date of the historic reference period for LULCC analysis: 2000 to 2011 (see **Map 14**).
- Start date and end of the first fixed baseline period: the fixed baseline period is 10 years with reassessment scheduled for 03/21/2022.
- Monitoring period: the monitoring period is one year beginning in 2012.



Map 14. Land-use and land-cover for 2000 and 2011.

Step 1.3 VM0015 Carbon Pools

The carbon pools considered in the Project are presented in Table 10.

Table 10. The carbon pools included or excluded in the project (Table 3 of the VM0015 methodology).

Carbon pools	Included / Excluded	Justification / Explanation for the choice
Above-ground	Tree: Included	Carbon stock change in this pool is always significant.
	Non-tree: Included	Pool included in the forest class used in the baseline scenario.
Below-ground	Included	Significant pool as it represents 26.1% of the total living biomass.
Dead wood	Excluded	Pool not significant.
Wood products	Excluded	Pool not included because it remains constant in the project and baseline scenarios, being conditioned to national legal and regulatory restrictions.
Litter	Excluded	Not measured according with the VCS Program Update of May 24, 2010.
Organic carbon in the soil	Excluded	Recommended when forests are converted for annual crops. Not measured in conversions to grazing areas and perennial crops in accordance with the VCS Program Update of May 24, 2010.

GHG sources, carbon sinks and pools are presented in the baseline scenario of Table 11.

Table 11. GHG Sources included or excluded in the limits of the Project Activities (Table 4 of the VM0015 Methodology).

Source	Gas	Included / Excluded	Justification / Explanation for the choice
Biomass burning	CO_2	Excluded	Counted as carbon stock changes
	CH_4	Excluded	Considered Negligible according to updates of the VCS Program on May 24, 2010
	N_2O	Excluded	Considered Negligible according to updates of the VCS Program on May 24, 2010
Emissions from herds	CO_2	Excluded	Not a significant source
	CH_4	Excluded	Not applicable to the project
	N_2O	Excluded	Not applicable to the project

4.5 Baseline Scenario (G2)

Step 2 VM0015 - Historical Analysis of Land-use and Land-cover

Collection of appropriate data source

The data from the PRODES Digital software, available in Shapefile format, was used to map land-use and land-cover classes. A total of 44 different Landsat images were used to map forest classes, non-forest vegetation, hydrography and anthropic vegetation (deforestation). The images cover the historical reference period (2000 to 2011) and correspond to the following Landsat orbits/scene spots: 223/62, 223/63, 224/62, 224/63 (Table 12). A review of the PRODES classification was performed using high spatial resolution images available on Google Earth.

Table 12. Satellite images used to map land cover in the Reference Region (Table 5 of Methodology VM0015).

Driver (satellite or airplane)	Sensor	Resolution		Coverage	Acquisition Date	Scene Identification	
		Spatial (m)	Spectral	(km^2)	(DD/MM/YY)	Path/ Latitude	Row/ Longitude
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	6/5/2000	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/10/2001	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/5/2002	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	6/30/2003	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	5/15/2004	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/10/2005	223	62

Driver (satellite or airplane)	Sensor	Resolution		Coverage	Acquisition Date	Scene Identification	
		Spatial (m)	Spectral	(km²)	(DD/MM/YY)	Path/ Latitude	Row/ Longitude
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/9/2006	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/13/2007	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	10/1/2008	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/17/2009	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/3/2010	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/25/2011	223	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	6/5/2000	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/26/2001	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/5/2002	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/16/2003	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	5/15/2004	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	10/9/2005	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/9/2006	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/13/2007	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/14/2008	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/1/2009	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/5/2010	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	6/4/2011	223	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/30/2000	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/2/2001	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/28/2002	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/24/2003	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/25/2004	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/14/2005	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	4/11/2006	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/20/2007	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/21/2008	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/9/2009	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/26/2010	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/29/2011	224	62
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	6/12/2000	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/2/2001	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/14/2002	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/23/2003	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/25/2004	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/14/2005	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	10/3/2006	224	63

Driver (satellite or airplane)	Sensor	Resolution		Coverage	Acquisition Date	Scene Identification	
		Spatial (m)	Spectral	(km^2)	(DD/MM/YY)	Path/ Latitude	Row/ Longitude
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	9/20/2007	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/21/2008	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	8/8/2009	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/26/2010	224	63
Satellite	Landsat	30 x 30	0.45 – 2.35 µm	34225	7/29/2011	224	63
Satellite	Spot 5	2.5 x 2.5	0.48 – 0.71 µm	3600	9/25/2011	-3.0058	-49.4073
Satellite	Spot 5	2.5 x 2.5	0.48 – 0.71 µm	3600	9/25/2011	-3.5069	-49.5173

Definition of land-use and land-cover classes

The land cover classes used in this Project are shown in Table 13. A description of each class and the existing area before the Project's start year is as follows:

Table 13. Land-use and land-cover classes in the Reference Region.

Class Identifier		Trend in Carbon stock	Presence in [1]	Baseline Activity[2]			Description
ID_{cl}	Name			LG	FW	CP	
1	Forest	Constant	RR PA LK	Yes	Yes	Yes	Remnant forest
2	Non-forest vegetation	Constant	RR	No	No	No	Natural non-forest vegetation cover
3	Hydrography	Constant	RR	No	No	No	Water bodies
4	Anthropic Vegetation in Equilibrium	Constant	RR LM	Yes	Yes	No	Forest areas that were cleared by the clear-cutting process and with a vegetation type other than Ombrophilous Forest.

1 RR: Reference Region; PA: Project Area; LK: Leakage belt; LM: Leakage Management Areas.

2 LG: Logging. FW = Fuel-wood collection; CP = Charcoal Production (yes/no)

- **Forest (310,091 ha):** area of remnant forest belonging to different phytophysiognomies of the ombrophilous forest.
- **Non-forest vegetation (20,426 ha):** area composed by natural vegetation with a physiognomy different from the forest, such as arboreal-shrubby savanna (cerrado), grassy-woody savanna (clear cerrado field), Campinarana, among others.
- **Hydrography** (738 ha): water bodies (rivers, lakes, creeks, among others).
- **Anthropic vegetation in Equilibrium (326,893 ha):** Deforested Ombrophilous Forest converted to other land uses (mosaic of different vegetation types including grazing areas, farmland, secondary vegetation and plantations).

Definition of land-cover and land-use change classes

The project has two land-use and land-use change categories that are expected to occur within the Project Area and the leakage belt: the change of Forest areas to areas with Anthropogenic Vegetation in Equilibrium.

Table 14. Definition of land-use and land-use change categories (Table 7.b of Methodology VM0015).

ID_{cl}	Name	Trend in Carbon Stock	Present in	Activity in case of baseline			Name	Trend in Carbon Stock	Present in	Activity in case of Project		
				LG	FW	CP				LG	FW	CP
I1/F1	Forest	Constant	PA	No	No	No	Anthropic Vegetation in Equilibrium	Constant	RR LM			
I1/F1	Forest	Constant	LK	Yes	Yes	No	Anthropic Vegetation in Equilibrium	Constant	RR LM			

Definition of land-use and land-use change history (Table 2.4 of Methodology VM0015).

Good quality data provided by PRODES was used to analyze the history of changes in land use. The main activities performed by PRODES to map deforestation in the Brazilian Amazon are presented below:

- **Pre-processing:** according to Câmara et al. (2006) the main procedures for the pre-processing of images executed by PRODES consist of selecting images with less cloud cover, with acquisition date as close to the dry season in the Amazon as possible, and with adequate radiometric quality; georeferencing of the images with spatial resolution of 30 meters with topographic charts at a scale of 1:100.000, and NASA's orthorectified images in MrSID format.
- **Interpretation and Classification:** the satellite images classification method used by PRODES follows four main steps. First, it generates a spectral mixture model, identifying the components of vegetation, soil and shade in the images. This technique is known as spectral linear mixture model (SLMM), which aims at estimating the percentage of vegetation, soil and shade components per cell (pixel) of image. The second step is the application of the segmentation technique, which identifies, in the satellite image, spatially adjacent regions (segments) with similar spectral characteristics; After segmentation, the segments are individually rated to identify aspects such as classes of forest, non-forest vegetation, hydrography and deforestation (anthropic vegetation). Finally, the classified segmentation result is submitted to an editing process, or classification audit, carried out by a specialist and finalizing with the creation of state mosaics.
- **Evaluation of the Mapping Accuracy (step 2.5 of VM0015):** PRODES mapping evaluation was carried out by comparison of each of the most recent class of the land-use and land-cover map (2011) with a set of 82 points randomly distributed over the reference region. The reference data used in this step comes from the visual interpretation of high spatial resolution images available on Google Earth. Using reference points and the land-use and land-cover map of 2011, it was possible to assess the mapping performance through the analysis of the confusion matrix (Table 15), as per Congalton (1999). The overall accuracy of the mapping for the different land-use and land-cover classes presented values above 80%. The overall accuracy of the forest cover reference map was 94%.

Table 15. PRODES 2011 data evaluation confusion matrix.

		REFERENCE					
		Forest	Anthropic vegetation	Hydrography	Non-forest vegetation	Total	User Accuracy
CLASSIFIED	Forest	32	1	2	0	35	91%
	Anthropic vegetation	2	22	0	2	26	85%
	Hydrography	0	0	8	0	8	100%
	Non-forest vegetation	0	1	0	12	13	92%
	Total	34	24	10	14	82	
	Producer Accuracy	94%	92%	80%	86%		

Results of the Historical Analysis on Land-Use and its Changes

The results of the analysis of historical deforestation which occurred between 2000 and 2011 in the reference region are shown in **Table 16**. By subtracting maps of land cover, a deforested area of approximately 95,679 acres was observed between 2000 and 2011 (about 24% of the forest in 2000).

Table 16. Matrix representing land-use changes in the Reference Region between 2000 and 2011 - Ii and Fi represent Beginning and End, respectively, for a given class i (Table 7.a of methodology VM0015).

ID_{cl}		Name:	Initial LU/LC Class (2000)				Total (ha)
			Forest I1	Non-forest vegetation I2	Hydrography I3	Anthropic Vegetation in Equilibrium I4	
Final LU/LC class (2011)	F1	Forest	310,091	0	0	0	310,091
	F2	Non-forest vegetation	0	20,426	0	0	20,426
	F3	Hydrography	0	0	738	0	738
	F4	Anthropic Vegetation in Equilibrium	95,679	0	0	231,214	326,893
Total (ha)			405,770	20,426	738	231,214	658,148

Preparation of a methodology annex to the PD

Methodological procedures for acquisition, pre-processing, classification, post-classification and evaluation of the accuracy of remote sensing imagery for analysis of changes in land-use and land-cover throughout the project.

a) **Data acquisition**: satellite images of radar or optical sensors should be used. Optical images should have a spectral resolution between 0,45 and 2,35 µm, radar images, on the other hand, need to be acquired in bands X (cm 3), C (5 cm) or L (23 cm). For the mapping of forest cover and land use, the images must have at least 30 meters of spatial resolution. The image should be acquired in times of low incidence of clouds and rain in the region, between the months of August and November. For the monitoring of forest cover within the Project Area and Leakage Belt, the satellite image must cover the area

corresponding to the following coordinates: 3°04'02"S – 49°29'19"W e 3°31'43"S – 49°12'08"W.

b) **Pre-processing:** the images should be geometrically corrected through georeferencing in the ArcGIS 10 software, using topographic charts as reference on the scale of 1:100.000 or orthorectified images from NASA in MrSID format. The georeferencing RMS must be less than 1 pixel for optical images and approximately 1.5 pixel for radar imagery. All data should be in the UTM coordinate system, Zone 22S and Datum WGS 1984.

c) **Classification**: use optical images to transform the values of digital numbers into scene components (vegetation, soil and shadow) by means of the spectral mixture algorithm. Select the images of the soil and shadow component and apply the segmentation technique through the region growing algorithm with similarity threshold parameters equal to 8 and area threshold equal to 4. The classification is performed using the ISOSEG unsupervised algorithm with acceptance threshold of 90% for the classes: forest, new deforestation, non-forest vegetation, hydrography and clouds. These segmentation and classification algorithms may be applied using the Spring 5 and TerraView 4 software. The mapped change category will consist of forest class to deforestation class.

d) **Post-classification**: the classification result in raster will be transformed in vector format for the auditing of the classification on the ArcGIS 10. For the analysis of areas with cloud cover, the radar image will be visually interpreted.

e) **Evaluation of classification accuracy**: performed by analyzing the overall accuracy and kappa index obtained from a confusion matrix (CONGALTON, 1999). At least 50 randomly allocated points derived from high spatial resolution satellite images (≤ 5 m) will be used. The minimum accuracy of the classification mapping must be 80%.

Step 3 VM0015 - Analysis of Agents. Drivers, Underlying Causes of Deforestation and their Future Development

Identification of Deforestation Drivers

a) **Name of deforestation agents**: Small, Medium and Large producers.

b) **Relative Importance**: These two groups of deforestation agents are responsible for 100% of the unplanned deforestation that has occurred in the Reference Region.

c) **Short description**: The small producers pointed out here as deforestation agents are those that act as land squatters ("non-timber") in the reference region, project area and leakage belt. They can be considered as the main agents responsible for unplanned deforestation. That's because they are influenced and financed by illegal loggers, which form the first group of players of the regional chain of deforestation events. (INSTITUTO PEABIRU, 2013 – Chapter 3). Although some come from old colonization, there are newer small producers and communities installed from the late 70s until the 90s, and most live in a context of nearly total absence of public policies, with land tenure insecurity, lack of technical assistance, poor access to credit facilities, and low quality/low permeability education and health systems (INSTITUTE PEABIRU, 2013 - Chapter 3). Therefore, they are easily lured by financial resources and often through violence

performed by illegal agents for land squatting and predatory extraction of hardwood to be used in sawmills, and less noble woods, branches and other plant material, for the preparation of illegal charcoal, to the point of being "hired" for preparing the charcoal (INSTITUTE PEABIRU, 2013 - chapter 3). According to Lima and Pozzobon (2005), we can frame this type of agent, after the land squatting events, as agents of "itinerant exploitation". Different than "traditional" small, medium and large producers or even corporate exploitation, this exploitation is characterized by its scale (small and medium), lack of title or legal land right, capillarity and frailty of action, that is, an action that permeates through time and space in forest areas and in the same area until the depletion of resources, bringing great socio-economic and environmental burden to the region. Among the intervention alternatives and solutions proposed by the authors, one consists of strengthening the management of natural resources and associations in the community, therefore, the interest of local people in preserving their environment and livelihood sources would end up being more efficient than monitoring. In addition, there is the need for improvements in quality of life, access to public policies, technical assistance and market access for these small producers.

Continuing the process of unplanned deforestation in the short or medium term, the areas squatted and deforested by "logless" groups are sold and incorporated by Medium and Large Owners, capitalized by extensive cattle ranching. These owners continue the cycle of deforestation to create more grazing areas and, currently, for planting or leasing the area to the production of oil palm, eucalyptus and other commodities (soybeans and corn in particular) (PEABIRU INSTITUTE 2013). As Pozzobon and Lima (2005), these owners behave as "recent landowners." The first landowners are from the late 1950s and appeared with the territorial expansion of farmers from other parts of Brazil (mainly south) to the Amazon. The occupation came in search of cheap land and facilitation of government policies such as tax credits and incentive programs for the expansion of the agricultural frontier towards the interior of the Amazon. The consequences of this process, which still occurs today, was the destruction of the vegetation cover, as an indication of ownership, often bringing great social harm, such as conflicts, violence and expulsion of indigenous and traditional communities, in addition to further consolidating a land concentration scenario. Currently, these areas are mainly used for extensive livestock, developed in poor soils and degraded grazing areas, causing serious environmental implications.

d) **Brief evaluation of the most likely development of population size**: according to the IBGE census (2012), the rural population in the reference region grew at a rate of 4.63% per year over the last 10 years.

e) **Statistics of deforestation** attributed to each agent of the reference region: between the years 2000 and 2011, 95,679 hectares were deforested in the reference region, at an average rate of deforestation of 7,579 hectares per year (2.12% p.a.). The annual increase in deforestation is presented in **Chart 2**. For the analysis of changes in land use, it has been identified that small producers are the primary agents of unplanned deforestation in the reference region (*Table 17*).

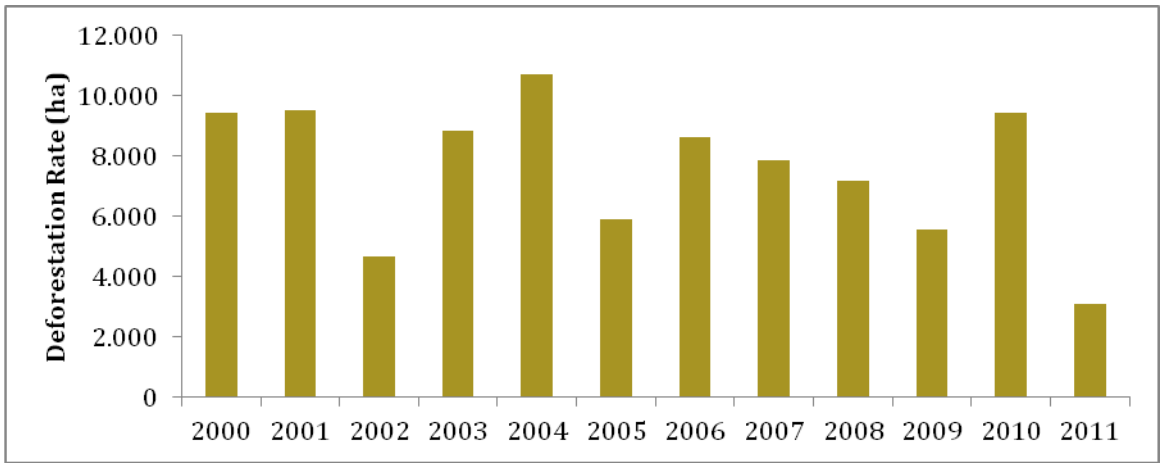


Chart 2. Annual deforestation in the Reference Region between 2000 and 2011.

Table 17. Deforestation attributed to each agent.

Agent	Deforestation (ha)	Contribution (%)
Small producers	73.664	66%
Medium and Large Producers	38.588	34%
Total	**112.252**	**100%**

Identification of Deforestation Drivers

The main drivers affecting the amount of deforestation in the reference region are: "white crops" (temporary crops), cattle ranching, palm oil and production of soybeans and maize.

- **White Crops (plantation)**

Brief description: "white farming" consists of the main livelihood crops of small producers, mainly incorporating rice, beans, cassava and maize crops. Among those, the cassava is the most prominent, as it is the basis of the family diet and trade in the reference region. The production of white crops is based on the "slash and burn" system, which is an unsustainable agricultural practice that leads to soil exhaustion and to the need for opening new areas, which occurs through the slashing and burning of forests for the deployment of white crops, which remain two to three years over the same area.

Impact on the behavior of agents: white farming crops are essential to the livelihood of small farmers and to supply the demand for food, especially cassava and flour. The cultivation of these crops is inevitable, and sustainable and efficient production techniques should be promoted along with better government policies.

Development Forecasts: the planting of cassava and the need for white farming areas tend to increasingly push deforestation in the reference region due to the population growth seen in recent years, increases in the price of flour and lack of perspective on the improvement of planting techniques and increased productivity (INSTITUTO PEABIRU, 2013).

Measures to be implemented: the project is expected to collaborate in promoting rural technical assistance with focus on improved planning and agronomic planting design, increased productivity and other techniques that minimize the need for opening new forested areas.

- **Cattle ranching**

Brief description: cattle ranching has a relevant historical and regional importance and is the main economic activity of medium and large landowners. This is considered an extensive activity on degraded, low-productivity grazing areas.

Impact on the behavior of agents: for being the main economic activity in the historical and cultural context of medium and large landowners present in the reference region, and despite being performed in a context of low productivity, this activity may allow these agents to capitalize and invest in the purchase of new land for expanding the activity. This process often leads to increased land tenure insecurity, the expulsion of traditional communities and conflicts with small farmers.

Development Forecasts: although livestock has been stable in recent years, there is a prospect of increase for the next 10 years due to the increasing specialization of the region (breeding, rearing, fattening, finishing, dairy cattle, matrix production, etc.). There is also an expectation that a greater volume of cattle will come from other places for fattening and finishing, leveraging the export infrastructure of the port of Barcarena (Port of Vila do Conde), close to the reference region (INSTITUTO PEABIRU 2013).

Measures to be implemented: search for conjunction with the bodies responsible for technical assistance and rural extension activities so as to increase the productivity and efficiency of livestock, encouraging low-impact techniques and integrated crop-livestock-forest. In addition to supporting the creation of sustainability indicators.

- **Oil Palm (palm oil)**

Brief description: the planting of oil palm was disseminated as its oil can be widely used in various food and cosmetic products. Although Brazil has historically had only a modest share of this market, this framework has been widely changed with the recent government policies enforced in the energy sector, promoting the planting of oil palm for biofuel production, through the National Palm Oil program, while attracting large national and multinational companies of the sector (INSTITUTO PEABIRU, 2013; MARTINS, 2010).

Impact of the behavior of agents: the presence of targeted public policies and large corporations presses the land market, leading medium and large landowners to invest in this activity. As cleared areas are recommended for planting oil palm, this activity occupies certain areas that were previously used as degraded grazing areas. And even if not directly entailing deforestation, the planting of oil palm leads to a transfer of land, creating a demand for new cattle ranching areas. These agents (medium and large landowners), now capitalized by the oil palm, seek the acquisition of new areas in the reference region. During the field survey, it was possible to identify cases of deforestation for the direct planting of oil palm.

Development Forecasts: the National Program of Palm Oil launched by the federal government in 2010 in Tomé-açu (near the reference region) aims at providing a set of public policies that guarantee the supply of raw materials for the production of Brazilian biodiesel. At the time, Pará

was already the largest palm producer in the country, with 80 hectares planted precisely in the regions of Rio Capim, Rio Guamá and Rio Tocantins. The outlook for the next 10 years is an increase of 20 to 30% in the importance of palm oil for the region.

Measures to be implemented: incorporate and strengthen sustainability and low-impact techniques in the cultivation of oil palm by supporting the creation of sustainability indicators and producer organizations.

- **Production of soybeans and maize**

Brief description: considering the dynamics of the reference region - in the Arc of Deforestation, the demand for agricultural commodities (mainly maize and soybeans) results in deforestation. In recent years, the state of Pará has become a major producer. In the case of soybean, three different producing hubs are already recognized in the state: Paragominas, Santarém and Redenção. The Paragominas hub incorporates much of the production from the Project's reference region. And for the year 2013, for example, the cities of Tailândia and Abaetetuba are already considered soybeans planting micro-regions (G1, Pará).

Impact of the behavior of agents: the form of land use for the production of grains, mainly maize and soybeans, occurs similarly to that used for palm oil production. Although plantations occur in cleared areas, they normally do not directly cause deforestation, but will push and take over grazing areas. This dynamic stimulates cattle ranching to deforest new areas.

Development Forecasts: with the increased availability of cleared areas (usually originating from grazing areas and secondary growths), as well as access infrastructure and drainage, and corporate, financial and government incentives, a significant increase in areas planted with grains is expected (INSTITUTO PEABIRU, 2013).

Measures to be implemented: similarly to the measures proposed for the oil palm, the Project is expected to support the creation of sustainability indicators and promote sustainable, low-impact techniques.

Variables that explain the location of deforestation

A total of 10 variables were analyzed to identify which are the most influential on the location of deforestation in areas converted between 2000 and 2010 (**Chart 3**). The method used to estimate the importance of variables was developed by Sangermano et al (2010) comparing standard deviation of independent variables inside and outside deforestation areas. The result was a value ranging between 0 and 1 (Relevance Weight) in which values close to one (01) present high importance. By analyzing **Chart 3**, it could be noted that the location of deforestation is more strongly associated with the proximity of old deforestation, rivers, roads, communities and elevation.

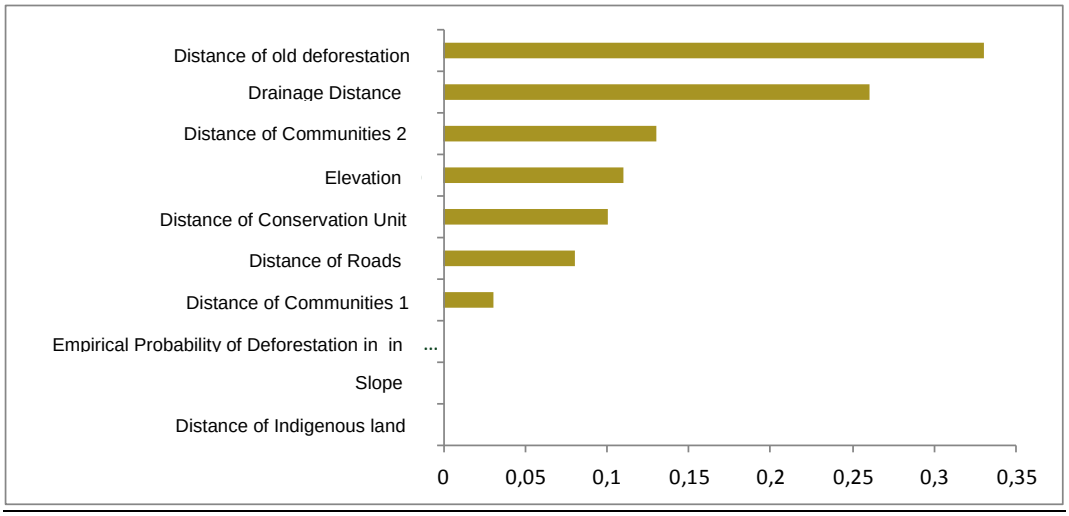


Chart 3. Relevance weights of independent variables regarding the location of new deforestations.

Underlying causes of deforestation

As observed by Geist and Lambin (2002), the deforestation of tropical forest is a complex phenomenon that occurs in several regions of the planet and its underlying causes stem from several factors acting directly and indirectly. In the Brazilian Amazon, the initial causes of deforestation are connected to occupation policies and infrastructure investments started in the 60s. As a result of these policies, that which is known as the first phase of colonization occurred, identified by the installation of large projects supported by the Brazilian government, such as the opening of roads, colonization projects, and agricultural projects, as Fazenda Maísa. But recently, it is possible to note another phase in progress, which regards the use of the land in the region, where government occupancy incentives have been replaced by agricultural activities and cattle ranching (CGEE, 2011), especially in areas of agricultural frontier, and within the Arc of Deforestation.

The Project area is located in a context of nearly total absence of public policies, thus, the main underlying causes of deforestation are related to land tenure insecurity (action of "logless" groups, agricultural activities to establish land tenure, and land grabbing); absence of public policies for sustainable land use (lack of rural technical support); weak law enforcement (agricultural/livestock production and forest exploitation with no respect for the laws); and governance of environmental issues (e.g., specific control actions, reduction of the legal reserve area from 80% to 50%). For the region of the Arc of Deforestation, forest degradation due to illegal logging for sawmill and charcoal production is also considered one of the underlying causes of deforestation (INSTITUTO PEABIRU 2013).

This set of causes results in different forms of forest exploitation and degradation, which contributed significantly to the deforestation carried out by the agents in recent years. As noted by INSTITUTO PEABIRU, 2013, the current structures of governance, especially at the municipal level, have shown weaknesses in defining clear, efficient and effective policies for conservation, sustainable development and fighting deforestation. As a result, these underlying causes of deforestation tend to remain as noted in recent years, if specific actions are not implemented to promote sustainable alternatives, or if property monitoring is not intensified to curb invasions of forest properties, such as Fazenda Maísa.

The Project is expected to implement measures with the involvement of government agencies to strengthen existing organizations and associations, and empowerment workshops to spread best social, environmental, economic and financial practices.

Analysis of chain of events leading to deforestation

Based on this framework of absence of governmental strategies for the conservation and sustainable development, the reference region has a complex chain of events, typical of the "Arc of Deforestation", which shows a pattern of continuous and predatory exploitation, always pushing deforestation to new areas and leaving huge social and environmental liabilities.

This chain starts with the entry of capitalized illegal loggers, using financial incentives or violence to lure small producers toward land squatting and predatory exploitation to obtain hardwood for the construction market. Along with this material, the least valuable timber is used for illegal charcoal production. After this cycle of forest degradation, the squatted land is deforested for the production of white crops or grazing areas. These so-called "squatters" or "logless" can stay in the region for a few years, developing small-scale farming activities in a "slash and burn" system. Without any assistance or sustainable production techniques, these small producers sell their land to medium and large producers historically linked to extensive livestock activities, often officializing the possession through "land grabbing" actions.

This medium and large producer clears new areas acquired for grazing to consolidate ownership and set property boundaries. More recently, these old grazing areas were turned in other land uses, targeting agricultural commodities (palm oil, maize, soybeans). These new activities re-capitalize this agent of deforestation, which keeps acquiring more land, in most cases, from small farmers.

Conclusion

Based on this information, on the data analyzed and on the opinion of experts from Imazon and Instituto Peabiru, it was possible to find conclusive evidence to explain the relationship between agents, drivers, underlying causes and the history of deforestation that has occurred in the reference region. The main hypothesis, in which the relationship among agents, drivers, underlying causes identified here, in conjunction with the reduced forest protection imposed by the new forest code and implementation of new infrastructures for the region (INSTITUTO PEABIRU, 2013), suggests that the future trend for the baseline estimate will show an increase in the rate of deforestation within the reference region.

Step 4 VM0015 - Projection of future deforestation

Projection of the Amount of Future Deforestation (Step 4.1)

The reference region has no stratified limits, because the agents, drivers and causes of deforestation were considered the same throughout its entire area.

Selection of Baseline Approach

A distinct analysis on the deforestation rates measured in the historical reference period does not show a clear trend toward increase, decrease or maintenance (Chart 2). As noted in Step 3.4 (chain of events),

this variation in the rate of deforestation between the sub-periods is the result of a complex interaction of multiple factors that act directly and indirectly.

As the conclusions obtained from the analysis of the relationship between the rate of historical deforestation, agents, drivers and underlying causes (Step 3) have indicated that there may be an increase in the rate of deforestation in the reference region, the historical approach "a" (historical average) was selected for projecting deforestation, because there is no single variable that can be used to model the future rate of deforestation in view of a given driver of deforestation (approach "c" - modeling).

Annual projection of baseline deforestation areas in the reference region

The annual baseline deforestation at year *t* for the reference region was calculated as indicated in equation 04 presented in Puyravaud (2003):

$$ABSLRR_{i.t} = Atn - Atn * e^{rt}$$

Where:

$ABSLRR_{i.t}$: Annual area of baseline deforestation in stratum *i* within the reference region at year *t*; (ha yr^{-1})

Atn: Area with forest cover in stratum *i* within the reference region at time n; (ha)

r: Deforestation rate applicable to stratum *i* within the reference region. (%)

t: Time interval (tn-tn-1).

The deforestation rate observed between 2000 and 2011 was calculated according to equation 07 given in Puyravaud (2003), and the obtained value was 2.12%. The deforestation caused by the Project for the 30-year period (2012-2041) in the reference region is shown in Table 18.

Annual projection of baseline deforestation areas in the project area and leakage belt

The baseline deforestation for the Project Area and the Leakage Belt was spatially designed for the entire reference region, as recommended in step 4.2.4 of Methodology VM0015.

Summary of the quantitative deforestation projection

The values of future deforestation projected for the period of 2011-2040 in the reference region (Table 18), the Project area (Table 19) and the leakage belt (Table 20), are presented in this section.

Table 18. Annual and accumulated deforestation in the Reference Region until 2041 (table 9.a of the VM0015 methodology).

Project year *t*	Stratum *i* in the reference region	Total	
	1	annual	cumulative
	$ABSLRR_{i,t}$	$ABSLRR_t$	ABSLRR
	ha	ha	ha
2012	6,510	6,510	6,510
2013	6,373	6,373	12,883
2014	6,240	6,240	19,123
2015	6,109	6,109	25,232
2016	5,980	5,980	31,212
2017	5,855	5,855	37,067
2018	5,732	5,732	42,799
2019	5,612	5,612	48,410
2020	5,494	5,494	53,904
2021	5,378	5,378	59,282
2022	5,265	5,265	64,548
2023	5,155	5,155	69,703
2024	5,047	5,047	74,749
2025	4,941	4,941	79,690
2026	4,837	4,837	84,527
2027	4,735	4,735	89,263
2028	4,636	4,636	93,899
2029	4,539	4,539	98,437
2030	4,443	4,443	102,881
2031	4,350	4,350	107,231
2032	4,259	4,259	111,490
2033	4,169	4,169	115,659
2034	4,082	4,082	119,741
2035	3,996	3,996	123,737
2036	3,912	3,912	127,650
2037	3,830	3,830	131,480
2038	3,750	3,750	135,230
2039	3,671	3,671	138,901
2040	3,594	3,594	142,495
2041	3,519	3,519	146,013

Table 19. Annual and accumulated deforestation in the project area until 2041 (table 9.b of VM0015 methodology).

Project year *t*	Stratum i of the reference region in the project area	Total	
	1	annual	Cumulative
	$ABSLPA_{i,t}$	$ABSLPA_t$	ABSLPA
	ha	ha	ha
2012	213	213	213
2013	257	257	470
2014	242	242	712
2015	286	286	998
2016	329	329	1,327
2017	370	370	1,697
2018	252	252	1,949
2019	226	226	2,175
2020	181	181	2,356
2021	198	198	2,554
2022	164	164	2,718
2023	156	156	2,874
2024	190	190	3,064
2025	163	163	3,227
2026	171	171	3,398
2027	172	172	3,570
2028	162	162	3,732
2029	146	146	3,878
2030	215	215	4,093
2031	199	199	4,292
2032	149	149	4,441
2033	171	171	4,612
2034	252	252	4,864
2035	177	177	5,041
2036	122	122	5,163
2037	269	269	5,432
2038	161	161	5,593
2039	172	172	5,765
2040	230	230	5,995
2041	108	108	6,103

Table 20. Annual and accumulated deforestation in the Leakage Belt until 2041 (table 9.c of the VM0015 methodology).

Project year *t*	Stratum i of the reference region in leakage belt	Total	
	1	annual	Cumulative
	$ABSLLK_{i,t}$	$ABSLLK_t$	ABSLLK
	ha	ha	ha
2012	1,121	1,121	1,121
2013	1,012	1,012	2,133
2014	855	855	2,988
2015	845	845	3,833
2016	965	965	4,798
2017	923	923	5,721
2018	673	673	6,394
2019	651	651	7,045
2020	543	543	7,588
2021	500	500	8,088
2022	444	444	8,532
2023	450	450	8,982
2024	407	407	9,389
2025	436	436	9,825
2026	390	390	10,215
2027	413	413	10,628
2028	375	375	11,003
2029	395	395	11,398
2030	402	402	11,800
2031	400	400	12,200
2032	422	422	12,622
2033	388	388	13,010
2034	383	383	13,393
2035	440	440	13,833
2036	414	414	14,247
2037	363	363	14,610
2038	426	426	15,036
2039	428	428	15,464
2040	352	352	15,816
2041	387	387	16,203

Projection of the Location of Future Deforestation (Step 4.2)

To determine the location of the baseline deforestation, the Land Change Modeler (LCM) was used, which consists of a choice of spatial modeling for land use available on the IDRISI Selva software. As indicated by the VM0015 (Step 4.2), the LCM is an appropriate model for the baseline modeling of REDD+ projects. The LCM was chosen for the following reasons: it is a model available in scientific publications of Eastman et al (2005), Fuller et al, 2011 and Sangermano (2010); it has a transparent process for the input and output of data and processed parameters; it incorporates the use of appropriate data to explain the location of deforestation, as per the literature related to the subject (BARRETO et al, 2011; SANGERMANO et al) and it is fitted with the appropriate tools for assessing uncertainties (PONTIUS & SCHNEIDER, 2001).

Figure 12 shows the flowchart used to perform the spatial distribution of future deforestation for the REDD+ Maísa Project. The main steps were: (I) definition of model assumptions; (Ii) organization of spatial and non-spatial database; (Iii) calibration and validation of the model; (Iv) development of scenarios. This project used a pixel size of 100 m x 100 m, IDRISI format, with 1,625 rows by 2,101 columns.

Preparation of factor maps

This step was performed using the empirical approach. Several studies show that distance maps of spatial landscape attributes (distance of roads, rivers, settlements, old deforestation, among others) present increased correction with the location of new deforestation areas. The main assumption presented by this approach was that deforestation tends to occur in areas closer to the deforestation drivers variable. For example, deforestation is more likely to occur close to a road than in a more distant region. The method used was the "Relevance Weight" (IDRISI Selva), described in step 3.

Using the DISTANCE algorithm of the IDRISI Selva software, distance maps were produced for spatial attributes that represent the deforestation drivers variable in the reference region. For the categorical variable representing private properties (provisional CAR), the Empirical Likelihood algorithm (IDRISI Selva) was used to assess the influence this factor had on the deforestation that has occurred in the reference region.

All input and output data of the model were digitally organized on IDRISI Selva. The factor maps used in this project are shown in Table 21 (Table 10 of VM0015).

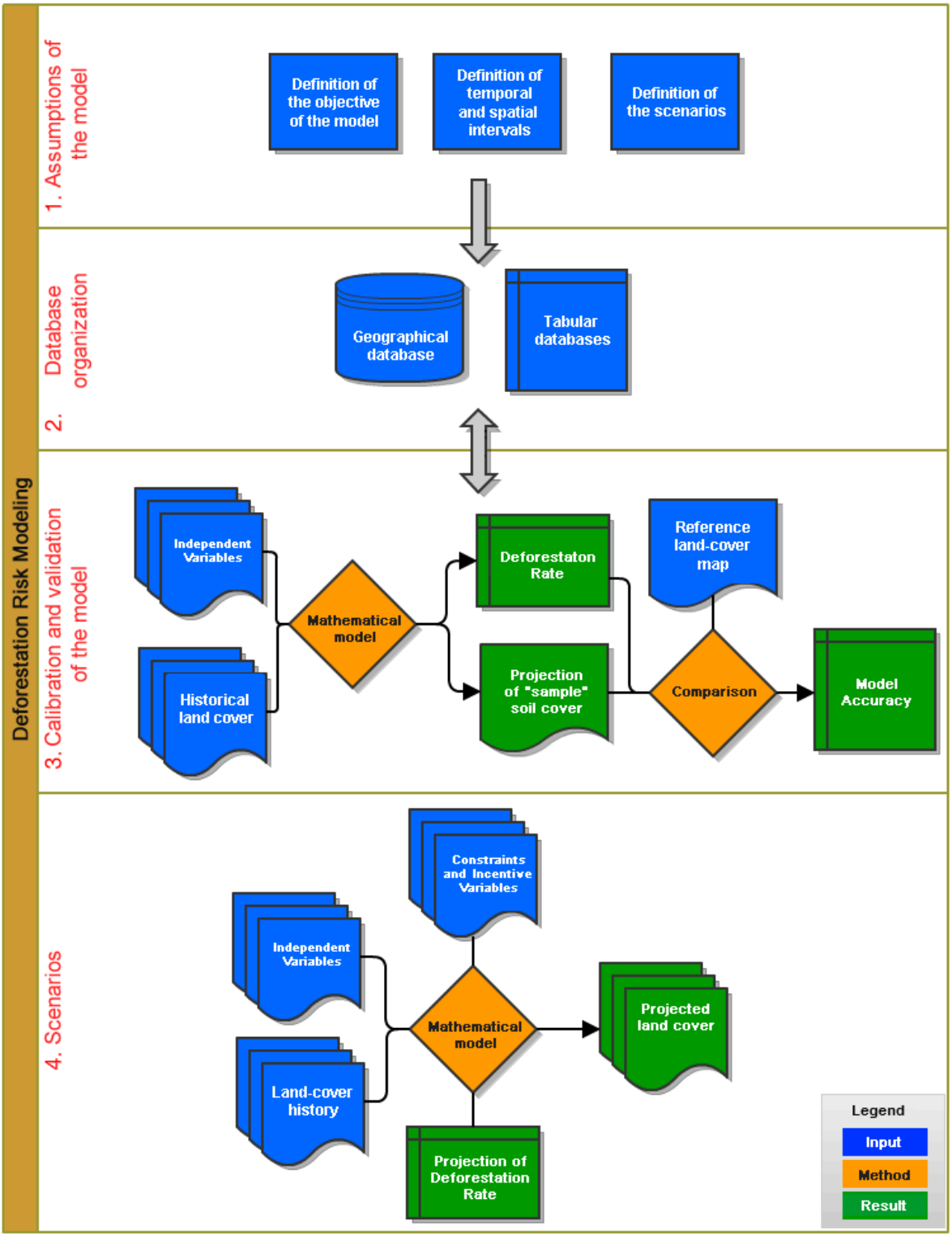


Figure 12. Flowchart of the model used for the deforestation projection.

Table 21. List of maps, variables and factor maps (Table 10 of the VM0015).

Factor Maps		Source	Variable represented		Meaning of the categories or pixel value		Other Maps and Variables used to create the factor Map		Algorithm or Equation used	Comments
ID	File Name		Unit	Description	Range	Meaning	ID	File Name		
1	dst_dsm_sub	INPE	meters	Distance old deforestation	0-6313	Values close to 0 are closer to the deforestation		Deforestation:	Distance (IDRISI Selva 17.00)	
2	dst_estrada_sub	Imazon	meters	Distance roads	0-10045	Values close to 0 are closer to the roads		Roads		
3	dst_gps_socioeconomia_sub	Field research	-	Distance communities in the reference region	0-76529	Values close to 0 are the closest to the communities		Communities		
4	dst_terra_indigena_sub	FUNAI	meters	Distance indigenous lands	0-57239	Values close to 0 are closer to the indigenous lands		Indigenous lands		
5	elevacao_sub	NASA	meters	Mean elevation	0-108	Change in elevation from mean sea level		elevacao_sub	-	
6	elevacao_declividade_sub	NASA	Degrees	Declivity	0-18	Average slope			Slope (IDRISI Selva 17.00)	
7	ev_0005_car_prov_sub	SEMA	-	Empirical Likelihood of deforestation in Medium and Large properties	0-1	Empirical Likelihood of deforestation occurrence in private properties		Provisional CAR	Empirical Likelihood (IDRISI Selva 17.00)	
8	dst_ibge_socioeconomico_sub	IBGE	meters	Distance communities in the reference region	0-20769	Values close to 0 are the closest to the communities		IBGE locations	Distance (IDRISI Selva 17.00)	
9	dst_uc_sub	IcmBio	meters	Distance conservation units	0-107836	Values close to 0 are closer to the conservation units		Conservation Units		
10	dst_drenagem_sub	IBGE	meters	Distance hydrography	0-4242	Values close to 0 are closer to the rivers		Hydrography		
11	mask_incentive_dstClass2	Eco-lógica	-	Mask Legal Reserve	0-2	Values close to 0 show less risk of clearing the forest in legal reserve		Provisional CAR	Empirical Likelihood; Distance (IDRISI Selva 17.00)	
12	mask_incentivo_PA151_final	Eco-lógica	-	Mask PA 151 and main side roads	0-2	Values close to 0 show less risk of clearing forests located close to the PA 151 and main side roads		Roads	Distance (IDRISI Selva 17.00)	

Preparation of deforestation risk maps

The deforestation risk maps show the regions that are most susceptible (risk = 1) or less susceptible (risk = 0) to deforestation. The risk maps were prepared using the Land Change Modeler (LCM) module available on IDRISI Selva, considering all variables presented in Table 21. IDRISI Selva has an algorithm called SimWeight to calibrate the model (SANGERMANO et al., 2010). SimWeight stands for Similarity Weight and uses logic K of closer neighborhood to identify the relevance of each variable considered as a deforestation driver to forecast the locations with potential to change from forest to anthropic vegetation. The logic used by SimWeight consists initially of an analysis of the relevance of each variable for the occurrence of deforestation, calculating the importance weight of the variable through equation 1.

Equation 1: Formula to calculate the Importance Weight of independent variables (PI):

PI = 1-(DPmudança/DPAreaEstudo)

Where:

PI = Importance weight

DPmudança = Standard deviation of the variable driver in the cells/pixels of change

DPAreaEstudo = Standard deviation of the variable driver in the cells/pixels of the entire area of study

After that, SimWeight calculates the deforestation risk by combining the change and persistence cells. For such, only the information on variables with PI above 0.1 were used. This information was combined by the following formula adapted from Sangermano et al. (2010).

Equation 2. Formula to calculate Deforestation Risk:

$$RiscoDesm = \frac{\sum_{i=1}^{c}\left(1.0 - \frac{1}{1+e^{\frac{1}{d_i}}}\right)}{k}; (c \leq k) \quad (2)$$

Where:

RiscoDesm = change occurrence risk value varying from 0 (low) to 1 (high)

c = number of cells/pixels of change

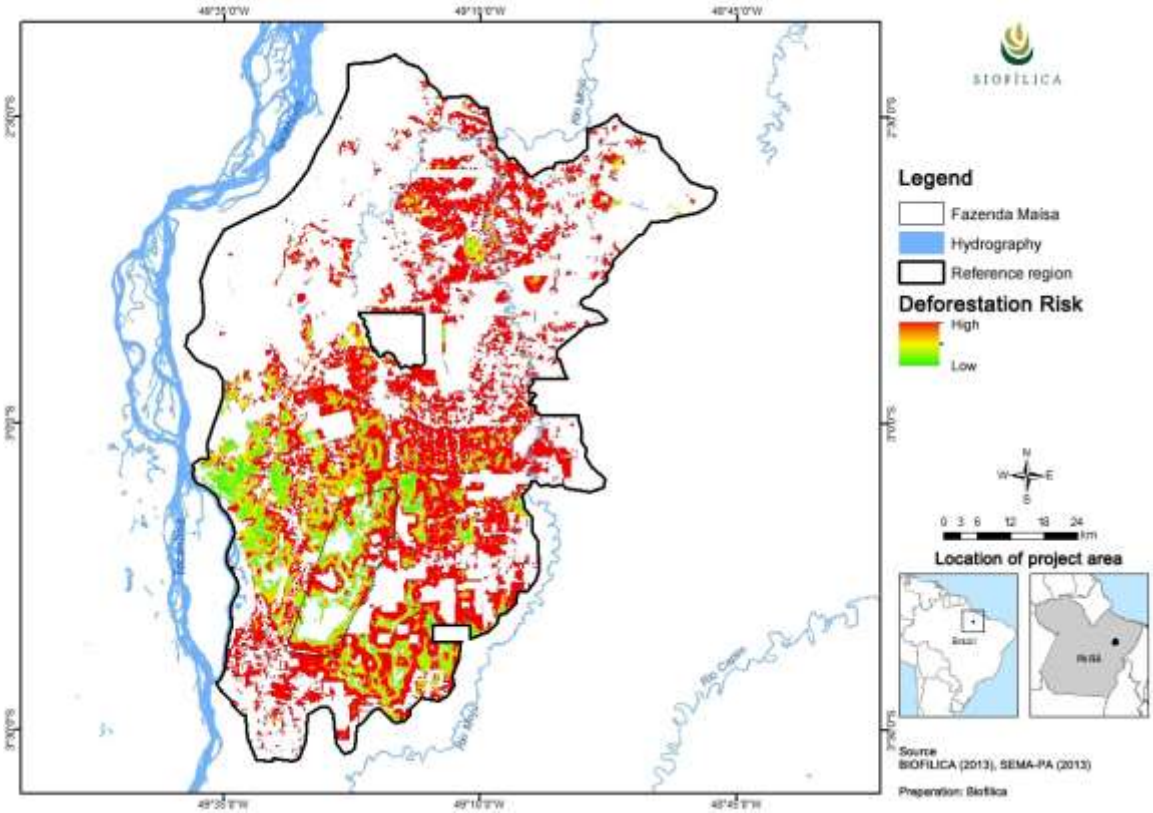
d = distance in cells/pixels between change pixels

i = change pixel identifier

k = distance in cells/pixels from the neighbors closer to the change pixel

The importance weight of the factors variables 1 to 10, of Table 21 were calculated using Equation 1(**Chart 3** - step 3 Relevance Weight chart). The results indicate that the less important variables (weight = 0) to represent the dynamics of deforestation in the reference region were: Empirical probability of deforestation on private property, Slope and Distance of Indigenous Lands. These variables were not used to produce the trend risk map.

The factors variables number 11 and 12 were used to identify areas that pose higher risk of baseline deforestation in areas close to the PA 151 highway and on private properties with excess legal reserve (>50%). These data were combined with the trend risk map to outline future deforestation in the reference region (**Map 15**). In conjunction with the dynamic variable "old deforestation", this deforestation risk map was the starting point to outline the deforestation rate calculated in step 4.1.



Map 15. Risk of deforestation projected for the Reference Region (2011-2041).

Selection of the most accurate deforestation risk map

In order to confirm the quality of the model generated, Option A was chosen – calibration and confirmation using two historical sub-periods – available in the VM0015 methodology, version 1.1 (page 53). The data from the deforestation that has occurred between 2000 and 2005 was used to calibrate the model, while the map of deforestation that has occurred until 2011 was used for the confirmation process. In this process, a deforestation map was simulated for the year 2011 based on data observed from 2000 to 2005.

IDRISI Selva's LCM module generates two simulation maps: the Hard Map and the Soft Map. The Hard Map consists of an estimate of the cell designing model (pixel) with greater probability of undergoing changes between the "Forest" class to the "Anthropic Vegetation in Equilibrium" class, in 2011 (Deforestation). The values in this map are categorical, representing a single class (e.g.: 1 = Forest; 2 = Non-Forest Vegetation; 3 = Hydrography; 4 = Anthropic Vegetation in Equilibrium). The Soft Map, is a deforestation risk map with continuous values indicating the areas of higher or lower risk of deforestation, the values vary from 0 (lower risk) to 1 (higher risk).

The Figure of Merit (FOM) technique was applied to assess the accuracy of map simulated in 2011. The FOM is the ratio of intersection of observed changes (changes between the reference map at time 1 and time 2) and simulated changes (changes between the reference map at time 1 and the reference map at time 2) for combining the observed change and the predicted variation, as defined in equation 9 of VM0015, version 1.1.

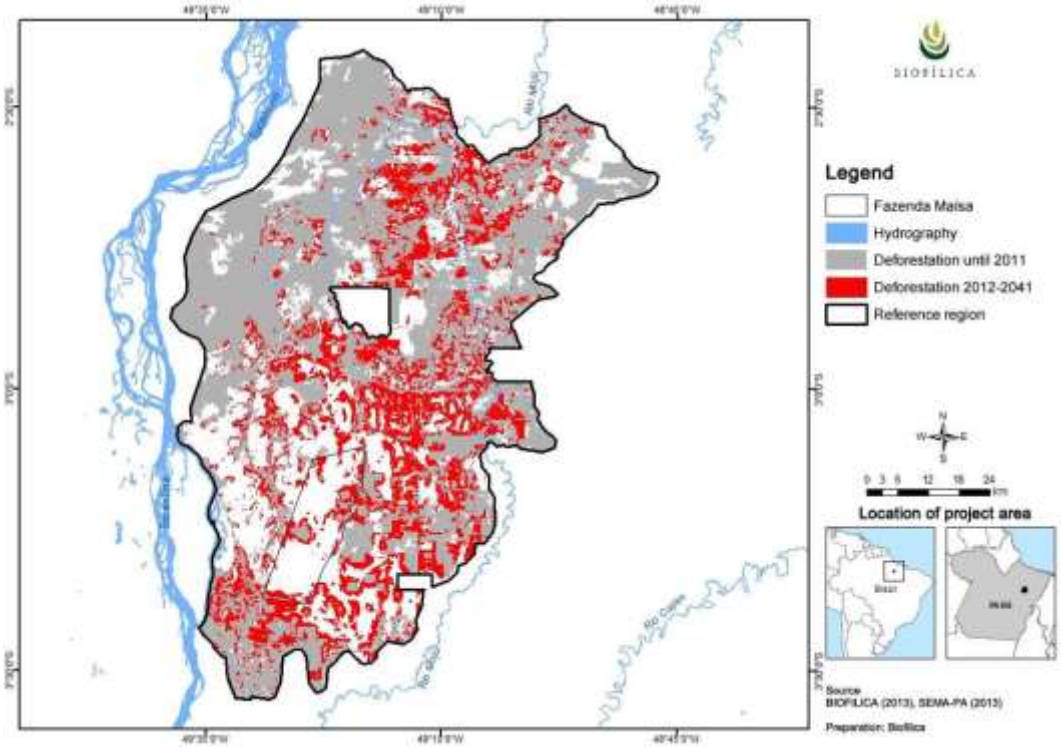
The VM0015 version 1.1 indicates that the minimum threshold for the best fit as measured by the FOM shall be defined by the net change observed in the reference region for the model's calibration period. The net change observed should be calculated as the total area of change being modeled in the reference region during the calibration period as a percentage of the total area of the reference region, and the FOM value should at least be equal to this value. If the FOM value is below this threshold, the project proponent must demonstrate that at least three models have been tested (resulting at least in three risk maps), and that the one with the best FOM was used.

The threshold value of net changes observed in the reference region was 0.08, and the FOM obtained by applying equation 9 of the VM0015, version 1.1, was 0.15. As the FOM for the first risk map produced is above the minimum threshold, it was not necessary to create other two templates to perform the allocation of future deforestation (Step 4.2.4 of VM0015 version 1.1).

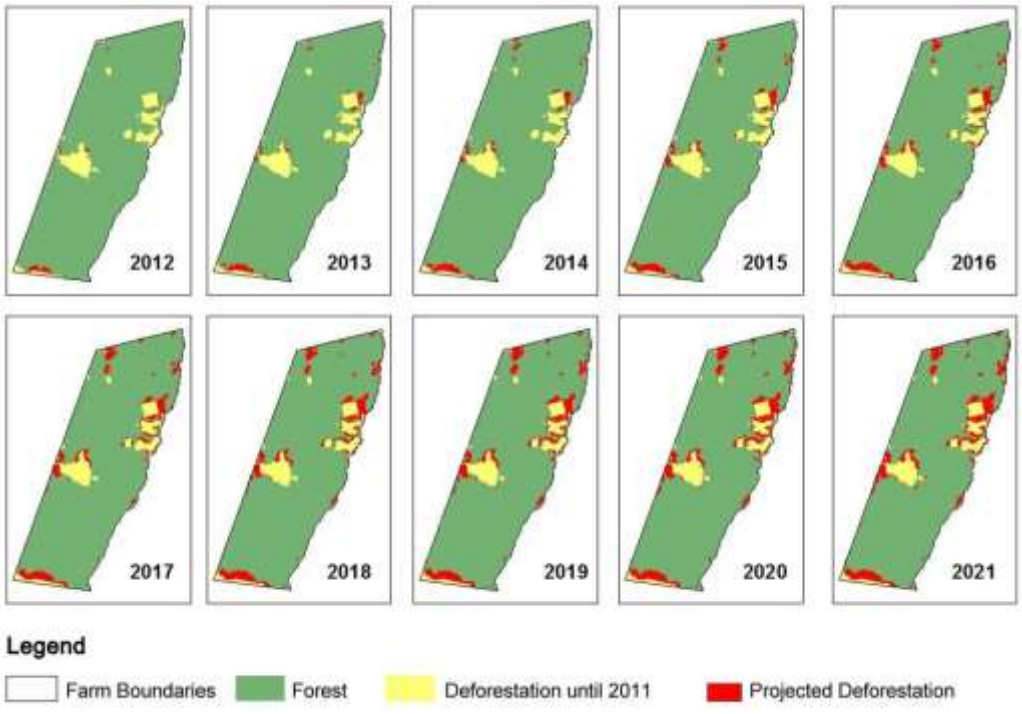
Thus, the deforestation risk map developed at this stage showed statistically acceptable accuracy for projecting land-use changes until 2041 in the reference region of the REDD+ Fazenda Maísa project.

Mapping of the locations of future deforestation

The procedure for selecting the pixels with highest risk of deforestation and for preparing the baseline maps of future deforestation were automatically executed (programmed on IDRISI) by LCM. Thus, by using IDRISI Selva's LCM module, the mapping of future deforestation until 2041 has been projected for the entire reference region (**Map 16**). After the completion of Step 4,2,4, the maps projecting future deforestation in the Reference Region were overlaid in IDRISI with the limits of the Project Area and the Leakage Belt in order to quantify deforestation (Tables 9b and 9c of VM0015, version 1.1). **Map 17** shows deforestation in the Project Area for the first fixed baseline period.



Map 16. Baseline deforestation in the Reference Region for the year 2041.



Map 17. Map of annual baseline deforestation in the Project Area until the year 2021.

4.6 Additionality (G2)

Project Additionality was analyzed according to the tool approved by the VCS "VT0001 - Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities", version 3.0, of February 1, 2012.

The conditions for the applicability of the tool are met because:

- The AFOLU activities are equal or similar to the proposed Project activities, within their respective limits, registered or not as a VCS AFOLU Project, and do not lead to a breach of any applicable law, even if that law is not enforced; and
- The VM0015 baseline methodology provides a stepwise approach to justify the determination of the most probable baseline scenario (see “Part 2 - Methodology steps for ex-ante estimation of GHG emissions reductions” of VM0015).

Step 1. Identification of land use scenarios as an alternative to those proposed by the VCS AFOLU project activity

Sub-step 1a. – Identify credible alternative land use scenarios to the proposed VCS AFOLU project activities

Among the realistic and credible scenarios for the land use to take place within the limits of the Project, in the absence of the AFOLU Project activity registered in the VCS, the following have been considered:

(I) Continuance of land use before the Project (baseline scenario):

In this scenario, deforestation, in its essence, continues to be caused by the illegal extraction for timber and charcoal carried out by squatters and small farmers ("logless"); the latter within a context with no public policies, being funded and encouraged by illegal loggers. At short and medium term after the squatting and illegal deforestation, most of the areas invaded and exploited illegally receive extensive cattle ranching activities. This situation tends to worsen as the current demand for other commodities are on the rise in the region, such as the oil palm, soybeans and maize, with devastating perspectives for the forest areas (INSTITUTO PEABIRU, 2013).

In this scenario, there is a great social burden in the project region. That's because this chain of events ends up causing deforestation and enhancing a number of social problems related to violence and marginalization, for instance. And as to biodiversity, the deforestation in the project area would represent a great loss at landscape level for the reference region. One of the studies conducted by the project pointed the importance of the project area as shelter and reproduction place of animal groups that contribute significantly to the food safety of the surrounding communities.

Moreover, without the extra investment of the proposed project activities for the closer monitoring of good practices and processes for sustainable forest management and reduced impact exploitation, there is no control or guarantee that the carbon stocks will not degrade in the long term, and consequently of the project's economic sustainability, for example, due to reduced natural regeneration rates that imply a smaller stock of exploitable timber for the next cycles. The degradation of carbon stocks would cause negative implications to the climate and provide low economic sustainability for the enterprise, and with a fragile economic viability, there is an increased risk of deforestation in the project area.

Between the years 2000 and 2011, in this context, there was a deforestation of approximately 96 hectares for the project's reference region, representing 24% of the remaining forest in 2000, (See Section 2, Item 2.4, Part 2 - Step 4) (BRANDAO JR. et al. 2013).

(ii) Project activity without registration as a VCS AFOLU Project:

The project activities would sum the already developed sustainable forest management activities and the reduced impact practices, with additional deforestation containment and monitoring activities, exploration and investment in new business alternatives (synergistic to the maintenance of the vegetation cover) and the implementation of activities focused on the socio-economic development and conservation of biodiversity within the farm and in the surrounding communities.

This would require considerable additional investment in addition to the investments strictly necessary for sustainable forest management in the project region. Currently, even considering only the investments needed for the development of sustainable forest management in the Amazon, the activity is already deemed as relative risk and low profitability due to different issues and barriers, such as: the complexity of operations and processes, bureaucratic barriers, wood value fluctuation and difficulty in flowing certified timber at regional and national markets. Disbursements for off-management factors (additional activities proposed by the REDD+) would further reduce the economic viability of the project.

Not considering the additional revenue resulting from the sale of VCS credits in this scenario, its economic viability is compromised in the medium and long run (see Step 2). With the economic viability of the project in check, the activities responsible for the additional benefits to the biodiversity and the communities would tend to fail over time, as many are not vital to the project and, thus, would reduce the net positive impacts and co-benefits of the project for the region.

These scenarios were constructed based on renowned scientific literature on sustainable forest management in the Brazilian Amazon and the usual dynamics of deforestation (PORTER-BOLLAND, 2012; VERÍSSIMO et al., 1992; HOLMES, et al., 2002 apud SABOGAL, et al., 2006; PUTZ, et al., 2008; SPATHELF, et al, 2004 and complemented with studies developed specifically for the design of this intervention, for example, in partnership with Instituto Peabiru.

Sub-step 1b. – **Credible land use scenarios consistent with applicable laws and regulations**

Among the proposed scenarios, scenario (ii) is in compliance with all applicable legal and regulatory requirements and only the practices contained in scenario (i) are not compliant with the mandatory laws and regulations.

This happens because the illegal or unauthorized deforestation occurs systematically and is widespread within the legal Amazon, especially in the project area located in the "Arc of Deforestation". According to Higuchi, et al (2009) 1997-2003, the authorized/unauthorized deforestation rate was 19%, that is, 81% of deforestation areas were not authorized by suitable government agencies. This same pattern is noted in the state of Pará.

A recent study conducted by Instituto do Homem e Meio Ambiente (Imazon 2013) reported that, for the years 2011-2012, 78% of logging activities were not authorized and, from these 78%, most (67%) were located within private, unclaimed or disputed areas. This finding corroborates previous studies by the same institute that have identified "private, unused and unclaimed" land categories as key stages of illegal/unauthorized deforestation.

The difficulties of government agencies to enforce the law will go from issues at federal and state level to problems with corruption, bureaucracy and lack of human and financial resources for monitoring. Nevertheless, even in cases in which the offenders are identified, there is a high degree of impunity, to mention one example, according to the report of the Brazilian Court of Audit (TCU), less than 0.6% of fines imposed by IBAMA are effectively collected. (BARRETO & SOUZA JR, 2002; BARRETO, 2006; ARAUJO & BARRETO, 2010; HUMMEL, et al., 2010)

Sub-step 1c. – **Selection of the baseline scenario**

Described in Section 4 - Application of Methodology, Item 2.4 of Baseline Scenario.

Step 2. Investment Analysis

Sub-step 2a. – Determining the appropriate analysis method

As the Project generates financial benefits besides the revenue related to credits registered in the VCS through the trade of tropical wood, an investment comparative analysis (Option II) of the alternative scenarios was used to determine Project additionality. Scenarios (i) and (ii) have been analyzed.

Sub-step 2b. – Option II. Applying investment comparative analysis

The Net Present Value (NPV) has been selected as a financial indicator for the comparative analysis of alternative scenarios. The NPV is one of the methods mostly used by companies to assess projects and it has the following advantages over other indicators: (i) takes into consideration the time value of money; (ii) the NPV can be added; and (iii) they depend only on the cash flow and cost of capital (LEMES JÚNIOR, 2005).

Sub-step 2c. – Calculation and comparison of financial indicators

The summary of revenue and expenses sources considered in the analysis are presented in Table 22 and Table 23. See Section 2.2 - Description of Project Activities for detailed description of sustainable forest management (scenarios i and ii) and additional activities proposed to contain/monitor unplanned deforestation and generate net benefits to the climate, communities and biodiversity.

Table 22. Summary of the revenue and expenses sources considered in the investment comparative analysis.

Scenario	Revenues	Expenses
(I) Sustainable Forest Management **without** complementary activities to contain/monitor unplanned deforestation and **without** additional activities to benefit the climate, community and biodiversity.	Sale of tropical timber from sustainable forest management.	Sustainable Forest Management
(ii) Sustainable Forest Management **with** complementary activities to contain/monitor unplanned deforestation and **with** additional activities to benefit the climate, community and biodiversity.	Sale of tropical timber from sustainable forest management.	Sustainable Forest Management **+** Additional activities to contain/monitor unplanned deforestation and to benefit the climate, community and biodiversity.

Table 23. Assumptions used to determine the project's cash flow.

Activity	Cash flow	Item	Values	Period	Remarks
Sustainable Forest Management	Revenues	Hardwood volume (m_3)	9,000	2013 - 2019	The sustainable forest management is in operation since 2002 and the management plan is valid until 2019, upon the exploitation of the last Annual Production Unit (unit 17), finishing, at first, its operating cycle and related revenues.
		Hardwood price (R$/$m^3$)	360	2013 - 2019	
		Mixed wood volume (m^3)	10,000	2013 - 2019	
		Mixed wood price (R$/$m^3$)	255	2013 - 2019	
	Costs	Fixed Costs	53% of the historical average of the last 2 years	2013 - 2019	Costs associated with sustainable forest management and reduced-impact harvesting.
		Variable Costs	47% of the historical average of the past two years	2013 - 2019	
	Expenses	Sales, General & Administrative (R$/year)	R$ 3,1 million	2014 - 2019	Maintenance of office and administrative headquarters
		Sales, General & Administrative (R$/year)	R$ 240,000	2020 - 2041	
	Taxes	Sales taxes (% of gross revenues)	14%	2014 - 2040	Taxes on gross revenues
	Deferred expenses	Pre-operational investments	R$ 403,000	2013 - 2022	Pre-operational investments are being deferred until 2022
REDD+	Expenses	Personnel costs (R$/year)	R$ 30,000	2013 - 2041	Initial planning of activities, continuous and adaptive management and monitoring
		Biodiversity and research (R$/year)	R$ 80,000	2013 - 2041	Internal check on the progress of activities and results, contribution to monitoring/surveys on flora and fauna, in conjunction with education and research institutions as well as workshops for knowledge dissemination.
		Social Activities (R$/year)	R$ 80,000	2013 - 2041	Constant engagement of stakeholders to review the planning and coordinate activities, including logistical expenses.
		Monitoring of vegetation cover and accreditation (R$/year)	R$ 93,000	2013 - 2041	Initialization meetings and workshops, purchase of satellite images, field checks, monitoring of carbon stocks, calculations of reduced emissions, preparation of reports, input and follow up of validation/verification processes (VCS and CCB)

The free cash flow scenarios and comparative analysis took into account the NPV revenue and expenses sources set out in Table 21, the assumptions described in Table 22 and also a discount rate of 20%. This discount rate reflects the critical management parameter of Biofílica Investimentos Ambientais to determine the continuation with a new project/investment.

A conservative analysis until the year 2041 showed a negative NPV of R$ 3,750,953 for scenario (i), and a even more negative NPV of R$ 5,406,953 for scenario (ii). Thus, it is evident that additional forest management activities to contain/monitor deforestation and generate positive net benefits to the climate, community and biodiversity undermine the (already fragile) financial viability of the Project if no additional revenue is added, as that resulting from the commercialization of VCS.

Therefore, it is concluded that scenario (i) provides a better financial indicator and that the VCS AFOLU Project without the financial benefit of VCS credits is not considered the most financially attractive scenario.

Sub-step 2b. - Sensitivity Analysis

Table 24 presents critical assumptions of scenarios (i) and (ii) and their variations, deemed reasonable, used in the sensitivity analysis. Panorama 1 considered pessimistic variations and Panorama 2 optimistic variations. The baseline values are those considered for the comparative analysis of NPV in Sub-step 2c.

Table 24. Critical assumptions for scenarios (i) and (ii) and their variations used in the sensitivity analysis.

Scenario	Assumptions	Scenario	
		1 – Pessimistic	2 – Optimistic
(I) Sustainable Forest Management **without** complementary activities to contain/monitor unplanned deforestation and **without** additional activities to benefit the climate, community and biodiversity.	a. Harvesting Volume	80% of baseline	120% of baseline
	b. Price of wood	80% of baseline	120% of baseline
(ii) Sustainable Forest Management **with** complementary activities to contain/monitor unplanned deforestation and **with** additional activities to benefit the climate, community and biodiversity.	a. Harvesting Volume	80% of baseline	120% of baseline
	b. Average price of logs	80% of baseline	120% of baseline
	c. REDD+ Costs	120% of baseline	80% of baseline

In Panorama 1, both scenarios showed negative NPV, whereas, scenario (i) showed a negative NPV of R$ 6,918.851 and scenario (ii) R$ 8,574,851. In Panorama 2, scenario (i) showed a positive NPV of R$ 858,488 and scenario (ii) remained negative at R$ 797.496. In both Panoramas 1 (pessimistic) and 2 (optimistic) of critical assumptions variation, scenario (i) shows the best financial indicators.

The sensitivity analysis strengthens the conclusion that, without registration as a VCS AFOLU project and the revenue arising from the sales of credits, the REDD+ Maísa Project cannot be considered the most financially attractive scenario, even with reasonable variations in the critical assumptions.

The financial models used in the analyzes of Sub-steps 2c and 2d are available to the validating/verifying bodies.

Step 4. Common Practice Analysis

In order to supplement previous analyzes, similar initiatives were conducted on the project's reference area, including area, forest cover and activities performed (sustainable forest management), however, without the approach, activities and additional financial incentives of the REDD+.

Later this year (2013), a report was published on Jornal do Pará about the squatting and deforestation of a property with similar characteristics as Fazenda Maísa. The property was located in the municipality of Moju and 20 kilometers away from Tailândia and consisted of approximately 23 hectares, of which 16,000 were dedicated to sustainable forest management activities (duly licensed by IBAMA and with forest certification) and, in addition to a small portion of the forest, the remainder incorporated other land uses and the infrastructure improvements of the farm and staff.

The farm known as Fazenda Santa Marta was squatted in 2006 for illegal logging and charcoal production in an extremely violent event. Since then, the owner has been trying different legal means and coordination with the institutions responsible for the repossession and recovery of management activities. However, no final and official response has been provided by the government and the (three) attempts to integrate land tenure have been frustrated and very violent.

Through satellite images obtained for Fazenda Maísa's baseline study, Biofílica studied Fazenda Santa Marta's history of deforestation (coordinates) as from the year 2000 (chart 4). Fazenda Santa Marta, with management by Juruá Florestal Ltd, is registered under CAR # 566 and had a total of 20,986 hectares of forest. From 2000 to 2011, it showed a deforestation rate of 1.5% per year and an accumulated deforested area of 5,542 hectares. However, by observing Chart 4 , one realizes that much of this deforestation occurred mainly from the year of the invasion.

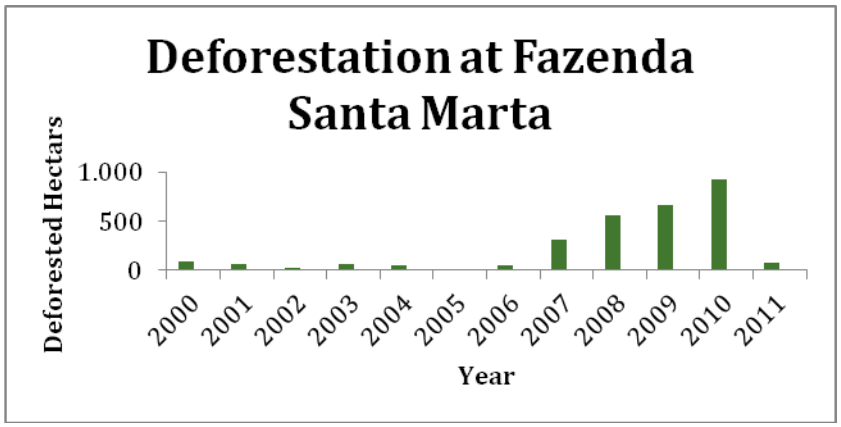


Chart 4. Common Practice Analysis

5 QUANTIFICATION OF GHG EMISSIONS REDUCTIONS AND REMOVALS (CLIMATE)

5.1 Project Scale and Estimated GHG Emissions Reductions and Removals

Table 25. Project scale

Project	X
Large project	

Table 26. Estimated GHG emissions reductions and removals.

Years	GHG removals and reduced emissions estimates (tCO2e)
2012	51,678.8
2013	65,449.9
2014	65,152.5
2015	79,741.9
2016	92,939.4
2017	109,049.4
2018	78,270.9
2019	72,865.7
2020	66,849.5
2021	73,000.1
2022	62,608.0
2023	59,670.6
2024	69,507.0
2025	60,791.8
2026	62,304.3
2027	61,512.7
2028	58,040.3
2029	52,836.6
2030	73,566.4
2031	68,808.4
2032	53,839.8
2033	60,472.2
2034	84,928.6
2035	62,676.7
2036	46,032.5
2037	90,331.0
2038	58,171.7
2039	61,589.7
2040	78,940.0

2041	42,117.5
Total estimated ERs	2,023,743.8
Total number of crediting years	30
Average annual ERs	**67,458.1**

5.2 Leakage Management (CL2)

The description of the leakage management plan and measures to be implemented in order to mitigate the leakage and risks of leakage is provided in Section 2, item **2.2** - **Description of the Project Activities (**G3)

5.3 Baseline Emissions (G2)

Step 5 VM0015 - Definition of the land-use and land-cover change component in the Baseline

Calculation of baseline activity data per forest class

The result of the baseline projections indicated a deforestation of approximately 6,103 hectares of forest in the Project Area between 2012 and 2041 (Table 27) and 16,203 hectares for the Leakage Belt (Table 28).

Table 27. The annual deforested area by forest class icl within the Project Area in case of baseline (baseline activity data per forest class). Table 11b of VM0015.

Area deforested per forest class *icl* within the Project Area		Total deforestation baseline in the Project Area	
ID_{icl}>	icl1	$ABSLPA_t$	ABSLPA
Name>	Forest	annual	cumulative
Project $year_t$	ha	ha	ha
2012	213	213	213
2013	257	257	470
2014	242	242	712
2015	286	286	998
2016	329	329	1,327
2017	370	370	1,697
2018	252	252	1,949
2019	226	226	2,175
2020	181	181	2,356
2021	198	198	2,554
2022	164	164	2,718
2023	156	156	2,874
2024	190	190	3,064
2025	163	163	3,227
2026	171	171	3,398

2027	172	172	3,570
2028	162	162	3,732
2029	146	146	3,878
2030	215	215	4,093
2031	199	199	4,292
2032	149	149	4,441
2033	171	171	4,612
2034	252	252	4,864
2035	177	177	5,041
2036	122	122	5,163
2037	269	269	5,432
2038	161	161	5,593
2039	172	172	5,765
2040	230	230	5,995
2041	108	108	6,103

Table 28. The annual Deforested area by forest class icl within the Leakage Belt in case of baseline (baseline activity data per forest class). Table 11b of VM0015.

Area deforested per forest class *icl* within the Project Area		Total deforestation baseline in the Leakage Belt	
ID_{icl}>	icl1	$ABSLPA_t$	ABSLPA
Name>	Forest	annual	Cumulative
Project $year_t$	ha	ha	ha
2012	1,121	1,121	1,121
2013	1,012	1,012	2,133
2014	855	855	2,988
2015	845	845	3,833
2016	965	965	4,798
2017	923	923	5,721
2018	673	673	6,394
2019	651	651	7,045
2020	543	543	7,588
2021	500	500	8,088
2022	444	444	8,532
2023	450	450	8,982
2024	407	407	9,389
2025	436	436	9,825
2026	390	390	10,215
2027	413	413	10,628
2028	375	375	11,003
2029	395	395	11,398

2030	402	402	11,800
2031	400	400	12,200
2032	422	422	12,622
2033	388	388	13,010
2034	383	383	13,393
2035	440	440	13,833
2036	414	414	14,247
2037	363	363	14,610
2038	426	426	15,036
2039	428	428	15,464
2040	352	352	15,816
2041	387	387	16,203

Calculation of baseline activity data per post-deforestation class

Method 1 available in Methodology VM0015 was used to define the class that will replace the forest cover in the Project baseline (named Anthropic Vegetation in Equilibrium). Table 29 shows the area of zone 1, which includes the Project Area, Leakage Belt and Leakage Management Areas, and the corresponding area of each land-use and land-cover class after deforestation.

Table 29. Zones of the reference region that comprise land-use and land-cover classes after baseline deforestation (Table 12 of VM0015).

Zone		Name		Total of all other LU/LC classes presents in the zone		Total area of each Zone	
		Zone 1					
		ID_{fcl}	1				
		Area	% of Zone	Area	% of Zone	Area	% of Zone
IDz	Name	ha	%	ha	%	ha	%
1	Zone 1	69,790	100	22,306	31.96%	69,790	100
Total area of each class *fcl*		69,790	100	22,306	31.96%	69,790	100

The area projected to be deforested is reported in Table 30 13.b (for the project area) and Table 31 13.c (for the leakage belt).

Table 30. Annual deforested area in each zone within the Project Area in the baseline scenario (Table 13b of VM0015).

Area established after deforestation per zone within the project area		Total baseline deforestation in the project area	
IDz>	1		
Name>	Zone 1	$ABSLPA_t$	ABSLPA

Project year$_t$	ha	ha	ha
2012	213	213	213
2013	257	257	470
2014	242	242	712
2015	286	286	998
2016	329	329	1,327
2017	370	370	1,697
2018	252	252	1,949
2019	226	226	2,175
2020	181	181	2,356
2021	198	198	2,554
2022	164	164	2,718
2023	156	156	2,874
2024	190	190	3,064
2025	163	163	3,227
2026	171	171	3,398
2027	172	172	3,570
2028	162	162	3,732
2029	146	146	3,878
2030	215	215	4,093
2031	199	199	4,292
2032	149	149	4,441
2033	171	171	4,612
2034	252	252	4,864
2035	177	177	5,041
2036	122	122	5,163
2037	269	269	5,432
2038	161	161	5,593
2039	172	172	5,765
2040	230	230	5,995
2041	108	108	6,103

Table 31. Annual deforested area of each zone within the Leakage Belt in the baseline scenario (Table 13b of VM0015)

Area established after deforestation per zone within the project area		Total baseline deforestation in the leakage belt	
IDz>	1		
Name>	Zone 1	ABSLLK$_t$	ABSLLK
Project year$_t$	ha	ha	ha
2012	1,121	1,121	1,121

2013	1,012	1,012	2,133
2014	855	855	2,988
2015	845	845	3,833
2016	965	965	4,798
2017	923	923	5,721
2018	673	673	6,394
2019	651	651	7,045
2020	543	543	7,588
2021	500	500	8,088
2022	444	444	8,532
2023	450	450	8,982
2024	407	407	9,389
2025	436	436	9,825
2026	390	390	10,215
2027	413	413	10,628
2028	375	375	11,003
2029	395	395	11,398
2030	402	402	11,800
2031	400	400	12,200
2032	422	422	12,622
2033	388	388	13,010
2034	383	383	13,393
2035	440	440	13,833
2036	414	414	14,247
2037	363	363	14,610
2038	426	426	15,036
2039	428	428	15,464
2040	352	352	15,816
2041	387	387	16,203

Calculation of activity data by land-cover and land-use change category

Does not apply.

Step 6 VM0015 - Estimation of baseline carbon stock changes and non-CO2 emissions

Baseline carbon stock changes estimate

The estimation of carbon stocks for the forest class was obtained through a primary forest inventory, conducted in 2012 by the crew of Amazônia Gestão Ambiental in partnership with Biofílica Investimentos Ambientais. The following are the main results of this study. More information can be found in the document Forest Inventory and estimation of carbon stocks Fazenda Maísa (AMAZÔNIA GESTÃO AMBIENTAL, 2013).

Estimation of the average carbon stocks per land-use and land-cover class

- **Forest classes within the project area and the leakage belt**

As mentioned in section 1 of the document, the forest class consists mainly of Dense Lowland Ombrophilous Forest with Emergent Canopy, with 98% representativeness in the project area. The remaining 2% are related to what IBGE (2012) considered in its distribution maps as Wooded Campinarana without Palm Tree. It was found in the field that the Project Area is under a transition area between Lowland Ombrophilous Forest with Emergent Canopy and Wooded Campinarana without Palm Tree typologies, the latter with strong characteristics of Lowland Ombrophilous Forest with Emergent Canopy. Thus, due to the low spatial representativeness of the typology Wooded Campinarana without Palm Tree, the high similarity noted in the field with Lowland Ombrophilous Forest with Emergent Canopy and the negligible differences found in the inventory, for the stock estimate, a single forest class was considered, consisting of Lowland Ombrophilous Forest with Emergent Canopy.

Data collection was performed using a stratified sampling (Batista, 2006), which was randomized based on the allocation of 6 transects (primary units), with 8 subplots (secondary units) each, noting the recommendations of Appendix 3 of VM0015 regarding plot allocations (Map 18). Each subplot represents an area of 2500 m² (20 x 125 m) as shown in **Figure 13**, whereas, each of them is 200 meters away from one another within the transect.

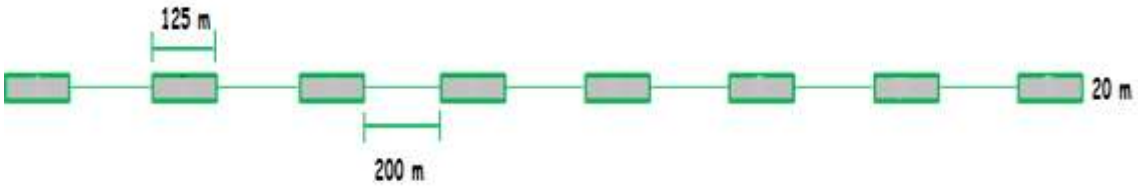
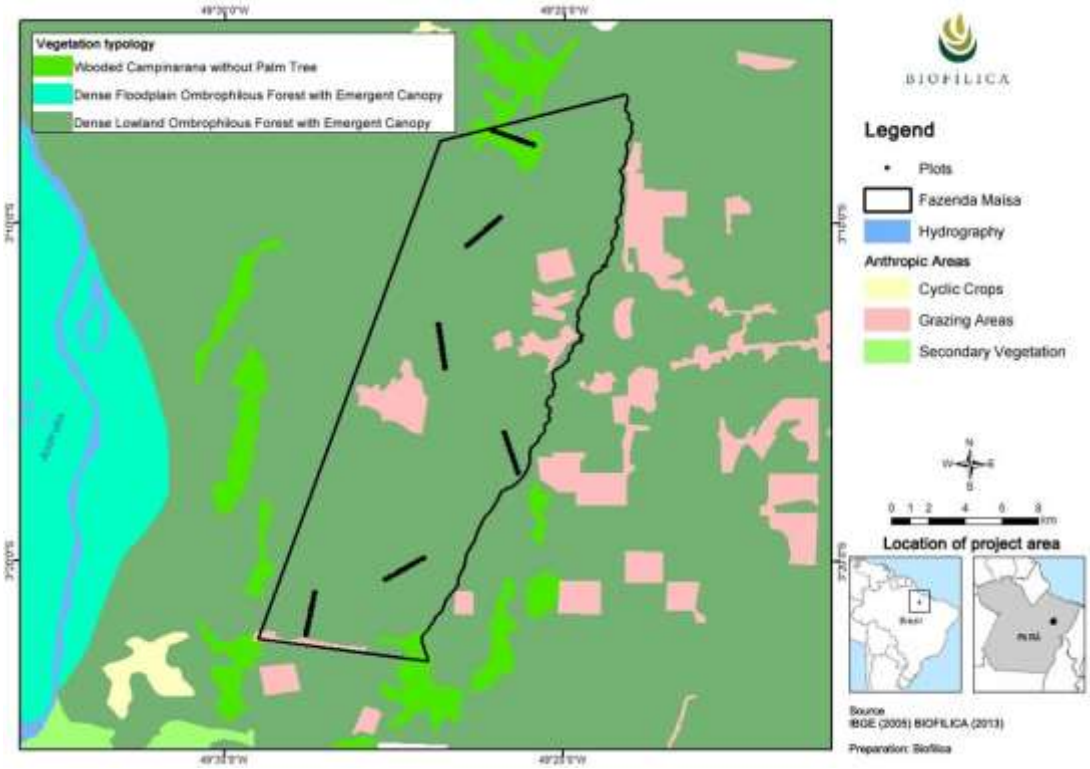


Figure 13. Spatial arrangement of the primary sampling unit (transect) and secondary units (plots).



Map 18. Allocation in sampling units of forest inventory within the Project Area

All trees with diameter at breast height (DBH = 1.30 m) greater than or equal to 15 cm were inventoried. These individuals were marked in the field with a nameplate and recorded with their ordinary names with circumference at breast height (CBH). Priority was given in the use of simple input linear models (DAP as dependent variable), because according to (SILVA R., 2007) simple input models are more efficient. Thus, no height data was collected due to the considerable increase of sampling uncertainties that occurred with the incorporation of this variable into the models (CHAVE et al., 2005; LIMA, 2010).

The allometric equation used to estimate forest biomass was developed by Silva (2007). This equation was developed to calculate the fresh biomass above ground, comprising trunk, thick and thin twigs, leaves, flowers and fruit. This equation also includes the below-ground fresh biomass with thick roots (base diameter exceeding 2 mm). Other equations were also tested and compared with Sliva (2007): ARAUJO et al (1999) and HIGUSHI et al (1998). Among these three Silva (2007) proved to be the most conservative one. Additional studies were carried ou to compare forest type (IBGE, 2012), biomass density (BACCINI, 2012) and high (SMARD et al, 2011) between PA and the site where Silva (2007)'s equation were developed. Theses additional studies also demonstrated the our approach were conservative.

The estimate of total fresh biomass (above and below ground) was then converted to dry biomass using a conversion factor also described in (SILVA R. , 2007). The factor of conversion of fresh biomass to used carbon (*Table 32*), was developed by Nogueira (2008), and was chosen for being a referential scientific publication for the Brazilian Amazon.

Table 32. Description of the allometric equation and conversion factors used.

Allometric Equation	Correlation (R^2)	Uncertainty (S_{yx}%)	Use of Conversion Factors
$PF = 2.7179 * (DAP)^{1.8774}$	0.94	3.9	PS = PF * TS C = PS * TC

Where:

PF = Fresh weight of total biomass (above and below ground) in kg;

DAP = DBH - Diameter at Breast Height (cm);

PS = dry weight of the total biomass (above and below ground) in kg;

C = Total carbon content (above and below ground) in kg;

TS = Concentration of dry biomass = 0.584 (SILVA, 2007);

TC = Carbon content in dry biomass = 0.485 (NOGUEIRA, 2008).

The equation of Silva (2007) was chosen for the following reasons:

- It was adjusted by the destructive method in the area of Dense Ombrophilous Forest, in a dryland forest located near Manaus-AM, in the Central Amazon;
- The equation was developed in a research institute renowned in forest ecology and management of Amazonian Biome, Instituto Nacional de Pesquisas da Amazônia – INPA;
- It is scientifically robust, has a considerable fit (R^2 94%), low uncertainty (3.9%) and regular distribution of waste;
- It is a simple input equation and minimizes mistakes by not using variables such as height and density, where the in-field measurement accuracy is low, and are subject to other non-sampling errors;
- The independent input variable is Diameter at Breast Height (DBH), which usually has the highest correlation with biomass and lower sampling error with regard to other allometric parameters; and
- The equation is recommended for DBH measurements over a wide range of arboreal diameters (from 5 to 120 centimeters).

The equation of Silva, 2007, accounts biomass above and below ground. The proportions indicated by the same author (SILVA, 2007) were used for the separation of pools of carbon stocks above and below ground. On said work, the author found a proportion of 72.9% ± 6.9 for above-ground biomass and 27% ± 6.9 for below-ground biomass. As a conservative measure, other components of plant biomass, such as trees with DBH under 10 cm, palms, vines and other non-arboreal components were not considered.

Based on forest inventory, the living biomass (above and below ground) has averaged 123.58 (± 7.57) tons of carbon per hectare. A conversion factor of 3.667 (44/12) was used for the conversion of carbon

stock to CO_2e. Table 33 present the average carbon values per hectare for the initial land-use and land-cover class considered for the baseline scenario in the project area and leakage belt.

Table 33. Carbon stocks per hectare of initial forest class icl in the Project Area and Leakage Belt (Table 15a of VM0015).

Initial forest class *icl*							
Name:	Forest						
ID_{icl}	1						
Average carbon stock per hectare + 90% CI							
Cab_{icl}		Cbb_{icl}		Cdw_{icl}		$Ctot_{icl}$	
C stock $tCO_2e\ ha^{-1}$	± 95% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	± 95% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	± 95% CI $tCO_2e\ ha^{-1}$	C stock[3] $tCO_2e\ ha^{-1}$	± 95% CI $tCO_2e\ ha^{-1}$
330.8	-	122.3	-			453.1	27.8

Where:

Cab_{icl} = Average carbon equivalent stock per hectare for the above-ground biomass pool for the initial forest class;

Cbb_{icl}= Average carbon equivalent stock per hectare for the below-ground biomass pool for the initial forest class;

Cdw_{icl} = Average carbon equivalent stock per hectare for the dead biomass pool for the initial forest class;

$Ctot_{icl}$ = Average carbon equivalent stock per hectare for the total biomass pool for the initial forest class;

- **Post-deforestation class projected for the Project Area and Leakage Belt in the baseline scenario and for the non-forest class in the Leakage Management Areas**

Methodology VM0015 allows the use of estimates derived from local studies, and thus a value of 61.2 $tCO_2e\ ha^{-1}$ was taken as reference for the carbon stock of the anthropic vegetation in equilibrium, which is the class projected to be in the Project Area and Leakage Belt Project within the baseline scenario. This carbon stock estimate was obtained by (FEARNSIDE, 1996), through a long-term study on the average composition of the landscape and vegetation in deforested areas of the Brazilian Amazon, consisting of a matrix comprised of grazing areas, small-scale agriculture and plantations (temporary and permanent), usually found in a post-deforestation scenario in the Amazon. This value is conservative because it represents an average estimate of the composition of a landscape in equilibrium, with an increase of 30% on the value presented by the author.

Fearnside (1996) is a peer-reviewed scientific literature, and represents the only study for the Brazilian Amazon about carbon stock on deforested areas, meeting the requirements of Section 4.5.6 of the VCS Standard:

1. The data was not collected directly from primary sources;

[3] Due to the uncertainty for estimating the Cdw. pool, as to a value above 10%, when adding the total stock, the lowest confidence interval value (18.35 tCO2e ha-1) was used for this pool.

2. The data was collected from secondary sources, by INPA's researcher (INPA is a reference institution in Brazil for such subject), published by a recognized and credible international journal (Forest Ecology and Management);
3. The data are from a period that accurately reflects the current practice available for the determination of carbon stocks, recently accepted in other international scientific publications as reference (Yanavi et al, 2012; Fearnside et al, 2009);
4. No sampling was applied on this data;
5. The dada is available to the public through the website: http://philip.inpa.gov.br/publ_livres/LISTAS%20POR%20ASSUNTO-L.htm. Accessed on September 12, 2011.
6. The data is available for independent evaluation by VCSA and VVB;
7. The data is appropriate for the geographic scope of VM0015,
8. Expert judgment was not necessary;
9. The data is not kept only in a central storage repository.

Calculation of carbon stock change factors

The Project's baseline scenario sets out the changes in the carbon stock of the forest replaced by some sort of vegetation, which can be grazing areas, small scale agricultural plantations or temporary or permanent crops. The document AFOLU VCS requires consideration of the decay of carbon stocks from organic-soil carbon pools, below-ground biomass, dead wood and wood products.

To calculate this decay, VM0015 version 1.1 applies a linear function to account for the decay of the initial carbon stock for the initial forest class *(icl)* and an increase in carbon stocks in the post-deforestation class (fcl). Table 20a (Table 34 in the document) and Table 20b (Table 35 the document) show how the carbon stock changes factor was calculated.

Table 34. Carbon stock change factor for initial forest classes icl (Method 1) (Table 20a of Methodology VM0015).

Years after deforestation		$\Delta Cab_{icl.t}$	$\Delta Cbb_{icl.t}$	$\Delta Cdw_{icl.t}$	$\Delta Ctot_{cl.t}$
1	t*	330.8	12.2	0.0	343.0
2	t*+1	0	12.2	0.0	12.2
3	t*+2	0	12.2	0.0	12.2
4	t*+3	0	12.2	0.0	12.2
5	t*+4	0	12.2	0.0	12.2
6	t*+5	0	12.2	0.0	12.2
7	t*+6	0	12.2	0.0	12.2
8	t*+7	0	12.2	0.0	12.2
9	t*+8	0	12.2	0.0	12.2
10	t*+9	0	12.2	0.0	12.2
11	t*+10				

12	t*+11				
13	t*+12				
14	t*+13				
15	t*+14				
16	t*+15				
17	t*+16				
18	t*+17				
19	t*+18				
20	t*+19				
21-T	t*+20...				

Table 35. Carbon stock change factor for final class fcl or zones z (Method 1) (Table 20b of Methodology VM0015).

Years after deforestation		$\Delta Ctot_{fcl.t}$
1	t*	6.1
2	t*+1	6.1
3	t*+2	6.1
4	t*+3	6.1
5	t*+4	6.1
6	t*+5	6.1
7	t*+6	6.1
8	t*+7	6.1
9	t*+8	6.1
10	t*+9	6.1
11	t*+10	0
12	t*+11	0
13	t*+12	0
14	t*+13	0
15	t*+14	0
16	t*+15	0
17	t*+16	0
18	t*+17	0
19	t*+18	0
20	t*+19	0
21-T	t*+20...	

Baseline carbon stock changes calculation

Method 1 of VM0015 version 1.1 *(activity data are available for classes)* was used to calculate the baseline of changes in the carbon stock in the Project Area (Table 36) and the Leakage Belt (Table 37) for the year *t,* according to equation 10 on page 72 of VM0015 version 1.1.

Table 36. Baseline of carbon stock changes in the Project Area.

Carbon stock changes per initial forest class *icl*		Total carbon stock change of initial forest class in the project area		Carbon stock changes per post-deforestation zone z		Total carbon stock change of post-deforestation zones in the project area		Total net carbon stock change of the project area	
ID_{icl}> Name> Project Year *t*	1 Forest tCO_2-e	$\Delta CBSLPA_{icl,t}$ annual tCO_2-e	$\Delta CBSLPA_{icl}$ cumulative tCO_2-e	ID_{iz}> Name> Project Year *t*	1 Zone 1 tCO_2-e	$\Delta CBSLPA_{z,t}$ annual tCO_2-e	$\Delta CBSLPA_{z}$ cumulative tCO_2-e	$\Delta CBSLPA_{t}$ annual tCO_2-e	$\Delta CBSLPA$ cumulative tCO_2-e
2012	73,065.4	73,065.4	73,065.4	2012	1,302.9	1,302.9	1,302.9	71,762.5	71,762.5
2013	90,763.7	90,763.7	163,829.1	2013	2,875.0	2,875.0	4,177.9	87,888.7	159,651.2
2014	88,761.4	88,761.4	252,590.5	2014	4,355.2	4,355.2	8,533.1	84,406.1	244,057.3
2015	106,814.3	106,814.3	359,404.8	2015	6,104.7	6,104.7	14,637.8	100,709.7	344,767.0
2016	125,062.4	125,062.4	484,467.2	2016	8,117.2	8,117.2	22,754.9	116,945.3	461,712.3
2017	143,150.3	143,150.3	627,617.5	2017	10,380.4	10,380.4	33,135.3	132,769.9	594,482.2
2018	107,197.9	107,197.9	734,815.4	2018	11,921.9	11,921.9	45,057.2	95,276.0	689,758.2
2019	101,361.1	101,361.1	836,176.4	2019	13,304.3	13,304.3	58,361.5	88,056.8	777,814.9
2020	88,688.7	88,688.7	924,865.1	2020	14,411.5	14,411.5	72,773.0	74,277.2	852,092.1
2021	96,733.8	96,733.8	1,021,598.9	2021	15,622.6	15,622.6	88,395.6	81,111.2	933,203.3
2022	84,887.4	84,887.4	1,106,486.3	2022	15,322.9	15,322.9	103,718.5	69,564.5	1,002,767.8
2023	81,005.7	81,005.7	1,187,492.0	2023	14,705.1	14,705.1	118,423.5	66,300.6	1,069,068.5
2024	91,617.0	91,617.0	1,279,109.0	2024	14,387.0	14,387.0	132,810.5	77,230.0	1,146,298.4
2025	81,181.1	81,181.1	1,360,290.0	2025	13,634.6	13,634.6	146,445.1	67,546.5	1,213,844.9
2026	81,895.1	81,895.1	1,442,185.2	2026	12,668.1	12,668.1	159,113.3	69,227.0	1,283,071.9
2027	79,804.4	79,804.4	1,521,989.6	2027	11,457.0	11,457.0	170,570.3	68,347.4	1,351,419.3
2028	75,395.7	75,395.7	1,597,385.2	2028	10,906.5	10,906.5	181,476.7	64,489.2	1,415,908.5
2029	69,124.5	69,124.5	1,666,509.7	2029	10,417.1	10,417.1	191,893.8	58,707.4	1,474,615.9
2030	92,365.5	92,365.5	1,758,875.2	2030	10,625.1	10,625.1	202,518.9	81,740.4	1,556,356.3
2031	87,084.9	87,084.9	1,845,960.2	2031	10,631.2	10,631.2	213,150.1	76,453.7	1,632,810.1
2032	70,361.5	70,361.5	1,916,321.7	2032	10,539.4	10,539.4	223,689.6	59,822.0	1,692,632.1
2033	77,822.5	77,822.5	1,994,144.2	2033	10,631.2	10,631.2	234,320.8	67,191.3	1,759,823.4
2034	105,375.6	105,375.6	2,099,519.8	2034	11,010.5	11,010.5	245,331.2	94,365.1	1,854,188.6
2035	80,736.8	80,736.8	2,180,256.6	2035	11,096.1	11,096.1	256,427.3	69,640.7	1,923,829.3
2036	61,943.6	61,943.6	2,242,200.2	2036	10,796.4	10,796.4	267,223.7	51,147.2	1,974,976.5
2037	111,757.5	111,757.5	2,353,957.6	2037	11,389.7	11,389.7	278,613.4	100,367.8	2,075,344.3
2038	76,018.8	76,018.8	2,429,976.5	2038	11,383.6	11,383.6	289,997.0	64,635.2	2,139,979.5

2039	79,975.6	79,975.6	2,509,952.1	2039	11,542.6	11,542.6	301,539.6	68,433.0	2,208,412.5
2040	99,345.5	99,345.5	2,609,297.5	2040	11,634.4	11,634.4	313,174.0	87,711.1	2,296,123.6
2041	57,874.9	57,874.9	2,667,172.5	2041	11,077.7	11,077.7	324,251.7	46,797.2	2,342,920.8

Table 37. Baseline of carbon stock changes in the Leakage Belt

Carbon stock changes per initial forest class *icl*		Total carbon stock change of initial forest class in the leakage belt area		Carbon stock changes per post-deforestation zone z		Total carbon stock change of post-deforestation zones in leakage belt area		Total net carbon stock change of the leakage belt area	
ID_{icl}>	1	$\Delta CBSLLK_{icl.t}$	$\Delta CBSLLK_{icl}$	ID_{iz}>	1	$\Delta CBSLLK_{z.t}$	$\Delta CBSLLK_{z}$	$\Delta CBSLLK_{t}$	$\Delta CBSLLK$
Name>	Forest	annual	cumulative	Name>	Zone 1	annual	cumulative	annual	cumulative
Project Year *t*	tCO_2-e	tCO_2-e	tCO_2-e	Project Year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
2012	384,536.6	384,536.6	384,536.6	2012	6,857.1	6,857.1	6,857.1	377,679.6	377,679.6
2013	360,856.2	360,856.2	745,392.8	2013	13,047.4	13,047.4	19,904.5	347,808.8	725,488.4
2014	319,377.2	319,377.2	1,064,770.1	2014	18,277.4	18,277.4	38,181.8	301,099.9	1,026,588.3
2015	326,403.6	326,403.6	1,391,173.7	2015	23,446.1	23,446.1	61,627.9	302,957.4	1,329,545.7
2016	377,901.5	377,901.5	1,769,075.2	2016	29,349.0	29,349.0	90,976.9	348,552.6	1,678,098.3
2017	375,296.2	375,296.2	2,144,371.4	2017	34,994.9	34,994.9	125,971.8	340,301.3	2,018,399.6
2018	300,827.0	300,827.0	2,445,198.4	2018	39,111.6	39,111.6	165,083.4	261,715.4	2,280,115.1
2019	301,511.2	301,511.2	2,746,709.6	2019	43,093.7	43,093.7	208,177.1	258,417.5	2,538,532.5
2020	272,425.6	272,425.6	3,019,135.2	2020	46,415.2	46,415.2	254,592.2	226,010.5	2,764,543.0
2021	264,316.2	264,316.2	3,283,451.5	2021	49,473.6	49,473.6	304,065.9	214,842.6	2,979,385.6
2022	237,511.7	237,511.7	3,520,963.2	2022	45,332.5	45,332.5	349,398.4	192,179.3	3,171,564.8
2023	232,623.3	232,623.3	3,753,586.5	2023	41,894.8	41,894.8	391,293.1	190,728.5	3,362,293.3
2024	212,919.8	212,919.8	3,966,506.3	2024	39,154.4	39,154.4	430,447.5	173,765.4	3,536,058.8
2025	217,511.0	217,511.0	4,184,017.3	2025	36,652.6	36,652.6	467,100.1	180,858.4	3,716,917.2
2026	195,261.9	195,261.9	4,379,279.2	2026	33,135.3	33,135.3	500,235.4	162,126.6	3,879,043.7
2027	196,633.0	196,633.0	4,575,912.2	2027	30,015.7	30,015.7	530,251.1	166,617.3	4,045,661.0
2028	180,418.1	180,418.1	4,756,330.3	2028	28,192.9	28,192.9	558,444.0	152,225.2	4,197,886.2
2029	183,903.2	183,903.2	4,940,233.4	2029	26,626.9	26,626.9	585,071.0	157,276.2	4,355,162.5
2030	184,494.4	184,494.4	5,124,727.8	2030	25,764.5	25,764.5	610,835.4	158,729.9	4,513,892.4
2031	182,609.8	182,609.8	5,307,337.6	2031	25,152.8	25,152.8	635,988.2	157,457.0	4,671,349.4
2032	189,618.3	189,618.3	5,496,955.9	2032	25,018.2	25,018.2	661,006.4	164,600.1	4,835,949.5
2033	177,612.8	177,612.8	5,674,568.7	2033	24,638.9	24,638.9	685,645.3	152,973.9	4,988,923.4
2034	175,665.3	175,665.3	5,850,234.0	2034	24,492.1	24,492.1	710,137.5	151,173.2	5,140,096.5
2035	194,569.8	194,569.8	6,044,803.9	2035	24,516.6	24,516.6	734,654.1	170,053.2	5,310,149.8
2036	186,262.6	186,262.6	6,231,066.4	2036	24,663.4	24,663.4	759,317.5	161,599.1	5,471,748.9
2037	168,780.3	168,780.3	6,399,846.7	2037	24,357.6	24,357.6	783,675.1	144,422.7	5,616,171.6
2038	190,244.4	190,244.4	6,590,091.1	2038	24,669.5	24,669.5	808,344.6	165,574.9	5,781,746.5

2039	191,309.6	191,309.6	6,781,400.7	2039	24,871.4	24,871.4	833,216.0	166,438.2	5,948,184.7
2040	165,557.3	165,557.3	6,946,957.9	2040	24,565.5	24,565.5	857,781.5	140,991.7	6,089,176.4
2041	176,976.3	176,976.3	7,123,934.2	2041	24,486.0	24,486.0	882,267.5	152,490.3	6,241,666.7

Baseline of non-CO2 emissions produced by forest fires

Non-CO2 emissions were not considered and accounted for the Project

5.4 Project Emissions (CL1)

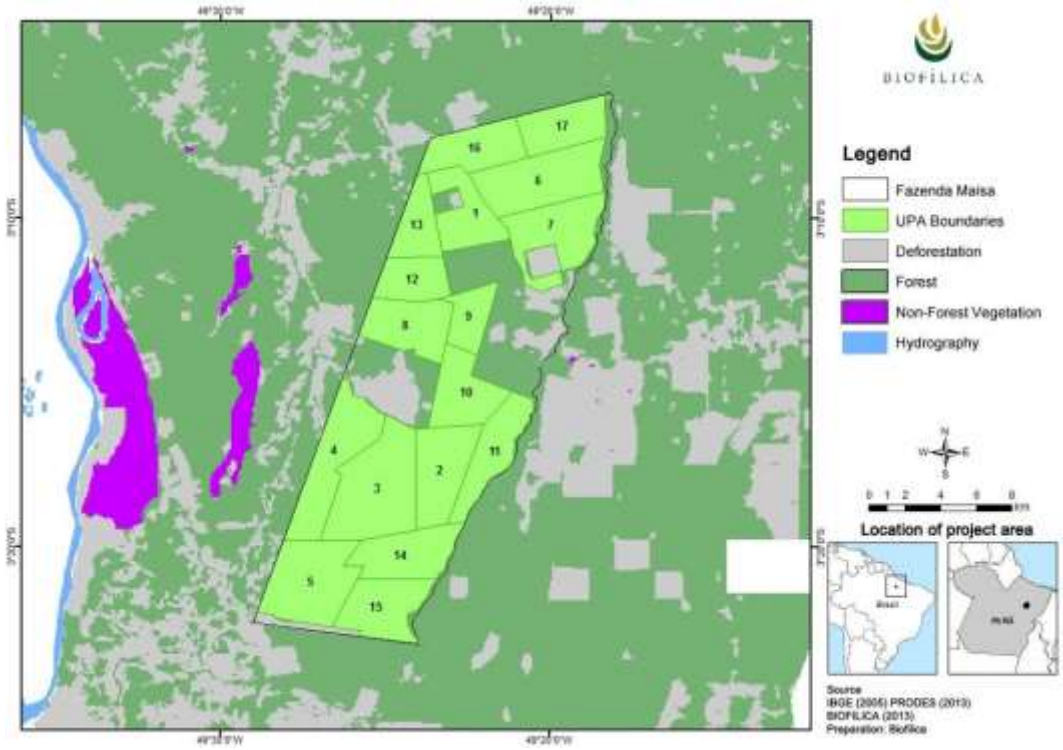
Ex ante estimation of actual carbon stock changes due to planned activities

Low impact logging activities are planned for the Project Area to be developed by SIPASA; and as they comply with the best forest management practices, large clearings will not be created in the forest. As noted by Holmes, et al., (2002), less than 10% of skidding trails from reduced impact forest management systems caused soil exposure and consequently clearings in the forest canopy. Therefore, based on the surveying reports, an estimation was conducted on the carbon stock decreases due to deforestation for the implementation of infrastructure, such as the opening of roads or skidding trails and forest patios in each annual production unit (UPA) in the Project Area. Table 38 shows the estimated planned deforestation and impact on the carbon stocks in the project area, conducted based on the PIan for Sustainable Forest Management and on Post-exploratory reports. *Map 19* shows the location of each UPA in the Project area and Table 39contains the deforestation predicted to occur in each Annual Production Unit.

Table 38. Ex ante estimate of inventory reduction due to planned deforestation in the project area (Table 25a of VM0015).

Project Year *t*	Areas of planned deforestation x Carbon stock change (decrease) in the project area		Total carbon stock decrease due to planned deforestation	
	ID_{cl} = $APDPA_{icl.t}$ ha	1 $Ctot_{icl.t}$ $tCO_2e\ ha^{-1}$	annual $\Delta CPDdPA_t$ tCO_2e	Cumulative $\Delta CPDdPA$ tCO_2e
2012	13	453.1	5,731.2	5,731.2
2013	13	453.1	5,740.0	11,471.2
2014	9	453.1	4,060.5	15,531.7
2015	8	453.1	3,847.1	19,378.8
2016	14	453.1	6,464.0	25,842.9
2017	14	453.1	6,460.4	32,303.3
2018	12	453.1	5,572.0	37,875.3
2019	12	453.1	5,504.8	43,380.1
2020	0	453.1	0.0	43,380.1

2021	0	453.1	0.0	43,380.1
2022	0	453.1	0.0	43,380.1
2023	0	453.1	0.0	43,380.1
2024	0	453.1	0.0	43,380.1
2025	0	453.1	0.0	43,380.1
2026	0	453.1	0.0	43,380.1
2027	0	453.1	0.0	43,380.1
2028	0	453.1	0.0	43,380.1
2029	0	453.1	0.0	43,380.1
2030	0	453.1	0.0	43,380.1
2031	0	453.1	0.0	43,380.1
2032	0	453.1	0.0	43,380.1
2033	0	453.1	0.0	43,380.1
2034	0	453.1	0.0	43,380.1
2035	0	453.1	0.0	43,380.1
2036	0	453.1	0.0	43,380.1
2037	0	453.1	0.0	43,380.1
2038	0	453.1	0.0	43,380.1
2039	0	453.1	0.0	43,380.1
2040	0	453.1	0.0	43,380.1
2041	0	453.1	0.0	43,380.1



Map 19. Location of Annual Production Units of the Sustainable Forest Management Plan.

Table 39. Estimates of deforestation due to infrastructure for sustainable forest management within each Annual Production Unit.

UPA	Year	Area (ha)	Open Infrastructure Estimation (ha)
10	2012	1303.67	12.65
11	2013	1305.68	12.67
12	2014	923.64	8.96
13	2015	875.09	8.49
14	2016	1470.37	14.27
15	2017	1469.55	14.26
16	2018	1267.45	12.30
17	2019	1252.17	12.15

Wood Extraction

The sustainable forest management activity planned by SIPASA will be monitored and reported in each Project verification event, which will be based on post-exploratory reports and on the inventory of permanent plots. If a reduction in carbon stocks is noted due to timber removal, Table 25b of VM0015 will be filled ex post.

Charcoal production and fuel-wood collection

Charcoal production or fuel-wood collection are not expected. If the forest's carbon stocks are reduced due to this activity, the Table 25c of VM0015 will be presented *ex post*.

The Table 40 presents the ex ante estimate of the reduction in carbon stocks due to activities planned by the Project

Table 40. Ex ante estimate of the decrease in carbon stocks due to planned activities in the Project Area (Table 25d of VM0015).

Project Year t	Total carbon stock decrease due to planned deforestation		Total carbon stock decrease due to planned logging activities		Total carbon stock decrease due to planned fuel-wood and charcoal activities		Total carbon stock decrease due to planned activities	
	annual $\Delta CPDdPA_t$ tCO_2e	cumulative $\Delta CPDdPA$ tCO_2e	annual $\Delta CPLdPA_t$ tCO_2e	cumulative $\Delta CPLdPA$ tCO_2e	annual $\Delta CPFdPA_t$ tCO_2e	cumulative $\Delta CPFdPA$ tCO_2e	annual $\Delta CPAdPA_t$ tCO_2e	cumulative $\Delta CPAdPA$ tCO_2e
2012	5,731.2	5,731.2	0.0	0.0	0.0	0.0	5,731.2	5,731.2
2013	5,740.0	11,471.2	0.0	0.0	0.0	0.0	5,740.0	11,471.2
2014	4,060.5	15,531.7	0.0	0.0	0.0	0.0	4,060.5	15,531.7

2015	3,847.1	19,378.8	0.0	0.0	0.0	0.0	3,847.1	19,378.8
2016	6,464.0	25,842.9	0.0	0.0	0.0	0.0	6,464.0	25,842.9
2017	6,460.4	32,303.3	0.0	0.0	0.0	0.0	6,460.4	32,303.3
2018	5,572.0	37,875.3	0.0	0.0	0.0	0.0	5,572.0	37,875.3
2019	5,504.8	43,380.1	0.0	0.0	0.0	0.0	5,504.8	43,380.1
2020	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2021	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2022	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2023	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2024	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2025	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2026	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2027	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2028	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2029	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2030	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2031	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2032	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2033	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2034	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2035	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2036	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2037	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2038	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2039	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2040	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1
2041	0.0	43,380.1	0.0	0.0	0.0	0.0	0.0	43,380.1

Optional accounting of carbon stock increase

The ex ante estimate *of the increase in carbon stocks due to regeneration after forest management activities was not considered a conservative measure*

Ex ante estimation of the changes in carbon stocks due to inevitable unplanned deforestation in the project area

It was assumed that the Project activities will be able to reduce about 90% of baseline emissions in the first four years of implementation (2012, 2013, 2014, 2015). After this period, considering greater physical presence and improved relationships with local communities, the Project Effectiveness Index is expected to gradually increase until it reaches 95% in the ninth year of the project (2020).

Ex ante estimated net actual carbon stock changes in the Project area.

Table 41 presents the changes in carbon stocks related to planned activities related to Project Effectiveness.

Table 41. Ex ante estimate of the net decrease in carbon stocks in the Project Area under the Project Scenario (Table 27 of VM0015).

Project Year t	Total carbon stock decrease due to planned activities		Total carbon stock increase due to planned activities		Total carbon stock decrease due to unavoided unplanned deforestation		Total carbon stock change in the project case	
	annual $\Delta CPAdPA_t$ tCO_2e	cumulative $\Delta CPAdPA$ tCO_2e	annual $\Delta CPAiPA_t$ tCO_2e	cumulative $\Delta CPAiPA$ tCO_2e	annual $\Delta CUDdPA_t$ tCO_2e	Cumulative $\Delta CUDdPA$ tCO_2e	annual $\Delta CPSPA_t$ tCO_2e	cumulative $\Delta CPSPA$ tCO_2e
2012	5,731.2	5,731.2	0.0	0.0	7,176.2	7,176.2	12,907.4	12,907.4
2013	5,740.0	11,471.2	0.0	0.0	8,788.9	15,965.1	14,528.9	27,436.4
2014	4,060.5	15,531.7	0.0	0.0	8,440.6	24,405.7	12,501.1	39,937.5
2015	3,847.1	19,378.8	0.0	0.0	10,071.0	34,476.7	13,918.0	53,855.5
2016	6,464.0	25,842.9	0.0	0.0	10,525.1	45,001.8	16,989.1	70,844.6
2017	6,460.4	32,303.3	0.0	0.0	10,621.6	55,623.4	17,082.0	87,926.7
2018	5,572.0	37,875.3	0.0	0.0	6,669.3	62,292.7	12,241.3	100,168.0
2019	5,504.8	43,380.1	0.0	0.0	5,283.4	67,576.1	10,788.2	110,956.1
2020	0.0	43,380.1	0.0	0.0	3,713.9	71,290.0	3,713.9	114,670.0
2021	0.0	43,380.1	0.0	0.0	4,055.6	75,345.5	4,055.6	118,725.6
2022	0.0	43,380.1	0.0	0.0	3,478.2	78,823.7	3,478.2	122,203.8
2023	0.0	43,380.1	0.0	0.0	3,315.0	82,138.8	3,315.0	125,518.8
2024	0.0	43,380.1	0.0	0.0	3,861.5	86,000.3	3,861.5	129,380.3
2025	0.0	43,380.1	0.0	0.0	3,377.3	89,377.6	3,377.3	132,757.6
2026	0.0	43,380.1	0.0	0.0	3,461.3	92,838.9	3,461.3	136,219.0
2027	0.0	43,380.1	0.0	0.0	3,417.4	96,256.3	3,417.4	139,636.4
2028	0.0	43,380.1	0.0	0.0	3,224.5	99,480.8	3,224.5	142,860.8
2029	0.0	43,380.1	0.0	0.0	2,935.4	102,416.1	2,935.4	145,796.2
2030	0.0	43,380.1	0.0	0.0	4,087.0	106,503.2	4,087.0	149,883.2
2031	0.0	43,380.1	0.0	0.0	3,822.7	110,325.8	3,822.7	153,705.9
2032	0.0	43,380.1	0.0	0.0	2,991.1	113,317.0	2,991.1	156,697.0
2033	0.0	43,380.1	0.0	0.0	3,359.6	116,676.5	3,359.6	160,056.6
2034	0.0	43,380.1	0.0	0.0	4,718.3	121,394.8	4,718.3	164,774.8
2035	0.0	43,380.1	0.0	0.0	3,482.0	124,876.8	3,482.0	168,256.9
2036	0.0	43,380.1	0.0	0.0	2,557.4	127,434.2	2,557.4	170,814.2
2037	0.0	43,380.1	0.0	0.0	5,018.4	132,452.6	5,018.4	175,832.6
2038	0.0	43,380.1	0.0	0.0	3,231.8	135,684.3	3,231.8	179,064.4

2039	0.0	43,380.1	0.0	0.0	3,421.6	139,106.0	3,421.6	182,486.0
2040	0.0	43,380.1	0.0	0.0	4,385.6	143,491.5	4,385.6	186,871.6
2041	0.0	43,380.1	0.0	0.0	2,339.9	145,831.4	2,339.9	189,211.4

Ex ante estimation of non-CO_2 emissions due to forest fire

Non-CO^2 emissions from forest fire were not accounted for the baseline scenario.

Total ex ante estimates for the Project Area

Table 42 shows the net changes expected and non-CO_2 emissions in the Project Area. The emissions that occur during the development of the Project activities will be monitored and reported, assuming a potential growth in the projected emissions with regard to the Project scenario.

Table 42. Total Ex ante estimate of net changes in carbon stocks and non-CO_2 emissions in the Project Area.

Project Year t	Total ex ante carbon stock decrease due to planned activities		Total ex ante carbon stock increase due to planned activities		Total ex ante carbon stock decrease due to unavoided unplanned deforestation		Total ex ante net carbon stock change		Total ex ante estimated actual non-CO_2 emissions from forest fires in the project area	
	annual $\Delta CPAdPA_t$ tCO_2e	cumulative $\Delta CPAdPA$ tCO_2e	annual $\Delta CPAiPA_t$ tCO_2e	cumulative $\Delta CPAiPA$ tCO_2e	annual $\Delta CUDdPA_t$ tCO_2e	cumulative $\Delta CUDdPA$ tCO_2e	annual $\Delta CPSPA_t$ tCO_2e	cumulative $\Delta CPSPA$ tCO_2e	annual $EBBPSPA_t$ tCO_2e	cumulative $EBBPSPA$ tCO_2e
2012	5,731.2	5,731.2	0.0	0.0	7,176.2	7,176.2	12,907.4	12,907.4	0.0	0.0
2013	5,740.0	11,471.2	0.0	0.0	8,788.9	15,965.1	14,528.9	27,436.4	0.0	0.0
2014	4,060.5	15,531.7	0.0	0.0	8,440.6	24,405.7	12,501.1	39,937.5	0.0	0.0
2015	3,847.1	19,378.8	0.0	0.0	10,071.0	34,476.7	13,918.0	53,855.5	0.0	0.0
2016	6,464.0	25,842.9	0.0	0.0	10,525.1	45,001.8	16,989.1	70,844.6	0.0	0.0
2017	6,460.4	32,303.3	0.0	0.0	10,621.6	55,623.4	17,082.0	87,926.7	0.0	0.0
2018	5,572.0	37,875.3	0.0	0.0	6,669.3	62,292.7	12,241.3	100,168.0	0.0	0.0
2019	5,504.8	43,380.1	0.0	0.0	5,283.4	67,576.1	10,788.2	110,956.1	0.0	0.0
2020	0.0	43,380.1	0.0	0.0	3,713.9	71,290.0	3,713.9	114,670.0	0.0	0.0
2021	0.0	43,380.1	0.0	0.0	4,055.6	75,345.5	4,055.6	118,725.6	0.0	0.0
2022	0.0	43,380.1	0.0	0.0	3,478.2	78,823.7	3,478.2	122,203.8	0.0	0.0
2023	0.0	43,380.1	0.0	0.0	3,315.0	82,138.8	3,315.0	125,518.8	0.0	0.0
2024	0.0	43,380.1	0.0	0.0	3,861.5	86,000.3	3,861.5	129,380.3	0.0	0.0
2025	0.0	43,380.1	0.0	0.0	3,377.3	89,377.6	3,377.3	132,757.6	0.0	0.0
2026	0.0	43,380.1	0.0	0.0	3,461.3	92,838.9	3,461.3	136,219.0	0.0	0.0
2027	0.0	43,380.1	0.0	0.0	3,417.4	96,256.3	3,417.4	139,636.4	0.0	0.0
2028	0.0	43,380.1	0.0	0.0	3,224.5	99,480.8	3,224.5	142,860.8	0.0	0.0
2029	0.0	43,380.1	0.0	0.0	2,935.4	102,416.1	2,935.4	145,796.2	0.0	0.0
2030	0.0	43,380.1	0.0	0.0	4,087.0	106,503.2	4,087.0	149,883.2	0.0	0.0

2031	0.0	43,380.1	0.0	0.0	3,822.7	110,325.8	3,822.7	153,705.9	0.0	0.0
2032	0.0	43,380.1	0.0	0.0	2,991.1	113,317.0	2,991.1	156,697.0	0.0	0.0
2033	0.0	43,380.1	0.0	0.0	3,359.6	116,676.5	3,359.6	160,056.6	0.0	0.0
2034	0.0	43,380.1	0.0	0.0	4,718.3	121,394.8	4,718.3	164,774.8	0.0	0.0
2035	0.0	43,380.1	0.0	0.0	3,482.0	124,876.8	3,482.0	168,256.9	0.0	0.0
2036	0.0	43,380.1	0.0	0.0	2,557.4	127,434.2	2,557.4	170,814.2	0.0	0.0
2037	0.0	43,380.1	0.0	0.0	5,018.4	132,452.6	5,018.4	175,832.6	0.0	0.0
2038	0.0	43,380.1	0.0	0.0	3,231.8	135,684.3	3,231.8	179,064.4	0.0	0.0
2039	0.0	43,380.1	0.0	0.0	3,421.6	139,106.0	3,421.6	182,486.0	0.0	0.0
2040	0.0	43,380.1	0.0	0.0	4,385.6	143,491.5	4,385.6	186,871.6	0.0	0.0
2041	0.0	43,380.1	0.0	0.0	2,339.9	145,831.4	2,339.9	189,211.4	0.0	0.0

5.5 Leakage (CL2)

Ex ante estimation of the carbon stock decrease and increase in GHG emissions due to leakage prevention measures

The leak prevention measures will be performed within the boundaries of Fazenda Maísa and boundaries of the communities included in Leakage Management Areas.

As described in Section 2, Item 2.2 - **Description of the Project Activities (***G3)* hereof, no activity that may reduce carbon stocks or increase GHG emissions, as compared to the baseline scenario, is expected. However, if such activities cause significant changes in carbon stocks, they will be monitored, recorded and reported.

Carbon stock changes due to activities implemented in leakage management areas

Table 30c of VM0015 (Step 8.1.1) is not applicable because no reductions are expected as a result of activities implementation.

Ex ante estimation of CH_4 and N_2O emissions due to grazing activities

As noted earlier, activities which involve a significant increase in CH_4 and N_2O emissions are not provided for. Thus, Tables 31 and 32 of VM0015 were not applied.

Ex ante estimation of the carbon stock changes and increase in GHG emissions due to leakage prevention measures

Table 33 of VM0015 does not apply.

Ex ante estimation of the carbon stock decrease and increase in GHG emissions due to leakage displacement.

As described in Step 3, the agents of deforestation are located in the communities close to the Project Area. Some of these communities are already involved in forestry activities within Fazenda Maísa, and others will be involved throughout the duration of the Project. The communities of operation of Project activities will be invited to participate in activities that help prevent the leakage. Thus, a Leakage Displacement Factor of 10% was assumed for the first year of Project activities, with a gradual decrease until reaching 5% in the 6th year of Project implementation (2017). The Project is expected to monitor any leakage displacements because the Leakage Belt will be monitored remotely. Table 43 presents the Ex ante estimation of leakage due to the displacement of an activity to the first baseline fixed period, and Table 44 indicates the total Ex ante of the leakage.

Table 43. Ex ante estimated leakage due to activity displacement (Table 34 of Methodology VM0015)

Project Year t	Total ex ante estimated decrease in carbon stocks due to displaced deforestation		Total ex ante estimated increase in GHG emissions due to displaced forest fires	
	annual $\Delta CADLK_t$ tCO_2e	cumulative $\Delta CADLK$ tCO_2e	annual $EADLK_t$ tCO_2e	Cumulative $EADLK$ tCO_2e
2012	7,176.2	7,176.2	0.0	0.0
2013	7,910.0	15,086.2	0.0	0.0
2014	6,752.5	21,838.7	0.0	0.0
2015	7,049.7	28,888.4	0.0	0.0
2016	7,016.7	35,905.1	0.0	0.0
2017	6,638.5	42,543.6	0.0	0.0
2018	4,763.8	47,307.4	0.0	0.0
2019	4,402.8	51,710.2	0.0	0.0
2020	3,713.9	55,424.1	0.0	0.0
2021	4,055.6	59,479.7	0.0	0.0
2022	3,478.2	62,957.9	0.0	0.0
2023	3,315.0	66,272.9	0.0	0.0
2024	3,861.5	70,134.4	0.0	0.0
2025	3,377.3	73,511.7	0.0	0.0
2026	3,461.3	76,973.1	0.0	0.0
2027	3,417.4	80,390.5	0.0	0.0
2028	3,224.5	83,614.9	0.0	0.0
2029	2,935.4	86,550.3	0.0	0.0
2030	4,087.0	90,637.3	0.0	0.0
2031	3,822.7	94,460.0	0.0	0.0
2032	2,991.1	97,451.1	0.0	0.0
2033	3,359.6	100,810.7	0.0	0.0
2034	4,718.3	105,528.9	0.0	0.0
2035	3,482.0	109,011.0	0.0	0.0

2036	2,557.4	111,568.3	0.0	0.0
2037	5,018.4	116,586.7	0.0	0.0
2038	3,231.8	119,818.5	0.0	0.0
2039	3,421.6	123,240.1	0.0	0.0
2040	4,385.6	127,625.7	0.0	0.0
2041	2,339.9	129,965.5	0.0	0.0

Total Ex ante leakage estimation

Table 44. Total Ex ante leakage estimation (Table 35 of VM0015).

Project Year *t*	Total ex ante GHG emissions from increased grazing activities		Total ex ante increase in GHG emissions due to displaced forest fires		Total ex ante decrease in carbon stocks due to displaced deforestation		Carbon stock decrease due to leakage prevention measures		Total net carbon stock change due to leakage		Total net increase in emissions due to leakage	
	annual $EgLK_t$ tCO_2e	cumulative EgLK tCO_2e	annual $EADLK_t$ tCO_2e	cumulative EADLK tCO_2e	annual $\Delta CADLK_t$ tCO_2e	cumulative ΔCADLK tCO_2e	annual $\Delta CLPMLK_t$ tCO_2e	cumulative ΔCLPMLK tCO_2e	annual ΔCLK_t tCO_2e	cumulative ΔCLK tCO_2e	annual ELK_t tCO_2e	cumulative ELK tCO_2e
2012	0.0	0.0	0.0	0.0	7,176.2	7,176.2	0.0	0.0	7,176.2	7,176.2	0.0	0.0
2013	0.0	0.0	0.0	0.0	7,910.0	15,086.2	0.0	0.0	7,910.0	15,086.2	0.0	0.0
2014	0.0	0.0	0.0	0.0	6,752.5	21,838.7	0.0	0.0	6,752.5	21,838.7	0.0	0.0
2015	0.0	0.0	0.0	0.0	7,049.7	28,888.4	0.0	0.0	7,049.7	28,888.4	0.0	0.0
2016	0.0	0.0	0.0	0.0	7,016.7	35,905.1	0.0	0.0	7,016.7	35,905.1	0.0	0.0
2017	0.0	0.0	0.0	0.0	6,638.5	42,543.6	0.0	0.0	6,638.5	42,543.6	0.0	0.0
2018	0.0	0.0	0.0	0.0	4,763.8	47,307.4	0.0	0.0	4,763.8	47,307.4	0.0	0.0
2019	0.0	0.0	0.0	0.0	4,402.8	51,710.2	0.0	0.0	4,402.8	51,710.2	0.0	0.0
2020	0.0	0.0	0.0	0.0	3,713.9	55,424.1	0.0	0.0	3,713.9	55,424.1	0.0	0.0
2021	0.0	0.0	0.0	0.0	4,055.6	59,479.7	0.0	0.0	4,055.6	59,479.7	0.0	0.0
2022	0.0	0.0	0.0	0.0	3,478.2	62,957.9	0.0	0.0	3,478.2	62,957.9	0.0	0.0
2023	0.0	0.0	0.0	0.0	3,315.0	66,272.9	0.0	0.0	3,315.0	66,272.9	0.0	0.0
2024	0.0	0.0	0.0	0.0	3,861.5	70,134.4	0.0	0.0	3,861.5	70,134.4	0.0	0.0
2025	0.0	0.0	0.0	0.0	3,377.3	73,511.7	0.0	0.0	3,377.3	73,511.7	0.0	0.0
2026	0.0	0.0	0.0	0.0	3,461.3	76,973.1	0.0	0.0	3,461.3	76,973.1	0.0	0.0
2027	0.0	0.0	0.0	0.0	3,417.4	80,390.5	0.0	0.0	3,417.4	80,390.5	0.0	0.0
2028	0.0	0.0	0.0	0.0	3,224.5	83,614.9	0.0	0.0	3,224.5	83,614.9	0.0	0.0
2029	0.0	0.0	0.0	0.0	2,935.4	86,550.3	0.0	0.0	2,935.4	86,550.3	0.0	0.0
2030	0.0	0.0	0.0	0.0	4,087.0	90,637.3	0.0	0.0	4,087.0	90,637.3	0.0	0.0
2031	0.0	0.0	0.0	0.0	3,822.7	94,460.0	0.0	0.0	3,822.7	94,460.0	0.0	0.0
2032	0.0	0.0	0.0	0.0	2,991.1	97,451.1	0.0	0.0	2,991.1	97,451.1	0.0	0.0

2033	0.0	0.0	0.0	0.0	3,359.6	100,810.7	0.0	0.0	3,359.6	100,810.7	0.0	0.0
2034	0.0	0.0	0.0	0.0	4,718.3	105,528.9	0.0	0.0	4,718.3	105,528.9	0.0	0.0
2035	0.0	0.0	0.0	0.0	3,482.0	109,011.0	0.0	0.0	3,482.0	109,011.0	0.0	0.0
2036	0.0	0.0	0.0	0.0	2,557.4	111,568.3	0.0	0.0	2,557.4	111,568.3	0.0	0.0
2037	0.0	0.0	0.0	0.0	5,018.4	116,586.7	0.0	0.0	5,018.4	116,586.7	0.0	0.0
2038	0.0	0.0	0.0	0.0	3,231.8	119,818.5	0.0	0.0	3,231.8	119,818.5	0.0	0.0
2039	0.0	0.0	0.0	0.0	3,421.6	123,240.1	0.0	0.0	3,421.6	123,240.1	0.0	0.0
2040	0.0	0.0	0.0	0.0	4,385.6	127,625.7	0.0	0.0	4,385.6	127,625.7	0.0	0.0
2041	0.0	0.0	0.0	0.0	2,339.9	129,965.5	0.0	0.0	2,339.9	129,965.5	0.0	0.0

5.6 Summary of GHG Emission Reductions and Removals (CL1 and CL2)

Total Ex ante net reduction of anthropic GHG emissions

Significance Assessment

Using the document "EB-CDM approved “Tool for testing significance of GHG emissions in A/R CDM Project activities”, it was possible to verify that above-ground biomass will contribute to 70% of expected emissions in the baseline scenario. Whereas, below-ground biomass contributes with 26% and dead-wood contributes with 4%.

Calculation of Ex ante estimates on the total net reductions of GHG emissions

Equation 19 suggested by the VM0015 was used for the Ex ante estimation of the reductions in the emissions from the Project. The result is shown in Table 45.

Ex ante Calculation of Verified Carbon Units (VCU)

Equation 20 of the VM0015 was used to estimate the number of VCUs. The Project Risk Factor parameter was estimated through the document "VCS AFOLU Non-Permanence Risk Tool", resulting in 19%. The result is shown in Table 45.

Table 45. Ex ante estimation of net anthropic emissions (DREDD) and Verified Carbon Units (Table 36 of VM0015).

Project Year t	Baseline carbon stock changes		Baseline GHG emissions		Ex ante project carbon stock changes		Ex ante project GHG emissions		Ex ante leakage carbon stock changes		Ex ante leakage GHG emissions		Ex ante net anthropogenic GHG emission reductions		Ex ante VCUs tradable		Ex ante buffer credits	
	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative
	$\Delta CBSLPA_t$	$\Delta CBSLPA$	$\Delta EBBBSLPA_t$	$\Delta EBBBSLPA$	$\Delta CPSPA_t$	$\Delta CPSPA$	$EBBPSPA_t$	$EBBPSPA$	ΔCLK_t	ΔCLK	ELK_t	ELK	$\Delta REDD_t$	$\Delta REDD$	VCU_t	VCU	VCB_t	VCB
	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2012	71,762.5	71,762.5	0.0	0.0	12,907.4	12,907.4	0.0	0.0	7,176.2	7,176.2		0.0	51,678.8	51,678.8	40,496.3	40,496.3	11,182.5	11,182.5
2013	87,888.7	159,651.2	0.0	0.0	14,528.9	27,436.4	0.0	0.0	7,910.0	15,086.2		0.0	65,449.9	117,128.6	51,511.5	92,007.8	13,938.4	25,120.8
2014	84,406.1	244,057.3	0.0	0.0	12,501.1	39,937.5	0.0	0.0	6,752.5	21,838.7		0.0	65,152.5	182,281.1	51,490.6	143,498.4	13,661.9	38,782.8
2015	100,709.7	344,767.0	0.0	0.0	13,918.0	53,855.5	0.0	0.0	7,049.7	28,888.4		0.0	79,741.9	262,023.1	63,251.5	206,749.9	16,490.4	55,273.2
2016	116,945.3	461,712.3	0.0	0.0	16,989.1	70,844.6	0.0	0.0	7,016.7	35,905.1		0.0	92,939.4	354,962.5	73,947.8	280,697.7	18,991.7	74,264.9
2017	132,769.9	594,482.2	0.0	0.0	17,082.0	87,926.7	0.0	0.0	6,638.5	42,543.6		0.0	109,049.4	464,011.9	87,068.7	367,766.3	21,980.7	96,245.5
2018	95,276.0	689,758.2	0.0	0.0	12,241.3	100,168.0	0.0	0.0	4,763.8	47,307.4		0.0	78,270.9	542,282.8	62,494.3	430,260.7	15,776.6	112,022.1
2019	88,056.8	777,814.9	0.0	0.0	10,788.2	110,956.1	0.0	0.0	4,402.8	51,710.2		0.0	72,865.7	615,148.5	58,184.7	488,445.4	14,681.0	126,703.2
2020	74,277.2	852,092.1	0.0	0.0	3,713.9	114,670.0	0.0	0.0	3,713.9	55,424.1		0.0	66,849.5	681,998.0	53,442.5	541,887.8	13,407.0	140,110.2
2021	81,111.2	933,203.3	0.0	0.0	4,055.6	118,725.6	0.0	0.0	4,055.6	59,479.7		0.0	73,000.1	754,998.1	58,359.5	600,247.3	14,640.6	154,750.8
2022	69,564.5	1,002,767.8	0.0	0.0	3,478.2	122,203.8	0.0	0.0	3,478.2	62,957.9		0.0	62,608.0	817,606.1	50,051.6	650,299.0	12,556.4	167,307.2
2023	66,300.6	1,069,068.5	0.0	0.0	3,315.0	125,518.8	0.0	0.0	3,315.0	66,272.9		0.0	59,670.6	877,276.7	47,703.3	698,002.3	11,967.3	179,274.4
2024	77,230.0	1,146,298.4	0.0	0.0	3,861.5	129,380.3	0.0	0.0	3,861.5	70,134.4		0.0	69,507.0	946,783.7	55,567.0	753,569.2	13,940.0	193,214.4
2025	67,546.5	1,213,844.9	0.0	0.0	3,377.3	132,757.6	0.0	0.0	3,377.3	73,511.7		0.0	60,791.8	1,007,575.5	48,599.7	802,168.9	12,192.1	205,406.6
2026	69,227.0	1,283,071.9	0.0	0.0	3,461.3	136,219.0	0.0	0.0	3,461.3	76,973.1		0.0	62,304.3	1,069,879.8	49,808.8	851,977.7	12,495.5	217,902.0
2027	68,347.4	1,351,419.3	0.0	0.0	3,417.4	139,636.4	0.0	0.0	3,417.4	80,390.5		0.0	61,512.7	1,131,392.5	49,176.0	901,153.7	12,336.7	230,238.8
2028	64,489.2	1,415,908.5	0.0	0.0	3,224.5	142,860.8	0.0	0.0	3,224.5	83,614.9		0.0	58,040.3	1,189,432.8	46,400.0	947,553.7	11,640.3	241,879.1
2029	58,707.4	1,474,615.9	0.0	0.0	2,935.4	145,796.2	0.0	0.0	2,935.4	86,550.3		0.0	52,836.6	1,242,269.4	42,240.0	989,793.7	10,596.7	252,475.7
2030	81,740.4	1,556,356.3	0.0	0.0	4,087.0	149,883.2	0.0	0.0	4,087.0	90,637.3		0.0	73,566.4	1,315,835.8	58,812.2	1,048,605.9	14,754.1	267,229.9
2031	76,453.7	1,632,810.1	0.0	0.0	3,822.7	153,705.9	0.0	0.0	3,822.7	94,460.0		0.0	68,808.4	1,384,644.1	55,008.5	1,103,614.4	13,799.9	281,029.8
2032	59,822.0	1,692,632.1	0.0	0.0	2,991.1	156,697.0	0.0	0.0	2,991.1	97,451.1		0.0	53,839.8	1,438,484.0	43,042.0	1,146,656.3	10,797.9	291,827.7
2033	67,191.3	1,759,823.4	0.0	0.0	3,359.6	160,056.6	0.0	0.0	3,359.6	100,810.7		0.0	60,472.2	1,498,956.2	48,344.2	1,195,000.5	12,128.0	303,955.7
2034	94,365.1	1,854,188.6	0.0	0.0	4,718.3	164,774.8	0.0	0.0	4,718.3	105,528.9		0.0	84,928.6	1,583,884.8	67,895.7	1,262,896.2	17,032.9	320,988.6
2035	69,640.7	1,923,829.3	0.0	0.0	3,482.0	168,256.9	0.0	0.0	3,482.0	109,011.0		0.0	62,676.7	1,646,561.5	50,106.5	1,313,002.7	12,570.2	333,558.8
2036	51,147.2	1,974,976.5	0.0	0.0	2,557.4	170,814.2	0.0	0.0	2,557.4	111,568.3		0.0	46,032.5	1,692,593.9	36,800.4	1,349,803.1	9,232.1	342,790.8
2037	100,367.8	2,075,344.3	0.0	0.0	5,018.4	175,832.6	0.0	0.0	5,018.4	116,586.7		0.0	90,331.0	1,782,924.9	72,214.6	1,422,017.7	18,116.4	360,907.2

2038	64,635.2	2,139,979.5	0.0	0.0	3,231.8	179,064.4	0.0	0.0	3,231.8	119,818.5		0.0	58,171.7	1,841,096.6	46,505.1	1,468,522.8	11,666.7	372,573.9
2039	68,433.0	2,208,412.5	0.0	0.0	3,421.6	182,486.0	0.0	0.0	3,421.6	123,240.1		0.0	61,589.7	1,902,686.3	49,237.5	1,517,760.3	12,352.2	384,926.0
2040	87,711.1	2,296,123.6	0.0	0.0	4,385.6	186,871.6	0.0	0.0	4,385.6	127,625.7		0.0	78,940.0	1,981,626.3	63,108.1	1,580,868.4	15,831.9	400,757.9
2041	46,797.2	2,342,920.8	0.0	0.0	2,339.9	189,211.4	0.0	0.0	2,339.9	129,965.5		0.0	42,117.5	2,023,743.8	33,670.6	1,614,539.0	8,446.9	409,204.8

5.7 Climate Change Adaptation Benefits (GL1)

Although the potential scenarios and regional impacts of climate change and variability have been identified (INSTITUTO PEABIRU, 2013), studies of CPTEC/INPE's *Grupo de Pesquisa em Mudanças Climáticas* (GPMC) show that the most conservative and reliable projections ('HadCM Cnrtl') of climate change for the project region throughout the next 30 years would lead to small or moderate changes. The changes related to rainfall would not lead to large impacts (reduction of 1 mm/day during the rainy season) and those related to temperature (although with an increase of up to 2°C between June and November) do not pose risks to the native vegetation cover, to other land uses in the region and to project benefits. With regard to extreme events, reliable projections were not evidenced, but an increased frequency and intensity of droughts is expected.

In this context, there is no direct approach to climate change adaptation. However, the activities described in Section 2, Item 2.2 - **Description of the Project Activities (**G3) aimed at improving management practices and leakage management areas help adapt to the potential impacts of climate change, although they are not considered. The best management practices ensure the ecological balance of the managed forest and mitigate certain negative impacts of exploitation, such as increased temperature within the forest and decreased humidity, contributing to the adaptation to potentially drier climate scenarios. The Leakage Area management activities contribute as they diversify the sources of revenue and the project's production strategies and that, through institutional coordination with the surrounding communities and public agencies responsible for rural technical assistance, are likely to promote the dissemination and access to techniques, cultures and alternative income synergistic to the projected drier scenarios.

6 COMMUNITY

6.1 Net Positive Community Impacts (CM1)

In the scenario without the Project, as described in items 1.3 and 4.5 , the absence of public policies and the context of extreme poverty mean that the communities of the Project Area are coerced by loggers for the removal of illegal timber, for sale as log and for charcoal production. Another problem in the current scenario is the inefficient and unprofitable farming, which brings many difficulties to the lives of people inhabiting these communities.

The REDD+ Maísa Project aims, at this time, consolidate and put into operation a mobilization, engagement and communication plan focus on the communities around Fazenda Maisa, targeting strengthen and organize the relationship between Fazenda Maísa and communities, included the follow themes:

- Job opportunities in Fazenda Maísa in an equal basis to achieve as many people as possible;
- Social and environmental Public policies such as vaccination campaigns, clean-ups, social registrations and other opportunities;
- Further clarification about Fazenda Maisa and REDD+ Project, collecting and also answering the target audience questions.

This activity will be implemented in partnership with a local organization and shall involve local communication means, such as radios and reports in churches and other community areas.

The social mobilization phase, despite of being the first step, requires continuous effort during the Project timelife. As a second step, it will start benefiting the indirectly acting communities, causing positive net impacts and mitigating potential negative impacts and seeking neutralization of drivers that cause deforestation in the region.

The social impact estimate was based on the Theory of Change, resulting in the following aspects of **Table 46**:

Table 46. Social activities and their expected results and impacts.

Focal Problems	Scenario intended for the future	Activities	Expected Impacts and Results	Impacts
Low access to public policies	Residents of the communities around Fazenda Maísa supported by public policies regarding access to education, health and	➢ Monthly transmission of 12 radio programs through 2015	➢ Residents accessing public policies ➢ Engagement of players and stakeholders	➢ Qualified residents ➢ Residents with better health and free from easily prevented diseases ➢

	safety			
Community members providing access and labor to illegal loggers, because of their Low-profitability and efficient family farming	Community members found more profitable and sustainable income alternatives and no longer depend on the income from illegal logging and charcoal production	➢ Technical Assistance and Rural Extension	➢ Community members with improved skills on administration/finances and cultivation techniques ➢ Crop diversification in the properties ➢ Slash and burn system no longer used	➢ Natural resources being used consciously ➢ Higher-income families
Low social organization	High participation and associational organization, with regularized associations that act in the pursuit of community rights	➢ Workshops and training courses related to the subject	➢ Strengthened social organization ➢ Associations with greater power of negotiation ➢ Association with greater knowledge about their rights and duties	➢ Community infrastructure being used and maintained by all
Low access to public policies	Residents of the communities around Fazenda Maísa supported by public policies regarding access to education, health and safety	➢ Monthly transmission of 12 radio programs through 2015	➢ Residents accessing public policies ➢ Engagement of players and stakeholders	➢ Qualified residents ➢ Residents with better health and free from easily prevented diseases

The Project is expected to create opportunities for the communities, bringing the positive impacts shown below, in the following order:

1. Involvement of local players in participatory management models to assist them in empowering local management;
2. Facilitate the aggregation of the communities' social capital in the pursuit of community organization, guided by personal and collective commitments;

3. Facilitate the access to public policies to ensure public goods and services in the context of strengthening social and third sector organizations, unions, companies, communities and community members through a Thematic Chamber;

4. Opportunity to develop business chains through rural technical assistance, as well as training, research and market access facilitation.

By acting on aspects of associative strengthening and improving family farming, the Project aims at influencing social issues and the living condition of the communities around the project area in order to reduce the social vulnerability that afflicts young people in these communities, providing income improvements and stability to their family.

Other negative impacts to the well being of other groups of local players are unlikely, as the project does not limit the access to natural resources in the Project Area by any agent originally dependent on these resources (Section 1 and 3), and the activities to be undertaken with regard to the surrounding communities (Section 2) are primarily based on the coordination with government agencies and other local institutions, precisely to promote the improvement of living conditions, greater access to public policies and rural technical assistance and extension. The negative impacts from these activities could be:

1. The competition regarding the allocation of time of community members (e.g. time used for meetings with government agencies and other institutions *vs*. time used in agriculture); and

2. The establishment of potential conflicts arising from the implementation and conduct of activities.

The implementation of participatory approaches in the design of activities and in making decisions regarding the most appropriate moment of the interaction structure is already being done as a mitigation measure for the first case. In order to address and mitigate the second potential impact, a procedure was developed for resolving disputes (Section 1) and, if it proves ineffective in solving a given issue, an independent institution may be required to act as a mediator or, in more extreme cases, the issue must be taken to the legal and official level of the most suitable judicial body.

Thus far, during the preliminary evaluation conducted with the studies of the Socioeconomic and Environmental Assessment, attributes of high conservation value related to social issues have not been identified (HCVs 5 and 6 – see Section 1). However, should they be identified at some time in the future, certain measures should be taken to prevent any negative impacts to the net attributes.

6.2 Negative Offsite Stakeholders Impacts (CM2)

Even though this is an illegal activity, loggers who perform deforestation around Fazenda Maísa with the help of the community, benefiting from the lack of control, may be adversely impacted by the activities of the Project, having their actions weakened in the Project Area and, probably, in its surrounding. This would be the main external negative impact resulting from project activities.

The illegal aspect of the activity and the high physical risk of those involved is no longer the responsibility of REDD+ Project neither Fazenda Maisa. Direct combat to these activities is the exclusive jurisdiction of the government and requires police force on site.

6.3 Exceptional Community Benefits (GL2)

Does not apply. There are no communities living within the project area, therefore, the poorest families, albeit indirectly benefited, do not effectively participate in carbon-related activities based on land use.

7 BIODIVERSITY

7.1 Net Positive Biodiversity Impacts (B1)

The no-project scenario *("business as usual")* for biodiversity is of concern. Considering the deforestation baseline developed (Section 4) until 2041, we will have 146,013 hectares more deforested in the Project Zone, that is, from the forest cover existing in 2011, only 52.91% will be standing in 2041. This scenario of absolute deforestation increase in the current context of anthropic landscape and forest cover (predatory logging, farmland, livestock, and crops of different dimensions) will bring serious implications for biodiversity, not to consider the likely degradation within the fragments that remain standing.

Among the major impacts of the increased deforestation within the Project Zone is the most direct threat to biodiversity: the loss and degradation of habitats. This occurs because when the ideal habitat for one (or more) species ceases to exist or contain the minimum conditions necessary for its survival, the species are swept (extinction), which can cause a ripple effect with more extinctions due to the ecological relationship that another species may have with the extinct species, or, if the extinction occurs only at local or regional level, the species may undergo genetic erosion. In extreme cases, the loss of habitat can lead to the extinction of key processes of the ecosystem (GROOM and VYNNE, 2006).

A secondary effect, as the destruction of habitats hardly occurs homogeneously, consists of forest cover and habitat fragmentation. Fragmentation is related to the decrease in the area available for a given habitat as well as the change in habitat configuration within the landscape, resulting in "smaller" habitats formed by "more isolated blocks". The consequences of fragmentation can be diverse and vary over time (short, medium and long term) and, among them, the effects that have been studied the most and produce greater impacts are: a drastic and initial exclusion of species, the "crowding effect" (Described by Leck in 1979), the isolation of habitats and populations, the edge effect, the matrix effect, problems arising from the effect of roads, facilitation of the establishment of invasive species and, finally, the impacts on ecological processes through indirect changes in relationships, such as predation, pollination, dispersal, herbivory and others (NOSS, CSUTI, and GROOM, 2006).

With the climate changes, these effects, which may already be significantly impactful even on stable environments of considerable resilience, can be even more drastic (NOSS, CSUTI, & GROOM, 2006). Although for the conservation, the impacts of climate changes are not significantly expected at short term, they are imminent at long term (50-100 years from today) due to the importance of climate conditions on the ecological design of natural systems, and, hence, in the distribution and composition of communities (flora and fauna). Nevertheless, the methodologies for predicting the impacts of climate changes on biodiversity are distinct and not that accurate, as only the impacts on a specific species can be predicted with greater accuracy. As the species and communities can have different behaviors in the face of climate changes, even in the same environment, this prediction task is quite complex, difficult and provides low accuracy for models with such a time anticipation (PARMESAN and MATTHEWS, 2006).

This framework of extreme degradation also makes room for the establishment of invasive species, although only a few would probably configure as invasive species (native or exotic) due to the effects of deforestation and fragmentation. The impact of the establishment of invasive species can be dramatic, and not just on the ecology of ecosystems and biodiversity conservation, but there can also be economy, aesthetic and socio-cultural impacts, and even impacts on public health and the spread of diseases. The Impacts on biodiversity, specifically, may be more or less complex, leading to changes in the resources and diversity (diversity *α and β)* of species of natural systems, and may have direct and indirect effects, such as effects due to the immediate interaction with other species in predation, competition, parasitism and disease, or effects of indirect interaction in the food chain, competition for resources and changes in habitats. The impacts of invasive species may be more or less significant, good or bad, but are inherent and imminent with the establishment of invasive species (WONHAM, 2006).

In the scenario with the project, the implementation of the activities described in Section 2 to bring benefits to the climate would impact directly and positively on the biodiversity of the Project Area, primarily through avoided deforestation and improvements in management practices. The maintenance of vegetation cover ensures the conservation of geographical habitats and the work developed with improved sustainable management techniques helps ensure the quality of habitats within the Project Area. In addition to acting directly against the loss of habitat, the maintenance of forest cover also contributes positively to mitigate the fragmented landscape context set out in the baseline for the Project Zone, and can be used as an "ecological corridor or stepping stone."

The biodiversity activities described in Section 2 also aim at precisely monitoring the impacts on the biodiversity of activities for the climate described above by monitoring key taxa and indicators of the presence and quality of preserved habitats and species which already appear in the assessments as in critical condition. This monitoring will allow adaptive management activities for biodiversity conservation, enabling more appropriate decision-making actions in handling operations, if necessary.

The search for partnership with education and research institutions, the activities with the communities and activities aimed at the management of leakage areas also allowed a greater reach of the measures proposed and the analysis of impacts on biodiversity conservation, extrapolating the Project Area and producing positive impacts for the Project Zone, by, for example, monitoring the species identified as "endangered" in the landscape context. The attributes identified as HCV (HCV 1 and 2) will not be adversely affected this way and, on the contrary, through the partnership with research institutions, the community and other stakeholders will be able to develop more extensive and effective conservation proposals in the regional context .

As the activities with the project are based on the sustainable management of native forests, invasive species will not be introduced or have their activities increased as a result of project population. Likewise, no exotic species or genetically modified organisms will be used to generate emission reduction and GHG removals.

7.2 Negative Offsite Biodiversity Impacts (B2)

Given the importance described in section 1 on the conservation of forest cover in the project area for biodiversity in the regional context (one of the largest forest fragments in the region), its location in the "arc of deforestation" and within the most deforested center of endemism in the Amazon (70% of vegetation cover lost), potential negative impacts are not expected on biodiversity outside the Project Zone.

This is because the Project activities consist of a set of measures aimed at conserving the vegetation cover; and, in the context of landscape ecology, the conservation of forest fragments indirectly produce significant positive impacts on biodiversity in areas outside the project zone, for contributing as "corridors and stepping stones" between the different fragments.

7.3 Exceptional Biodiversity Benefits (GL3)

The Project Zone includes areas of high priority for biodiversity conservation for meeting the vulnerability criteria, because, through reports and interviews with the communities, it was possible to identify certain species, such as the Chiropotes satanas (known locally as Cixiú-preto) and Cebus Kaapori (Known locally as cairara), considered as critically endangered (CR) on the IUCN Red List of endangered species. Both species are primates whose occurrence is restricted to certain areas in the states of Pará and Maranhão, especially among the Tocantins (Pará) and Grajaú (Maranhão) rivers, that is, they are not only endemic to the country, but specifically to Belém's Center of Endemism (INSTITUTO PEABIRU, 2013, and IUCN, 2010)

8 MONITORING

8.1 Description of the monitoring Plan (CL3, CM3 and B3)

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 changes in land use within the project area and leakage belt. The climate component also includes in the context of this project, and in the joint search for VCS and CCB standards, the monitoring of aspects related to sustainable forest management, property monitoring 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 at following-up the actions, results and impacts of activities related to the engagement of players and stakeholders, the strengthening of associations and coordination 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).

In addition to these components, a simplified plan was developed for monitoring project management, to be submitted shortly after the Initial Monitoring Plan for Biodiversity.

Plan to Monitor the Impacts on the Climate

The Plan to Monitor the 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

1. 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 will be carried out through the monitoring of avoided unplanned deforestation. The process to monitor the effectiveness of

REDD+ activities aimed at avoiding unplanned deforestation will be developed by Sipasa and Biofílica through the monitoring of forest cover areas from satellite imagery and field checks in the Project Area.

b) Data to be collected

Table 47. 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 icl at year t	Hectares (ha)	Calculated through remote sensing images.	Each time a catastrophic event occurs
	$\Delta CUCdPA_t$	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
	ΔCUDdPAt	Total change in carbon stock	Ton of carbon	Calculated	Annual

		due to unavoided planned deforestation at year t in the Project Area	dioxide equivalent (tCO_2-e)		

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 are:

- 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-CO_2 emissions:

The monitoring of changes (reduction) in carbon stocks will be performed through forest inventory, 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. The monitoring of carbon stocks in forest management areas will be performed 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.

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 will be 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 will be stored by Biofílica Investimentos Ambientais throughout the project. Maps showing the installed infrastructure, satellite images and deforestation reports will be made available to the verification body at each verification event.

Monitoring of carbon stocks and non-CO2 emissions:

The quality assurance control procedure, although not explicit in the Sustainable Forest Management Plan (SFMP), is controlled by Sipasa 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 will be stored by SIPASA and Biofílica will keep a copy of these documents throughout the project life cycle. 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 will be stored by Biofílica Investimentos Ambientais in digital files throughout the project lifecycle. Original (physical) reports and field records produced by the forest management activity will be stored by Sipasa. Biofílica Investimentos Ambientais will keep a copy of these documents filed in digital format throughout the project. 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 Biofílica Investimentos Ambientais, Maísa-Moju Agroindustrial and Sipasa.

1.1 Monitoring of Project Implementation

The monitoring of implementation and enforcement of forest management activities will be 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 will be 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 will be 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 will be 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. In order to have more flexibility in the deforestation mapping process, different techniques for classification and visual interpretation of SAR images using field data and cartographic quality standards may be used.

Data on deforestation events will be compared to the baseline scenarios. Emission reduction values for the monitored period will be 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 is calculated the following way:

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

Where:
$\Delta CUDdPA_t$ Total carbon stock change due to unavoided unplanned deforestation within the project area at year t:
$AUDPA_{icl,y}$ Area of unplanned deforestation in the initial forest class icl at year t within the Project Area in the project scenario.
$\Delta Ctoticl_{,Ac}$ Carbon stock loss in the initial forest class icl at age of change AC (# of years after LU/LC change).
$AUDPAfcl_{,y}$ Area of non-forest class fcl at time t within the project area after unplanned deforestation in the project scenario.
$\Delta Ctoticl_{,Ac}$ Carbon stock gain in the final non-forest class icl at age of change AC (# of years after LU/LC change).

In case there is significant reduction in carbon stock due to sustainable forest management activities, such reduction will be reported in the verification processes using Table 29 of the VCS methodology VM0015 version 1.1.

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 will be 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 to be carried out by the project to collect and process data are:

- 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. In case there is significant reduction in carbon stock due to natural disturbance or catastrophic events, such reduction will be reported in the verification processes using Tables 25e, 25f and 25g of the VCS approved methodology VM0015, version 1.1.

2 Leakage Monitoring

a) Technical description of the monitoring tasks

The REDD+ Maísa Project will involve 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 cause reductions in carbon stocks and/or increase in GHG emissions in Leakage Management areas, such carbon stock changes and/or GHG emissions will be estimated by Biofílica Investimentos Ambientais.
ii. The monitoring of forest cover in the Leakage Belt via satellite images will be performed by Biofílica Investimentos Ambientais.

b) Data to be collected

Table 48. 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 changes and GHG emissions associated to leakage prevention activities

The main activities carried out for the collection and processing of data for the monitoring of Carbon stock changes due to activities implemented in Leakage Management Areas are:

- The leakage prevention activities will be listed;
- A map showing the areas and type of intervention will be prepared;
- Areas where leakage prevention activities impact carbon stock will be identified;
- Non-forest classes within these areas will be identified;
- The carbon stocks within the identified classes will be measured or estimated based on the literature;
- The carbon stock changes in the Leakage Management Areas under the project scenario will be reported using table 30b of the VM0015 methodology;
- Net carbon stock changes caused by leakage prevention measures during the fixed baseline period and the project crediting period will be calculated;
- The calculation results will be Reported on table 30.c of the VM0015.

The main activities developed to collect and process data for monitoring methane (CH_4) and nitrogen oxide emissions from livestock are:

- The areas taken by grazing activities in the leakage management areas will be specified;

- Type of animal, fodder and management 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 scenario 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 methodology will be used to estimate emissions from enteric fermentation and waste management; The final calculations will be done using equation 18 of the VM0015 and results will be reported in table 32 of VM0015.

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

Monitoring of changes in carbon stock
The data collection procedures will be 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 changes and GHG emissions associated to deforestation prevention activities:
To be determined depending on the activity, if implemented.

Monitoring of carbon stock decrease and increases in GHG emissions due to leakage displacement:
The quality control and assurance procedures will be the same applied to monitor deforestation in the Project Area (section 1.2).

e) Data archiving

The original reports and field records will be stored by Maísa-Moju Agroindustrial and Sipasa. Biofílica Investimentos Ambientais will keep a copy of these documents filed in digital format throughout the project lifecycle. The original (raster) and processed (vector) digital data from satellite images, coordinates, technical maps, field photos and records will be stored by Biofílica 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 Biofílica Investimentos Ambientais, Maísa-Moju Agroindustrial and Sipasa.

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. However, if it is decided that such activities are necessary, then, the ex ante carbon stock changes and GHG emissions associated to such activities will be estimated through step 8 of the VM0015 methodology, and, if meaningful, they will be monitored and data will be provided to the verification body at each verification event through tables 30b, 30c, 31, 32 and 33 of VM0015 methodology, version 1.1.
The following activities in leakage management areas may occasionally cause a decrease in carbon stocks or an increase in GHG emissions:

- Carbon stock changes due to activities implemented in leakage management areas;
- Methane (CH4) and nitrous oxide (N2O) emissions from livestock intensification (involving changes in the animal diet and/or number of animals).

According to the most recent version of the VCS Standard, nitrous oxide (N2O) emissions from nitrogen fertilization are always considered negligible. The consumption of fossil fuels is always considered negligible in AUD project activities and must not be regarded.

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 will be determined using the same methods applied to monitor deforestation in the project area (section 1.2). If during the monitoring process, a deforestation event greater than expected for the baseline scenario is identified within the leakage belt, and such deforestation is attributed to deforestation agents from the project area, the losses in carbon stocks will be accounted for and reported using Table 22c and 21d of the VM0015 approved methodology.
The total carbon stock change due to unavoided unplanned deforestation within the area of the Leakage Belt is calculated as follows:

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

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.
$\Delta Ctoticl,_{Ac}$ Carbon stock loss in the initial forest class icl at age of change Ac (# of years after LU/LC change).
$AUDLK_{fcl,y}$ Non-forest area fcl at time t within the area of the Leakage Management Belt after unplanned deforestation in the project area.
$\Delta Ctot_{fcl,Ac}$ 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 will be presented using Table 36 of the VM0015 approved methodology, version 1.1, along with the spatial data (deforestation maps, when available).

b) Data to be collected

Table 49. Data to be 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	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 Maísa REDD+ Project at year t will be 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 will be used to ensure that the data are adequate for the verification process and the number of VCUs is reliable.

e) Data archiving

All data and reports of the Fazenda Maísa REDD+ Project will be stored by Biofílica Investimentos Ambientais in digital files throughout the 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 are the responsibility of Biofílica Investimentos Ambientais.

TASK 2: REVISITING THE BASELINE PROJECTIONS FOR FUTURE BASELINE DEFINITION PERIODS

1. Updated information on agents, drivers and underlying causes of deforestation

The statistical and spatial data, studies and information about agents, drivers and underlying causes of deforestation necessary to perform steps 2 and 3 of VCS Methodology VM0015, version 1.1, will be updated and used in the review of baseline projections after a defined period of 10 years. When available, the data from the monitoring of forest management and other activities developed in the project area will be used.

2. Adjustment of the land-use and land-cover change component at the baseline

In case a national or sub-national baseline becomes available during the next fixed baseline period, it will be applied to the following period. In case there is no national or sub-national baseline available, step 4 of the VM0015 methodology will be redone considering the 10-year period (2012-2021), using the updated

variables on agents, drivers and underlying causes of deforestation in the reference region. The two main components to be revisited are: annual deforestation area and location of deforestation in the baseline.
The assumptions and hypothesis considered in the modeling of the future deforestation dynamic (social and economic data), as well as the data used in the spatial projection (road updates, locations and distance of new deforestations) will be reviewed and updated.

3. Adjustment of the carbon component of the baseline
The spatial estimate of the carbon component may be reviewed according to the results obtained during the changes in carbon stock monitoring processes, according to the VM0015 methodology, version 1.1, Part 3, item 1.1.3. During the project life cycle, new techniques and methodologies can be analyzed to provide a spatial estimate of the biomass, such as, for example, LIDAR or SAR data.

Part 2 - Activities that Supplement the application of the VM0015 methodology

a) Technical description of the monitoring tasks

The monitoring of activities supplementing the methodology linked to climate benefits consists of three components:

- Monitoring of sustainable forest management activities before, during and after the handling operations to be performed primarily by SIPASA's specialized staff, responsible for managing the operational, environmental and occupational safety aspects. Much of this monitoring lies in the documentation and analysis of Annual Operational Plans, post-exploratory reports, results of systematic inventory of permanent plots and procedures for assessing harvesting damages and impacts;
- Monitoring of property monitoring activities is to assess the efficiency gain and improvement of practices and procedures of property security processes; and
- Monitoring of activities of leakage management areas within the farm, which aim at monitoring the diversification of project income sources, as well as the economic sustainability and employability of each land use.

b) Data to be collected

Table 50. Data to be collected for monitoring the activities supplementing the VM0015 methodology and linked to climate benefits.

Component	Data/Parameter	Description	Unit	Source	Frequency
Sustainable Forest Management	Exploited Wood Volume	Volume of wood harvested by each Annual Production Unit.	m³/ha/year	Post Exploratory Report	Annual
	Open area of management infrastructure	Area cleared for building the infrastructure required for Sustainable Forest	Hectares (ha)	Post Exploratory Report	Annual

		Management activities, such as patios, primary and secondary roads.			
	Regeneration rate of permanent plots	Inventory conducted in permanent plots of each Annual Production Area one year before the harvest, one year later, three years later and then every 5 years.	m^3/ha/year	Post Exploratory Report	Annual (Annual Production Units inventoried during the year)
	Assessment of crop damage	Assessment carried out by sampling at the UPAs during and after the harvesting operation.	m^3/ha	Post Exploratory Report	Annual
	Acquisition/maintenance of legality verification (LHV or similar)	Maintenance of legality verification seal	Not applicable	Verification Report of the certifying institution	Annual
	Acquisition/maintenance of robust forest management certifications.	Any acquisition and maintenance of robust certification standards for sustainable forest management.	Not applicable	Auditing Report of the certifying institution	Annual
Property Monitoring	Number of monitoring stations	Number of active monitoring stations within the limits of the farm	Number	Monitoring reports	Monthly
	Number of patrols	Number of patrols	Number	Monitoring reports	Monthly

		responsible for performing the watch			
	Watch Frequency	Number of times a single section is patrolled	Number	Monitoring reports	Monthly
	Number of occurrences	Number of times an event is detected	Number	Monitoring reports	Monthly
	Status of occurrences	What happens once the occurrence is detected?	Not applicable	Monitoring reports	Monthly
Leakage Management Areas within the limits of Fazenda Maísa	No. of new businesses prospected	No. of new businesses prospected to gain scope in the Project Area.	Number	Project Monitoring Report	Annual
	No. of prospected alternative uses for the soil	No. of prospected alternative uses for the soil for the Leakage Management Areas within the limits of Fazenda Maísa.	Number	Project Monitoring Report	Annual
	No. of new businesses implemented	From the new business prospected, how many were actually implemented?	Number	Project Monitoring Report	Annual
	No. of different land uses within the limits of Fazenda Maísa	Number of different land uses developed within the limits of Fazenda Maísa	Number	Project Monitoring Report	Annual
	Net income of each land use within the limits of Fazenda Maísa	Net income (gross revenue - costs) from	R$	Project Monitoring Report	Annual

		each type of land use within the limits of Fazenda Maísa			
	Number of employees for each land use within the limits of Fazenda Maísa	Employability of different land uses within the limits of Fazenda Maísa	Number	Project Monitoring Report	Annual

c) Overview of the data collection procedure

- The data will be collected in the field before, during and after the sustainable forest management operations, through monitoring records, and after the collection period, the information is systematized via annual post-exploratory reports produced by Sipasa. The data related to forest certification will be collected directly from the one responsible for the management operations and from the certifying institution responsible for each audit event produced by Biofílica.
- For monitoring property surveillance, the data will be collected once a month by Maísa-Moju and Sipasa for the preparation of surveillance reports.
- With regard to leakage management activities, the data collection will be held once a year by Biofílica Investimentos Ambientais for the preparation of project monitoring reports.

d) Quality control and quality assurance procedures

- The data presented in the monitoring records shall be verified through field sampling. Any information not consistent with the reality will be rectified.
- The information contained in the monthly property surveillance reports will be validated in a consultation with the field staff responsible for patrolling.
- The data collection and preparation of annual monitoring reports of the project should incorporate consultations with the owner of Fazenda Maísa, the accounting sector responsible for each land use and field visits accompanied by the one in charge.

e) Data archiving

All data and reports of the REDD+ Maísa Project will be stored by Biofílica Investimentos Ambientais in digital files throughout the project lifecycle. Original (physical) reports and field records produced by the forest management activity will be stored by Sipasa. Biofílica Investimentos Ambientais will keep a copy of these documents filed in digital format throughout the project. 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 the responsibility of Biofílica Investimentos Ambientais, Maísa-Moju Agroindustrial and Sipasa.

Initial Plan to Monitor the Impacts on the Communities

We present below an Initial Plan to Monitor the Impacts on the Communities, whereas the complete monitoring plan will be completed within one year after Project validation and will be posted on the Internet and reported to the communities, project proponents, partners and other stakeholders through the document, which will be provided in full, as well as an executive summary and return workshops. The Initial Plan to Monitor the Impacts on the Communities is comprised, essentially, of process indicators and part of the performance indicators. For the submission of the Complete Plan to Monitor the Impacts on the Communities, the plan presented here shall be evaluated and validated by stakeholders, the process indicators and results will be supplemented, and the impact indicators will be established.

Following the same strategic logic of activities, the monitoring aims at accessing the effectiveness of targeted interventions: in the engagement of local players and stakeholders to strengthen the association and promote rural technical assistance.

a) Technical description of the monitoring tasks

The monitoring of benefits to communities consists of three components:

- Monitoring the engagement of players, aiming at following-up the implementation of activities related to the coordination and engagement of institutions and organizations (governmental, non-governmental and private) to facilitate community access to public policies, basic services and rural development;
- Monitoring the strengthening of associations, focusing on activities (courses, trainings and combined actions) developed to strengthen it, its results and impacts; and
- Monitoring of activities for the coordination of rural technical assistance services and leakage management outside the boundaries of the farm, monitoring the result in the increased agro-extractive productivity and implementation of more sustainable techniques and technologies.

b) Data to be collected

Table 51. Data to be collected for monitoring the activities held with the communities.

Component	Data/Parameter	Description	Unit	Source	Frequency
Engagement of Players	No. of Meetings Held	Number of meetings held with stakeholders during the reference period	Number	Minutes of meetings and social activities report	Biannual
	Number of communities engaged	Number of communities engaged in the meetings held with stakeholders for coordination	Number	Minutes of meetings and social activities report	Biannual

		purposes.			
	Number of institutions engaged	Number of institutions participating in coordination meetings, including non-governmental public agencies, and private institutions.	Number	Minutes of meetings and social activities report	Biannual
	Number of municipalities engaged	Number of municipalities engaged in project activities	Number	Minutes of meetings and social activities report	Biannual
	Status of follow-ups	Forwarding status of agendas drafted and discussed during meetings of stakeholders	Not applicable	Minutes of meetings and social activities report	Biannual
	Perception of the "3Es" of intervention	Query on the perception of the "3Es" (effectiveness, efficiency and equity) for the REDD+ Maísa project among those involved in the intervention	Not applicable	Interview records and social activities report	Annual
	Number of policies and public services accessed	Number of public policies and services accessed by the project communities	Number	Interview records and social activities report	Annual
Strengthening the Associations	Number of associations affected	Number of associations contacted and engaged with the project	Number	Report of social activities	Biannual
	Number of cooperatives	Number of cooperatives	Number	Report of social activities	Biannual

	affected	contacted and engaged with the project			
	Number of courses and trainings	Number of courses and trainings developed by the projects	Number	Report of social activities	Biannual
	Number of new associations	Number of new formalized associations as from the project intervention	Number	Report of social activities	Biannual
	Number of new cooperatives	Number of new formalized cooperatives as from the project intervention	Number	Report of social activities	Biannual
	% of regularized associations	From the total number of associations served by the project, what percentage is regularized?	Percentage	Report of social activities	Biannual
	% of regularized cooperatives	From the total number of cooperatives served by the project, what percentage is regularized?	Percentage	Report of social activities	Biannual
	Perception of the "3Es" of intervention	Query on the perception of the "3Es" (effectiveness, efficiency and equity) for the REDD+ Maísa project among those involved in the intervention	Not applicable	Interview records and social activities report	Annual
Leakage Management	Number of institutions involved	Number of institutions	Number	Report of social activities	Biannual

in the Reference Region.		(governmental, non-governmental and private bodies) involved in technical assistance and rural extension activities			
	Number of families affected	Number of families served by the ATER service	Number	Report of social activities	Biannual
	Frequency of technical visits	Average frequency of service rendered to families by field workers	Average number of visits per month	Assistance records and social activities report	Biannual
	Number of courses and trainings	Number of training courses and qualifications developed within the scope of ATER	Number	Report of social activities	Biannual
	Productivity of cassava fields.	Average amount of cassava produced per area per family	Average kilograms per hectare	Assistance records and social activities report	Annual
	Amount of cassava flour produced	Average amount of cassava flour produced per family	Average sacks per family	Assistance records and social activities report	Annual
	Amount of cassava flour sold	Average amount of cassava sold per family	Average sacks per family	Assistance records and social activities report	Annual
	Price of cassava flour	Average price of a sack of flour per family	R$	Assistance records and social activities report	Annual
	Cultivated Area	Average area per family destined to	hectares	Assistance records and social activities	Biannual

		agricultural crops and cattle ranching activities		report	
	Number of crops grown on the property	Average diversity of agricultural, livestock and extractive uses developed on the outskirts of rural properties	Number	Assistance records and social activities report	Biannual
	Use of Inputs	Type and amount of raw materials used in the maintenance of production systems	Not applicable	Assistance records and social activities report	Biannual
	Number of families managing non-timber forest products	Number of families developing extractive activities	Number	Assistance records and social activities report	Biannual
	Market access	Final marketing spaces of products produced in rural properties	Not applicable	Assistance records and social activities report	Biannual
	Family Income:	Average monthly income per family, with focus on the participation of agricultural and forestry activities	R$	Assistance records and social activities report	Biannual
	Professional Occupation	Occupation of family members	Not applicable	Assistance records and social activities report	Biannual
	Perception of the "3Es" of intervention	Query on the perception of the "3Es" (effectiveness, efficiency and equity) for the	Not applicable	Assistance records and social activities report	Annual

		REDD+ Maísa project among those involved in the intervention			

c) Overview of the data collection procedure

Data will be collected during and after activities with stakeholders and/or through specific interviews. This information will be systematized and presented on reports of social activities developed by the project, every six months. Certain annual indicators, such as, for instance, the index of the perception of the "3Es", will be contained in the report, according to their collection frequency (once a year).

d) Quality control and quality assurance procedures

The data collected and portrayed in the reports will be presented and validated during coordination meetings with stakeholders, to which the affected producers, associations and cooperatives will be invited as members, throughout the project lifecycle.

e) Data archiving

All data and reports of the REDD+ Maísa Project will be stored by Biofílica Investimentos Ambientais in digital files throughout the project lifecycle. The original reports (physical), minutes of meetings and field records will be stored by the local partner in implementing social activities. Biofílica Investimentos Ambientais will keep a copy of these documents filed in digital format throughout the project. 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 the responsibility of Biofílica Investimentos Ambientais and of its local partner in the implementation of social activities.

Initial Plan to Monitor the Impacts on Biodiversity

We present below an Initial Plan to Monitor the Impacts on Biodiversity, whereas the complete monitoring plan will be completed within one year after Project validation and will be posted on the Internet and reported to the communities, project proponents, partners and other stakeholders through the document, which will be provided in full, as well as an executive summary and return workshops. The Initial Plan to Monitor the Impacts on Biodiversity is comprised, essentially, of process indicators and part of the performance indicators. For the submission of the Complete Plan to Monitor the Impacts on Biodiversity, the plan presented here shall be evaluated and validated by stakeholders, the process indicators and results will be supplemented, and the impact indicators will be established.

The Initial Plan for Monitoring the Impacts on Biodiversity focuses on the monitoring of activities aimed at monitoring the impacts of the project on biodiversity, the monitoring of species of relevance and the interaction with education and research institutions for knowledge promotion and dissemination. The evaluation of the effectiveness of the measures taken to maintain and enhance the HCVs will be

incorporated within these tasks as HCV1 is linked to the monitoring of species of relevance and the measures adopted in the HCV2 are based on the interaction with education and research institutions.

a) Technical description of the monitoring tasks

The monitoring of benefits to Biodiversity consists of three components:

- Monitoring the overall impacts of activities developed by the project, through a regular survey on different fauna taxa, avifauna at first; and the impacts of the activities of sustainable forest management, through the measurement of permanent inventory plots and evaluation of impacts and damages;
- Monitoring of species of relevance that aims at monitoring the activities employed to preserve attributes of high conservation value related to the value of the species (HCV 1), that is, the species Chiropotes satanas (known locally as Cuxiú-preto) and Cebus Kaapori (Known locally as cairara), two primates considered critically endangered by IUCN's Red List of Endangered Species and endemic by Belém's Center of Endemism. Other species that may also be identified as relevant in future should also be included in the monitoring; and
- The monitoring of coordination actions with education and research institutions, focusing on attributes of high conservation value related to the landscape level (HCV 2), which will be carried out through the collaboration with education and research institutions and non-governmental organizations, which have a much broader reach at the landscape level for the development of studies and mobilizations required to maintain this attribute of high conservation value.

b) Data to be collected

Table 52. Data to be collected for monitoring the activities with biodiversity.

Component	Data/Parameter	Description	Unit	Source	Frequency
Impact Monitoring	Number of expeditions	Number of expeditions for the sampling of a single taxon at each monitoring event	Number	Fauna Monitoring Report	Annual
	Intensity of expeditions	Effort in days of sampling employed in each expedition	Days	Fauna Monitoring Report	Annual
	No. of monitored taxa	Number of sampled taxa	Number	Fauna Monitoring Report	Annual
	No. of monitored species	Number of species sampled at each monitoring	Number	Fauna Monitoring Report	Annual

	Diversity of the monitored fauna taxon	Variety of species found for each monitored fauna taxon	Not applicable	Fauna Monitoring Report	Annual
	Value of the monitored fauna taxon	Numerical abundance of species identified by the study in a single taxon	Number	Fauna Monitoring Report	Annual
	Diversity of plant community in Permanent Plots	Variety of species found in the flora community within the permanent plots	Not applicable	Post Exploratory Report	Annual
	Diversity of the plant community in Permanent Plots	Numerical abundance of species found in the plant community within the permanent plots	Number	Post Exploratory Report	Annual
	Species mentioned in official lists of endangered species	Species constantly mentioned in official lists of endangered species	Not applicable	Fauna Monitoring Report	Annual
Monitoring of Species of Relevance	Number of expeditions	Number of expeditions for the sampling of species at each monitoring event	Number	Fauna Monitoring Report	Annual
	Intensity of Expeditions	Effort in days of sampling employed in each expedition	Days	Fauna Monitoring Report	Annual
	Number of communities interviewed	Number of communities interviewed for Ethnozoological identification of species in the project area	Number	Fauna Monitoring Report	Annual
	Presence of the	Identification of	Not	Fauna	Annual

	species in the Project Zone	the presence of the species in the project zone through ethnozoology or sighting	applicable	Monitoring Report	
	Presence of the species in the Project Area	Identification of the presence of the species in the project area through ethnozoology or sighting	Not applicable	Fauna Monitoring Report	Annual
	Status of species of relevance on IUCN's red list of endangered species	Monitor the status of species sampled in the project area on IUCN's Red List of endangered species.	Not applicable	Fauna Monitoring Report	Annual
	Number of studies and research projects developed	Number of studies and research projects conducted with the species of relevance	Number	Fauna Monitoring Report	Annual
	Number of scientific papers	Number of scientific papers based on the research projects and studies developed	Number	Fauna Monitoring Report and published scientific papers.	Annual
Coordination with Education and Research Institutions	Number of institutions contacted	Number of institutions contacted for the development of studies and research on biodiversity conservation at landscape level in the project region	Number	Report of Project Activities	Biannual
	No. of Meetings Held	Number of meetings held for the development	Number	Report of Project Activities	Biannual

		of studies and research on biodiversity conservation at landscape level in the project region			
	Number of institutions engaged	Number of institutions engaged in the development of studies and research on biodiversity conservation at landscape level in the project region	Number	Report of Project Activities	Biannual
	Number of studies and research projects developed	Number of institutions engaged in the development of studies and research on biodiversity conservation at landscape level in the project region	Number	Report of Project Activities	Biannual
	Number of scientific publications	Number of scientific publications on biodiversity conservation at landscape level in the project region	Number	Report of project activities and published papers	Biannual
	Access to additional sources of encouragement	Access to additional sources of promotion due to the submitted proposals for studies and research projects	Not applicable	Report of Project Activities	Biannual
	Amount invested in research	Grand total amount invested in research, knowledge	R$	Report of Project Activities	Biannual

		generation			
	Validation workshops/knowledge return	Number of workshops held for validating and disseminating the information and knowledge generated in the project region	Number	Report of Project Activities	Biannual

c) Overview of the data collection procedure

- The parameters related to the impacts of the sustainable forest management activity will be collected after harvest operations. The parameters linked to the fauna assessment will be collected at least once every Amazonian climate season (summer and winter). Each taxon studied will have its specific procedure for data collection in accordance with the procedures adopted for the initial assessment, in order to preserve the comparability of the results over time. This information will be systematized and presented through fauna monitoring reports related to one year of monitoring, before each verification event.
- The data on species of relevance will be collected during the studies. This information will be systematized and presented through fauna monitoring reports related to one year of monitoring, before each verification event.
- The data of the collaboration with educational and research institutions will be collected continuously, before, during and after the completion of the studies. This information will be systematized and presented through fauna monitoring reports related to one year of monitoring, before each verification event.

d) Quality control and quality assurance procedures

- The monitoring parameters directly related to sustainable forest management activities (permanent plots and damage evaluation) will follow the control and quality assurance procedures set out in the Sustainable Forest Management Plan.
- The quality assurance and control procedures linked to the collection of other data will depend on the internal procedures of the organization responsible for the field surveys of each study.
- The surveys based on ethnozoology will be presented and validated during meetings held with stakeholders, to which the communities interviewed will be invited as members, throughout the project lifecycle.

e) Data archiving

All data and reports of the REDD+ Maísa Project will be stored by Biofílica Investimentos Ambientais in digital files throughout the project lifecycle. The original reports (physical) and field records produced will be stored by the organizations responsible for field surveys and/or by Sipasa. Biofílica Investimentos Ambientais will keep a copy of these documents filed in digital format throughout the project. 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 the responsibility of Biofílica Investimentos Ambientais, the organizations that cooperate in the studies and Sipasa.

Monitoring of Project Management

A simplified plan has also been developed to monitor project management, containing two main tasks: following-up the activities, by monitoring the relationship with players, and incorporating adaptive management.

a) Technical description of the monitoring tasks

This task aims at monitoring the progress of project activities through the analysis of financial parameters, internal reports and external audit events. It also incorporates different aspects related to the relationships of the REDD+ Maísa Project, as the effectiveness of the conflict resolution proceeding and the relationships with institutions involved in the different phases of the project, and evaluates the implementation of adaptive management practices during project implementation.

b) Data to be collected

Table 53. Data to be collected for monitoring the project management.

Component	Data/Parameter	Description	Unit	Source	Frequency
Activities Follow-up	Cash flow of the project	Analysis of disbursements made with the project's internal resources	Not applicable	Report of Project Activities	Biannual
	Frequency of publication of Activity Reports	Time interval between the publications of Activity Reports	Months	Report of Project Activities	Biannual
	Frequency of publication of Monitoring Reports	Time interval between the publication of monitoring reports on deforestation, social activities and biodiversity	Months	Monitoring reports on deforestation, social activities and biodiversity	Biannual

	Frequency of verification under the VCS	Time interval between verification events in the VCS	Years	Monitoring reports in the VCS	Biannual
	Frequency of verification under the CCB	Time interval between verification events in the CCB	Years	Monitoring reports in the CCB	Biannual
	% of Implementation	Percentage of implementation of activities as provided in the annual strategic plan	Percentage	Report of Project Activities	Biannual
Relationship with Stakeholders	Number of occurrences through the dispute resolution procedure	Number of occurrences reported through the dispute resolution procedure	Number	Report of Project Activities	Biannual
	Number of institutions involved in the implementation and monitoring of activities for the climate	Number of institutions involved in the implementation and monitoring of activities for the climate	Number	Report of Project Activities	Biannual
	Number of institutions involved in the implementation and monitoring of activities for the communities	Total number of institutions involved in the implementation and monitoring of activities for the communities	Number	Report of Project Activities	Biannual
	Number of institutions involved in the implementation and monitoring of activities for biodiversity	Total number of institutions involved in the implementation and monitoring of activities for biodiversity	Number	Report of Project Activities	Biannual
	Conflict	Status of the	Not	Report of	Biannual

	resolution forwarding status	follow-ups of occurrences reported through the dispute resolution procedure	applicable	Project Activities	
Adaptive Management	Number of interventions arising from the monitoring	Number of interventions and/or changes in activities carried out as a result of the analysis of monitoring results	Number	Report of Project Activities	Biannual
	Perception of the "3Es" by proponents and partners	Query on the perception of the "3Es" (effectiveness, efficiency and equity) for the REDD+ Maísa project among project partners and proponents.	Not applicable	Report of Project Activities	Biannual

c) Overview of the data collection procedure

The data will be collected every six months when making the report on project activities.

d) Quality control and quality assurance procedures

The data collected and portrayed on the reports will be presented and discussed among project partners and proponents to validate the information.

e) Data archiving

All data and reports of the REDD+ Maísa Project will be stored by Biofílica Investimentos Ambientais in digital files throughout the project lifecycle. All related documents will be gathered in physical and/or virtual files and provided to the verification staff at each verification event.

f) Organization and responsibilities of the parties involved

All monitoring activities are the responsibility of Biofílica Investimentos Ambientais.

8.2 Data and Parameters Available at Validation (CL3)

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[4].
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:	$tCO_2e\ ha^{-1}$
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:	478.1 $tCO_2e\ ha^{-1}$
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). The dead wood pool was estimated based on (FELDPAUSCH, 2005).
Data purpose:	• Definition of the baseline scenario • Calculation of baseline emissions

[4] Available on: < http://www.obt.inpe.br/prodes/index.php >

Comments:	• Calculation of project emissions • Calculation of leakage 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+ Maísa 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_2e
Description:	Carbon mass to CO_2e 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 Exploratory Report
Value applied:	Maximum of 20 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.
Data purpose:	• Calculation of project emissions • Correlation with the financial performance of the

Comments:	sustainable forest management • Analysis of sustainable forest management impacts. 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 Exploratory 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. 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:	**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	Current number of monitoring stations

description of measurement methods and procedures applied:	
Data purpose:	Supervision of asset 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:	**Watch 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
Data purpose:	Monitor: • Diversification of the enterprise's income sources

Comments:	• Project's decreased financial risk • Generation of employment and income

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
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 applied:	Not applicable
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 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: Justification for the choice of data or description of measurement methods and procedures applied: Data purpose: Comments:	Not applicable Not applicable Monitor: • Diversification of the enterprise's income sources • Project's decreased financial risk • Generation of employment and income

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

Parameter:	**No. of Meetings Held**
Project Component: Unity: Description: Data source: Value applied: Justification for the choice of data or description of measurement methods and procedures applied: Data purpose: Comments:	Communities/Engagement of Players Number Number of meetings held with stakeholders during the reference period Minutes of meetings and social activities report Not applicable Not applicable Monitor the effort for the collaboration of stakeholders and engagement of players.

Parameter:	**Number of communities engaged**
Project Component: Unity:	Communities/Engagement of Players Number

Description:	Number of communities engaged in the meetings held with stakeholders for coordination purposes.
Data source:	Minutes of meetings and social activities report
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
Data purpose:	Monitor the extent of the social interventions of the project.
Comments:	

Parameter:	**Number of institutions engaged**
Project Component:	Communities/Engagement of Players
Unity:	Number
Description:	Number of institutions participating in coordination meetings, including non-governmental public agencies, and private institutions.
Data source:	Minutes of meetings and social activities report
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
Data purpose:	Monitor the extent of the social interventions of the project.
Comments:	

Parameter:	**Number of municipalities engaged**
Project Component:	Communities/Engagement of Players
Unity:	Number
Description:	Number of municipalities engaged in project activities
Data source:	Minutes of meetings and social activities report
Value applied:	Not applicable
Justification for the choice of data or description of measurement methods and procedures applied:	Not applicable
Data purpose:	Monitor the extent of the social interventions of the project.
Comments:	

Parameter:	**Cash flow of the project**
Project Component:	Management/Monitoring of Activities
Unity:	Not applicable
Description:	Analysis of disbursements made with the project's internal resources
Data source:	Report of Project Activities
Value applied:	Not applicable
Justification for the choice of data or	Not applicable

description of measurement methods and procedures applied: Data purpose: Comments:	Monitor the implementation of activities through a financial disbursement flow.

Parameter:	**Frequency of publication of Activity Reports**
Project Component: Unity: Description: Data source: Value applied: Justification of choice of data or description of measurement methods and procedures applied: Data purpose: Comments:	Management/Monitoring of Activities Months Time interval between the publications of Activity Reports Report of Project Activities Not applicable Not applicable Monitor project communication and provide verification resources

Parameter:	**Number of institutions involved in the implementation and monitoring of activities for the climate**
Project Component: Unity: Description: Data source: Value applied: Justification for the choice of data or description of measurement methods and procedures applied: Data purpose: Comments:	Management/Relationship with Players Number Number of institutions involved in the implementation and monitoring of activities for the climate Report of Project Activities Not applicable Not applicable Monitor the scope of project relationships on interventions for the climate

Parameter:	**Number of institutions involved in the implementation and monitoring of activities for the communities**
Project Component: Unity: Description: Data source: Value applied: Justification for the choice of data or description of measurement methods and	Management/Relationship with Players Number Total number of institutions involved in the implementation and monitoring of activities for the communities Report of Project Activities Not applicable Not applicable

procedures applied: Data purpose: Comments:	Monitor the scope of project relationships on interventions for the communities

Parameter:	**Number of institutions involved in the implementation and monitoring of activities for biodiversity**
Project Component: Unity: Description: Data source: Value applied: Justification for the choice of data or description of measurement methods and procedures applied: Data purpose: Comments:	Management/Relationship with Players Number Total number of institutions involved in the implementation and monitoring of activities for biodiversity Report of Project Activities Not applicable Not applicable Monitor the scope of project relationships on interventions for biodiversity

8.3 Data and Parameters Monitored (CL3, CM3 and B3)

Description of data and parameters monitored after the validation, including parameters for the evaluation of real (positive and negative) and anticipated impacts on the communities and biodiversity resulting from project activities.

Parameter:	**Deforestation in the Project Area and Leakage Belt**
Project Component: Unity: Description: Data source: Description of measurement methods and procedures to be applied: Frequency of monitoring/recording: Applicable value: Monitoring equipment:	Climate/Unplanned deforestation avoided Hectare (ha) Forest cover areas converted into non-forest areas inside the REDD+ Maísa Project area and the leakage belt. Calculated through remote sensing images together with GPS data collected in the field. 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. Annual Not applicable 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). *Methodology for the annual calculation of deforestation within the Legally-defined Amazon*

Parameter:	**Ctot**
Project Component:	Climate/Unplanned deforestation avoided
Unity:	$tCO_2e\ ha^{-1}$
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 value:	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 intervals after the harvesting of the Annual Production Unit.
Applicable value	N/A
Monitoring equipment:	Calculated based on circumference at breast height data (CAP) measured in the field by means of a tape measure.
Quality control and quality assurance procedures to be applied:	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:	The monitoring of forest cover areas will be carried out by 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.
Applicable value	N/A
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 indentified, the Forest Cover Benchmark Map will be updated through the algebraic map.
Comments:	

Parameter:	**$\Delta CabBSLLK_t$**
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
Applicable value	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 (CH_4) and nitrous oxide (N_2O) arising from herds**
Project Component: Unity:	Climate/Unplanned deforestation avoided 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
Applicable value:	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:	**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 Exploratory 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.
Applicable value:	Does not apply.
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.
Calculation method:	See Sustainable Forest Management Plan
Comments:	

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 Exploratory 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.
Applicable value:	Does not apply.
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.
Calculation method:	See Sustainable Forest Management Plan
Comments:	

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
Applicable value	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Does not apply.
Calculation method:	Does not apply.
Comments:	

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
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
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
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Does not apply.
Comments:	The Property Monitoring Reports will be implemented based on the validation of the project.

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
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft report of Project Monitoring with the proponents before its official publication.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Forwarding status**
Project Component:	Communities/Engagement of Players
Unity:	Not applicable

Description:	Forwarding status of agendas drafted and discussed during meetings of stakeholders
Data source:	Minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Perception of the "3Es" + co-benefits of the intervention**
Project Component: Unity:	Communities/Engagement of Players Not applicable
Description:	Query on the perception of the "3Es" (effectiveness, efficiency and equity) + Co-benefits for the REDD+ Maísa Project among those involved in the intervention
Data source:	Interview records, minutes of the meeting and social activities report
Description of measurement methods and procedures to be applied:	While conducting meetings with stakeholders and/or through specific interviews, the various players engaged will be trained and leveled on the "3Es" concept (effectiveness, efficiency and equity) + Co-benefits, and are then asked about their perception of the application of "3Es" in the REDD + Maísa project. The questioning of perception will be conducted through a grading system, in which a grade from 0 to 5 should be assigned to each component (effectiveness, efficiency, equity and co-benefits) according to the perception of each respondent.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of policies and public services accessed**
Project Component:	Communities/Engagement of Players
Unity:	Number
Description:	Number of public policies and services accessed by the project communities
Data source:	Interview records, minutes of the meeting and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of associations affected**
Project Component:	Communities/Strengthening of Associations
Unity:	Number
Description:	Number of associations contacted and engaged with the project
Data source:	Interview records, minutes of the meeting and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of cooperatives affected**

Project Component: Unity:	Communities/Strengthening of Associations Number
Description:	Number of cooperatives contacted and engaged with the project
Data source:	Interview records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter: **Number of courses and trainings**

Project Component: Unity:	Communities/Strengthening of Associations Number
Description:	Number of courses and trainings developed by the projects
Data source:	Interview records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter: **Number of new associations**

Project Component: Unity:	Communities/Strengthening of Associations Number
Description:	Number of new formalized associations as from the project

	intervention
Data source:	Interview records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter: **Number of new cooperatives**

Project Component: Unity:	Communities/Strengthening of Associations Number
Description:	Number of new formalized cooperatives as from the project intervention
Data source:	Interview records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter: **% of regularized associations**

Project Component: Unity:	Communities/Strengthening of Associations Percentage
Description:	From the total number of associations served by the project, what percentage is regularized?
Data source:	Interview records, minutes of meetings and social activities report

Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**% of regularized cooperatives**
Project Component: Unity:	Communities/Strengthening of Associations Percentage
Description:	From the total number of cooperatives served by the project, what percentage is regularized?
Data source:	Interview records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Perception of the "3Es" + co-benefits of the intervention**
Project Component: Unity:	Communities/Strengthening of Associations Not applicable
Description:	Query on the perception of the "3Es" (effectiveness, efficiency and equity) + Co-benefits for the REDD+ Maísa Project among those involved in the intervention
Data source:	Interview records, minutes of the meeting and social activities report
Description of measurement methods and procedures to be applied:	While conducting meetings with stakeholders and/or through specific interviews, the various players engaged will be

	trained and leveled on the "3Es" concept (effectiveness, efficiency and equity) + Co-benefits, and are then asked about their perception of the application of "3Es" in the REDD + Maísa project. The questioning of perception will be conducted through a grading system, in which a grade from 0 to 5 should be assigned to each component (effectiveness, efficiency, equity and co-benefits) according to the perception of each respondent.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of institutions involved**
Project Component: Unity:	Communities/Technical Assistance and Rural Extension Number
Description:	Number of institutions (governmental, non-governmental and private bodies) involved in technical assistance and rural extension activities
Data source:	Interview records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of families affected**
Project Component: Unity:	Communities/Technical Assistance and Rural Extension Number

Description:	Number of families served by the ATER service
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter: **Frequency of technical visits**

Project Component: Unity:	Communities/Technical Assistance and Rural Extension Average number of visits per month
Description:	Average frequency of service rendered to families by field workers
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter: **Number of courses and trainings**

Unity:	Number
Description:	Number of training courses and qualifications developed within the scope of ATER
Data source:	Interview records, assistance records, minutes of meetings and social activities report

Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Productivity of cassava fields.**
Project Component: Unity:	Communities/Technical Assistance and Rural Extension Average kilograms per hectare
Description:	Average amount of cassava produced per area per family
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Amount of cassava flour produced**
Project Component: Unity:	Communities/Technical Assistance and Rural Extension Average sacks per family
Description:	Average amount of cassava flour produced per family
Data source:	Assistance records and social activities report
Description of measurement methods and procedures to be applied:	Interview records, assistance records, minutes of meetings and social activities report
Frequency of monitoring/recording:	To be established.
Applicable value:	Biannual
Monitoring equipment:	Does not apply.

Quality control and quality assurance procedures to be applied:	Does not apply.
Calculation method:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Comments:	

Parameter:	**Amount of cassava flour sold**
Project Component:	Communities/Technical Assistance and Rural Extension
Unity:	Average sacks per family
Description:	Average amount of cassava sold per family
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Price of cassava flour**
Project Component:	Communities/Technical Assistance and Rural Extension
Unity:	R$
Description:	Average price of a sack of flour per family
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.

Comments:	

Parameter:	**Cultivated Area**
Project Component: Unity:	Communities/Technical Assistance and Rural Extension hectares
Description:	Average area per family destined to agricultural crops and cattle ranching activities
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of crops grown on the property**
Project Component: Unity:	Communities/Technical Assistance and Rural Extension Number
Description:	Average diversity of agricultural, livestock and extractive uses developed on the outskirts of rural properties
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Use of Inputs**
Project Component:	Communities/Technical Assistance and Rural Extension
Unity:	Not applicable
Description:	Type and amount of raw materials used in the maintenance of production systems
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of families managing non-timber forest products**
Project Component:	Communities/Technical Assistance and Rural Extension
Unity:	Number
Description:	Number of families developing extractive activities
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Market access**
Project Component:	Communities/Technical Assistance and Rural Extension

Unity:	Not applicable
Description:	Final marketing spaces of products produced in rural properties
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Family Income:**
Project Component:	Communities/Technical Assistance and Rural Extension
Unity:	R$
Description:	Average monthly income per family, with focus on the participation of agricultural and forestry activities
Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Professional Occupation**
Project Component:	Communities/Technical Assistance and Rural Extension
Unity:	Not applicable
Description:	Profession practiced by the members of the families assisted.

Data source:	Interview records, assistance records, minutes of meetings and social activities report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Perception of the "3Es" of intervention**
Project Component: Unity:	Communities/Technical Assistance and Rural Extension Not applicable
Description:	Query on the perception of the "3Es" (effectiveness, efficiency and equity) for the REDD+ Maísa project among those involved in the intervention
Data source:	Interview records, minutes of the meeting and social activities report
Description of measurement methods and procedures to be applied:	While conducting meetings with stakeholders and/or through specific interviews, the various players engaged will be trained and leveled on the "3Es" concept (effectiveness, efficiency and equity) + Co-benefits, and are then asked about their perception of the application of "3Es" in the REDD + Maísa project. The questioning of perception will be conducted through a grading system, in which a grade from 0 to 5 should be assigned to each component (effectiveness, efficiency, equity and co-benefits) according to the perception of each respondent.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft of the Report of Social Activities with stakeholders before the official publication of the report.
Calculation method:	Does not apply.
Comments:	

Parameter:	**# of expeditions**
Project Component:	Biodiversity/Monitoring
Unity:	Number
Description:	Number of expeditions for the sampling of a single taxon at each monitoring event
Data source:	Field records, datasheets and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	To be established.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Does not apply.
Comments:	The number of applicable or ideal expeditions will depend on the monitored taxon and the institution responsible for data collection.

Parameter:	**Intensity of expeditions**
Project Component:	Biodiversity/Monitoring
Unity:	Days
Description:	Effort in days of sampling employed in each expedition
Data source:	Field records, datasheets and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	To be established.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Does not apply.
Comments:	The intensity of applicable or ideal expeditions will depend on the monitored taxon and the institution responsible for data collection.

Parameter:	**No. of groups of monitored animals**
Project Component:	Biodiversity/Monitoring
Unity:	Number

Description:	Number of monitored animals groups (Taxa)
Data source:	Field records, datasheets and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	At least one taxon, preferably avifauna.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Digital spreadsheet
Comments:	

Parameter:	**Number of sampled species**
Project Component:	Biodiversity/Monitoring
Unity:	Number
Description:	Number of species sampled in the fauna survey of each monitoring.
Data source:	Field records, datasheets and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	Use the amounts acquired by group as a reference when the methodology is consistent and comparable with those adopted in the initial assessments (Section 1).
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Digital spreadsheet
Comments:	

Parameter:	**Diversity of the monitored fauna taxon**
Project Component:	Biodiversity/Monitoring
Unity:	Not applicable
Description:	Variety of species found for each monitored fauna taxon
Data source:	Field records, datasheets and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual

Applicable value:	Use the amounts acquired by group as a reference when the methodology is consistent and comparable with those adopted in the initial assessments (Section 1).
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Digital spreadsheet
Comments:	

Parameter: **Value of the monitored fauna taxon**

Project Component: Unity:	Biodiversity/Monitoring Number
Description:	Numerical abundance of species identified by the study in a single taxon
Data source:	Field records, datasheets and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	Use the amounts acquired by group as a reference when the methodology is consistent and comparable with those adopted in the initial assessments (Section 1).
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Digital spreadsheet
Comments:	

Parameter: **Diversity of plant community in Permanent Plots**

Project Component: Unity:	Biodiversity/Monitoring Not applicable
Description:	Variety of species found in the flora community within the permanent plots
Data source:	Post Exploratory 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.
Applicable value:	To be established.
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.
Calculation method:	To be established.
Comments:	

Parameter:	**Diversity of the plant community in Permanent Plots**
Project Component:	Biodiversity/Monitoring
Unity:	Number
Description:	Numerical abundance of species found in the plant community within the permanent plots
Data source:	Post Exploratory 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.
Applicable value:	To be established.
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.
Calculation method:	To be established.
Comments:	

Parameter:	**Species mentioned in official lists of endangered species**
Project Component:	Biodiversity/Monitoring
Unity:	Not applicable
Description:	Continuous monitoring of species sampled in the project area in relation to their status in IUCN's Red List of Endangered Species, with emphasis on species listed as critically endangered (CR) or endangered (EN).
Data source:	Field records, datasheets, interview files, and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	Systematization and comparison of data and information collected in fauna surveys and ethnozoological interviews with IUCN's Official List, available at: http://www.iucnredlist.org
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.

Quality control and quality assurance procedures to be applied:	Comparison of different sources of information (empirical survey and traditional knowledge).
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of expeditions**
Project Component: Unity:	Biodiversity/Monitoring of Species of Relevance Number
Description:	Number of expeditions for sampling species of relevance (attribute of high conservation value 1: value of the species), with emphasis on species listed as critically endangered (CR) or endangered (EN).
Data source:	Field records, datasheets and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	To be established.
Monitoring equipment:	To be established.
Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Digital spreadsheet
Comments:	The number of applicable or ideal expeditions will depend on the methods and procedures established and on the institution responsible for data collection.

Parameter:	**Intensity of Expeditions**
Project Component: Unity:	Biodiversity/Monitoring of Species of Relevance Days
Description:	Effort in days of sampling employed at each expedition undertaken for sampling species of relevance (attribute of high conservation value 1: value of the species), with emphasis on species listed as critically endangered (CR) or endangered (EN).
Data source:	Field records, datasheets and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	To be established.
Monitoring equipment:	To be established.

Quality control and quality assurance procedures to be applied:	To be established.
Calculation method:	Digital spreadsheet
Comments:	The intensity of applicable or ideal expeditions will depend on the methods and procedures established and on the institution responsible for data collection.

Parameter:	**Number of communities interviewed**
Project Component: Unity:	Biodiversity/Monitoring of Species of Relevance Number
Description:	Number of communities interviewed for Ethnozoological identification of species of relevance (attribute of high conservation value 1: value of the species), with emphasis on species listed as critically endangered (CR) or endangered (EN) in the Project Zone.
Data source:	Interview files and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	To be established.
Frequency of monitoring/recording:	Annual
Applicable value:	To be established.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Fauna Monitoring with the communities interviewed.
Calculation method:	Systematization of interview records.
Comments:	

Parameter:	**Presence of species of relevance in the Project Zone**
Project Component: Unity:	Biodiversity/Monitoring of Species of Relevance Does not apply.
Description:	Identification of species of relevance (attribute of high conservation value 1: value of the species), with emphasis on species listed as critically endangered (CR) or endangered (EN), in the project zone by means of ethnozoology or sighting.
Data source:	Field records, datasheets, interview files, and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	Systematization and comparison of data and information collected in fauna surveys and ethnozoological interviews.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.

Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Comparison of different sources of information (empirical survey and traditional knowledge).
Calculation method:	Does not apply.
Comments:	

Parameter:	**Presence of species of relevance in the Project Area**
Project Component: Unity:	Biodiversity/Monitoring of Species of Relevance Not applicable
Description:	Identification of species of relevance (attribute of high conservation value 1: value of the species), with emphasis on species listed as critically endangered (CR) or endangered (EN), in the Project Area by means of ethnozoology or sighting.
Data source:	Field records, datasheets, interview files, and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	Systematization and comparison of data and information collected in fauna surveys and ethnozoological interviews.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Comparison of different sources of information (empirical survey and traditional knowledge).
Calculation method:	Does not apply.
Comments:	

Parameter:	**Status of species of relevance on IUCN's red list of endangered species**
Project Component: Unity:	Biodiversity/Monitoring of Species of Relevance Not applicable
Description:	Continuous monitoring of the species of relevance in the project with regard to their status on IUCN's Red List of Endangered Species, with emphasis on species listed as critically endangered (CR) or endangered (EN).
Data source:	Field records, datasheets, interview files, and Fauna Monitoring Report
Description of measurement methods and procedures to be applied:	Systematization and comparison of data and information collected in fauna surveys and ethnozoological interviews with IUCN's Official List, available at: http://www.iucnredlist.org

Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Comparison of different sources of information (empirical survey and traditional knowledge).
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of studies and research projects developed**
Project Component: Unity:	Biodiversity/Monitoring of Species of Relevance Number
Description:	Number of studies and research projects developed with the species of relevance (attribute of high conservation value 1: value of the species), with emphasis on species listed as critically endangered (CR) or endangered (EN), in the Project Zone and Project Area.
Data source:	Fauna Monitoring Report and Report of Project Activities.
Description of measurement methods and procedures to be applied:	Systematization of information and studies reported and contained on the Fauna Monitoring Reports and the Report of Project Activities.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Comparison of different sources of information (Fauna Monitoring Report and Report of Project Activities).
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of scientific publications**
Project Component: Unity:	Biodiversity/Monitoring of Species of Relevance Number
Description:	Number of scientific papers based on studies and research developed with the species of relevance (attribute of high conservation value 1: value of the species), with emphasis on species listed as critically endangered (CR) or endangered (EN), in the Project Zone and Project Area.
Data source:	Fauna Monitoring Report, Report of Project Activities and published scientific papers.

Description of measurement methods and procedures to be applied:	Systematization of published papers and information about the studies described on the Fauna Monitoring Reports and on the Report of Project Activities.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Comparison of different sources of information (Fauna Monitoring Report, Report of Project Activities and published papers).
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of institutions contacted**
Project Component:	Biodiversity/Coordination with Education and Research Institutions
Unity:	Number
Description:	Number of institutions contacted for the development of studies and research on biodiversity conservation at landscape level in the Project Zone (attribute of high conservation value 2: importance at landscape level)
Data source:	Records and Meeting Minutes, Fauna Monitoring Report and Report of Project Activities.
Description of measurement methods and procedures to be applied:	Systematization of Records and Meeting Minutes.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the Education and Research institutions contacted.
Calculation method:	Does not apply.
Comments:	

Parameter:	**No. of Meetings Held**
Project Component:	Biodiversity/Coordination with Education and Research Institutions
Unity:	Number
Description:	Number of meetings held for the development of studies and research on biodiversity conservation at landscape level in the Project Zone (attribute of high conservation value 2:

	importance at landscape level)
Data source:	Records and Meeting Minutes, Fauna Monitoring Report and Report of Project Activities.
Description of measurement methods and procedures to be applied:	Systematization of Records and Meeting Minutes.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the Education and Research institutions contacted.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of institutions engaged**
Project Component:	Biodiversity/Coordination with Education and Research Institutions
Unity:	Number
Description:	Number of institutions engaged in the development of studies and research on biodiversity conservation at landscape level in the Project Zone (attribute of high conservation value 2: importance at landscape level)
Data source:	Records and Meeting Minutes, Fauna Monitoring Report and Report of Project Activities.
Description of measurement methods and procedures to be applied:	Systematization of information contained in the Records and Meeting Minutes, Fauna Monitoring Report and Report of Project Activities.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the Education and Research institutions engaged.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of studies and research projects developed**
Project Component:	Biodiversity/Coordination with Education and Research Institutions

Unity:	Number
Description:	Number of institutions engaged in the development of studies and research on biodiversity conservation at landscape level in the Project Zone (attribute of high conservation value 2: importance at landscape level)
Data source:	Fauna Monitoring Report and Report of Project Activities.
Description of measurement methods and procedures to be applied:	Systematization of information contained in the Fauna Monitoring Report and the Report of Project Activities and/or consultations to engaged educational and research institutions.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the Education and Research institutions engaged.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of scientific publications**
Project Component:	Biodiversity/Coordination with Education and Research Institutions
Unity:	Number
Description:	Number of scientific papers on biodiversity conservation at landscape level in the Project Zone (attribute of high conservation value 2: importance at landscape level)
Data source:	Fauna Monitoring Report, Report of Project Activities and published scientific papers.
Description of measurement methods and procedures to be applied:	Systematization of information contained in the Fauna Monitoring Report, the Report of Project Activities, published scientific papers and/or consultations to engaged educational and research institutions.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the Education and Research institutions engaged.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Access to additional sources of encouragement**
Project Component:	Biodiversity/Coordination with Education and Research Institutions
Unity:	Does not apply.
Description:	Access to additional sources of promotion due to the submitted proposals for studies and research projects
Data source:	Fauna Monitoring Report and Report of Project Activities.
Description of measurement methods and procedures to be applied:	Consultations to engaged education and research institutions.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the Education and Research institutions engaged.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Amount invested in research**
Project Component:	Biodiversity/Coordination with Education and Research Institutions
Unity:	R$
Description:	Grand total amount invested in research, knowledge generation and education.
Data source:	Fauna Monitoring Report and Report of Project Activities.
Description of measurement methods and procedures to be applied:	Consultations to education and research institutions engaged.
Frequency of monitoring/recording:	Annual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the Education and Research institutions engaged.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Validation workshops/knowledge return**

Project Component:	Biodiversity/Coordination with Education and Research Institutions
Unity:	Number
Description:	Number of workshops held for validating and spreading the information and knowledge generated in the Project Zone.
Data source:	Attendance list, Meeting Minutes, Fauna Monitoring Report and Report of Project Activities.
Description of measurement methods and procedures to be applied:	Systematization of information contained on the Report of Project Activities, consultation to engaged education and research institutions and other stakeholders.
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the Education and Research institutions and other stakeholders.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Frequency of publication of Monitoring Reports**
Project Component:	Management/Monitoring of Activities
Unity:	Months
Description:	Time interval between the publications of Project monitoring reports, whereas, the main ones are the Reports of Deforestation, Social Activities, Fauna Monitoring, Project Activities and Post-exploratory Management Reports.
Data source:	Reports of Deforestation, Social Activities, Fauna Monitoring, Project Activities and Post-exploratory Management Reports.
Description of measurement methods and procedures to be applied:	Systematization of the dates of publication of Reports of Deforestation, Social Activities, Fauna Monitoring, Project Activities and Post-exploratory Management Reports.
Frequency of monitoring/recording:	Annual
Applicable value	See frequently adopted for each monitoring.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Does not apply.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Frequency of verification under the VCS**
Project Component:	Management/Monitoring of Activities
Unity:	Years
Description:	Time interval between verification events in the VCS
Data source:	Verification reports in the VCS
Description of measurement methods and procedures to be applied:	Systematization of dates of publications on VCS Verification Reports.
Frequency of monitoring/recording:	Annual, if applicable.
Applicable value	Maximum of 5 years interval between verifications.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Does not apply.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Frequency of verification under the CCB**
Project Component:	Management/Monitoring of Activities
Unity:	Years
Description:	Time interval between verification events in the CCB
Data source:	Verification reports in the CCB
Description of measurement methods and procedures to be applied:	Systematization of dates of publications on CCB Verification Reports.
Frequency of monitoring/recording:	Annual, if applicable.
Applicable value	Maximum of 5 years interval between verifications.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Does not apply.
Calculation method:	Does not apply.
Comments:	

Parameter:	**% of Implementation**
Project Component:	Management/Monitoring of Activities
Unity:	Percentage
Description:	Percentage of implementation of activities as provided in the annual strategic plan
Data source:	Project's Annual Strategic Plan and Report of Project Activities.

Description of measurement methods and procedures to be applied:	Comparative analysis (in percentage) between the provisions of the Annual Strategic Plan of the REDD+ Maísa Project and the activities implemented according to the Project Activity Reports.
Frequency of monitoring/recording:	Annual
Applicable value	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Does not apply.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of occurrences through the dispute resolution procedure**
Project Component: Unity:	Management/Relationship with Players Number
Description:	Number of occurrences reported through the dispute resolution procedure
Data source:	Report of Project Activities
Description of measurement methods and procedures to be applied:	Number of occurrences reported through the dispute resolution procedure
Frequency of monitoring/recording:	Biannual
Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the stakeholders.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Conflict resolution forwarding status**
Project Component: Unity:	Management/Relationship with Players Not applicable
Description:	Status of the follow-ups of occurrences reported through the dispute resolution procedure
Data source:	Report of Project Activities
Description of measurement methods and procedures to be applied:	Systematization and reporting of follow-ups carried out at every occurrence through the dispute resolution procedure
Frequency of monitoring/recording:	Biannual

Applicable value:	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the stakeholders.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Number of interventions arising from the monitoring**
Project Component:	Management/Adaptive Management
Unity:	Number
Description:	Number of interventions and/or changes in activities carried out as a result of the analysis of monitoring results
Data source:	Report of Project Activities
Description of measurement methods and procedures to be applied:	Comparative analysis between the results and recommendations of studies and monitoring reports and the adaptation/change/deletion/inclusion of activities listed in the Reports of Project Activities.
Frequency of monitoring/recording:	Annual
Applicable Value	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of information systematized on the draft report of Project Activities with the partner institutions engaged in the implementation of activities and monitoring.
Calculation method:	Does not apply.
Comments:	

Parameter:	**Perception of the "3Es" by proponents and partners**
Project Component:	Management/Adaptive Management
Unity:	Not applicable
Description:	Query on the perception of the "3Es" (effectiveness, efficiency and equity) for the REDD+ Maísa project among project partners and proponents.
Data source:	Interview records, meeting minutes and social activities report

Description of measurement methods and procedures to be applied:	While conducting meetings with proponents and/or project partners through specific interviews, the parties will be trained and leveled on the "3Es" concept (effectiveness, efficiency and equity) + Co-benefits, and then asked about their perception of the application of the "3Es" in the REDD + Maísa project. The questioning of perception will be conducted through a grading system, in which a grade from 0 to 5 should be assigned to each component (effectiveness, efficiency, equity and co-benefits) according to the perception of each respondent.
Frequency of monitoring/recording:	Annual
Applicable Value	Does not apply.
Monitoring equipment:	Does not apply.
Quality control and quality assurance procedures to be applied:	Validation of systematic information on the draft report of Project Activities with the proponents before its official publication.
Calculation method:	Does not apply.
Comments:	

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10 ANNEX