# THE ARC REDD+ PROJECT

Document Prepared By Amazon Reforestation Consortium (ARC)

| | |
|---|---|
| **Project Title** | The ARC REDD+ Project |
| **Version** | *02* |
| **Date of Issue** | *18th August 2019* |
| **Project Location** | State of Para, Brazil |
| **Project Proponent(s)** | Amazon Reforestation Consortium<br>amazonreforestation.consortium@gmail.com<br>Address: Rodovia BR 010 Km 15, Paragominas, Para, Brazil<br>CEP: 68.625-970 |
| **Prepared By** | Amazon Reforestation Consortium (ARC) |
| **Validation Body** | |
| **Project Lifetime** | 1st April 2015 – 31st March 2045; 30-year lifetime |
| **GHG Accounting Period** | 1st April 2015 – 31st March 2045 |
| **History of CCB Status** | Not applicable. |
| **Gold Level Criteria** | Not applicable |
| **Expected Verification Schedule** | |

## Table of Contents

*The page numbers of the table of contents below shall be updated upon completion of the project description.*

# 1 SUMMARY OF PROJECT BENEFITS

This project is an Agriculture, Forestry and Other Land Use (AFOLU) project under the Reducing Emissions from Deforestation and Degradation (REDD) project category. Specifically, the project is of the "Avoided Unplanned Deforestation & Degradation" (AUDD) project category.

The project preserves and conserves the native amazon forest of around 53,528 hectares in a critical region of the eastern amazon biome. A region where there is high deforestation risk. The project has quantifiable CCB benefits, as it provides full time employment, training and access for the families that live in and around the project area, to be self-empowered in a region where there are few job opportunities. The project also provides cookstoves with chimneys to help mitigate lung cancer and more efficiently burn fuel for cooking.

## 1.1 Unique Project Benefits

| Outcome or Impact Estimated by the End of Project Lifetime | Section Reference |
|---|---|
| 1) The permanent protection and conservation easement of 53,528 hectares in the Amazon. | 2.1.2 |
| 2) Re-creation of a critical mass forested area to allow the fauna of the region to have refuge. | 2.1.2 |
| 3) The permanent protection of habitat for countless fauna and flora. | 2.1.2 |
| 4) The Project will manage the land as a private protected area, thus conserving local ecosystems through avoided unplanned deforestation and will enhance ecosystem functionality by allowing patched of deforestation to regenerate thus eliminating ecosystem fragmentation. | 2.1.2 |
| 5) The medium term goal is to allow forest regeneration thus increasing the amount of carbon sequestered in the forest. | 2.1.2 |

## 1.2 Standardized Benefit Metrics

| Category | Metric | Estimated by the End of Project Lifetime | Section Reference |
|---|---|---|---|
| GHG emission reductions or removals | Net estimated emission removals in the project area, measured against the without-project scenario | N/A | |
| | Net estimated emission reductions in the project area, measured against the without-project scenario | 340,800 $tCO_2$ | 2.3.3 |
| Forest[1] cover | For REDD[2] projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario | 53,528 hectares | 2.1.4 |
| | For ARR[3] projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario | N/A | |
| Improved land management | Number of hectares of existing production forest land in which IFM[4] practices are expected to occurred as a result of project activities, measured against the without-project scenario | 53,528 hectares | 2.1.3 |
| | Number of hectares of non-forest land in which improved land management practices are expected to occurred as a result of project activities, measured against the without-project scenario | N/A | |
| Training | Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities | 40 families | 2.3.7 |

[1] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)
[2] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)
[3] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)
[4] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

| Category | Metric | Estimated by the End of Project Lifetime | Section Reference |
|---|---|---|---|
| | Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities | 15 | 2.3.7 |
| Employment | Total number of people expected to be employed in project activities,[5] expressed as number of full-time employees[6] | 30 | 2.3.8 |
| | Number of women expected to be employed as a result of project activities, expressed as number of full-time employees | 8 | 2.3.8 |
| Livelihoods | Total number of people expected to have improved livelihoods[7] or income generated as a result of project activities | 40 families | 2.1.4 |
| | Number of women expected to have improved livelihoods or income generated as a result of project activities | 15 | 2.1.4 |
| Health | Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario | 40 families | 2.1.7 |
| | Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario | 15 | 2.1.7 |

[5] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.
[6] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])
[7] Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

| Category | Metric | Estimated by the End of Project Lifetime | Section Reference |
|---|---|---|---|
| Education | Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario | 20 | 4.4 |
| | Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario | 10 | 4.4 |
| Water | Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario | 40 families | |
| | Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario | 15 | |
| Well-being | Total number of community members whose well-being[8] is expected to improve as a result of project activities | 40 families | |
| | Number of women whose well-being is expected to improve as a result of project activities | 15 | |
| Biodiversity conservation | Expected change in the number of hectares managed significantly better by the project for biodiversity conservation,[9] measured against the without-project scenario | 250 hectares | |
| | Expected number of globally Critically Endangered or Endangered species[10] benefiting from reduced threats as a result of project activities,[11] measured against the without-project scenario | 12 | |

[8] Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Livelihoods, Health, Education and Water), and may also include other benefits such as strengthened legal rights to resources, increased food security, conservation of access to areas of cultural significance, etc.
[9] Managed for biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation, e.g. enhancing the status of endangered species
[10] Per IUCN's Red List of Threatened Species
[11] In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

# 2 GENERAL

## 2.1 Project Goals, Design and Long-Term Viability

### 2.1.1 Summary Description of the Project (G1.2)

Amazon Reforestation Consortium seeks to combine elements of conventional integrated conservation and development projects (ICDP) with a “payments for ecosystem services” (PES) approach when designing and implementing the ARC REDD project. REDD has at times been conceived narrowly as simply a system of conditional performance-based payments (PES). Projects developed by Amazon Reforestation Consortium & REDD group are similarly premised on performance-based payments, but we have gone further in developing an approach to project implementation that recognizes the part that can be played by tried and tested interventions. These include participatory land use mapping, boundary determination, development of land use plans, clarification of tenure, income generating activities, employment and community development.

The ARC REDD+ Project that has a primary focus of preserving native forest in the Amazon in regions that have already been highly degraded and converted to agriculture. Via reparing degraded forest through protection and the avoiding further actors who are seeking to degrade, the forest will be able to support and protect more flora and fauna.The project preserves 53,528 hectares of the native forest.

The project goal it to prove out the economic feasibility of preservating the forest in regions that are already heavily degraded, and where it is still considered socially acceptable to convert forest to agriculture. Prior to the current owner the land was a degraded forest, with no cutting plan, the forest area still has a high threat situation, and it is common for illegal loggers to be operating in and around the project area.

The Project has made and will continue to make the following actions:

- Protect the forest land, and help the forest area to regenerate from the previous landowner who degraded all aspects of the 53,528 hectares

- Socioeconomic development: through its job creation, training in reforestation practices, sustainable development, fire prevention, and the project hopes to help the local population to have high capacities to move into the rural middle class through training in sustainable land use.

Climate Benefits:

Estimated annual GHG reductions are 340,800 tons of CO2e per year, the project corresponds to an estimated 10,224,000 avoided deforestation over the life of the project.

Community Benefits:

The main object of the project for the community is to direct the community toward *employment* opportunities in the area. In addition to this provide cook stoves and training for sustainable land use.

There are 4 different villages next to the project area, where the project attempts to focus hiring from these villages, where it saves the project money by not having to transport people from the two population centers of Ulianopolis and Paragominas.

Biodiversity Benefits:

Create Animal Corridors by the *protestation* and repair of the 53,528 hectares of *forest. This* critical mass will help many of threatened and endangered species.

- 

### 2.1.2 Project Scale

| Project Scale | |
|---|---|
| Project | |
| Large project | Yes |

### 2.1.3 Project Proponent (G1.1)

| | |
|---|---|
| Organization name | Amazon Reforestation Consortium |
| Contact person | Mr. Michael Greene |
| Title | Project Manager |
| Address | Rodovia BR 010 Km 15<br>Paragominas, Para, Brazil<br>CEP: 68.625-970 |
| Telephone | +55 970203200 |
| Email | amazonreforestation.consortium@gmail.com |

### 2.1.4 Other Entities Involved in the Project

| | |
|---|---|
| Organization name | Grupo Dacko |
| Contact person | Mr. Vander Gomes |
| Title | Manager |
| Address | Paragominas, Brazil |

| | |
|---|---|
| Telephone | +55 88300836 |
| Email | vande.gomes@hotmail.com |

### 2.1.5 Physical Parameters (G1.3)

1. Location of the project

The project is located in the northern part of the Brazil, State of Para, under three municipalities namely Nova Esperanca do piria, Paragominas and Ulianpolis. Nearest Airport is around 300 Kms by road which is located at Belem.

Map 1: Project Location


The project is located on private properties in the Municipality of Paragominas and Ulianopolis and Nova Esperança do Piriá in the state of Para. It makes up of 3 separate blocks of land representing 53,528 hectares.

2. Basic Physical Parameters

Climate:

The climate of the region can be characterized as hot and humid, with quite high temperature, relative humidity and volumetric rainfall, perfectly framed in the AW type of the Koppen classification (tropical humid, with monsoon rains, dry winter, with precipitation in the driest month below 60 mm). The annual rainfall is around 1,800 mm (Figure:1,2 and 3)

Figure 1: Annual Precipitation from year 2011 to 2018 – Nova Esperança do Piriá

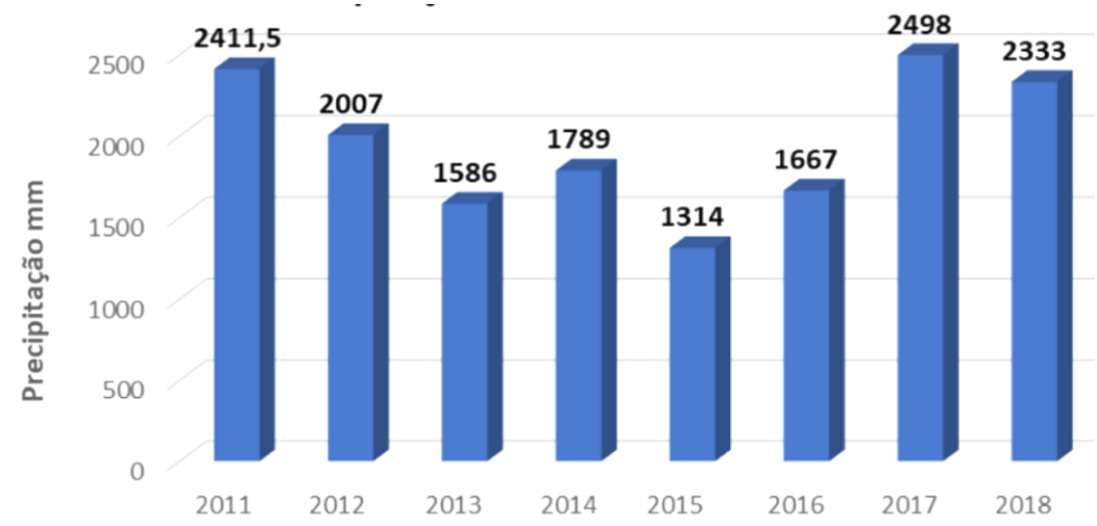



Figure 2: Annual Precipitation from year 2011 to 2018 – Paragominas

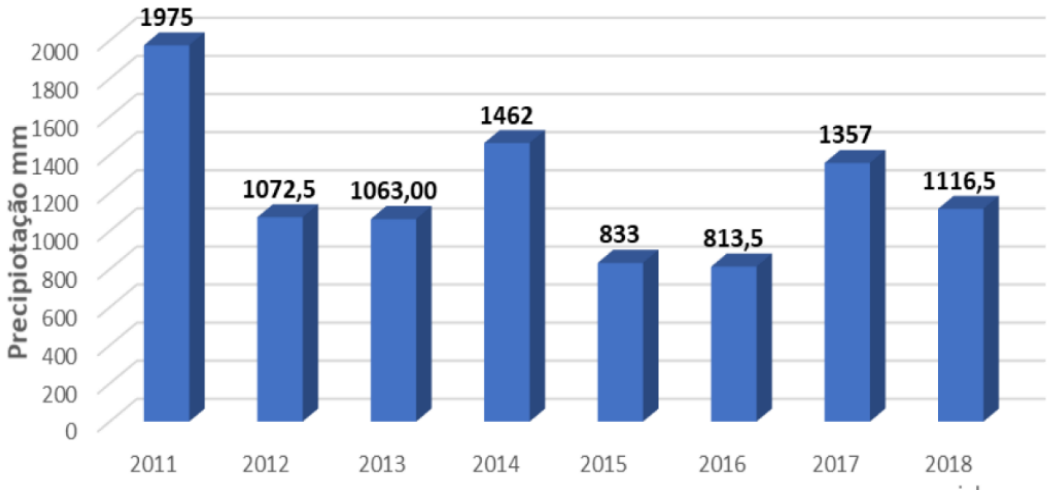
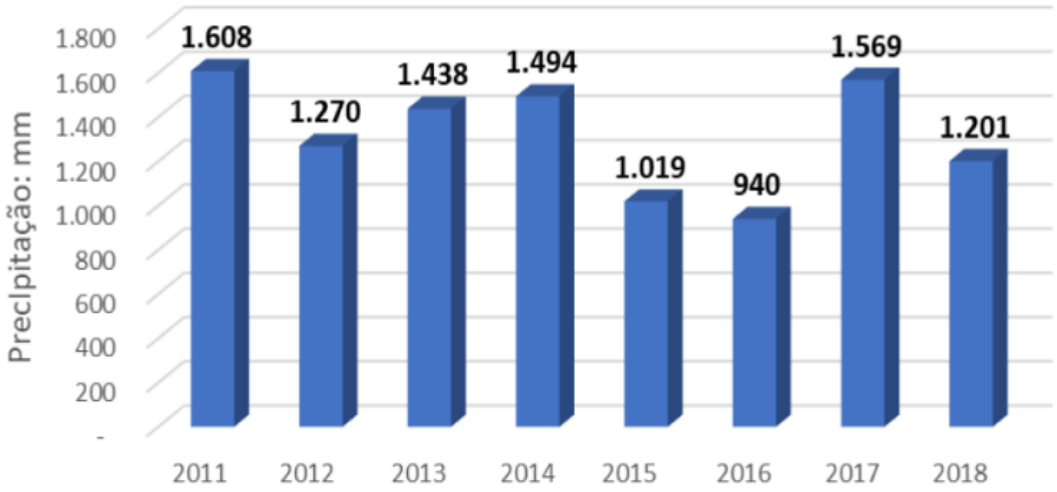


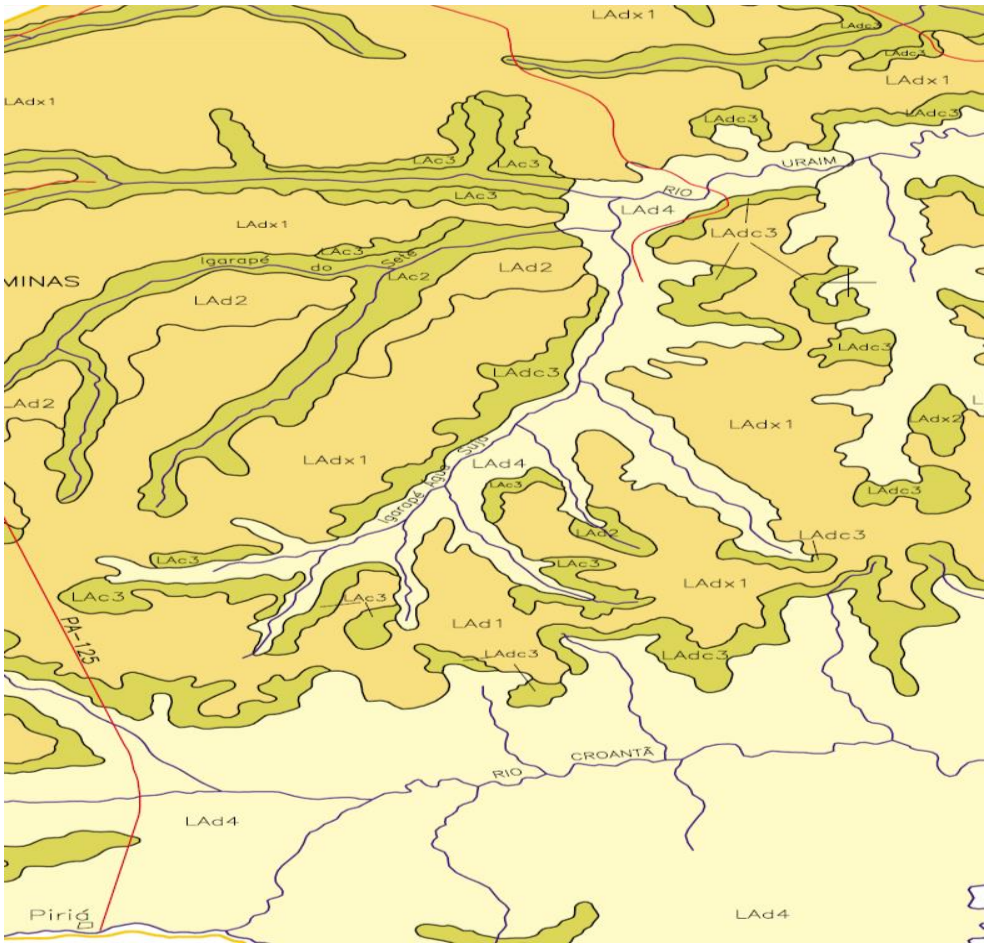
Figure 3: Annual Precipitation from year 2011 to 2018 – Ulianopolis




Soils:

According to Rodrigues et al. (2000), the main soils mapped within the region of the Municipal District of Paragominas were: Yellow Latisols, Yellow Argisols, Plithosols, Gleysols and Neosols. These soils were classified according to criteria and differential characteristics to frame them within the Brazilian System of Soil Classification (EMBRAPA, 1988). As it can be seen in Figure 2, project area soils are Yellow Latisols. According to Viera (1988), they are soils where clay contents in B horizon vary from 15% to more than 60%. It is possible to define a soil classification of intermediate texture (15% to 35% clay), clay-like texture (35% to 60% clay) and of very clay-like texture (more than 60% clay). With reference to use possibilities, Rodrigues et Al. (2003) state that Latisols, due to their unfavourable chemical characteristics for agricultural activities, require correction, mainly in relation to high acidity and high aluminium content. These limiting characteristics are easily corrected by means of correctives and chemical and organic fertilizer application with the aim of increasing concentration and retention capacity of nutrients in the soil. As regards physical properties, Rodrigues et al. (2003) suggest adopting soil and handling conservation practices for Yellow Latisols, although they do not have restrictions for intensive agricultural use, considering soil and nutrient losses due to water erosion resulting from rainfall indices present in the most rainy season.

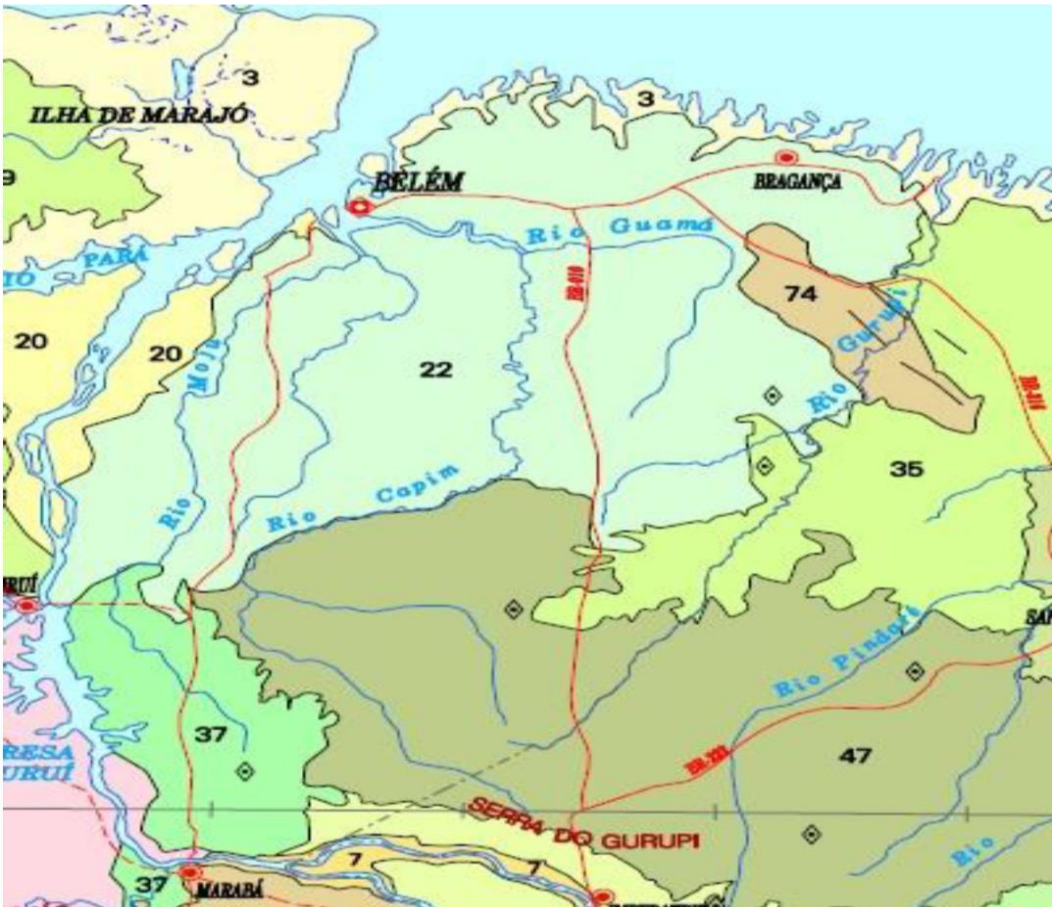
Figure 4: Soil classification map




Hydrology:

The municipality of Ulianópolis is covered by the Gurupi sub-region and the Guamá-Capim Basin. Due to the location of the South Block, near the border with the state of Maranhão, it is located in the Gurupi sub-region. The municipality of Ulianópolis is the southern boundary of the Gurupi sub-region, which belongs to the Northeast Atlantic Hydrographic Region (MMA, 2006) (Figure 6). The Gurupi sub-region has its boundary to the west with the Guamá-Capim Basin, belonging to the Tocantins-Araguaia Basin. Central Block is located in the southern region of the municipality of Paragominas, at the meeting between the Piriá River and Rio Gurupi (the Piriá River flows into the Rio Gurupi). The Rio Gurupi is a currency of the states of Pará and Maranhão. North Block is located between the municipalities of Paragominas, Nova Esperança do Piriá and Garrafão do Norte, between one of the sources of the Guamá River and the Igarapés Maritacas and Piriazinho (the Piriá River flows into the Rio Gurupi). The study area is located in the Northeast Atlantic Coast Hydrographic Region.

Figure 5: Map of the hydrology region of the project



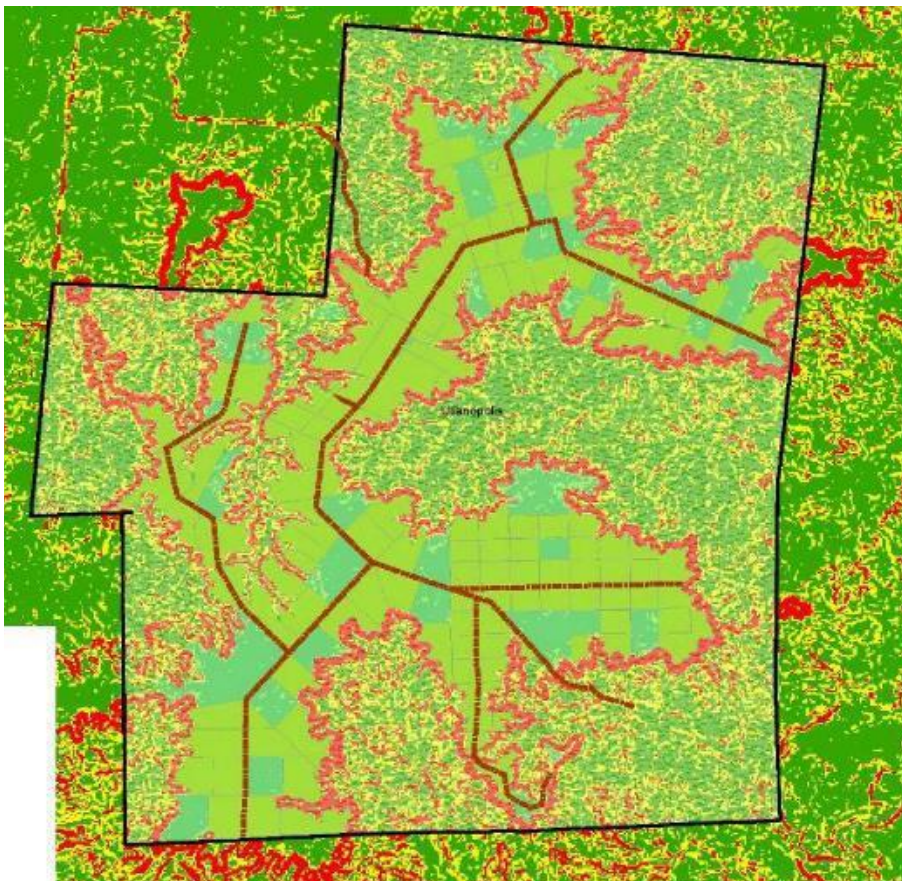

Geology:

The geological terrains of the Paragominas region belong to the Maranhao Basin, according to the definition by Mesner & Wooldridge (1964). However, more recently, Góes (1995) admitted to this extensive Sedimentary Province a polycyclic evolution, enabling its partitioning in the following different basins: Parnaíba, Apercatas, Grajaú and Espigao-Mestre. Taking into account this new conceptualization, the region is situated in the Grajaú Basin, in whose stratigraphy can be identified, from the bottom to the top, the following geological units: Ipixuna Formation, Itapecuru Formation, Detritus-Lateritic Paleogene Coverage, Pleistocene Sedimentary Coverage and Alluvial Deposits.

The areas of the Municipalities of Ulianópolis and Paragominas are located in the Morphostructural Domain of the Non-Bended Sedimentary Plateau, characterized by flattened structural surfaces, in the form of extensive plateaus, with average elevations around 200 m, bounded by plateaus dissected under the form of crests, tabular interflúvios, and developed in sedimentary rocks constituted of argillites, of the Ipixuna Formation, of the Upper Cretaceous period and belonging to the Grajaú Basin and by alluvial plains.

Considering the grouping of geomorphological units that have similarities resulting from the convergence of factors responsible for their evolution, the area was identified as belonging to the geomorphological region of the Northern Plateau Pará-Maranhão. The geomorphological units, resulting from the association of recurrent forms of relief, generated from a common evolution are: Tabular Surfaces of the Tiracambu Mountain, Dissected Plateau of Paragominas, Plains of Ulianópolis and Plains of the Capim and Gurupi Rivers.

Figure 6: The maps of altimetry and slope are, respectively, for the south block. Where red represents areas with high risk of erosion.



They are the remains of a degraded pediplano, developed in sedimentary rocks of the upper unit of the Ipixuna Formation, filled with clayey or sandy-clay sediments, these being recognized as the deposits correlative to an extensive erosive / depositional or interpolar episode occurring at the beginning of Tertiary, called Del'Arco & Mamede (1985) of Paleogenic Planing. Environmental conditions, coupled with relative tectonic quietude, have led to the development of thick lateritic crusts that constitute the group of Paleogenic Detrito-Lateritic Coverages, which respond to the preservation of the relief in the chapadões that characterize this geomorphological unit. The altitudes decrease from South to North, with maximum values, around 200 meters.

Dissected Plateau of Paragominas constitutes a relief unit formed by crystalline hills with steep valleys, or by tabular interflúvios with ravenous slopes, modeled in the inferior unit of the Ipixuna Formation and constitute the level of dissection of the Paleogenic Planing.

The Planos de Ulianópolis unit represents another planning (flat) surface that lowered the Paleogenic Surface to the altimetric level around 80 meters. It is modeled in sediments of the Ipixuna Formation, being retouched by erosion recovery, and flooded by the quaternary sediments that constitute the Pleistocene Sedimentary Coverage group, which cover the Ipixuna Formation.

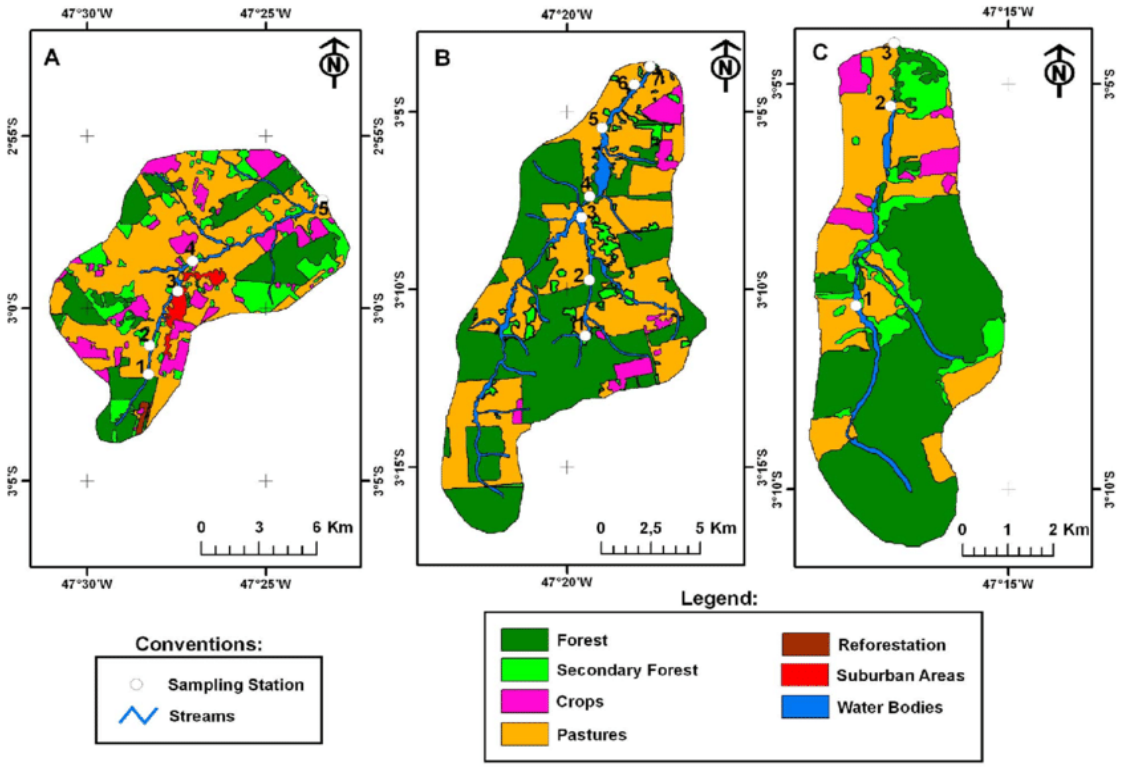
Plains of Capim and Gurupi Rivers plains are developed in the valleys of these rivers, with the presence of terraces and alluvial plains of Quaternary age.

Land Use:

Most of the project boundary is constituted by Pasteur lands with very large patches of human activity. These patches constitute small-scale agriculture. From a social assessment conducted by ARC in the months of December 2014 and January-February 2016, it is known that there were nearby areas under timber extraction within the past ten years. Timber extraction at large scale is not conducted in the project's vicinity anymore.

A more elaborated and detailed approach to land use can be found in the PDD under VCS" vm0015 (Land-Use, Land-Cover analysis) and attached together with this document. Land uses in the project area are shown below in Map 2:

Map 2: Land Use in the Project area



### 2.1.6 Social Parameters (G1.3)

**The Municipalities of Ulianopolis, Paragominas & Nova Esperança do Piriá**

Ulianópolis was elevated to the category of municipality in 1991. Its colonization began in 1958, when the pioneers set up a small encampment under a Cumarú tree, next to a creek. The head of the camp, engineer Bernardo Sayão, thought that it was the Gurupi river that established the border of the states of Pará and Maranhão. Realizing that it was only a tributary of the Gurupi, he called him Gurupizinho (little Gurupi)

The village, called Gurupizinho, began to house several families in the 1960s. These were attracted by the colonization projects of the Amazon and by the ease in obtaining lands in the region. Uliana was among the first families to reach the site, and its name gave rise to the current denomination of the municipality.

It was elevated to the category of municipality with the denomination of Ulianópolis, by the state law nº 5679, of December of 1991, dismembered of Paragominas.

Already Paragominas was elevated to the category of municipality with the denomination by the State Law n. 3,225, dated 04-01-1965, being dismembered from the municipality of São Domingos do Capim and Viseu.

Thus, remaining in territorial division dated 1-1-1979, by State Law n. 5,087, of 09-14-1983, the district of Dom Eliseu is created and attached to the municipality of Paragominas. In territorial division dated 18-8-1988 the municipality was constituted of 2 districts: Paragominas and Dom Eliseu. Through State Law n. No. 5,450, dated 05-05-1988, the district of Dom Eliseu was dismembered from the municipality of Paragominas, and raised to the category of municipality, thus remaining two distinct municipalities.

By 1970 the area occupied by the Municipality of Novo Esperanca of Piriá was used only by hunters. The access was difficult for those who moved from the seat of the Municipality of Viseu, and for those who were on their way from Ourém, Captain Poço and surrounding areas.

From that year the first families began to settle in the area, introducing subsistence agriculture (rice, beans and cassava). These pioneers from Bahia State (a different state in Brazil), led by Jossué Mendes de Almeida, were responsible for opening the first branch of the road that facilitated access to that area, stimulating the arrival of other families, which resulted in the formation of a population cluster that gave rise to Vila de Piriá.

Vila Piriá began on March 18, 1972. The first commercial establishment was installed by Ademar Pontes, at 13 de Maio Street. The first house built was the one of Adriano Mendes and Josinal Pires da Silva was the first child to be born in the place, on January 30, 1973.

Subsistence agricultural activity gradually grew as other families moved to Vila Piriá. Logging also contributed to the formation and growth of the urban nucleus that gave rise to that locality, which later became the seat of the municipality.

The Official document forwarded to the Legislative Assembly by the Pro-Emancipation Committee referred to the suggestions of names: Antônio Guerreiro de Serra Azul do Piriá and Nova Esperança Piriá. The latter ended up satisfying the majority of the population, because it reflected the expectation

that political-administrative autonomy emerged as a new hope (novo esperanca) for promising days for the municipality and its population.

Table 1: Demographic data for Ulianopolis 2015 (source IBGE)

| | |
|---|---|
| *Population in 2010* | *43,341* |
| *Population in 2015* | *53,881* |
| *Area in square km of the Municipality* | *5,088* |
| *Inhabitants per square km* | *8.52* |

Table 2: Demographic data for Paragominas 2015 (source IBGE)

| | |
|---|---|
| *Population in 2010* | *97,819* |
| *Population in 2015* | *107,010* |
| *Area in square km of the Municipality* | *19,342* |
| *Inhabitants per square km* | *5,06* |

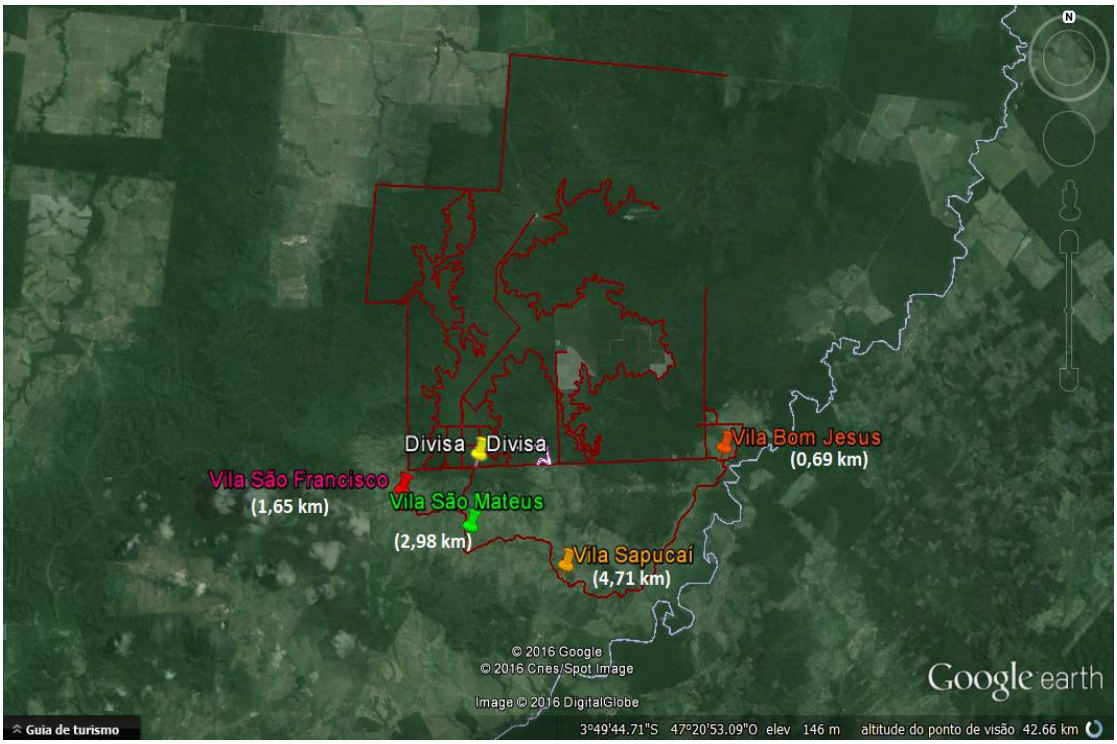
Table 3: Demographic data for Nova Esperanca do Piria (source IBGE)

| | |
|---|---|
| *Population in 2010* | *20,158* |
| *Population in 2015* | *20,663* |
| *Area in square km of the Municipality* | *2,809* |
| *Inhabitants per square km* | *7,18* |

Community Locations:

Each block of land has a set number of communities around them as can see in the following figures maps and distances from the land.

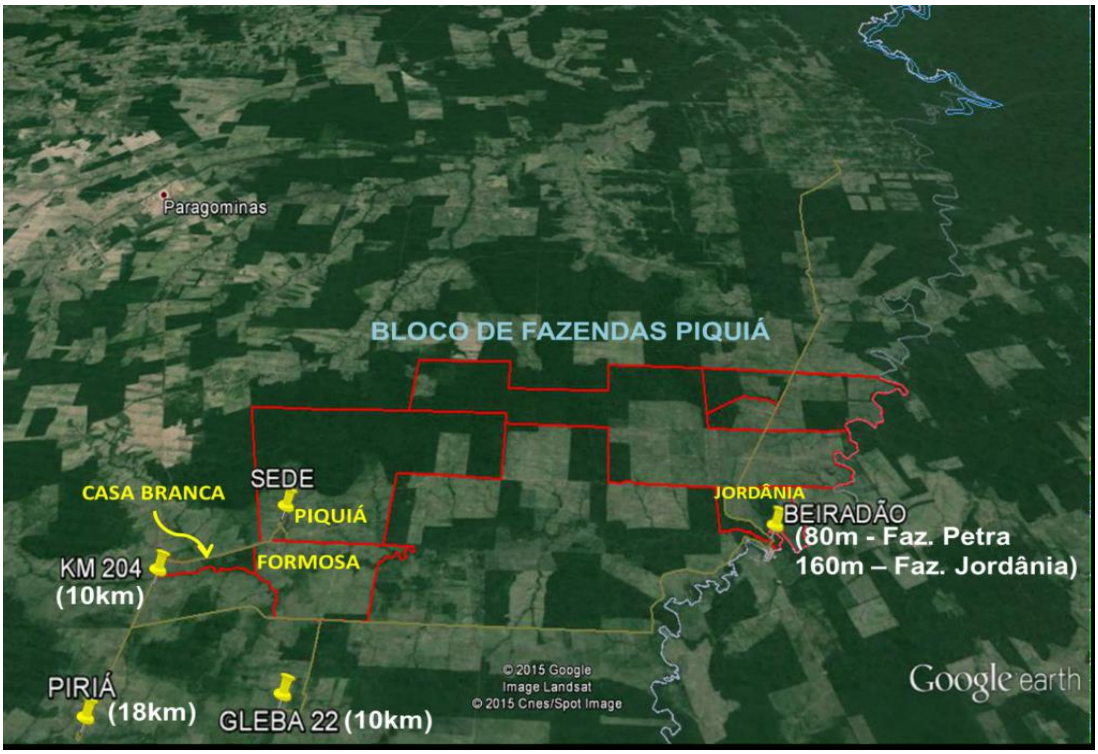
Figure 7: Location of communities in relation to the South Block




There are four communities that are near to the south block with one right next to the preserved area.

1. Vila Sao Francisco
2. Vila Sao Mateus
3. Vila Sapucai
4. Vila Bom Jesus

Figure 8: Location of the communities in relation to the central block




There are four communities near to the central block. With two right next to the property.

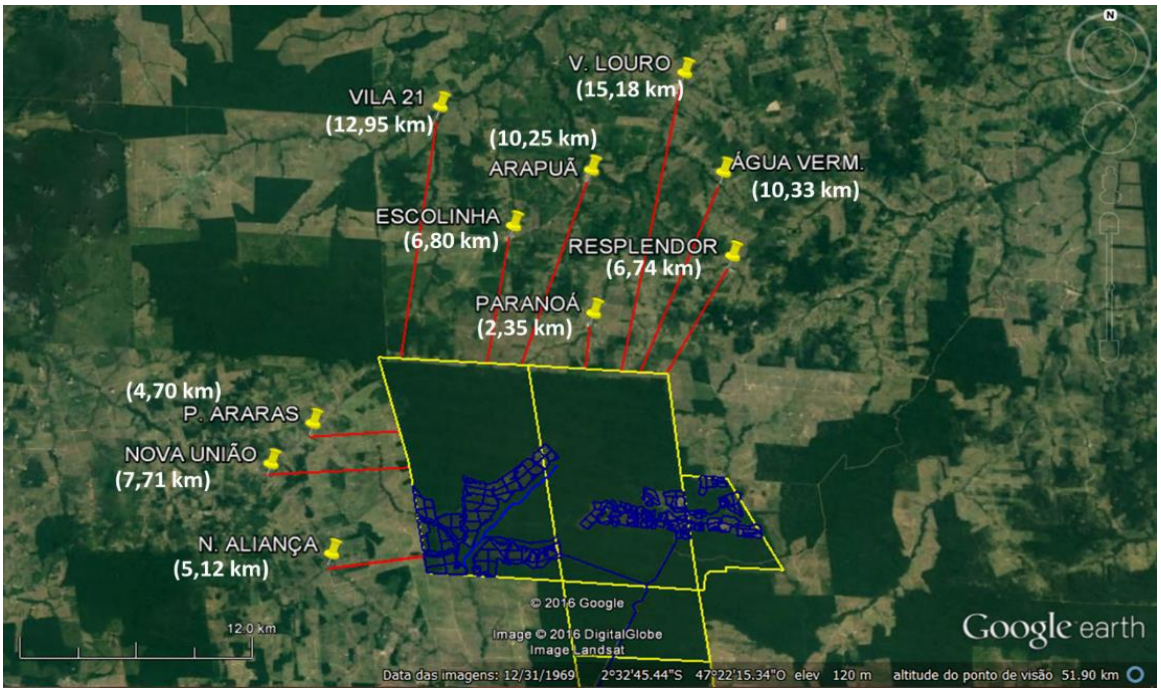
1. Vila Piria

2. Vila Gleba 22

3. Vila Km 204

4. Vila Beiradao

Figure 9: Location of the communities in relation to the north block.




There are 10 communities near to the north block, with one right near the property.

1. Vila N. Alianca
2. Vila Novo Uniao
3. Vila P. Araras
4. Vila Paranoa
5. Vila Resplendor
6. Vila Agua Vermalha
7. Vila Louro
8. Vila Arapua
9. Vila Escolinha
10. Vila 21

Land markets turnover and the characteristics of settlers:

By definition frontiers are dynamic, as such we would expect that there would be considerable turnover as development proceeds. The initial settlers should be specialists in clearing and making rudimentary investments. As development proceeds, population densities increase, transportation improves, land

values increase and market transactions for land exchange of land will entail the issuance of a witnessed receipt for the squatted claim. The exchange of informal claims-squatters rights for a witnessed receipt – represents the initial extension of the market to the frontier. During the transition, lower-valued users of land should sell out to higher valued users.

We interviewed the settlers near the communities of Paragominas, Nova Esperanca do Piria and Ulianopolis and therefore we were able to compare the characteristics of those settlers who stayed with those who sold their plots and migrated. Unfortunately, we do not have systematic data on the in-migrants. We have 54 observations for both Nova Esperanca do Piria and Paragominas, and 64 observations for Ulianopolis. To capture the impact on whether to stay or move, we collected data on the following variables: age of the settler, years of education, wealth (value in USD) and previous number of migrations. Age and education are proxies of human capital and wealth is a proxy for physical capital. The number of prior moves is an additional measure of human and physical capital. Our hypothesis is that each move represents a sale where the seller improves his stock of assets. Our measures of physical capital- wealth and number of moves- most likely increase with age, as does experience. As such, our framework has a life-cycle component. This is in contrast to a view that a class of settlers remains landless, drifting from frontier to frontier. Table 4, represents the mean characteristics of settlers Paragominas, Nova Esperanca do Piria and Ulianopolis.

Table 4: Mean characteristics of settlers who stay or leave

| | **Nova Esperanca do Piria** | | **Paragominas** | | **Ulianopolis** | |
|---|---|---|---|---|---|---|
| | ***Sold*** | ***Stay*** | ***Sold*** | ***Stay*** | ***Sold*** | ***Stay*** |
| **N** | 5 | 49 | 11 | 43 | 21 | 41 |
| **Mean age** | 35 | 43 | 37 | 43 | 39 | 43 |
| **Mean education (years)** | 3.0 | 2.9 | 1.5 | 1.8 | 3.3 | 2.9 |
| **Mean wealth** | $ 8,262 | $ 12,902 | $ 500 | $ 18,000 | $ 8,242 | $ 13,912 |
| **Number of prior moves** | 1.4 | 1.8 | 1.9 | 2.4 | 2.2 | 2.8 |

*Note: Differences in the means are significant at 99% differences in the means are significant at 99%. *Ulianopolis, Nova Esperanca do Piria*

Agriculture, mining and timber industry were the major drivers for deforestation of native forest lands. Bauxite mining was the main factor for floating population in and around Paragominas. To begin assessing the relative advantages and disadvantages for the communities to sell non-timber products in addition to logs, ARC marketing studies were conducted in Paragominas, Nova Esperanca do Piria and Ulianopolis, the region's commercial centre, and in Paragominas, the nearest city and the centre of the region's logging industry. Described here, the ARC market survey had three primary aims: (1) to identify the non-timber forest resources for which relatively high levels of demand exist in regional markets; (2) to determine the principal sources and prices of these key products; and (3) to examine forces which may impact the future availability and marketing of these products for regional traders.

Figure 10: Bauxite ore mining area of Paragominas

Figure 11: Settlements of Nova Esperanca do Piria

Figure 12: Forest lands converted to agriculture patch observed at Ulianopolis

Social Organization and cultural identity:

All villages are agglomerations of small families and are organized according to religious beliefs. Thus, some villages can be catholic and others evangelic (in the project area there are 6 catholic and 3 evangelic villages). According to the PRA 68.1% of the people in the project area are Catholics, 30.4% evangelic and 1.5% didn't want to respond about their religion.

Churches are the meeting points for each village and it is there where –after mass- interest topics for the community are discussed. In the case of each cult, the person that offers the mass acts as a local leader as well.

Infrastructure and services:

Households - in the project area have the following characteristics: 83.8% of residents own their own house and 16.2% have a home transferred, leased or relatives. Houses are mostly wooden planks constructions processed by chainsaw (not sawn).

Appliances in households: 37.7% of residents have radio, 42.0% of the local population has TV, 62.3% have a gas stove and 16.9% of residents have a refrigerator.

Drinking water - Local population uses water from rivers and streams as well as groundwater. In the project area 47.8% of the families mentioned that draws groundwater (through artesian wells) and 52.2% from streams and / or rivers. With regard to water quality, 73.9% of respondents mentioned that the water is clean, 15.9% said is muddy and 10.1% said it contains debris.

Drinking water is not treated, and in some towns several illnesses associated with consumption of contaminated water have been identified.

Urban wastewater is eliminated in the backyard and in the local creek or river. The sanitation system is negligible, only 10.1% of households have a silo at home and 89.9% make their hygienic needs in the field or forest.

Energy consumption - None of the families have public electricity service. Families get electricity by using a diesel-powered electric generator.

Food cooking - most families use gas stoves. Very few households use firewood for cooking, wood is used principally and almost exclusively for the preparation of farinha.

Regarding education - Educational services are highly demanded by local households. Most villages have schools only with elementary level education and only one village (Vila N. Alianca) provides high-school level education covering only the first grade of high school. Once reached this level, young people that wish to continue studying must migrate to nearby towns.

Regarding health - Most villages in the project area have no health centres; villagers have to be assisted in the health centre of Paragominas and Ulianopolis. The most common serious diseases are malaria, diarrhoea and vomiting in addition to snake bites.

### 2.1.7 Project Zone Map (G1.4-7, G1.13, CM1.2, B1.2)

The project area is approximate 40 km from the city of Paragominas. It straddles the river basins of the Gurupa river which divides the border between the state of Maranahao Brazil and the state of Para Brazil – which is to the east of the property and borders part of the property, to the west of the property by 70 km is the river Capim, a major tributary in the region.

Figure 13: Location of the project in the Region

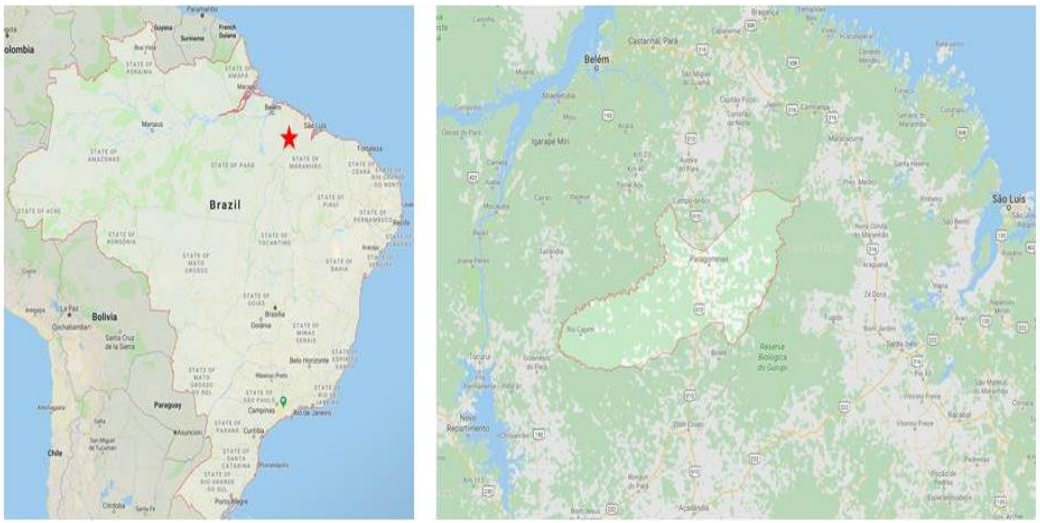


Figure 14: The three blocks of land (project area) as they fit into the municipality

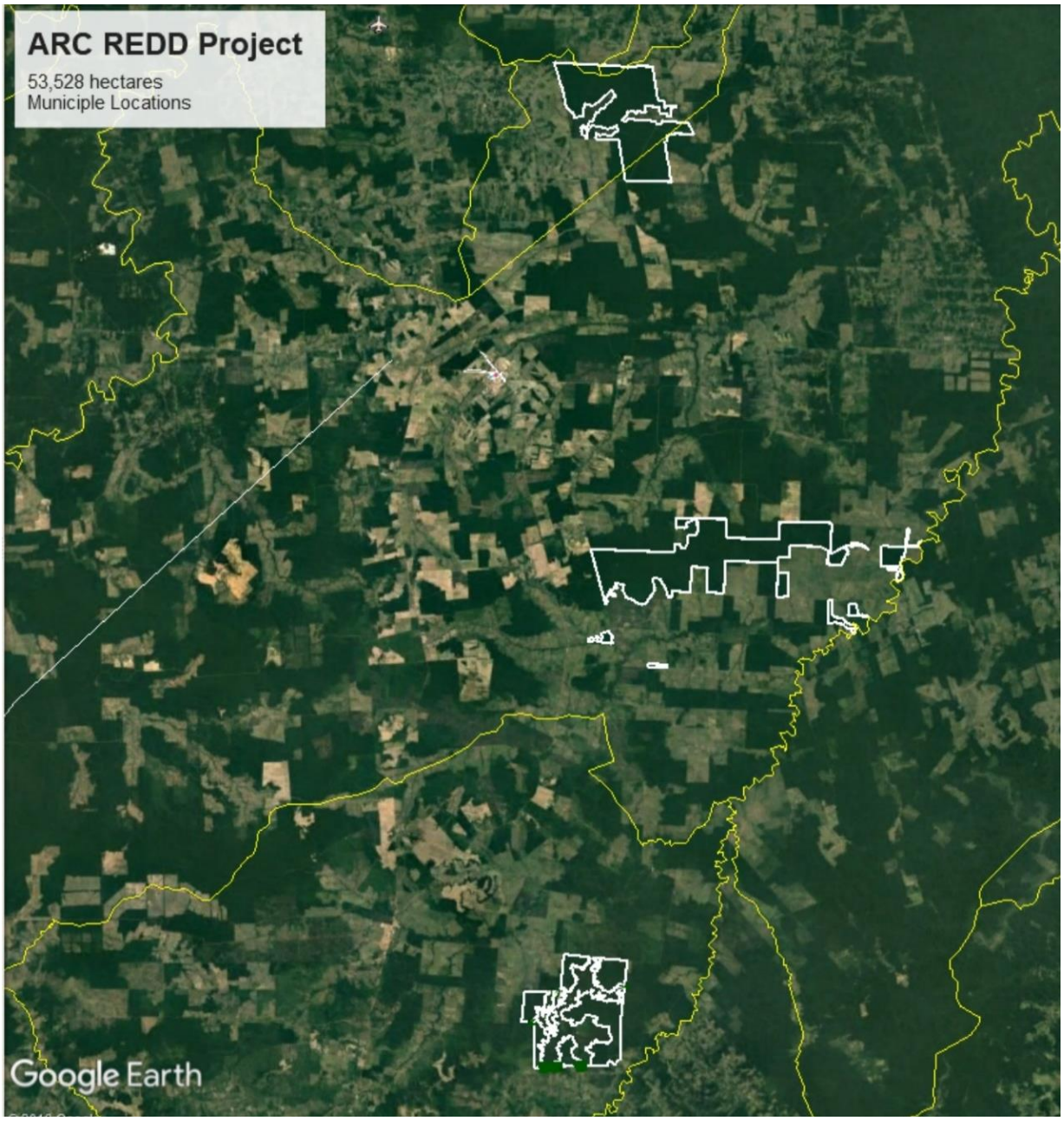


Figure 15: North Block

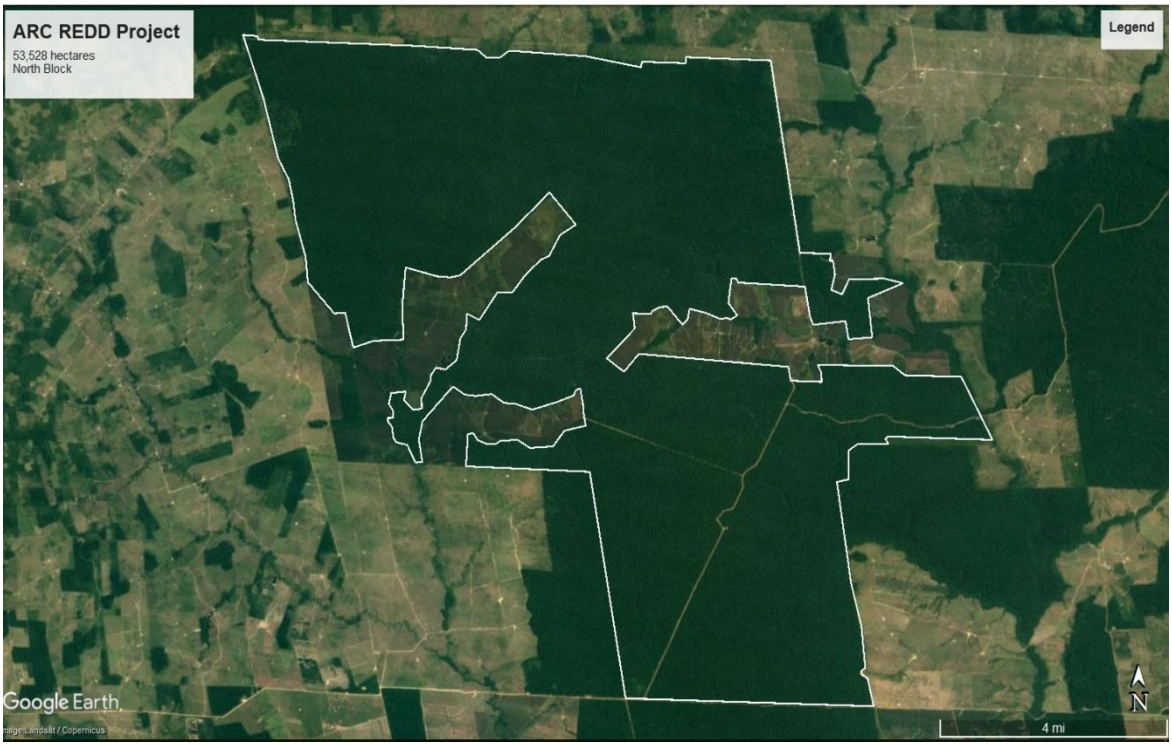



Figure 16: Central Block

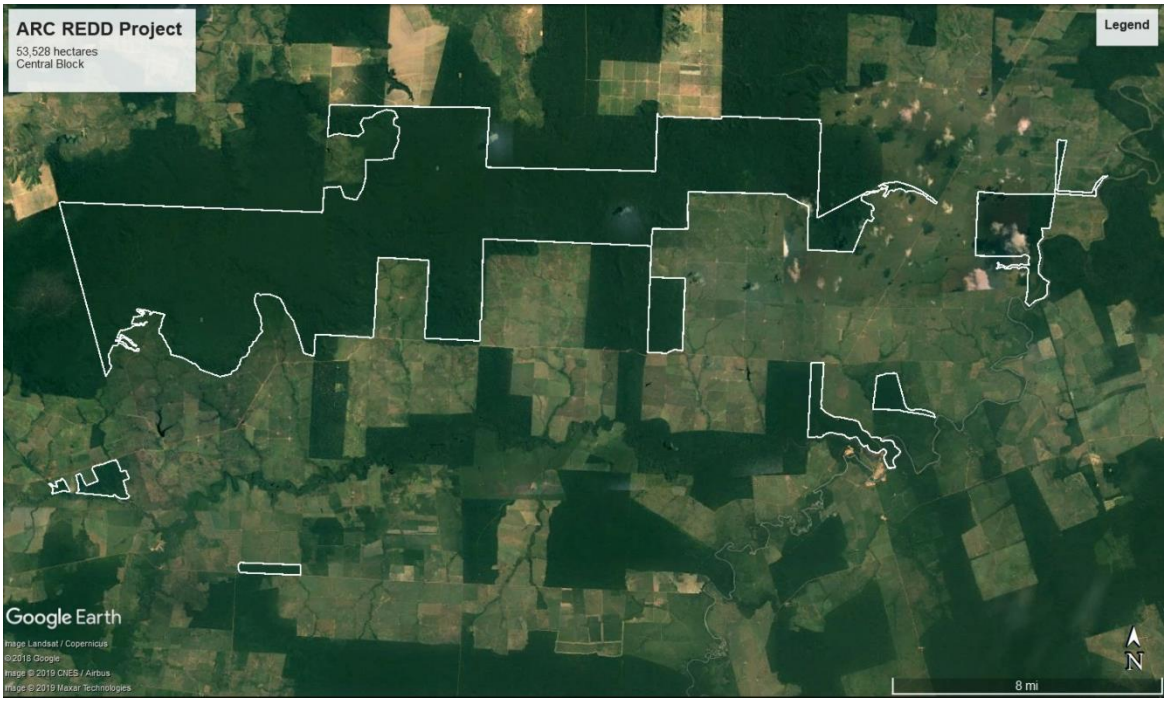


Figure 17: South Block

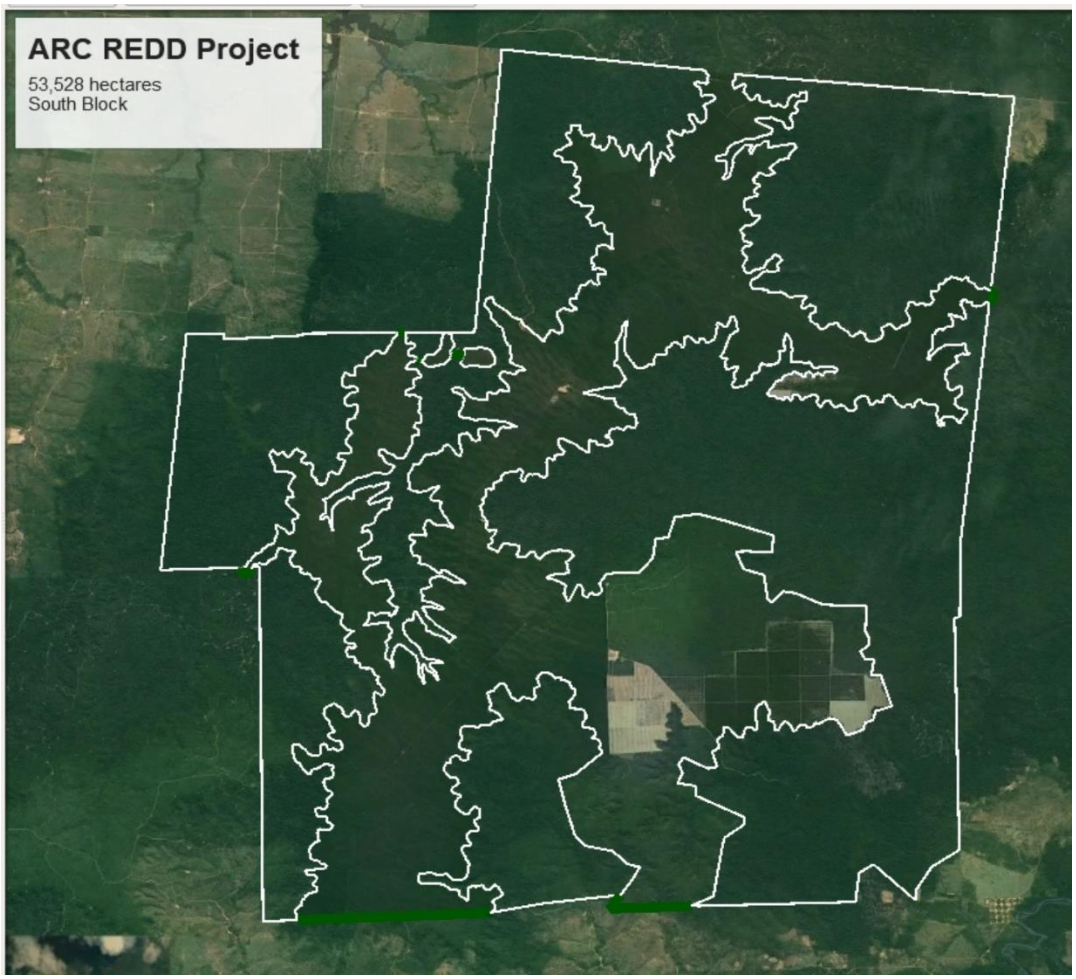
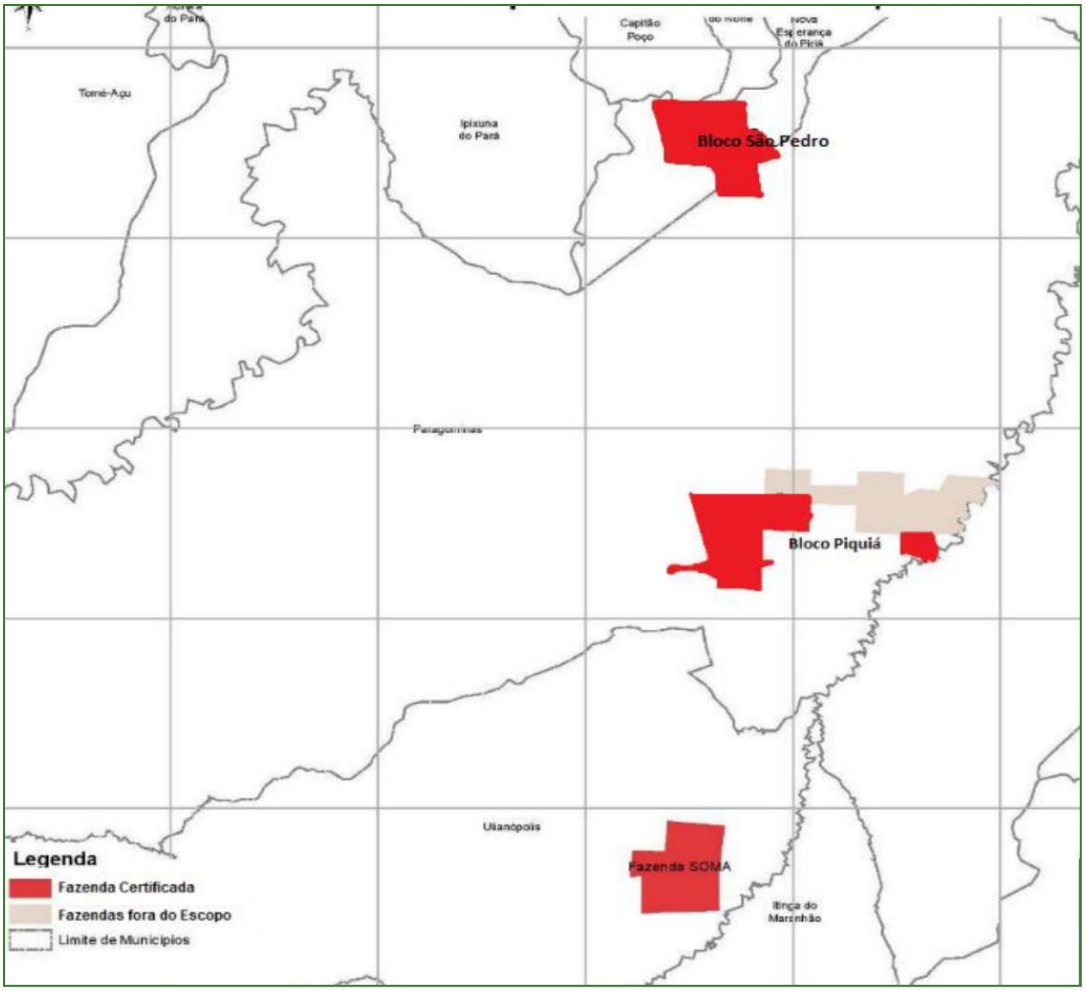



Figure 18: Displaying the 3 blocks of land and their located in the three municipalities: Ulianopolis to the south, Paragominas in the central and Nova Esperanca do Piria in the top.


Capitão Poço
Tomé-Açu
Ipixuna do Pará
Bloco São Pedro
Paragominas
Bloco Piquiá
Ulianópolis
Fazenda SOMA
Itinga do Maranhão
Legenda
Fazenda Certificada
Fazendas fora do Escopo
Limite de Municípios

### 2.1.8 Stakeholder Identification (G1.5)

As a first step in this identification process, a review of secondary information was made available for both the area and the project area. Thus, from official documents such as the Municipal Development Plans and Plans or Schemes of Territorial Ordering, in addition to reports corresponding to studies of socio-economic characterization, it was possible to determine in a preliminary way the actors present in the area. Subsequently, a series of interviews were conducted with social professionals who have accompanied community processes in the project area, with a view to specifying the information previously collected.

Finally, from socialization workshops, the secondary information collected and the information provided by the professionals interviewed will be validated with the community, carrying out the joint exercise of identification as proposed in the Manual for the Evaluation of Social Impact and the Biodiversity (SBIA) of REDD + projects. For this, the following activities were carried out:

• Brainstorm key informants or focus groups to list and classify stakeholders.

• Classification of wealth or well-being of local actors or the community.

• Analysis of each group of actors according to their interests, motivation to participate and relationships with other actors.

• Analysis of the level of influence and importance of each group of potential actors.

Next, the groups of actors identified in the process of reviewing secondary information for both the area and the project area, as well as the information derived from interviews with professionals in the area, are described. Aspects such as the level of participation of the actors, the classification of their wealth or well-being, their degree of influence in the process and the analysis of each group according to their interests, motivation to participate and relations with other actors, will be specified once the socialization workshops will be developed within the framework of which this identification exercise will be carried out.

During the Pre-Project scenario in 2014 were identified all the commercial stakeholders that would be involved with the security and the community activities of the project.

Prior to the initiation to the project, the local communities were assessed for people who needed jobs, who had families and were indirectly need of income or people who were in need of cookstoves or had current sub-par cooking apparatuses. These are the stakeholders to the project. As long as the project is able to continue planting it is able to service the needs of the stakeholders.

### 2.1.9 Stakeholder Descriptions (G1.6, G1.13)

The PRA was developed through a series of field visits, observations, surveys, workshops and interviews to local leaders and experts whom were informed about the project idea, its activities, the potential benefits to the communities and their participation in the project. To complement field information, the team used secondary information from IBGE‟s 2010 Census.

List of all Communities, Community Groups and Other Stakeholders:

• Communities: workers of the property, workers families, technicians and experts involved in the Project, people from neighbouring farms (landlords, workers, technicians).

• Community Groups: Villages near the project: N. Alianca; Novo Uniao; P. Araras; Paranoa; Resplendor; Agua Vermalha; V. Louro; Arapua; Escolinha; Vila 21; Piria; Gleba 22; Km 204; Beiradao; Sao Francisco; Sao Mateus; Sapucai; Vila Bom Jesus.

• Other Stakeholders: City of Paragominas and City of Ulianopols where many workers come from.

• Direct Stakeholders: Project Owner; Land Owner; Employees from local villages

• Institutional Stakeholders: Mayoral office of the Municipality of Paragominas and Ulianopolis, Mayoral office of Nova Esperanca do Piria

• Commercial Stakeholders: Grupo Dacko Tree nursery, Brazil Agfor Ltd. land management

Figure 19: Surveys and interviews applied to villagers and local leaders

Carrying out workshops has been one element of great relevance for the design of the project in PRA. The villagers were informed about the project idea and the potential benefits for the communities and how their participation will be throughout the entire process. Likewise, „speaking maps" were constructed in a

participatory manner in each one of the workshops which has allowed the villagers to face and describe their current life conditions identifying the main existing problems and the future conditions they would like to have in a situation where the project is being developed.

The tool of elaborating a "current map" and a "future desired map" in each locality has allowed the population and ARC to clarify the needs and expectations of the local villagers in comparative terms on how they are and how they picture their communities in the future.

The information gathered in the field work through the tools mentioned before, especially the needs and problems pointed out by the leaders and local villagers, has been the basis upon which the proposal for the activities of the project has been developed. The project staff believes that it is better to reach the villages with a clear open mind in order to understand local needs and later shape the activities based on the results of the PRA.

For this matter, project activities were conceived right after the social evaluation and not the other way around. Thus, local settlers not only have participated in the design of the project but have indeed provided inputs to ARC staff for such design

The following table shows the main problems, priorities and necessities identified by the population in the workshops and interviews to the local leaders.

Table 5: Main problems, priorities and necessities identified by the population

| Identified problems | Priorities |
|---|---|
| Low family income | Access to job opportunities |
| Limited work opportunities | Agricultural production improvement |
| Increased difficulty to get resources from hunting and other deforestation activities | Access to communitarian transportation and means in order to facilitate access to Paragominas |
| Low training levels in relation to agricultural activities | new productive alternatives (fisheries and minor animal breeding) |
| Limited knowledge and training on productive activities alternative to farinha. | Access to electricity |
| Low training levels in the organizations for communitarian management | Bi-annual trainings on management |
| Low levels of citizen participation in communitarian management | Awareness camps |
| Land tenure uncertainty and insecurity | Land tenure resolution |
| Unsafe water consumption | Access to drinking water |

| | |
|---|---|
| Limited access to health services | Access to health services |
| Limited access to education for children | Access to education |
| Limited access to communication | Access to communication |

The proposal for the project activities has been designed based upon the problems and priorities identified and pointed out by the villagers.

The project believes that the proposed activities will conduct an improvement in the quality of life of the local villagers in terms of strengthening their capacities and provide opportunities for the economic development of the families. Likewise, being aware that it is not the role of the project to cover and comply with the functions and competencies of the State, the project considers that the proposed activities related to organizational and communitarian managerial capacity building will provide enough skills for the community to manage their public services requirements before the correspondent authorities.

Additionally, the project has determined the creation of an additional fund to the budget to develop and implement project activities. The amount is 5% of the annual income from carbon credits to support the initiatives that arise from the capacities strengthening in the localities.

### 2.1.10 Sectoral Scope and Project Type

The project corresponds to the VCS Scope VM00015 – for Unplanned Emissions from Deforetation and forest Degadation. The project aims to protect rainforest, which are expected to be deforested in the abscense of the Project.

### 2.1.11 Project Activities and Theory of Change (G1.8)

Forests of the project area have become important areas for conservation. Although these are strategic ecosystems in the provision of environmental services, they are surrounded by a mosaic of pasturelands and thus have become highly fragmented and threatened with the expansion of the agricultural frontier. To continue supporting both production and conservation on these lands, adaptation strategies and alternatives to current regional production systems must be sought to both integrate the sustainable use of natural resources and allow for the connectivity of strategic ecosystems.

In keeping with the REDD+ approach of examining the direct relationship between human activities, deforestation, and forest degradation, a series of project activities has been proposed to reduce the aforementioned threats on the forests in the project zone and mitigate the associated GHG emissions. In parallel, the project activities described in this section seek to: (i) promote sustainable economic activities that positively impact the local community while reducing the impact of production on forests, (ii) integrate land management into the socioeconomic and political climate, and (iii) fortify management, governance, and technical capacities to ensure the efficient implementation of the REDD+ project.

The development of the following series of project activities has been proposed after having carefully accounted for the ideas and the wealth of accumulated knowledge particular to the project zone. Among the considered information were: a socioeconomic evaluation of the study area (reported from official sources such as the "Scheme for Land Management" and the "Municipal Development Plans"), the Management Plan of the Regional Integrated Management District (DRMI) of the para of Brazil and surrounding lands," an assessment of agents and drivers of deforestation and degradation, input from the community, and the expertise of those with institutional and community experience in the implementation of sustainable production activities.

Table 6. Project activities and theory of change

| Activity description | Expected climate, community, and/or biodiversity | | | Relevance to project's objectives |
|---|---|---|---|---|
| | Outputs (short term) | Outcomes (medium term) | Impacts (long term) | |
| Capacity building | Better understanding of the importance of protecting the forest and how forest conservation will benefit their livelihoods.<br><br>Opportunity to develop local businesses through an external fund. | In own land illegal activity is minimised and protection is enhanced | Forest is protected<br><br>Illegal activities are minimized | Improved forest management practices with community participation |
| Improve local livelihoods for villagers | Diversification of food through agroforestry practices thus an improvement in local nutrition<br><br>More efficient technologies to produce farinha therefore less time is consume in this activity.<br><br>Generation of | Improvement in agricultural practices and promotion of income from other activities | Food security is increased<br><br>Positive impact on average income | Improvement of livelihoods by capacity building |

| | | | | |
|---|---|---|---|---|
| | income from monitoring activities. | | | |
| Participatory Rural Appraisal | Survey conducted in area constituted by the Project‟s Boundary and a<br><br>15km buffer to gather socio-economic information | Identification of deforestation drivers and agents by means of survey | Implementation of mitigation measures to reduce impact by drivers of deforestation | Positive effect on maintenance of carbon stocks |
| Improvement of health | Distribution of improved cookstoves to households | Better air quality is ensured in households | Longer life expectancy | Improvement of livelihoods |

### 2.1.12 Sustainable Development

Describe how the project contributes to achieving any nationally stated sustainable development priorities, including any provisions for monitoring and reporting same.

The Project Activity promotes proper handling of the land in the Amazon Biome, contributing to the mitigation of climate change by reducing GHG emissions, generate sustainable development through their activities such as reforestation and generate social, climatic and environmental co-benefits.

Social co-benefits:

Project activities have stimulated an increase in the local workforce employed in the Project Zone (before the project there was only one worker in each section of the property who was responsible for raising 10,000 beef cattle). It has also allowed the specialization and qualification of this workforce and this has produced a wage increase of these workers, with consequent benefits to their families.

Climate co-benefits:

The Project has a positive impact on the micro climate of the region: in fact it contributes, less soil reflectivity, and a reduction in temperatures. This could, as it is done on a large scale, have significant effects on the climate of the micro-region.

Environmental co-benefits:

Soil: the Project has a positive impact on the soil, which improves the characteristics, mainly organic matter: this increasing follows the planting and the subsequent cuts because during the harvesting and

the selection of the timber abundant vegetable matter (branches and leaves) remains in the location. This wood litter, with natural decomposition, integrates with the soil in the form of organic matter.

Biodiversity:

As for biodiversity in the specific case of the property, there will be an increase in different species of birds (including hawks, woodpeckers, snakes-hunter birds and various species of birds) and mammals (including Anteaters, Tapirs, Deer, Foxes, Wild Boars, Ocelots and numerous species of rodents) can be frequently found in the Project Zone.

### 2.1.13 Implementation Schedule (G1.9)

Funding for Project activities is secured by funds committed by the Project Proponent until the end of 2018. After 2013 the project is expected to generate enough revenues from carbon credit sale to cover Project costs. The Project financial analysis makes clear how important is the revenue generated through carbon credits to protect the Project Area and to implement the Project activities. The project proponent has made a financial statement to demonstrate their commitment to cover future costs until the project receives credits for the emissions achieved since the Project start date until validation date.

| Date | Milestone(s) in the project's development and implementation |
|---|---|
| 2015 | Start date and Implementation of project activities |
| 2016 | Implementation of project activities |
| 2016 | Climate change adaptation workshop and presentation of climate change analysis. |
| 2017 | Implementation of biodiversity monitoring plan |
| 2018 | Resource Management Plan completed and signed |
| 2019 | Validation and Verification of project activities. |

### 2.1.14 Project Start Date

The project start date is 1st April 2015. The project start date is based on the time when the project started implementing the planned conservation activities to protect the native rain forest of Amazon which took place immediately after the transfer of the land to a new company.

### 2.1.15 Benefits Assessment and Crediting Period (G1.9)

Project started on April 1st 2015 and ends on 31st March 2045. 30 years. The benefit assessment period is the same crediting period.

### 2.1.16 Differences in Assessment/Project Crediting Periods (G1.9)

There is no difference.

### 2.1.17 Estimated GHG Emission Reductions or Removals

| Year | Estimated GHG emission reductions or removals ($tCO_2e$) |
|---|---|
| 1 | 340,800 |
| 2 | 340,800 |
| 3 | 340,800 |
| 4 | 340,800 |
| 5 | 340,800 |
| 6 | 340,800 |
| 7 | 340,800 |
| 8 | 340,800 |
| 9 | 340,800 |
| 10 | 340,800 |
| 11 | 340,800 |
| 12 | 340,800 |
| 13 | 340,800 |
| 14 | 340,800 |
| 15 | 340,800 |
| 16 | 340,800 |
| 17 | 340,800 |
| 18 | 340,800 |
| 19 | 340,800 |
| 20 | 340,800 |
| 21 | 340,800 |
| 22 | 340,800 |
| 23 | 340,800 |
| 24 | 340,800 |
| 25 | 340,800 |
| 26 | 340,800 |

| | |
|---|---|
| 27 | 340,800 |
| 28 | 340,800 |
| 29 | 340,800 |
| 30 | 340,800 |
| Total estimated ERs | 10,224,000 |
| Total number of crediting years | 30 |
| Average annual ERs | 340,800 |

### 2.1.18 Risks to the Project (G1.10)

The identified risks to the project benefits and outline measures taken to mitigate these risks are described in Table 7.

Table 7. Risks and measures to the project benefits

| **Risk** | **Measure** |
|---|---|
| Non continuity of the project activities | The project is backed by conservation agreements signed by the owners voluntarily under prior and informed referring to the benefits and commitments to engage in REDD strategy (see folder Land owners Agreements). Likewise, the strategy of permanent communication with the owners and the community and the good results of the project will allow continued ownership of the project by the owners.<br>• According to the conservation agreements the land owner is committed to conserve the productive systems implemented in their properties. Also, if a beneficiary want/must sell the land, he/she may transfer the commitments and benefits to the new land owner; it will favor the permanence of project benefits regardless the changes in ownership.<br>• Active participation of the community in the project management and the effective communication to show the multiple benefits related to the project in every phase. |
| Invasion of project land by outsiders | Regular patrols, signage, purchasing of more vehicles to conduct patrols, increasing awareness of community members about conservation and the rules of the resource plan, strengthening and authenticating land rights |

| | |
|---|---|
| Climate change /drought | Reducing deforestation – reduces carbon emissions and creates a better local ecosystem.<br>Diversification of livelihood sources to reduce reliability on livestock. |
| Weak leadership /governance /limited allocation of income | Leadership training and capacity building activities for the community leadership and village leadership teams, measures to increase transparency around income and expenditure of funds |
| Lack of budget for implementation of activities and / or project monitoring | Most of the project activities are designed to reduce the maintenance costs and/or increase the profitability of the productive systems. Also, the land owners are trained along with the implementation of the activities, in order to enable that subsequently, the activities can be developed by themselves.<br>Amazon Reforestation Consortium has an extensive trajectory in implementing projects with rural communities (especially in the project region) related to forest conservation and productive alternative systems. Therefore, this risk is mitigated based on its certified experience and management and mobilizing resources capacities at the country and international level. |

### 2.1.19 Benefit Permanence (G1.11)

ARC and its partners have conducted capacity building and training within the communities and Land owners. In addition, project partners are creating monkey corridors and providing job opportunities for the locals in and around the project activity. Reframing and reinvigorating the resource plan Community understanding of the potential for forest conservation to create and maintain native forest.

### 2.1.20 Financial Sustainability (G1.12)

Through its extensive experience ARC group has developed an operational and management capacity to manage potential contributors (both private companies and donors) such as local Brazilian companies, which will be part of the project leverage. The funds raised by ARC Group were invested in the project implementation activities including community capacity building on technical issues, monitoring and technical follow for the first years. It will allow that subsequently, the activities can be developed by the land owners and the project's climate, community and biodiversity benefits can be achieved, without depending on additional funds that might be obtained in the future.

Projected revenues from GHG emission reductions or other resources, will provide a flow of funds for project´s growth (addition of new instances) and for achieving bigger project's climate, community and biodiversity benefits.

### 2.1.21 Grouped Projects

This is not a grouped project activity.

## 2.2 Without-project Land Use Scenario and Additionality

### 2.2.1 Land Use Scenarios without the Project (G2.1)

For the determination of the land use scenario in the absence of the Project (baseline scenario) the approved methodology VCS VM0015 version 1.1 was used in conjunction with the VCS approved tool "VT0001 - Tool for the Demonstration and Assessment of Additionality in VCS "VT0001 - Tool for the Demonstration and Assesment of Addicionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities", version 3.0.

The analysis of deforestation, vector agents and hidden causes, as well as the probable scenarios of land use in the absence of the Project were performed based on the baseline scenario and are detailed in section 3.1.4 Baseline Scenario.

The range of potential land use scenarios and the associated drivers of land use changes most likely to occur within the project zone in the absence of the project, are:

- Deforestation for the expansion of livestock activities
- Deforestation for the expansion of the agricultural frontier and crops

In order to mitigate these risks, the project has several proposals for training activities directed to the population with aims at diversifying the crops with appropriate and adaptive agroforestry practices contributing to guarantee food security in the intervention area.

Moreover, it is foreseen to maintain a better water table level and the precipitations patterns in a microclimate environment by maintaining a forest coverage, which at the same time provides protection to extreme events, reducing the impact of heavy rain erosion and level the air temperature.

### 2.2.2 Most-Likely Scenario Justification (G2.1)

In the absence of the project, the most likely activities are livestock and expansion of the agricultural frontier; its realization under traditional systems give continuity to management practices that generally are detrimental to natural resources. This in turn affects gradually the loss of soil fertility, increase erosion and decrease topsoil, and as a result, a decrease in productivity is achieved with unprofitable products.

However, these activities continue to perform as traditional methods also involve low capital investment and implementation of known techniques. These characteristics are most important when taking into account that much of the rural population in the prioritized area corresponds to adult age groups, culturally most established to the knowledge acquired from their parents and less willingness to change their traditional systems production.

### 2.2.3 Community and Biodiversity Additionality (G2.2)

The current scenario in the absence of the Project would be limited in generating benefits to climate, community and biodiversity. The scenario without the Project tends to progress to the increase of illegal extractive activities, conversion of forest areas into unplanned irregular occupations, expansion of the area of agriculture and livestock with low productivity and environmental degradation due to the lack of basic sanitation, increasing the deforestation pressure in the project's area of expansion and gradually advancing towards the boundaries of the Project area.

The region's scenario with the development of the REDD+ ARC Project is socially, environmentally and economically positive. Sustainable extractives is an important path for the conservation of forests and for the economy of families. The Project seeks to improve management techniques, production and control of the productive chain. In the area of agriculture and livestock, agroecological production techniques, increased productivity in smaller areas and the strengthening of production networks can contribute to reductions in environmental impacts, as well as enhancing socioeconomic improvements for the region's population.

The role of education in the scenario with the Project is extremely important, and access to schools, vocational and technical courses should provide better conditions of employment and income. In addition, incentives to develop sustainable forest management practices reduce forest stress.

The project, together with its mechanisms, guarantees the permanence of the forest and the consequent conservation of biodiversity, maintenance of ecosystem services, water quality and climate regulation. In the scenario without Project, the forest environment is being replaced by areas that are more and more anthropized through deforestation (FEARNSIDE, 2006). In the face of the scenarios presented with and without REDD, through secondary data, the importance of the implementation and development of the Project is reiterated.

Further details on Project additionality for community and biodiversity can be found in sections 4.1.4 Scenario in the absence of the Project: Community and 5.1.3 - Scenario in the absence of the Project: Biodiversity.

### 2.2.4 Benefits to be used as Offsets (G2.2)

Not Applicable

## 2.3 Stakeholder Engagement

### 2.3.1 Stakeholder Access to Project Documents (G3.1)

Describe how full project documentation, including project description documentation and monitoring reports, as they become available through the project lifetime, has been and will be made accessible to communities and other stakeholders.

The ARC REDD+ Project has determined three methods of communication with the parties involved, aiming to guarantee access to documents and all other information of the Project through oral, written and virtual form, as described below.

**Writing:** a printed version of each document related to the Project, such as the Project design document, monitoring report, validation and verification report and the summary will be available for consultation at the ARC office. Information and news about the Project are disclosed through local public notices.

**Virtual:** documents related to the Project are available through virtual means on the VCS and ARC company websites. The circulars of the project and ARC REDD+ are also digitally accessible. News and novelties about the Project will be published in the ARC and Dacko newsletter through social media.

**Oral:** information and news about the Project will also be conveyed orally at REDD+ Technical Board events through meetings between the community council of agricultural communities and technicians as well as other opportunities for contact between stakeholders and project proponents.

The communities that are not directly involved in the development of the Project, but which are part of the Project area, will receive important information about the Project from similar dissemination tools.

### 2.3.2 Dissemination of Summary Project Documents (G3.1)

Summary documentation describing the proposed project activities and its requirements have been translated into Portuguese shared with all community groups at all levels of administration through consultative workshops and specific training sessions. ARC group has set in place a Carbon Champions program, training young men and women from each of the five villages in climate change and project development. These carbon champions have travelled to all villages and sub-villages to inform people about this REDD project.

### 2.3.3 Informational Meetings with Stakeholders (G3.1)

During all consultation aspects of the climate change and carbon markets were addressed by providing information and general concepts in simple language that could be understood by all participants. The documentation and information regarding the Project was made available to the community through the following mechanisms:

• At the beginning of each meeting, participants received a summary sheet of the Project for them to understand the Project.

• During the meetings aspects related to forest carbon project, specific project activities and participants were explained.

• There were question and answer sessions after the talks. The questions of the participants were resolved and all observations were heard and taken into consideration.

• The information provided, included contacts (phone number and email) of the people in charge of the Project documentation (project developers), in order to give the attendants, the possibility to permanently communicate their concerns or comments.

• Once the project document is ready, it will be published on the website of the CCB for public Comments.

In addition to the topics mentioned above, during the local consultation were analysed the possible impacts that the project might have on individual or collective actors in terms of economic, social and

biodiversity aspects. This analysis was performed through the use questions, comments and opinions regarding to the exposed topics. The result of the evaluation, assigned to each impact a rating of positive, negative or neutral according to the effect on the quality of life of each participant.

During the local consultation, all participants were informed about the validation and registry process while pointing out that an external auditor (a validation and verification body) who visits the area of influence executes this process, interacts with stakeholders, evaluates the project information and issues a report of the evaluation.

### 2.3.4 Community Costs, Risks, and Benefits (G3.2)

Through carbon benefits workshop all participants were explained the benefits of the project and the potential costs and risks that they could perceive due to the implementation of the project. However, the project activities have been designed in conjunction with the owners in order to minimize possible negative impacts.

In addition, in every consultation workshop each participant interested in being involved in the project received an “Intention letter” which they voluntary signed to continue with the process of visit their properties and evaluate whether their areas are eligible for the project purpose.

On the other hand, there were also people who wanted to evaluate their participation and talk with their respective families, so that they were given the possibility of carrying the letter of intent and then a ARC group technician would pick up the letter from the concerned. Finally, during all the workshops they were repeated that participation in the project is totally voluntary.

### 2.3.5 Information to Stakeholders on Validation and Verification Process (G3.3)

The validation and verification process was explained during the local consultation workshops. A power point presentation was used, and when performed in areas where there was no electricity, billboards with the same information were used. In this way, ensured that all participants will always receive the same information about the project cycle.

During the local consultation process, all participants were informed about the mechanisms that generate Carbon Credits and the validation and registry process while pointing out that an external auditor (a validation and verification body) who visits the Project Area and executes the process, interacts with stakeholders, evaluates the Project information and issues evaluation reports.

### 2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

Referring to the Project Owner, and Project Proponent has maintained constant and direct communication with the Project Owner, in order to give the guidelines and clarity aspects related to the Project cycle, including validation, registration and Project monitoring. We explained to the stakeholders of the property the project process in a comprehensible way giving the timing for the visit of the DOE. The Forest Operations Manager, will take charge of collecting from the workers any kind of questions to be asked to the DOE during the site-visit.

### 2.3.7 Stakeholder Consultations (G3.4)

The Project designed its activities based on the results of the PRA. It was intended since the beginning to develop activities that were tuned with local livelihoods and the best way to do so was by first consulting with local stakeholders.

All Project activities are based fundamentally on local customs and needs. Such activities will not constitute dramatic changes on local ways of life or customs but will only provide knowledge and finance to improve and make more efficient what is already happening on the ground.

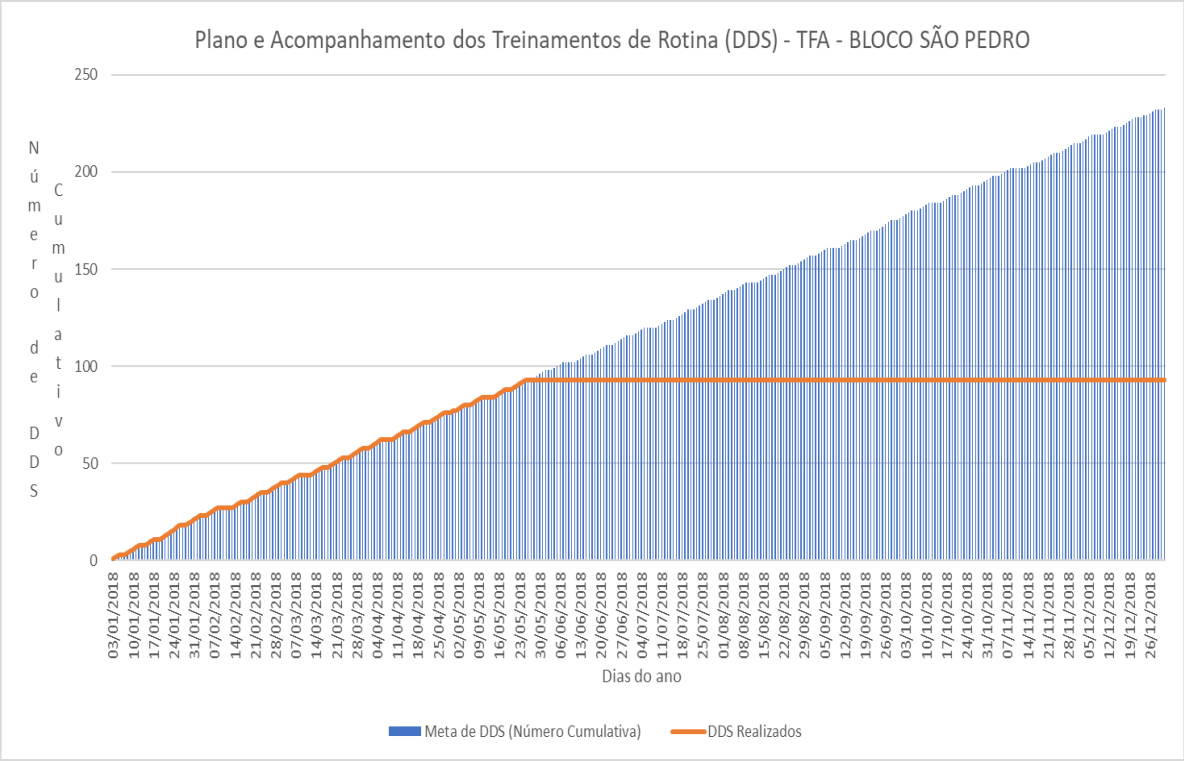
### 2.3.8 Continued Consultation and Adaptive Management (G3.4)

There are weekly meetings to address all aspects from the carbon credit projects, fire prevention and sustainable plans.

The update meetings and project status meetings will be both open to the workers and their families, as well as the tree nursery staff and their families as well as the city of Paragominas and Ulianopolis.

The Training meetings are held weekly with the locals, communities, employees to update them on any changes and reminders. As the workers receive a salary and go to the property 5 days per week, any change or update in meeting schedule can be informed at that time. The following figure 22, shows the dates of training for 2018.

Figure 20: Training schedules held in the year 2018



### 2.3.9 Stakeholder Consultation Channels (G3.5)

We have conducted a number of stakeholder engagement and consultation meetings with identified project communities and other stakeholders from the nearby villages and settlements. Our project staffs have conducted participatory surveys with the Participatory Rural Appraisal (PRA) method as part of the consultative process. This included focus group discussions (FGDs), interviews with men and women living in nearby settlements and villages, and observation and ground checks with local residents including participatory visits to a variety of important areas and community epicentres.

### 2.3.10 Stakeholder Participation in Decision-Making and Implementation (G3.6)

The project proposes to conduct a process of FPIC to continue the informative process initiated with the PRA in order to promote a reasonable understanding about the project and their activities, an equitable participation in decision-making processes and the involvement of the population in the implementation of the proposed project. Consultations ensure to engage with both men and women, and more marginal stakeholder groups in culturally appropriate ways to ensure that the project can hear a wide range of perspectives.

### 2.3.11 Anti-Discrimination Assurance (G3.7)

ARC has company policies to prevent discrimination and outline a course of action, should it occur, the human resource (HR) policy provides a clear statement on discrimination relating to gender, religion or sexual discrimination. Discrimination is considered a level A misconduct under the HR policy. Where discrimination occurs within the company, partner organisations or within project areas (project participants), actions are outlined in the grievance policy to ensure that any discrimination is dealt with by the senior management. All company employees and field partners sign a code of conduct with ES that includes anti-discrimination.

### 2.3.12 Feedback and Grievance Redress Procedure (G3.8)

The Feedback and Grievance Redness Procedure is manage by the Forest Manager, who personally delivered to every single stakeholder his business card with the phone and e-mail contacts.

For being in constant contact with the community and workers, the Forest Manager is the first responsible for responding to requests from the community.

According to the internal procedures the Forest Manager must climb the observation to the area of Project Owner and must address the affected to a discussion room, in order to handle the complaint.

On the other hand, the Forest Manager and the Project Owner maintain constant contact with the institution, in order to verify that externally, the Project operations are not negatively impacting the surrounding communities. It will be done through regular meetings, email and phone calls, allowing them to express their suggestions, recommendations or claims.

The time frames established concerning to the grievance procedures are:

• Claims or complaints must be attended within 15 working days of receipt of the request.

• Suggestions must be attended within 30 working days of receipt of the request.

• However, where it is not possible to provide an answer within the established frame time, the claimant must be formally informed and the reasons for the delay and the new date for reply must be given.

The proposed mechanism will be in constant evaluation and adjustment, according to the recorded dynamics and evaluation of effectiveness. So far, none of the stakeholders has been expressed any kind of grievance.

### 2.3.13 Accessibility of the Feedback and Grievance Redress Procedure (G3.8)

Accessibility of the feedback and grievance procedure is ensured as grievances can be reported at multiple levels. Individual community members have direct communication access to ARC group staff, the community has bi-annual meetings designed for this specific purpose, and the leadership have direct formal channel to air grievances and general feedback. Landowners will also engage in this process, as they are highly active at the grassroots level in the community and are a neutral group. Furthermore, the concept of feedback and grievance and the channels of using the mechanism have been explained to the community at all these levels.

### 2.3.14 Worker Training (G3.9)

ARC group has extensive experience in conservation and community development projects. The activities of the Project have been designed to transfer knowledge and technological packages to the owners involved in the project through workshops and the direct activities developed in each of the properties.

To fulfil the worker responsibilities, the recruiting manager is responsible for integrating and managing confidential personnel information, verifies information provided and drawing up contracts. Once hired, the staff goes through a trial period. For the selection of officials, the human resources team will have the principle to find qualified and reliable staff whose skills are in line with the requirements and objectives of the company, through technical, transparent and non-discriminatory procedures, based on merits and excellence.

At the end of the most important training, the workers sign the participation document and specific certificates are given to each worker who, in addition to attesting their participation, also have the function of enhancing the person and increasing the professionalizing process of each participant.

### 2.3.15 Community Employment Opportunities (G3.10)

For hiring staff, the Project Owner verify that the person meets the hiring profile established for the vacant position, without any discrimination of age, sex, marital status, ethnicity, social status or religious convictions, political ideas and / or sexual orientation. It is not allowed to employ under age young people (18 for Brazil).

To full-fill their responsibilities, the Project Owner is responsible for integrating and managing confidential personnel information, verify information provided and drawing up contracts. Once hired, the staff goes through a trial period of 90 days (as expected by law). For the selection of officials, the Project Owner will have the principle to find qualified and reliable staff whose skills are in line with the requirements and

objectives of the company, through technical, transparent and non - discriminatory procedures, based on merits and excellence.

### 2.3.16 Relevant Laws and Regulations Related to Worker's Rights (G3.11)

The labour laws in Brazil, although they have previous origin, are born in the government of Getúlio Vargas. From the year 1930, President Vargas joined a group of lawyers and legislators to elaborate the Consolidation of Labour Laws - CLT.

The labour laws of Vargas's era, as they are also called, took 13 years of development, and sought to guarantee a series of securities and regulations in the relationship between employers and employees.

Since 1943, the CLT has undergone a series of modifications - natural, in Law. The Labour Laws in 2015 best represent the new labour relations, and the main changes relate to new technologies, and their use in work.

There are a number of issues addressed in the CLT, but some stand out due to the advances that have accrued for the living conditions of the working classes and to the systematization of the Brazilian labour market.

Undoubtedly, the CLT is one of the greatest examples of a law that is concerned with the worker. The following are the main Brazilian labour laws:

- Law 605/1949 - Repouso Semanal Remunerado (Paid Weekly Rest);
- Law 2.959/1956 - Contrato por Obra ou Serviço Certo (Contract for Work or Right Service);
- Law 3.030/1956 - Desconto por Fornecimento de Alimentação (Discount for Food Supply);
- Law 4.090/1962 - Gratificação de Natal;
- Law 4.749/1965 - 13º Salário
- Law 4.886/1965 - Representantes Comerciais Autônomos (Autonomous Business Representatives);
- Law 4.950-A/1966 - Remuneração de Profissionais (Engenharia, Química, Agron. e Veter.) (Remuneration of Professionals (Engineering, Chemistry, Agron. And Veter.);
- Law 5.859/1972 - Empregado Doméstico (Housekeeper);
- Law 5.889/1973 - Trabalho Rural (Rural Work);
- Law 6.019/1974 - Trabalho Temporário Urbano (Temporary Urban Work);
- Law 6.494/1977 - Estagiários (Trainees);
- Law 6.919/1981 - FGTS de Diretores (FGTS of Directors);

▪ Law 6.932/1981 - Médicos Residentes (Resident Doctors);

▪ Law 7.418/1985 - Vale-Transporte (Transportation vouchers);

▪ Law 8.036/1990 - Lei do FGTS (FGTS Law);

▪ Law 8.906/1994 - Advogados (Lawyers);

▪ Law 9.601/1998 - Banco de Horas e Contrato por Prazo Determinado (Bank of Hours and Contract for Term Determined);

▪ Law 10.101/2000 - Participação dos Trabalhadores nos Lucros ou Resultados (Workers' Participation in Profits or Results);

▪ Law 10.607/2002 - Declara Feriados Nacionais (National Holidays);

▪ Law 10.748/2003 - Programa Primeiro Emprego – PNPE (First Job Program);

▪ Law 10.820/2003 - Desconto de Prestações em Folha de Pagamento (Discount on Payroll Benefits);

All these laws aim to achieve justice in the relations arising between employers and workers, under a spirit of economic coordination and social balance. All hiring processes that occur inside the Project are governed by the labour code, in addition to the internal quality system that has processes and procedures associated with the management of human resources.

As mentioned before, all workers have a contract, in which its duties, rights and laws that protect them are reported.

### 2.3.17 Occupational Safety Assessment (G3.12)

Work within ARC group and on-site includes low-level risks typically associated with activities conducted in sites with little infrastructure and irregular conditions. The level of risk varies depending on the type of employment in ARC group and the associated activities, although none of the work requires undue exposure to risks. Work in the ARC group does not require the operation of heavy machinery or vehicles larger than the rangers' pickup trucks. All ARC group field staff have first aid training and all vehicles carry first aid kits. ARC group through land owner structures provides assistance to injured project participants. ARC group policy instructs participants to avoid to the best of their ability situations which pose unnecessary risk to personal safety. As participants live with-in and often traverse the landscape risks like exposure to dangerous animals, snake bites, etc. are unaffected by employment in the ARC group. ARC group discourages the use of weapons in any project related activities.

## 2.4 Management Capacity

### 2.4.1 Project Governance Structures (G4.1)

The proponents and partners of the ARC REDD Project, as well as the roles, responsibilities and governance structure of each of these entities involved in the design and implementation of the Project

are detailed in sections 2.1.3 Project Proponents and 2.1.4. - Other Entities Involved in the Project. The Project has satisfactory human and financial resources for the effective implementation of activities.

### 2.4.2 Required Technical Skills (G4.2)

• Knowledge of the region and social science / community related skills.

• Experience in sustainable practices for local / rural development, conservation and management of biodiversity and ecosystem services.

• Knowledge in planning, execution and control of administrative and financial resources. Extensive experience and skills in managing resources from donors or co-operators.

• Experience in carbon markets, VCS and CCB standards.

• Experience in biodiversity monitoring, sampling methods of wildlife and ecosystem assessment using quality indicators.

• Extensive experience in working with the community and environmental education.

• Knowledge of the area and experience in field implementation of restoration activities, crop improvement, woodlots, silvo-pastoral systems, efficient stoves and solar power panels.

• Abilities to manage the geographical information system and databases of property owners, as well as to generate all required cartographic analysis.

### 2.4.3 Management Team Experience (G4.2)

The project manager owns 100,000 hectares in the state of Para, and has dealt with for ten years security and social programs related to this land. In addition to this project manager has a Bachelors in Science giving a pre-disposition to have an understanding of a engineering related projects such as this.

### 2.4.4 Project Management Partnerships/Team Development (G4.2)

Project consultant on the project is a well-regarded carbon consultant.

### 2.4.5 Financial Health of Implementing Organization(s) (G4.3)

The project is being implemented by ARC a company registered in Brazil.

The company is with the full financial where with all to finance and manage the entire project due to its large financial asset base.

### 2.4.6 Avoidance of Corruption and Other Unethical Behavior (G4.3)

All forms of bribery and corruption are prohibited. ARC group will not tolerate any act of bribery or corruption. Any breach of ARC group company policy on corruption and unethical behaviour or local law could result in disciplinary action being taken. A bribe does not actually have to take place - just promising to give a bribe or agreeing to receive one is prohibited.

### 2.4.7 Commercially Sensitive Information (*Rules* 3.5.13 – 3.5.14)

There is no commercially sensitive information in this project description document, itself. Supporting documents which include commercially sensitive information that will not be made publicly available include: the MOU; Contracts with Buyers and Service Providers; and documents related to project financials.

## 2.5 Legal Status and Property Rights

### 2.5.1 Statutory and Customary Property Rights (G5.1)

All project lands are private property managed by the land owners who are engaged to the project through a free, prior and informed consent. The conservation agreements signed freely between ARC group and the owners are the result of the socialization workshops and the commitment of both parties.

### 2.5.2 Recognition of Property Rights (G5.1)

The property rights for each parcel are recognized and respected. All properties involved in the project either have property titles or equivalent documents to certify and assure rights over the land. Within the Reference Region, there are no communities of Brazil or indigenous heritage with collective property titles.

### 2.5.3 Free, Prior and Informed Consent (G5.2)

The Prior Informed Consent (of the appropriate holders of property rights and other stakeholders) has been applied throughout the implementation period and will continue to be applied throughout the duration of the ARC REDD Project. The property where the Project is located has a vastly larger area than the area used for the Project activities and there is no interference in the surrounding properties. In addition, the Project does not aim to develop any activity on private property, belonging to indigenous and traditional communities or to the government. In relation to social activities and monitoring of biodiversity, it is guaranteed that no activity will be carried out without the free, prior and informed consent of the parties involved.

No activity related to the Project will result in the involuntary removal or relocation of the Property Rights Owners of their lands or territories, nor will force them to relocate activities important to their culture or livelihoods. Any proposed removal or relocation takes place only after obtaining the Free Prior Informed Consent from the appropriate Owners of Property Rights.

In addition, all the stakeholders that could be impacted in some way by the ARC REDD Project were consulted. In the communities related to the Project, workshops were carried out in order to pass information about the Project, as well as consultations regarding the opinions of the community about the Project. These consultations will continue throughout the life cycle of the Project. In addition, all information about the ARC REDD Project can be acquired in virtual channels, such as Dacko website and newsletter by social media such as Facebook and LinkedIn, ARC office and TFA Group.

### 2.5.4 Property Rights Protection (G5.3)

The project activities do not lead to any type of involuntary relocation or relocation because all the participants / owners own their land and present documents that accredit it. In addition, ARC group has informed in all the socializations that at no time will be made purchase of land. Finally, the conservation agreements signed freely between ARC group and the owners are the result of the socialization workshops and the commitment of both parties to identify and define the activities that will be developed in each one of the farms; which ensures that they have not been forced to relocate activities important to their culture and livelihood. At the same time, one of the measures implemented by the project proponent is to maintain constant communication with the owner.

### 2.5.5 Illegal Activity Identification (G5.4)

In the baseline scenario, the illegal deforestation practised in the project area generates problems related to a scenario without the project. The project aims to prevent these illegal practices by means of a set of activities aimed at the conservation of the forest.

Illegal activities in the area are constituted by unplanned timber extraction. Such logging operations are eventuated by the proliferation of pioneer roads between nearby project area and Belem. It is known from literature that extractive operations will take advantage from the fact that local farmers don't have land titles to displace them or to gain access to the forest resources nearby villages (Araujo, Bonjean et al. 2009). At the same time, illegal logging operations thrive whenever there are forested areas that seem to be under no-use and where the presence of the landowner is not made evident (Margulis 2004).

The Project will train local villagers to work as monitoring staff in the Project Area and the LMA. This is the main activity to identify, prevent and avoid illegal activities from taking place in the Project Area.

As support measures against illegal activities, the Project will provide land titles against conservation results to villagers living within the Project Boundaries and will provide support to neighbour villagers to achieve land tenure on unused public lands.

Stakeholders in neighbouring villages will be encouraged to report encroachers and illegal loggers trying to get into nearby forests. The Project will proceed to make the respective denounce to local authorities as just like the situation is occurring in the Project Area. Through this mechanism the project will be generating positive leakage.

### 2.5.6 Ongoing Disputes (G5.5)

The project has no ongoing disputes.

### 2.5.7 National and Local Laws (G5.6)

Brazil is one of the signatories of Kyoto protocol. The project is in compliance with this regulatory framework, because in the AFOLU scope, conservation is one of several mechanisms by which GHG emissions are expected to be reduced.

Nationally, the most significant effort to date was the submission of Bill No. 195/2011, which "establishes the national system to reduce emissions from deforestation and degradation, conservation, sustainable

forest management, maintenance and increase of carbon stocks (REDD+), and other provisions", which are still in progress.

• Law 12,651 of 05/25/2012: It provides for the protection of native vegetation; amending Laws No. 6938, of August 31, 1981, Law No. 9393, of December 19, 1996, and Law No.11428 of December 22, 2006; revoking Laws No. 4771, of September 15, 1965, and No. 7754 of April 14 1989, and Provisional Measure No. 2166-67, of August 24, 2001; and other measures.

• Law No. 12187 of 12/29/2009: It established the National Policy on Climate Change (PNMC) and provides other measures.

• Provisional Measure No. 571, of 05/25/2012: It amends Law 12651 of May 25, 2012, which provides for protection of native vegetation; amending Laws No. 6938, of August 31, 1981, Law No. 9393, of December 19, 1996, and Law No.11428 of December 22, 2006; revoking Laws No. 4771, of September 15, 1965, and No. 7754 of April 14 1989, and Provisional Measure No. 2166-67, of August 24, 2001.

• Law No. 58,054 of 3/23/1966: It promulgates the Convention for the protection of flora, fauna and scenic beauties of the American countries.

• Decree No. 96944 of 10/12/1988: It created the Program in Défense of the Ecosystem Complex of the Legal Amazon, and other measures.

• Decree No. 2661 of 7/8/1998: It regulates the sole paragraph of art. 27 of Law 4.771 of September 15, 1965 (Forest Code), by establishing precautionary standards for activities involving fire in agropastoral and forestry practices, and other measures.

• Decree No. 2959 of 2/10/1999: It provides for measures to be implemented in the Legal Amazon, for monitoring, prevention, environmental education, and forest fire fighting.

• Decree No. 5975 of 11/30/2006: It regulates art. 12, final part, 15, 16, 19, 20 and 21 of Law 4771 of September 15, 1965, art. 4, item III, of Law 6938 of August 31, 1981, art. 2 of Law No. 10650, of April 16, 2003, amends and adds provisions to Decrees 6514/08 and 3420/00, and other provisions.

• Decree No. 7390 of 12/9/2010: Regulates articles 6, 11 and 12 of Law 12187 of December 29, 2009, establishing the National Policy on Climate Change (PNMC), and other measures.

• Decree-Law No. 5452 of 05/01/1943: Approves Labor Laws Consolidation. CONAMA Resolution No. 16 of 12/07/1989: It establishes the Integrated Program for Assessment and Environmental Control of the Legal Amazon.

• CONAMA Resolution No. 378 of 10/19/2006: It defines undertakings potentially responsible for national or regional environmental impact for purposes of item III, paragraph 1, art. 19 of Law 4771 of September 15, 1965, and other measures.

• CONAMA Resolution No. 379 of 10/19/2006: It creates and regulates the data system and on forest management under the National Environmental System - SISNAMA.

• CONAMA Administrative Rule No. 218 of 5/4/1989: It provides for felling and exploration of native forests and successors forest formations of the Atlantic Forest, and other measures.

• IBAMA Administrative Rule No. 37 of 4/3/1992: Recognizes as Official List of Brazilian Endangered Flora Species the list found in the Administrative Rule.

• Ministry of Environment Administrative Rule No. 103 of 4/5/2006: It provides for the implementation of the Document of Forest Origin - DOF, and other measures.

• Ministry of Environment Administrative Rule No. 253 of 8/18/2006: It establishes, from 1 September 2006 on, under the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), the Document of Forest Origin (DOF), replacing the Authorization for Transportation of Forest Products (ATPFs).

• Administrative Rule 1896 of 09/12/2013: It amends Regulatory Norm No. 31. Ministry of Environment Administrative Rule No. 1 of 9/5/1996: It provides for Obligatory Reforestation and Forest Integrated Plan.

• Ministry of Environment Administrative Rule No. 07 of 4/27/1999: It provides for the authorization for deforestation in the Legal Amazon States.

• Ministry of Environment Administrative Rule No. 02 of 5/10/2001: It provides for the economic exploration of forests in rural properties located in the Legal Amazon, including Legal Reserve areas and with exception of permanent preservation established in current legislation, which will be carried out through multiple use sustainable forest management practices.

• IBAMA Normative Instruction No. 30 of 12/31/2002: It informs the geometric volume calculation of standing trees, applying the volume equation that specifies it, and other measures.

• IBAMA Normative Instruction No. 112 of 08/21/2006: It regulates the Document of Forest Origin - DOF, established by Ordinance Ministry of Environment Administrative Rule .253 of August 18, 2006. (Amended by IBAMA Normative Instruction No. 134 of November 22, 2006)

• Ministry of Environment Administrative Rule No. 06 of 12/15/2006: It provides for the reforestation and consumption of forest raw materials, and other measures.

• IBAMA Normative Instruction No. 178 of 6/23/2008: It defines guidelines and procedures, provided by IBAMA, for consideration and approval on the issue of forest suppression authorizations and other forms of native vegetation in an area greater than two thousand hectares in rural properties located in the Legal Amazon, and a thousand hectares in rural properties located in the remaining regions of the country.

• Regulatory Norm No. 31 of 03/03/2005: Approves the Regulatory Norm for Safety and Health at Work in Agriculture, Cattle Raising, Forestry, Forest Exploration, and Aquafarming.

### 2.5.8 Approvals (G5.7)

The Project is developed on privately owned land and complies with all the required laws and regulations regarding forest protection in private lands. Given the fact that in Brazil there are not regulations

regarding REDD projects and the fact that the Project will not undertake extractive activities but will preserve 100% of its Project Area, permits are not required from municipal, state or federal authorities.

The REDD initiative in Paragominas is a precedent created that will encourage new REDD projects and strengthen the existing ones towards a solid and robust system in Para. For this reason the Project – although not required to do so yet- will make arrangements to inform about its activities to local institutions at state and federal level.

To this end, the Project will design a strategy to properly identify and approach institutions that most likely will have key roles in a potential REDD framework in Paragominas or in Ulianopolis.

During the preliminary social evaluation, the informed consent about the development of activities for the study, the design of the project and its latter implementation was obtained from 19 leaders and local authorities.

The population has also been adequately informed and has actively participated in the elaboration of a diagnosis through the participatory workshops carried out in 5 localities and in which 56 settlers have participated and have expressed their main needs and local priorities. During these activities the population was consulted about the implementation of the project being studied and has manifested much interest in participating in it.

In addition to this, it has been planned to carry out a participatory census in the entire project zone in order to have a complete and appropriate participation before the beginning of the social activities of the project. During this census, several meetings will take place with the local leaders from all the communities involved in the project area boundaries. Assemblies with the population will also be developed in order to inform the details of the activities of the project and the PRA results will be shared.

By the end of each participatory workshop, the free and informed consent for the project implementation from each village will be requested. Such free and informed consent will be registered through and act with the signature of each village. This document will be filed in an electronic version as well as a hard copy by the time of the first verification.

### 2.5.9 Project Ownership (G5.8)

The ownership of the lands inside the project area is supported by legal documentation (see folder: contract between ARC group and the land owner).

Through the signing of the letters of intent, the land owners and ARC group (as the project proponent) agree that the benefits generated by the reduction of greenhouse gas (GHG) emissions, will be used to give continuity to the project and expand its scope. This will be managed by Dacko with the participation and follow-up of the community (See folder).

Also, ARC group signs voluntary agreements with other project owners (outside the project area, but inside the project zone). These project owners are supported throught the implementation of the project activities in their lands. Despite the agreements are signed for a period between 3 to 10 years, these will be subject to periodical and conditional renewal, according to the medium-term results (see folder).

### 2.5.10 Management of Double Counting Risk (G5.9)

The ARC REDD Project generates benefits to the climate, communities and biodiversity, but only net reductions and removals of greenhouse gases will be marketed after being properly registered on a market platform.

### 2.5.11 Emissions Trading Programs and Other Binding Limits

Does not apply.

### 2.5.12 Other Forms of Environmental Credit

The ARC REDD Project is not intended to generate any other form of environmental credits related to the reductions and removals of GHG emissions claimed under the VCS (Verified Carbon Standard) program.

### 2.5.13 Participation under Other GHG Programs

The ARC REDD Project did not receive or sought to be registered in any other GHG program, in addition to submitting the Project to validation and verification in the VCS (Verified Carbon Standard) and CCBS (Climate, Community and Biodiversity Standard).

### 2.5.14 Projects Rejected by Other GHG Programs

The ARC REDD Project has not undergone validation/verification of any other GHG program and is therefore not rejected by any other GHG program.

### 2.5.15 Double Counting (G5.9)

Specify how double counting is avoided, particularly for credits sold as offsets sold on the voluntary market VCS CCB credits are currently the only environmental credit being generated from this project. No other environmental credits will be generated or sold.

# 3 CLIMATE

## 3.1 Application of Methodology

### 3.1.1 Title and Reference of Methodology

- VCS Methodology for Avoided Unplanned Deforestation (VM0015 v1.1)

- VCS-approved VT0001Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities.

- VCS AFOLU Non-permanence Risk Tool: VCS Version 3.2

- Climate, Community & Biodiversity Standards (CCBS) 3rd edition

### 3.1.2 Applicability of Methodology

Demonstrate and justify how the project activity(s) meets each of the applicability conditions of the methodology(s), and tools (where applicable) applied by the project. Address each applicability condition separately.

Table 7: Applicability conditions of the methodology VM0015

| Condition | Applicability |
|---|---|
| a) Baseline activities may include planned or unplanned logging for timber, fuel-wood collection, charcoal production, agricultural and grazing activities as long as the category is unplanned deforestation according to the most recent VCS AFOLU requirements. | Baseline activities include unplanned utilization. This scenario considers the conversion of native forest areas into agriculture and pasture through unplanned deforestation. |
| b) Project activities may include one or a combination of the eligible categories defined in the description of the scope of the methodology (Table 1 and Figure 2 of the methodology). | At a baseline deforestation, an "old growth forest with logging" (mature natural forest with logging activities). This implies a protection scenario with charcoal production, extraction of firewood and controlled forest extraction (Baseline C). |
| c) The project area can include different types of forest, such as, but not limited to, old-growth forest, degraded forest, secondary forests, planted forests and agro-forestry systems meeting the definition of "forest". | The Project Area includes only forest according to the definition of Brazil |
| d) At project commencement, the project area shall include only land qualifying as "forest" for a minimum of 10 years prior to the project start date. | Landsat TM images from more than 10 years before the Project start date have been analyzed to identify only forested areas according to Brazil's definition of forest. |
| e) The project area can include forested wetlands (such as bottomland forests, floodplain forests, mangrove forests) as long as they do not grow on peat. Peat shall be defined as organic soils with at least 65% organic matter and a minimum thickness of 50 cm. If the project area includes forested wetlands growing on peat (e.g. peat swamp forests), this methodology is not applicable. | The Project does not include forested wetlands. |

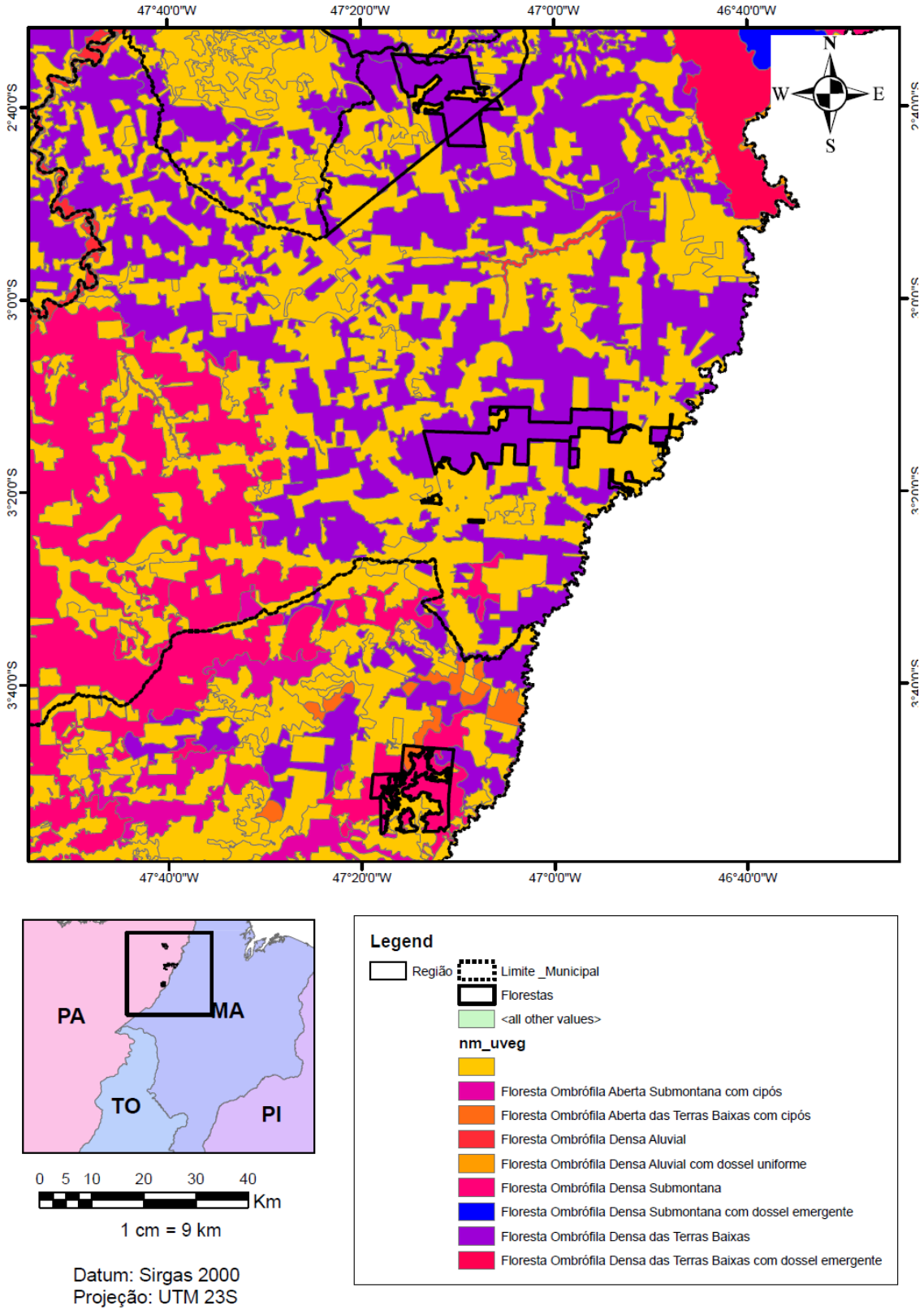
### 3.1.3 Project Boundary

Step 1.1 of VM0015 Project Spatial Boundaries

Region of Reference

The reference region is the spatial boundary where rates, agents, vectors, and patterns of land use and land cover are analyzed, projected for the future, and monitored. The Project area, leakage belt and leak management area are contained in the reference region (Figure 21).

Figure 21. Location of the Reference Region, Project Area, Leakage belt, and Leak Management Area.



The reference region covers 2,522,426 ha (two million, five hundred twenty–two thousand, four hundred twenty-six ha) and presents a historical deforestation rate (between 2000 and 2014) of 6,613 ha per year (0.40% per year - in relation to the remaining forest area in 2000).

In defining the spatial boundary of the reference region, environmental characteristics (river basin boundaries), deforestation direction vector and land tenure situation were considered. The boundary of the reference region followed the guidelines described on page 20 of the VM0015 methodology, with the final area within the range suggested by footnote 09 (page 21 of methodology VM0015).

The characteristics of the reference region meet the similarity requirements with the Project area determined by the methodology VM0015 (presented on pages 22 and 23 of VM0015), presenting the following characteristics:

1. Deforestation agents and vectors

2. Landscape configuration and ecological conditions

3. Socioeconomic and cultural conditions

Table 8: Carbon pools included/excluded

| Source | | Gas | Included? | Justification/Explanation |
|---|---|---|---|---|
| Baseline | Aboveground biomass: Tree | $CO_2$ | Included | Mandatory |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Aboveground biomass: Non- Tree | $CO_2$ | Included | Optional |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Below-ground | $CO_2$ | Included | Significant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Deadwood | $CO_2$ | Excluded | Insignificant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Harvested Wood Products | $CO_2$ | Excluded | Insignificant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Litter | $CO_2$ | Excluded | Insignificant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |

| Source | Gas | Included? | Justification/Explanation |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Soil Organic Carbon | $CO_2$ | Excluded | Insignificant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| Project | Aboveground biomass: Tree | $CO_2$ | Included | Mandatory |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Aboveground biomass: Non- Tree | $CO_2$ | Included | Optional |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Below-ground | $CO_2$ | Included | Significant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Deadwood | $CO_2$ | Excluded | Insignificant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Harvested Wood Products | $CO_2$ | Excluded | Insignificant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Litter | $CO_2$ | Excluded | Insignificant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |
| | Soil Organic Carbon | $CO_2$ | Excluded | Insignificant carbon pool |
| | | $CH_4$ | Excluded | Not applicable according to VM0015 |
| | | $N_2O$ | Excluded | Not applicable according to VM0015 |

Table 9. Carbon sources included/excluded

| Source | | Gas | Included? | Justification/Explanation |
|---|---|---|---|---|
| Baseline | Burning of woody biomass | $CO_2$ | Excluded | Potential emissions are negligibly small as there is no burning of woody biomass. |
| | | $CH_4$ | Excluded | Potential emissions are negligibly small as there is no burning of woody biomass. |
| | | $N_2O$ | Excluded | Potential emissions are negligibly small as there is no burning of woody biomass. |
| Proj ect | Burning of woody biomass | $CO_2$ | Excluded | Potential emissions are negligibly small as there is no burning of woody biomass. |

| | | | | |
|---|---|---|---|---|
| | | $CH_4$ | Excluded | Potential emissions are negligibly small as there is no burning of woody biomass. |
| | | $N_2O$ | Excluded | Potential emissions are negligibly small as there is no burning of woody biomass. |

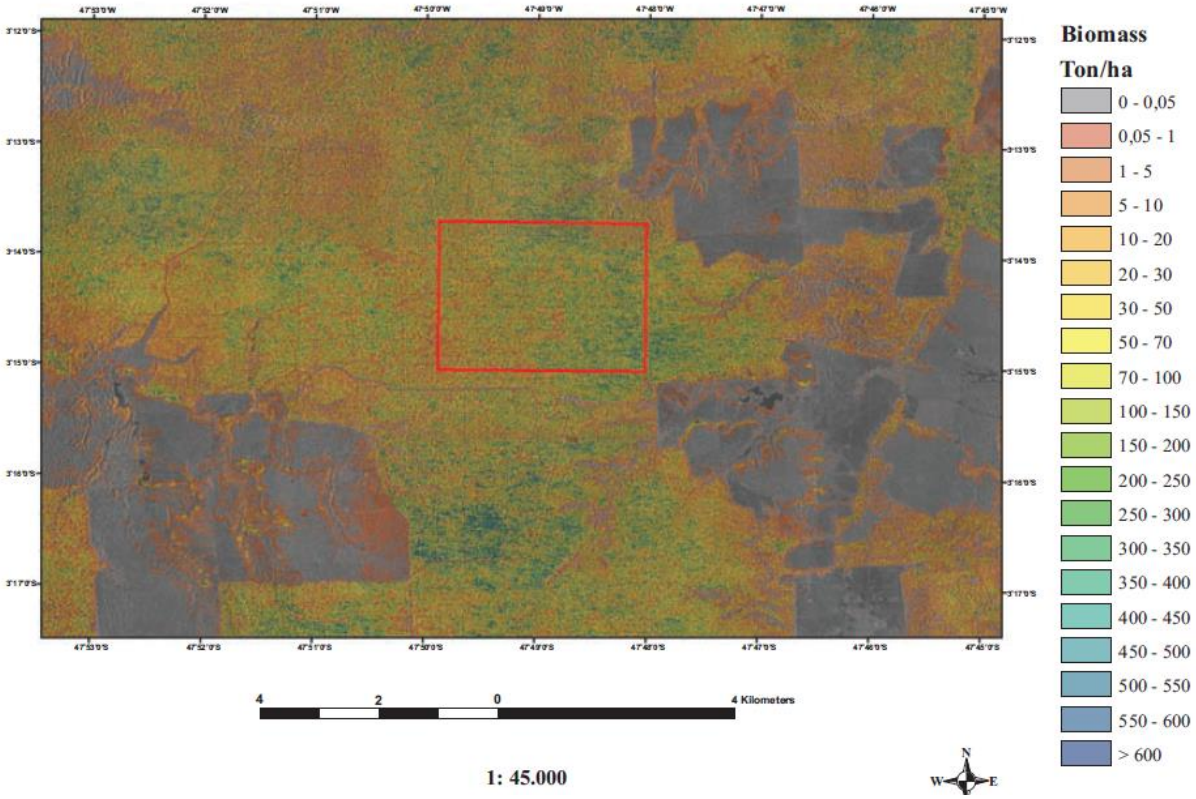
### 3.1.4 Baseline Scenario

The baseline scenario as identified in the additionality assessment is the progressive loss of forest cover by the advancement of the consolidated frontier and the development and consolidation of the pioneer frontier, cattle ranches, forest clearance for agricultural activities and for timber.

The main driver for both deforestation fronts is land speculation, which is generated from economic incentives, perverse regulations and an erroneous definition of what a productive forest is. A land with forest cover is assumed to be non-productive thus under no use; a deforested land is worth 5 to 10 times more than the same forested area; the Brazilian Constitution recognizes the rights of squatters to invade and claim public and private lands if such appear to be under no-productive use.

Given the widespread unclear land tenure and weak law enforcement, squatters move freely in the Project Area. Squatters take advantage of the constantly evolving roads network developed by illegal loggers (pioneer roads) and invade previously inaccessible forested lands.

Map 3: Map of the forest biomass of the project area



Several remote sensing technologies are being developed (Sambatti, 2012) to provide accurate estimates of forest biomass to guarantee that REDD can effectively reduce carbon emissions from deforestation and forest degradation. X/P-band InSAR combines the potential for wall-to-wall data acquisition in very large areas and estimation of forest biomass in conditions - such as with the presence of cloud cover, and dense vegetation – that other remote sensing technologies face difficulties to deliver. We confirmed the results of the studies demonstrating that, when Hint is available, forest biomass estimation is improved substantially. This can overcome the known limitation of using P-band backscatter alone for biomass estimation, i.e., signal saturation above a certain biomass threshold. It was evident from the study that cattle ranching and timber logging are the main drivers of deforestation in and around the project area.

### 3.1.5 Additionality

For the additionality analysis the most recent version of the VCS "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities - VT0001", Version 3.0, is used. The steps defined by the tool for this analysis are then developed.

Applicability conditions:

The tool is applicable under the following conditions:

a) AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced;

All project activities are legal and do not lead to violation of any applicable law. The national and sectoral policies relevant to this project are those derived from laws pertaining to natural resources and forestry activities in Brazil.

b) The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity.

The most plausible baseline scenario is determined following the stepwise approach of the VCS Tool for the demonstration and assessment of Additionality. The determination of the baseline scenario was using determined employing literature, direct field observation, GIS information and scientific research.

Step 1. Identification of the alternative scenarios of land use to the activities of the Project.

Sub-step 1a: Identification of alternative land use scenarios for proposed REDD project activities.

According to the stipulated by the tool, the following alternatives of land use are considered:

a. Continuation of land uses prior to project implementation: Based on prevailing historical land use trends in the region, two realistic scenarios (agricultural and livestock uses) were identified, which could occur in case of non-implementation of the REDD project. Due to mainly economic factors (such as the lack of job opportunities and the poor quality of life of the inhabitants of the forested

areas of the study area), the agricultural frontier is widening in a worrisome way through the destruction of forests for the establishment of crops and unimproved pastures

1. **Deforestation for the expansion of livestock activities:** Since the 1960s (Veiga et al., 2003), the cattle herd of the Amazon Basin has increased from 5 million to more than 70-80 million heads. Around 15% of the Amazon forest has been replaced and around 80% of the deforested areas have been covered by pastures (approximately 900 000 km2). Cattle expansion occurs in the new agricultural frontier areas of the "Arc of deforestation", from the Eastern Brazilian Amazon (States of Maranhão and Pará), through the Southern Brazilian Amazon (States of Tocantins, Mato Grosso and Rondônia) and the Bolivian rainforests, to the Andean Amazon ecosystems of Bolivia, Peru, Ecuador, Colombia and Venezuela. Based on 1990s data from different agricultural frontiers of the Amazon basin, the authors try to identify the main factors responsible for cattle expansion. Whereas some promising and sustainable land-use alternatives are emerging in some regions, adequate solutions to avoid or minimize the negative ecological impact of Amazon basin development still have to be found.

2. **Deforestation for the expansion of the agricultural frontier – crop:** Recent increase in the rate of deforestation of the Brazilian Amazon has inflamed discussion about the causes of forest loss, with a special focus on agriculture (Garagorry, 2005). There were few studies conducted on the expansion of agriculture in the Brazilian Amazon from 1976 to 2001 based on the eight most important products (cattle, bananas, beans, cassava, coffee, maize, rice and soybeans). A biological delimitation of the Amazon based on a map of Brazil's biomes was adopted in order to avoid inclusion of non-forested areas in the analysis by few researchers. Intense spatial changes in Brazilian agriculture have occurred, with the emergence of new production centres for soybeans and cattle. Several of these regions are located nearby or inside the Amazon's limits. Livestock and soybean cropping in Brazil are consistently moving north. The contribution of the Amazon to Brazilian agriculture rose significantly during the last decades, reaching 28.9% of cassava, 21.3% of banana, 14.2% of rice and 20.0% of cattle production in Brazil in 2001 (three-year average). Cropped area and production in the Amazon have grown at higher annual rates than in the rest of the country for almost all items analysed, supporting the view that the region is a new frontier of Brazilian agriculture. Most recent trends point to a vigorous demand for new land, which will consequently imply a predicted increase in forest clearing.

b. Project activities, within the boundaries of the project area, without being registered under a project VCS AFOLU (Project activity on the land boundary project without being registered as VCS AFOLU project)

3. Alternatives productive systems:

Agroforestry: establishment of agricultural crop systems (eg: soyabean, cocoa) under shade (forest species). For this, native tree species are selected, based on criteria such as: adaptability, compatibility with agroforestry systems, cultural and ecological value, seed availability, resistance to pests and diseases, and commercial value. These systems are established to improve the yield of agricultural crops, and to access the market for the sale of timber, to meet subsistence consumption (eg firewood, fences, etc.) and / or production of non-timber products (eg fruit harvest).

• Silvopastoral systems: establishment of combined forest species in the same management unit with herbaceous plants (crops, pastures - forage banks) and / or animals (grazing). The silvopastoral system looks for the growth of stems of greater diameter, being able to obtain wood suitable for specific sectors of the market of the wood.

**4. Conservation of natural forests:** Forest conservation activities for the Payment for Environmental Services.

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

According to the information in sub-step 1a all of these alternative land use scenarios are legal and enforced by mandatory applicable laws and regulations taking into account the enforcement in Brazil and the state of Para.

In summary the alternative land uses scenarios in the Project Area that are in compliance with all mandatory applicable legal and regulatory requirements are:

▪ Cattle farming: this activity is regulated by the following main laws: Law n° 11,443 - January 5, 200758, Law n° 12,727 - October 17, 201259, Law n° 12,805, April 29, 201360.

▪ Forest plantations (without being registered as a carbon project): all the laws that regulate the forest plantations in the state of Para are presented in the appendix.

On the other hand, according to the values of loss of forest cover in the last decade, even in protected areas belonging to the state, it can be concluded that these protection figures have not exercised their function of control and preservation of forest ecosystems99, therefore they are considered systematically not enforced regulations in the region.

Outcome Sub-step 1b. List of land use scenarios that are alternative to the VCS AFOLU activity, consistent with applicable legislation and regulations:

- Cattle ranching.
- Forest plantations (without being registered as a carbon project).
- Alternative productive systems.
- Conservation of natural forests.

Sub-step 1c. Selection of the baseline of the project:

The identification of the baseline scenario is done in section 3.1.4 according to the guidelines of the methodology used.

There is no reliable information on production costs associated with the different activities that are implemented prior to the project. The information is managed mainly by the associations of producers

(e.g. State of Para, National Federation of Coffee Growers, Soyabean, among others); Other data, are those of independent producers, whose information is not properly registered in the Municipal Technical Assistance Units. Therefore, the barrier analysis is selected.

STEP 3. Barrier analysis

Sub-step 3a. Identify barriers that may prevent the implementation of proposed project activities.

a) Investment barriers

The lack of economic resources and the low priority given to the development of sustainable forest management in Brazil are the main constraints to the sector, both in natural and planted forests. Opportunities to channel domestic and international resources into the sector have not been exploited in part as a result of a lack of understanding of the key role that forests can play in reducing poverty, building the peace process, and, in general, in the economic and social development of the country. In addition, broad sectors of society do not seem to have an adequate understanding of the fact that such goals can be achieved while at the same time sustaining and enriching the crucial environmental services provided by forests, particularly those belonging to natural ecosystems.

Of all agricultural financing lines, forest credit is perhaps one of the most complex and constitutes a real challenge for economists and bankers. Historically, the vast majority of commercial reforestation initiatives in the country have been constituted with own resources; almost no entrepreneur takes the option of financing through ordinary credits and if he does, he requests small amounts, usually for working capital and never as investment capital. The credit conditions do not correspond to the productive period of the plantation, there are high interest rates which are unattractive for investors. In addition, since long-term forestry is not a priority area for the allocation of resources by financial institutions. A little more than 90 percent of the financing for commercial reforestation is carried out, basically, through the incentives, incentives and tax benefits granted by the State, which, although valuable, are often insufficient for the sector to grow at speed what is needed

1) Barriers related to the local tradition, inter alia:

The technological barriers are linked to bad practices used in the main production systems, which promote deforestation. In the livestock sector of Paragominas, and Ulianpolis identified different problems, among which are: production costs (eg high costs of labor, concentrates and raw materials, medicines and other inputs), animal feed (eg prices, lack of irrigation districts), human capital (eg, quality of technical assistance, technical assistance, etc.), lack of technical and professional education, etc.) All these problems stagnate the production of land with existing pasture cover, and therefore, the owners, without technical bases that promote improvements in their lands, want to exploit a greater number of areas (border expansion).

On the other hand, the agricultural sector is characterized by traditional exploitation (especially in township and village areas), framed in family and subsistence economies, based on manual labor, inefficient use of water and soil, excessive use of agrochemicals and low crop rotation. As in the livestock sector, these traditional agricultural practices generate the underutilization of cultivated areas, and, therefore, promote the search for new areas with soils with better properties for productivity.

2) Barriers caused by prevailing practices:

The tradition in the region is the management of traditional systems, without the inclusion of complementary production, such as forestry. The development of agroforestry and silvopastoral systems is aimed at maximizing productivity in already deforested areas, in order to avoid the expansion of the agricultural and livestock frontier, and thus deforestation.

In the Paragominas and Ulianpolis development centers, there is no tradition of forest production, so there are different barriers that make it difficult to include them in traditional systems, such as: inexperience in the production of forest plant material and in the execution of silvicultural activities, ignorance of potential markets for the commercialization of timber and non-timber products, among others. The project will provide trainings to producers, advice on the design of the seed model (forest and silvopastoral arrangements), delivery of inputs, implementation of the model and technical support.

Sub-step 3b. Show that the identified barriers can not prevent the implementation of at least one of the alternative scenarios:

The most likely scenarios of land use in the absence of the REDD project correspond to those that give continuity to the productive activities predominant in the region of study. With regard to the barriers identified in the previous step, despite the problems faced by agricultural and livestock producers in the region, these are not restrictive for the development of such systems. These sectors are supported by productive associations of the country: National Federation of Coffee Growers and among others. They are also prioritized in economic strengthening programs, within the framework of Departmental and / or Municipal Development Plans, for their contribution to the department's economy.

STEP 4. Common practice analysis

Brazil is the fifth country in the world for total area: over 8.500.000 square kilometre and composed of 26 federated states, each with very different characteristics. We have decided to take into consideration the State of Para (where the project is actually implemented) because it has a multitude of similar characteristics within it that impact on the project but which differ or may differ from other federated states. The main characteristics taken into consideration are the following: climatic, pedological, legislative, rainfall, photoperiod, economic, financial, cost and skilled labor, market related to timber prices, cost of products due to duties that vary from state to state.

The integrationist spirit of the 1960s and 1970s served as basis for creation and implementation of several major ventures in the Amazon region that generated social conflicts that persist until the present day and directly reflect the articulation of deforestation that still occurs in the Amazon region. For expamle, surrounding to our REDD project thhe (small–medium) forest owner is often forced to sell the wood to figures that are lower than the cost generated to produce it. This happens because of a market dominated by a strong presence of a few and huge companies (described above) that control the market along the entire supply chain (from wood to the finished product). Because of this market situation that has become unsustainable for small forest producers, cases are increasingly frequent in which the forest is destroyed to restore cattle breeding (initial condition).

The cancellation of an approved permit to conduct suppression activities to clear land for productive use cannot be characterized as common practice in the region of the project. While it is impossible to assess the lack of following through on an intended action on a landowner by landowner basis, there is ample

evidence to demonstrate that the reverse, executing legal forest suppression permits, is common practice in the region.

In Paragominas, most legal forest clearing is conducted to open lands for livestock raising, and the prioritization of the livestock activity in the 2006 business plan reflects the predominance of the livestock market in the Paragominas region, providing an environmental and infrastructure conducive to initiating this activity.

Paragominas was the leading livestock producer in Para state for ten consecutive years, from 1983 to 1992, and continues to be among the most important producers in the state. In 2007, Paragominas municipality was the sixth largest livestock producer in Pará, with 419,430 cattle, which is equivalent to 3% of the livestock in Pará (IBGE / PPM). In 2008 there were 1,152 properties in Paragominas with livestock activity (Adepará/Register 2008) as shown in Figure 24. In 2009, the highest proportion of cleared areas in Paragominas was used for livestock, as shown in Table 10.

Figure 22: Livestock distribution in Paragominas, Pará state. Source: Adepará/Cadastro

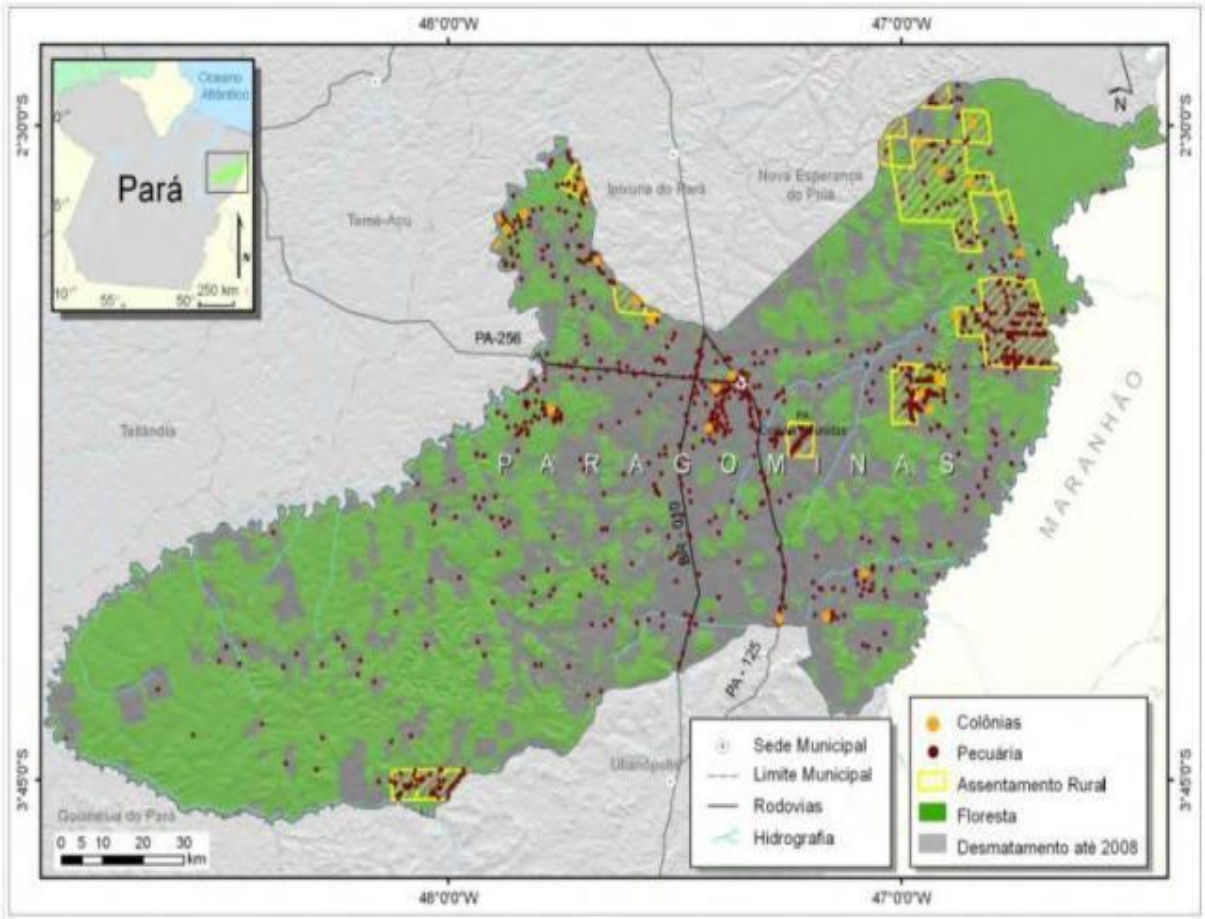



Table 10: Land Use of Paragominas in 2009

| | **Área (ha)** | **% related to the municipality area** |
|---|---|---|
| Area- clearcut[1] | 7,48,000 | 38.7 |
| Family agriculture[2] | 1,08,569 | 5.6 |
| *Livestock*[3] | *5,99,186* | *31.0* |
| Grain Crops (rice, corn and soybeans) | 34,200 | 1.8 |
| Undetermined Use[4] | 6,045 | 0.3 |
| Areas with highly forest degraded in 2008 | 1,30,693 | 6.8 |
| Área with Forest cover | 10,55,089 | 54.6 |
| Remaining native Forest | 10,15,089 | 52.5 |
| Reforestation | 40,000 | 2.1 |
| Total area of Paragominas | 19,33,089 | 100.0 |

To estimate the suppressed area in the segment "family agriculture", it was calculated the rate of deforestation within the polygons of the official settlements, being this equal to 68%, and extrapolated to the entire area occupied by small producers (settlement projects + colonies outside these projects).

It was used a stocking of 0.7 head / hectare, which is the weighted average of data from the last Agricultural Census of IBGE (1995), which indicates an average stocking of 1.38 heads/hectare in the most productive pastures in the Amazon, which corresponds to 20% of the total pasture, and the data of Arima and Verissimo (2002) which indicate an average stocking of 0.5 head / hectare in the remaining 80% Amazon pasture.

The difference between the total clearcut area and areas with size calculated by kind of use.

Although the latter data presented here are from post project start date in 2015, they are representative of conditions and land use change dynamics at that time. Notably, in the immediate vicinity surrounding the project area, 42% properties bordering the project are engaged in livestock activity.

Private landowners in the region that have not exercised their rights to legally clear forest (up to 20%), without incentives from carbon market revenues, present essential distinctions from ARC. These landowners are characterized as large companies, larger than ARC, with business operations not as dependent on land use activities (forestry or otherwise), occupying manufacturing, telecommunications and financial sectors, and are represented by the ORSA group, MARTINS and ALGAR/ABC, all located in the state of Pará.

The main difference between the project and similar ones is the possibility of balancing this serious obstacle thanks to the carbon project and the consequent sale of the VCUs, thus maintaining the forest throughout the project period. The same IMASUL (state forestry agency) is looking with particular attention and interest to this project because it could be a resource for small and medium forest projects

in the state. VCUs could be the means to ensure the survival of these small projects and the development of new forest projects.

Conclusions:

As demonstrated above, the project activity, without the revenue from carbon credits, it is not the most financially attractive land use alternative, and it is not a common practice in the region. Therefore, the project is determined to be additional.

### 3.1.6 Methodology Deviations

No deviation of methodology was applied in this Project.

## 3.2 Quantification of GHG Emission Reductions and Removals

### 3.2.1 Baseline Emissions

Step 5 of VM0015 - Definition of the Component of Changes in Land Use and Coverage in the Baseline

Baseline activity data calculation by forest class:

The results of the baseline projections showed a deforestation of approximately 51,985 hectares in the Project area between 2015 and 2045, and 55,445 hectares in the leakage belt (Table 11).

Calculation of baseline activity data by post-deforestation class

As available in methodology VM0015, method 1 was used to determine the substitute class of forest cover in the baseline of the Project (indicated as anthropic Vegetation in Balance). Table 11 shows the area of project zone, which comprises the Project area, the leakage belt and the leakage management areas, as well as the corresponding areas of each class of use and coverage after deforestation.

Table 11: Areas of the reference region covering different combinations of potential post-deforestation classes.

| **Zone** | | **Name** | | **Total of all other LU/LC classes present 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** | **ha** | **%** |
| 1 | ARC REDD | 53,528 | 100 | 6,901 | 12.15% | 53,528 | 100 |
| Total area per class *fcl* | | 53,528 | 100 | 6,901 | 12.15% | 53,528 | 100 |

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

Does not apply.

Step 6 of VM0015 - Estimation of Changes in Carbon Stocks and Non-CO2 Emissions at Baseline

The estimate of the carbon stock for the Forest class was reached through forest inventory carried out by the technical team of ARC, in the year 2019. The main results found in this study will be described below, and more information can be obtained in the document Final Report for the Determination of Forest Carbon Stock.

Estimate of average carbon stock by use class and change in land cover

The implementation of the forest inventory in the REDD project area adopted the recommendations presented in the VCS approved methodology VM0015, distributing the plots proportionally to the area of each typology and considering a uniform distribution of plots in the management area. Physical Parameters a total of 3 strata were identified in the Project area, which resulted in a total of 75 planned initial sample units. In addition, it was also considered an analysis for the plots implanted in managed areas and unmanaged areas. All plots were evenly distributed to cover much of the Project area.

According to EMBRAPA (2005), the permanent plots may be have a circular, square or rectangular shape. However, the most used shape is the square in tropical forests. Based on this guideline, the inventory was carried out in 1-hectare square plots, as it was found that with this format and dimension it is possible to obtain greater representativity and less difficulty of operation.

For each plot, data will be collected from the arboreal stratum, collecting individuals with Diameter at the Chest Height (DCH) of more than 15 centimeters and for better ordering each plot was divided into subunits of 0.25 hectares. Each implemented plot received an identification plate with the unit number, this numbering was allocated at the start point of each plot, and was also done for the subunits.

Estimated Variables: Biomass and Carbon

The above-ground dry biomass of the Project area was estimated using allometric equations, and ten different models were tested (ARAUJO et al., 1999; CHAMBERS et al., 2001; CHAVE et al., 2005; CHAVE et al., 2014; GERWING, 2002; HIGUSHI et al., 1998; NOGUEIRA et al., 2008). All of them adopt the diameter above the soil (DCH> 10 cm) of the trees sampled as an independent variable, while others consider, in addition to the DCH, the basic density of the tree species. DCH values above the maximum value used for the development of the allometric equations tested were truncated to the maximum value. Basic wood density values were obtained from the Global Wood Density Database. Due to the fact that the database reports more than one density value per species, the average of the values reported by species for the Project region was preferably used.

For cases where this information was not present, the global averages of the values reported for the species were adopted. However, when species-specific values were not available, the average biomass of the arboreal genus was adopted, according to the standard procedure typically reported in the literature (MEDJIBE et al., 2011; RUTISHAUSER et al., 2015; WEST et al., 2014). We emphasize that below-ground biomass is already included in the estimation. To quantify the biomass, we used the allometric equation described by Nogueira et al. (2008), showing more appropriate for the region of study. The following is a description of equation (4):

$$B = \exp( -1.716 + 2.413^{*} \ln(DAP))$$

Where:

B: dry biomass (kg);

DCH: diameter at breast height (1.30 cm);

Carbon Content

In accordance with the methodology VM0015, the carbon stocks were quantified in tons of carbon dioxide equivalent per hectare (tCO2-e ha-1). For calculations and conservatively, the estimated carbon stocks considered only the biomass reservoirs above and below the ground. The following equation was used for the conversion of the dry biomass into tCO2-e ha-1 based on the sampled trees and their respective plots and subplots (equation 5):

$$C_{i,j,k} = \sum_{i=1}^{N} \left( \frac{B_{i,j,k} \cdot (1+S) \cdot FC \cdot \left(\frac{44}{12}\right)}{1000} \right)$$

Where:
$B_{i,j,k}$: ton of dry biomass per hectare of tree *i* in plot *j* and sub plot *k;*
S: fraction of biomass below the ground in relation to $B_i$;
FC: fraction of biomass carbon.

The carbon fraction of biomass used for the calculations was 0.485, value reported by Silva (2007) and previously used in other REDD+ Projects implemented in the Brazilian Amazon. The proportion of below-ground biomass was estimated with the standard value reported by Nogueira et al. (2008), corresponding to 25.8% of above-ground biomass.

**Amostral Effort**

The amostral effort (number of plots to be implanted) was estimated according to the equation A3-1 of the methodology VM0015 (equation 6):

$$n = \frac{t_{st}^2 \cdot CV^2}{E^2 + \frac{t_{st}^2 \cdot CV^2}{N}}$$

Where:
*t*: value of the *t*-student table at the 95% confidence level;
*E*: maximum allowed value of sampling error (10%);
*CV*: coefficient of variation for biomass in tropical forests (%);
*N*: possible number of sample plots

Furthermore, VM0015 recommends the adoption of different strata in order to reduce sample effort in the area of carbon project. For this purpose, strata were tested based (1) on managed areas and unmanaged areas and (2) based on the different forest typologies present in the study area.

**Carbon Stock**

The adoption of a single stratum for the Project area is presented as the best sampling strategy for the biomass inventory. Still, this measure proves to be interesting in the context of the study because it tends to improve future calculations related to the baseline modelling of the REDD+ Project area.

**Calculation of Reduced Emissions**

For the determination of the reduced emissions, the estimated stock in the inventory should be multiplied by 3.6667 (44/12), due to the fact that 1 kg of C corresponds to 3.66667 kg of CO2 (mass of CO2 = 44 and the mass of C = 12; 44/12 = 3.66667). The average carbon values per hectare for each initial class of land use and cover considered for the baseline scenario present in the area of the project and leakage belt can be seen in the table below (Table 12).

**Post-deforestation classes projected for the Project area and leakage belt in the baseline scenario and non-forest classes existing in the areas of leakage management**

The methodology VM0015 allows the use of estimates from local studies, and thus a value of 60.1 tCO2e ha-1 was taken as reference for the carbon stock of the anthropic vegetation class in equilibrium, the class projected to exist in the project area and the leakage belt in the Project scenario. This estimation of carbon stock was obtained by WANDERLLI (FEARNSIDE, 2015), through a long-term study of the landscape and average vegetation composition in deforested areas of the Brazilian Amazon, which consists of a matrix composed of pastures, small-scale agriculture and secondary vegetation, usually found in a post-deforestation scenario in the Amazon.

Wanderlli & Fearnside (2015) is a revised scientific literature and represents one of the most updated studies for the Brazilian Amazon on the carbon stock in deforested areas, satisfying the requirements of section 4.5.6 of the VCS Standard:

1. Data were not collected directly from primary sources;

**2.** The data were collected from secondary sources, by researchers from INPA (renowned research institute for the subject in Brazil), published by an international and reputed scientific journal (*Forest Ecology and Management*, 2015);

**3.** The data are from a period that accurately reflects the current practice available for the determination of carbon stock;

**4.** No sampling was applied on these data;

**5.** The data are available to the public through the website:

http://www.ppginpa.eco.br/documents/teses_dissertacoes/wandelli-fearnside-2015-for-colman_Land-use-history-and-capoeira-growth.pdf. Accessed on June 18, 2018;

**6.** They are available for independent evaluation of VCSA and VVB;

**7.** The data are appropriate for the geographic scope of VM0015,

**8.** Expert review was not necessary;

**9.** Data are not maintained only in a central storage repository.

**Calculation of the carbon stock change factors**

The baseline scenario of the Project considers the changes in forest carbon stock replaced by a type of vegetation that may be areas of pasture, small-scale plantations or temporary and permanent agricultural

crops. The requirements of the AFOLU VCS document require consideration of the carbon stock decay of carbon reservoirs in organic soil, below-ground biomass, dead wood, and timber products.

To calculate this decay, VM0015 version 1.1 applies a linear function to account for the initial carbon stock decay for the initial forest class (icl) and an increase in the carbon stock in the class after deforestation (fcl). Table 12 show how the carbon stock change factor was calculated.

Table 12. Change factor in carbon stock for the initial forest class icl (Method 1) (Table 20a of VM0015).

| Years after deforestation | | $\Delta Cab_{icl,t}$ | $\Delta Cbb_{icl,t}$ | $\Delta Cdwb_{icl,t}$ | $\Delta Ctot_{cl,t}$ |
|---|---|---|---|---|---|
| 1 | t* | 306.9 | 10.7 | 0.0 | 317.6 |
| 2 | t*+1 | 0 | 10.7 | 0.0 | 10.7 |
| 3 | t*+2 | 0 | 10.7 | 0.0 | 10.7 |
| 4 | t*+3 | 0 | 10.7 | 0.0 | 10.7 |
| 5 | t*+4 | 0 | 10.7 | 0.0 | 10.7 |
| 6 | t*+5 | 0 | 10.7 | 0.0 | 10.7 |
| 7 | t*+6 | 0 | 10.7 | 0.0 | 10.7 |

Table 13. Carbon stock change factor for forest class fcl or z zones (Method 1) (Table 20b of VM0015).

| Years after deforestation | | $\Delta Cab_{icl,t}$ |
|---|---|---|
| 1 | t* | 6.0 |
| 2 | t*+1 | 6.0 |
| 3 | t*+2 | 6.0 |
| 4 | t*+3 | 6.0 |
| 5 | t*+4 | 6.0 |
| 6 | t*+5 | 6.0 |
| 7 | t*+6 | 6.0 |
| 8 | t*+7 | 6.0 |
| 9 | t*+8 | 6.0 |

| | | |
|---|---|---|
| 10 | t*+9 | 6.0 |
| 11 | t*+10 | 0 |

Calculation of baseline changes in carbon stock

For the calculation of the baseline changes in carbon stock in the Project area (Table 40) and leakage belt (Table 41) for year t was used Method 1 of VM0015 version 1.1, according to equation 10 on page 72 of VM0015 version 1.1.

Baseline of non-CO2 emissions from forest fires

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

### 3.2.2 Project Emissions

**Step 7 of VM0015 - Ex-ante estimate of Actual Changes in Carbon Stocks and Non-$CO_2$ Emissions in the Project Area**

Non-$CO_2$ emissions were not considered and accounted for the REDD+ Project.

**Ex ante estimation of real changes in carbon stock**

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

For the REDD+ Project area only sustainable forest management activities are planned, i.e., low impact activities.

**Extraction of wood**

All planned forest management activity performed by ARC will be monitored and reported in each Project verification event, and this monitoring will be based on the Post-Exploratory Reports.

In this sense, a significance analysis was performed based on the "*Tool for testing significance of GHG emissions in A/R CDM project activities*" in order to evaluate the impact of the emissions of the logging activity on the Project emissions. For the calculation were used data provided by ARC referring to the annual intensity of forest exploitation and the amount of carbon extracted.

For the significance assessment, the relationship between the balance of carbon stock changes due to the logging activity and the total baseline emissions was applied. The results showed that the emissions related to the logging activity are below the threshold of 5% of significance required by the Standard and therefore can be disregarded from the scope of project emissions.

The construction of infrastructures for forest management activities, such as yards and roads, will be considered as planned deforestation in the Project area. And, according to footnote 85 of VM0015, the carbon stock of forest management products with the purpose of constituting durable wood products can be conservatively ignored in the project scenario.

**Charcoal production and collection of firewood**

The charcoal production or firewood collection is not expected for the Project, and during the social diagnosis this type of use was not verified among families. If there is a reduction of forest carbon stock due to this activity, table 25c of VM0015 will be presented ex post. Table 43 presents the ex-ante estimate of the carbon stock reduction due to activities planned by the Project.

**Optional accounting for increase in carbon stocks**

The ex-ante estimate of the increase in carbon stock by regeneration after management activities was not considered by conservative measure.

**Ex ante estimate of changes in carbon stock due to unavoidable unplanned deforestation in the Project area**

Project activities are expected to reduce about 90% of baseline emissions in the first five years of implementation, and to gradually increase their efficiency over the years. Considering the implementation of effective monitoring of forest cover and strengthening the degree of governance in the area due to the management activity, the activities foreseen by the Project and the greater alignment with the communities, the project is expected to reach high levels of effectiveness during its 30-year duration.

**Ex ante estimate of net real changes in carbon stock in the Project area**
The changes in carbon stock related to planned activities and the effectiveness of the Project are presented in appendix.

**Ex-ante estimate of non-$CO_2$ emissions due to forest fires**

No non-CO2 emissions from fire were recorded for the Baseline scenario.

### 3.2.3 Leakage

**Step 8 of VM0015 - Ex-ante leakage estimate**

**Ex-ante estimate of carbon stock reduction and increased GHG emissions due to leakage prevention measures**

The Project activity does not expect any displacement of agricultural activities present in the Project Zone before the beginning of the Project, thus leakage emissions are considered insignificant and hence accounted as zero.

In addition to this the area around the project area has been absolutely devastated during past periods of deforestation. The project area is an open land surrounded by deforested and dry area.

Starting from 2012 the cattle were gradually sold as they reached maturity for the marketing of the meat. Since January 2015, of the beginning of the Project until today there are no cattle in the farm, except several milk cows owned by the farm keeper for his self-consumption. Because of that, no leakage management zone was identified.

### 3.2.4 Net GHG Emission Reductions and Removals

**Step 9 if VM0015 - Net ex-ante net reduction in anthropogenic GHG emissions**

**Significance assessment**

**Calculation of ex ante estimates of total net GHG emission reductions**

The equation 19 suggested by VM0015 was used for the ex-ante estimation of the project emissions reductions.

**Ex-ante calculation of Verified Carbon Units (VCUs)**

To estimate the number of VCUs, we used equation 20 of VM0015. The Risk Factor parameter of the Project was estimated through the document *VCS AFOLU Non-Permanence Risk Tool*, resulting in 11%.

| Year | Estimated baseline emissions or removals ($tCO_2e$) | Estimated project emissions or removals ($tCO_2e$) | Estimated leakage emissions ($tCO_2e$) | Estimated net GHG emission reductions or removals ($tCO_2e$) |
|---|---|---|---|---|
| Year A | 340,800 | 0 | 0 | 340,800 |
| Year B | 340,800 | 0 | 0 | 340,800 |
| Year C | 340,800 | 0 | 0 | 340,800 |
| Year D | 340,800 | 0 | 0 | 340,800 |
| Year E | 340,800 | 0 | 0 | 340,800 |
| Year F | 340,800 | 0 | 0 | 340,800 |
| Year G | 340,800 | 0 | 0 | 340,800 |
| Year H | 340,800 | 0 | 0 | 340,800 |
| Year I | 340,800 | 0 | 0 | 340,800 |
| Year J | 340,800 | 0 | 0 | 340,800 |
| Total | 3,408,000 | 0 | 0 | 3,408,000 |

## 3.3 Monitoring

### 3.3.1 Data and Parameters Available at Validation

Below is the description of the data and parameters available in the validation.

| Data / Parameter | **Deforestation** |
|---|---|
| Data unit | *Hectare (ha)* |
| Description | *Maps of forest cover areas converted into non-forest cover areas* |
| Source of data | *Measured through data from the PRODES/INPE Project* |

| | |
|---|---|
| Value applied | *0.40%/year on average (2000-2014)* |
| Justification of choice of data or description of measurement methods and procedures applied | *Data from the PRODES Digital program (official mapping satellite of Brazilian Amazon Forest) were used to map the deforestation and production of the Forest Cover Excellence Brand Map. During the analyzed period, a total of 46 Landsat images were used. And for the classification of the images in the mapping of forest classes, non-forest vegetation, hydrography and deforestation, the ISOSEG method of unsupervised classification was used* |
| Purpose of data | • *- Determination of baseline scenario*<br>• *- Calculation of baseline emissions*<br>• *- Calculation of project emissions*<br>*- Calculation of leakage* |
| Comments | *View the documents:*<br>*- Câmara et al. 2006. Methodology for the calculation of the annual rate of deforestation in the Legal Amazon*<br>*- Determination of the Forest Carbon Stock for the REDD+ Project* |

| | |
|---|---|
| Data / Parameter | **CF** |
| Data unit | *T* |
| Description | *Carbon contained in dry biomass* |
| Source of data | *Nogueira et al. (2008). Estimates of forest biomass in the Brazilian Amazon: New allometric equations and biomass adjustments of wood volume inventories. Forest Ecology and Management, v. 256, n. 11, p. 1853-1867, 2008* |
| Value applied | *0.485* |
| Justification of choice of data or description of measurement methods and procedures applied | *Value found in scientific literature* |
| Purpose of data | • *- Determination of baseline scenario*<br>• *- Calculation of baseline emissions*<br>• *- Calculation of project emissions*<br>*- Calculation of leakage* |
| Comments | |

| | |
|---|---|
| Data / Parameter | ABSLRRt |

| | |
|---|---|
| Data unit | *Ha* |
| Description | *Annual area of baseline deforestation within the RR at year t* |
| Source of data | Calculated, see Annex VM0015 tables |
| Value applied | *Table 9a, 11a Annex VM0015 tables* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of the VM0015 v1.1.* |
| Purpose of data | Calculation of baseline emissions |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | ABSLRR |
| Data unit | *Ha* |
| Description | *Cumulative area of baseline deforestation in the reference region at year t* |
| Source of data | Calculated, see VCS Annex |
| Value applied | *Table 9a, 11a Annex VM0015 tables* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of the VM0015 v1.1.* |
| Purpose of data | Calculation of baseline emissions |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | ABSLPAt |
| Data unit | *Ha* |
| Description | *Annual area of baseline deforestation in the project area at year t* |
| Source of data | Calculated, see VCS Annex |
| Value applied | *Table 9b, 11b, 13b of Annex VM0015* |

| | |
|---|---|
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of the VM0015 v1.1.* |
| Purpose of data | Calculation of baseline emissions |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | ABSLPAicl,t |
| Data unit | *Ha* |
| Description | *Area of initial (pre-deforestation) forest class icl deforested at time t within the project area in the baseline* |
| Source of data | Calculated, see VCS Annex |
| Value applied | *Table 11b of Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of VM0015 v1.1, 5.1 by applying land cover map to the result of Table 9b* |
| Purpose of data | Calculation of baseline emissions |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | ABSLPAi,t |
| Data unit | *Ha* |
| Description | Annual area of baseline deforestation within stratum (i) of the project area at year t |
| Source of data | Calculated, see VCS Annex |
| Value applied | *Table 9b of Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of VM0015 v1.1, 4.1.2.2* |

| | |
|---|---|
| Purpose of data | Calculation of baseline emissions |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | ABSLPA |
| Data unit | *Ha* |
| Description | Cumulative area of baseline deforestation within the project area at year t |
| Source of data | Calculated, see VCS Annex |
| Value applied | *Table 9b, Table 11b, Table 13b of Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of the VM0015 v1.1.* |
| Purpose of data | Calculation of baseline emissions |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | ABSLPAz,t |
| Data unit | *Ha* |
| Description | Area of the zone z “deforested” at time t within the project area in the baseline case; ha |
| Source of data | Calculated, see VCS Annex |
| Value applied | *Table 13b of Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *Equal to values of Table 11b grouped by zones.* |
| Purpose of data | Calculation of baseline em issions |
| Comments | *Calculating net GHG emissions via post-deforestation C-stocks* |

| | |
|---|---|
| Data / Parameter | ABSLLKt |

| | |
|---|---|
| Data unit | *Ha* |
| Description | Annual area of baseline deforestation within the leakage belt at year t |
| Source of data | Calculated, see VCS Annex |
| Value applied | *Table 9c, 11c, 13c of Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of VM0015 v1.1.* |
| Purpose of data | Calculation of leakage |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | $ABSLLK_{icl,t}$ |
| Data unit | *Ha* |
| Description | Area of initial (post-deforestation) forest class fcl deforested at time t within the leakage belt in the baseline case |
| Source of data | Calculated, see VCS Annex |
| Value applied | *Table 11c of Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of VM0015 v1.1, 5.1 by applying land cover map to the result of Table 9c* |
| Purpose of data | Calculation of leakage |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | $ABSLLK_{l,t}$ |
| Data unit | *Ha* |
| Description | Annual area of deforestation in stratum (i) within the leakage belt at year t |
| Source of data | Calculated. See VCS annex – section 4 |
| Value applied | *Table 9c, 11c, 13c of Annex VM0015.* |

| | |
|---|---|
| Justification of choice of data or description of measurement methods and procedures applied | *Activity data for calculating GHG emissions. Calculated according to requirements of VM0015 v1.1.* |
| Purpose of data | Calculation of leakage |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | ABSLLK |
| Data unit | *Ha* |
| Description | Cumulative area of baseline deforestation within the leakage belt at year t |
| Source of data | Calculated |
| Value applied | *Table 9c, 11c, 13c of Annex VM0015.* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of VM0015 v1.1.* |
| Purpose of data | Calculation of leakage |
| Comments | *Activity data for calculating GHG emissions in the baseline scenario* |

| | |
|---|---|
| Data / Parameter | CFj |
| Data unit | *Dimensionless* |
| Description | Carbon fraction for tree tr, of species, group of species or forest type j |
| Source of data | IPCC GPG 2006 Chapter 6 |
| Value applied | *forest classes: 0.5 Post-deforestation classes: 0.47* |
| Justification of choice of data or description of measurement methods and procedures applied | *Default values IPCC GPG 2006, Chapter 6* |

| | |
|---|---|
| Purpose of data | Calculation of baseline emission |
| Comments | Conversion from biomass to CO2e |

| | |
|---|---|
| Data / Parameter | Cabcl |
| Data unit | t $CO_2e$ $ha^{-1}$ |
| Description | Average carbon stock per hectare in the above-ground biomass carbon pool of LU/LC class cl |
| Source of data | Calculated, see VCS Annex |
| Value applied | *forest class: bh-M: 250.75*<br>*bh-MB: 350.22*<br>*bh-PM: 196.63*<br>*bmh-M: 216.28*<br>*bmh-MB: 448.24*<br>*bmh-PM and and bmh-PMt: 460.92*<br>*bms-T: 169.23*<br>*bp-M: 183.36*<br>*bp-MB: 181.47*<br>*bp-PM: 398.95*<br>*bs-MB: 165.78* |
| Justification of choice of data or description of measurement methods and procedures applied | *Derived from forest inventory data, IDEAM. See VCS Annex.* |
| Purpose of data | Calculation of baseline emission |
| Comments | Emissions factors for estimating GHG emissions from deforestation. |

| | |
|---|---|
| Data / Parameter | Rj |
| Data unit | *Relation factor* |
| Description | Root shoot ratio |
| Source of data | IPCC/Literature value |
| Value applied | *0.24* |

| | |
|---|---|
| Justification of choice of data or description of measurement methods and procedures applied | *Default value of 0.24 from IPCC Guidelines for National Greenhouse Gas Inventories. 2006. Table 4.3/Mokany 2006* |
| Purpose of data | Calculation of baseline emission |
| Comments | Belowground biomass estimation |

| | |
|---|---|
| Data / Parameter | Cbbcl |
| Data unit | t $CO_2e$ $ha^{-1}$ |
| Description | Average carbon stock per hectare in the below-ground biomass carbon pool of LU/LC class cl |
| Source of data | Calculated, see Table Biomass, Annex GEI DB |
| Value applied | *forest class:*<br>*bh-M=60.18*<br>*bh-MB=122.05*<br>*bh-PM=47.19*<br>*bmh-M=51.91*<br>*bmh-MB=107.58*<br>*bmh-PM and bmh-PMt=75.65*<br>*bms-T=40.62*<br>*bp-M=44.01*<br>*bp-MB=43.55*<br>*bp-PM=95.75*<br>*bs-T=39.79* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated by applying the default value of 0.24 from IPCC Guidelines for National Greenhouse Gas Inventories. 2006. Table Table 4.3/Mokany 2006* |
| Purpose of data | Calculation of baseline emission |
| Comments | Emissions factors for estimating GHG emissions from deforestation. |

| | |
|---|---|
| Data / Parameter | Ctot(icl) |
| Data unit | t $CO_2e$ $ha^{-1}$ |

| | |
|---|---|
| Description | Average carbon stock per hectare in the below-ground biomass carbon pool of LU/LC class cl |
| Source of data | Calculated, see Table Biomass, Annex GEI DB |
| Value applied | *forest class:*<br>*bh-M=310.92*<br>*bh-MB=630.61*<br>*bh-PM=243.82*<br>*bmh-M=268.19*<br>*bmh-MB=555.82*<br>*bmh-PM y bmh-PMt=390.85*<br>*bms-T=209.85*<br>*bp-M=227.37*<br>*bp-MB=225.02*<br>*bp-PM=494.70*<br>*bs-T=205.57* |
| Justification of choice of data or description of measurement methods and procedures applied | *Derived from various forest inventory data. See Table Biomass, Annex GEI DB.* |
| Purpose of data | Calculation of baseline emission |
| Comments | Emissions factors for estimating GHG emissions from deforestation. |

| | |
|---|---|
| Data / Parameter | $Ctot_{icl,t}$ |
| Data unit | t $CO_2e$ $ha^{-1}$ |
| Description | Average carbon stock of all accounted carbon pools in forest class icl at time t |
| Source of data | Calculated, see Table Significancia, Annex VM0015 |
| Value applied | *Deemed de-minimus* |
| Justification of choice of data or description of measurement methods and procedures applied | *Significance analysis.* |
| Purpose of data | Calculation of baseline emission |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | Cabfcl |
| Data unit | t $CO_2e$ $ha^{-1}$ |
| Description | Average carbon stock per hectare in the above-ground biomass carbon pool of final post-deforestation class fcl |
| Source of data | Calculated, see table CarbonPostdef, Annex GEI DB |
| Value applied | *Grassland: 17.95*<br>*Heterogeneous farmland: 23.74*<br>*Crops: 21.78* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated according to requirements of VM0015 v1.1.* |
| Purpose of data | Calculation of baseline emission |
| Comments | Calculate GHG emissions from deforestation |

| | |
|---|---|
| Data / Parameter | Cp |
| Data unit | t $CO_2e$ $ha^{-1}$ |
| Description | Average carbon stock per hectare in the carbon pool p |
| Source of data | Table 20.a |
| Value applied | *Table 20.a. Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *Requirements of the VM0015 sec. 6.1.2.* |
| Purpose of data | Calculation of baseline emission |
| Comments | Baseline GHG emissions estimates |

| | |
|---|---|
| Data / Parameter | $Ctot_{fcl, t}$ |
| Data unit | t $CO_2e$ $ha^{-1}$ |
| Description | Average carbon stock of all accounted carbon pools in non-forest class fcl at time t; |

| | |
|---|---|
| Source of data | N.A |
| Value applied | *N.A* |
| Justification of choice of data or description of measurement methods and procedures applied | *Leakage management activities do not decrease carbon stocks.* |
| Purpose of data | Calculation of baseline emission |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔCabABSLKK |
| Data unit | t $CO_2e$ |
| Description | Cumulative baseline carbon stock changes for the above-ground biomass pool in the leakage belt |
| Source of data | Table 21.c.1, Annex VM0015 |
| Value applied | *See Table 21.c.1, Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *GHG accounting in the leakage belt.* |
| Purpose of data | Calculation of leakage |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔCbbABSLKK |
| Data unit | t $CO_2e$ |
| Description | Cumulative baseline carbon stock changes for the below-ground biomass pool in the leakage belt |
| Source of data | Table 21.c.1 Annex VM0015 |
| Value applied | *See Table 21.c.1 Annex VM0015* |

| | |
|---|---|
| Justification of choice of data or description of measurement methods and procedures applied | *GHG accounting in the leakage belt.* |
| Purpose of data | Calculation of leakage |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔCabBSLPA |
| Data unit | t $CO_2e$ |
| Description | Cumulative baseline carbon stock changes for the above-ground biomass pool in the project area |
| Source of data | Table 21.b.1 Annex VM0015 |
| Value applied | *See Table 21.b.1 Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *GHG accounting in the project area.* |
| Purpose of data | Calculation of baseline emissions |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔCbbABSLPA |
| Data unit | t $CO_2e$ |
| Description | Cumulative baseline carbon stock changes for the below-ground biomass pool in the project area |
| Source of data | Table 21.b.1 Annex VM0015 |
| Value applied | *See Table 21.b.1 Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *GHG accounting in the project area.* |
| Purpose of data | Calculation of baseline emissions |

| | |
|---|---|
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔCADLK |
| Data unit | t $CO_2e$ |
| Description | Cumulative total decrease in carbon stocks due to displaced deforestation |
| Source of data | Table 34, 35, Annex VM0015 |
| Value applied | *See Table 34, 35, Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *GHG accounting from displaced leakage* |
| Purpose of data | Calculation of leakage |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔCBSLPA |
| Data unit | t CO2-e |
| Description | Total baseline carbon stock changes in the project area |
| Source of data | Table 36, Annex VM0015 |
| Value applied | *See Table 36, Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *GHG accounting in the project area* |
| Purpose of data | Calculation of leakage |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔCPSPA |
| Data unit | t CO2-e |
| Description | Cumulative project carbon stock change within the project area at year t |

| | |
|---|---|
| Source of data | See Tables 27 and 36, Annex VM0015 |
| Value applied | *Tables 27 and 36, Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *Calculation of net GHG emissions reductions* |
| Purpose of data | Calculation of baseline emissions |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔCUDdPA |
| Data unit | t CO2-e |
| Description | Cumulative actual carbon stock change due to unavoided unplanned deforestation at year t in the project area |
| Source of data | Table 27, Annex VM0015. |
| Value applied | *Effectiveness index: 40%* |
| Justification of choice of data or description of measurement methods and procedures applied | *Measure of project effectiveness* |
| Purpose of data | Calculation of project emissions |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ΔREDDt |
| Data unit | t CO2-e |
| Description | Net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity at year t |
| Source of data | See Table 36, Annex VM0015 |
| Value applied | *Table 36, Annex VM0015* |

| | |
|---|---|
| Justification of choice of data or description of measurement methods and procedures applied | *The cumulative result of applying the VM0015 methodology* |
| Purpose of data | Calculation of project emissions |
| Comments | Final GHG calculations |

| | |
|---|---|
| Data / Parameter | DLF |
| Data unit | % |
| Description | Displacement leakage factor |
| Source of data | Table 34, Annex VM0015 |
| Value applied | *5* |
| Justification of choice of data or description of measurement methods and procedures applied | *ex-ante leakage* |
| Purpose of data | Calculation of leakage |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | EI |
| Data unit | % |
| Description | ex-ante estimated Effectiveness Index |
| Source of data | Estimate generated by the project |
| Value applied | *0.40* |
| Justification of choice of data or description of measurement methods and procedures applied | *Estimate generated by the project* |
| Purpose of data | Calculation of project emissions |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | ELK |
| Data unit | t CO2-e |
| Description | Cumulative sum of ex-ante estimated leakage emissions at year t |
| Source of data | Table 35, 36 Annex VM0015 |
| Value applied | *Table 35, 36 Annex VM0015* |
| Justification of choice of data or description of measurement methods and procedures applied | *The cumulative result of applying the VM0015 methodology* |
| Purpose of data | Calculation of leakage |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | RFt |
| Data unit | % |
| Description | Risk factor used to calculate VCS buffer credits |
| Source of data | VCS Non Permanence Risk analysis |
| Value applied | *16* |
| Justification of choice of data or description of measurement methods and procedures applied | *see VCS Non-Permanence Risk Analysis* |
| Purpose of data | Calculation of project emissions |
| Comments | N.A |

| | |
|---|---|
| Data / Parameter | VBCt |
| Data unit | t CO2-e |
| Description | Number of Buffer Credits deposited in the VCS Buffer at time t; |
| Source of data | See Table 36, Annex VM0015 |
| Value applied | *Table 36, Annex VM0015* |

| | |
|---|---|
| Justification of choice of data or description of measurement methods and procedures applied | *Calculated* |
| Purpose of data | Buffer calculation |
| Comments | N.A |

### 3.3.2 Data and Parameters Monitored

The description of the data and monitored parameters subsequent to validation follows.

| | |
|---|---|
| Data / Parameter | ABSLLKt |
| Data unit | *Ha* |
| Description | *Annual area of deforestation within the leakage belt at year t* |
| Source of data | *Satellite images* |
| Description of measurement methods and procedures to be applied | *ARC will be in charged for the climate monitoring according to the methodology VM0015 v1.1. Table 9c, 11c, 13c of Annex VM0015.* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |
| Monitoring equipment | *GIS software* |
| QA/QC procedures to be applied | *Quality control/quality assurance (QA/QC) procedures will be performed by ARC* |
| Purpose of data | Activity data for calculating GHG emissions.<br>Calculated according to requirements of VM0015 v1.1. |
| Calculation method | *Calculation of leakage* |

| | |
|---|---|
| Comments | *N.A* |

| | |
|---|---|
| Data / Parameter | ABSLPA |
| Data unit | *Ha* |
| Description | *Cumulative area of deforestation within the project area at year t* |
| Source of data | *Satellite images* |
| Description of measurement methods and procedures to be applied | *ARC will be in charged for the climate monitoring according to the methodology VM0015 v1.1. Table 9b, 11b, 13b of Annex VM0015.* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |
| Monitoring equipment | *GIS software* |
| QA/QC procedures to be applied | *Quality control/quality assurance (QA/QC) procedures will be performed by ARC* |
| Purpose of data | Activity data for calculating GHG emissions.<br>Calculated according to requirements of VM0015 v1.1. |
| Calculation method | *Calculation of project emissions* |
| Comments | *N.A* |

| | |
|---|---|
| Data / Parameter | ABSLPAt |
| Data unit | *Ha* |
| Description | *Annual area of deforestation in the project area at year t* |
| Source of data | *Satellite images* |

| | |
|---|---|
| Description of measurement methods and procedures to be applied | *ARC will be in charged for the climate monitoring according to the methodology VM0015 v1.1. Table 9b, 11b, 13b of Annex VM0015.* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |
| Monitoring equipment | *GIS software* |
| QA/QC procedures to be applied | *Quality control/quality assurance (QA/QC) procedures will be performed by ARC* |
| Purpose of data | Activity data for calculating GHG emissions.<br>Calculated according to requirements of VM0015 v1.1. |
| Calculation method | *Calculation of project emissions* |
| Comments | *N.A* |

| | |
|---|---|
| Data / Parameter | ΔCPSPAt |
| Data unit | t CO2-e |
| Description | *Annual project carbon stock change within the project area at year t* |
| Source of data | *Satellite images and carbon stocks defined in 4.1* |
| Description of measurement methods and procedures to be applied | *ARC will be in charged for the climate monitoring according to the methodology VM0015 v1.1. Table 27 and Table 36, Annex VM0015.* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |

| | |
|---|---|
| Monitoring equipment | *N.A* |
| QA/QC procedures to be applied | *Quality control/quality assurance (QA/QC) procedures will be performed by ARC* |
| Purpose of data | Calculation of project emissions |
| Calculation method | *Activity data for calculating GHG emissions reductions.* |
| Comments | *N.A* |

| | |
|---|---|
| Data / Parameter | ΔREDD |
| Data unit | t CO2-e |
| Description | *Cumulative net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity* |
| Source of data | *Methodology VM0015 v1.1. Table 36, Annex VM0015* |
| Description of measurement methods and procedures to be applied | *According to the methodology VM0015 v1.1. Table 36, Annex VM0015.* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |
| Monitoring equipment | *N.A* |
| QA/QC procedures to be applied | *ARC will assign a QA/QC coordinator* |
| Purpose of data | Calculation of project emissions |

| | |
|---|---|
| Calculation method | *Final GHG calculations* |
| Comments | *N.A* |

| | |
|---|---|
| Data / Parameter | ΔREDDt |
| Data unit | t CO2-e |
| Description | *Net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity at year t* |
| Source of data | *Methodology VM0015 v1.1. Table 36, Annex VM0015* |
| Description of measurement methods and procedures to be applied | *According to the methodology VM0015 v1.1. Table 36, Annex VM0015* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |
| Monitoring equipment | *N.A* |
| QA/QC procedures to be applied | *ARC will assign a QA/QC coordinator* |
| Purpose of data | Calculation of project emissions |
| Calculation method | *Final GHG calculations* |
| Comments | *N.A* |

| | |
|---|---|
| Data / Parameter | RFt |
| Data unit | % |
| Description | *Risk factor used to calculate VCS buffer credits* |

| | |
|---|---|
| Source of data | *VCS Non Permanence Risk analysis* |
| Description of measurement methods and procedures to be applied | *AFOLU Non permanence Risk Tool v.3.2* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |
| Monitoring equipment | *N.A* |
| QA/QC procedures to be applied | *N.A* |
| Purpose of data | Calculation of project emissions |
| Calculation method | *N.A* |
| Comments | *Buffer calculation* |

| | |
|---|---|
| Data / Parameter | VBCt |
| Data unit | t CO2-e |
| Description | *Number of Buffer Credits deposited in the VCS Buffer at time t;* |
| Source of data | *Methodology VM0015 v1.1. Table 36, Annex VM0015* |
| Description of measurement methods and procedures to be applied | *According to the methodology VM0015 v1.1. Table 36, Annex VM0015* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |

| | |
|---|---|
| Monitoring equipment | *N.A* |
| QA/QC procedures to be applied | *N.A* |
| Purpose of data | Calculation of project emissions |
| Calculation method | *N.A* |
| Comments | *Buffer calculation* |

| | |
|---|---|
| Data / Parameter | VCUt |
| Data unit | t CO2-e |
| Description | *Number of Verified Carbon Units (VCUs) to be made available for trade at time t* |
| Source of data | *Methodology VM0015 v1.1. Table 36, Annex VM0015* |
| Description of measurement methods and procedures to be applied | *According to the methodology VM0015 v1.1. Table 36, Annex VM0015* |
| Frequency of monitoring/recording | *At each verification period* |
| Value applied | *N.A* |
| Monitoring equipment | *N.A* |
| QA/QC procedures to be applied | *N.A* |
| Purpose of data | Calculation of project emissions |
| Calculation method | *N.A* |

| Comments | *Buffer calculation* |
|---|---|

### 3.3.3 Monitoring Plan

The monitoring plan of the REDD+ Project is a combination of three components: climate, community and biodiversity. ARC group is one of the proponents and implementing partners of this Project, being responsible for coordinating the monitoring processes during its life cycle. The climate aspects will be monitored directly by the ARC group and the social and biodiversity aspects will be monitored by the land owners and partners hired with skills in the subject.

Monitoring Plan for Climate Impacts:

The Climate Impact Monitoring Plan will encompass key issues for the demonstration of emission reduction by deforestation and degradation due to avoided unplanned deforestation, in accordance with the applied methodology VM0015, and changes in carbon stock throughout the project life cycle due to changes in land use within the Project area and in the leakage belt.

**Part 1 –Application of Methodology VM0015**

**1. TASK 1: MONITORING CARBON STOCK CHANGES AND GHG EMISSIONS FOR PERIODICAL CHECKS**

**1.1 Monitoring current changes in carbon stock and GHG emissions in the Project area**

**a) Technical description of monitoring tasks**

In the Project area, the monitoring of changes in carbon stock and GHG emissions will be carried out through analysis of avoided unplanned deforestation. ARC group will develop actions to monitor REDD+ activities, which aim to avoid unplanned deforestation by verifying areas of forest cover by satellite images and field checks in the Project area.

**b) Data to be collected**

Table 14. Data to be collected to monitor changes in carbon stock and GHG emissions for periodic verification in the REDD+ Project.

| Data/Parameter | Description | Unit | Source | Frequency |
|---|---|---|---|---|
| $^{Ctot}{}_{icl}$ | Average carbon stock for all carbon reservoirs in the forest class *icl* | Tonne of carbon dioxide equivalent $(tCO_{2}e)$ | Calculated by allometric equations and field-measured data | Collected in periods of up to 10 years |
| $^{APDPA}{}_{icl,t}$ | Areas of planned deforestation in forest class *icl* in year *t* in the Project area | Hectare (ha) | Calculated through remote sensing images, technical maps and data, field and post- exploratory information on management | Annual |

| | | | | |
|---|---|---|---|---|
| $\Delta CPLdPA_t$ | Total decrease in carbon stock due to planned timber cutting activities in year *t* in the Project area | Tonne of carbon dioxide equivalent ($tCO_2e$) | Calculated | Annual |
| $ACPA_{icl,t}$ | Annual area within the Project area affected by catastrophic events in class *icl* in year *t* | Hectare (ha) | Calculated through remote sensing images | Each time a catastrophic event occurs |
| $AUFPA_{icl,t}$ | Areas affected by forest fire in class *icl* where carbon stock recovery occurs in year *t* | Hectare (ha) | Calculated through remote sensing images | Each time a forest fire event occurs |
| $\Delta CUFdPA_t$ | Total carbon stock decrease due to unplanned forest fires in year *t* in the Project area | Tonne of carbon dioxide equivalent ($tCO_2e$) | Calculated | Each time a forest fire event occurs |
| $\Delta CUCdPA_t$ | Total decrease in carbon stock due to catastrophic events in year *t* in the Project area | Tonne of carbon dioxide equivalent ($tCO_2e$) | Calculated | Each time a catastrophic event occurs |
| $\Delta CUDdPA_t$ | Total current change in carbon stock due to avoided planned deforestation in year *t* in the Project area | Tonne of carbon dioxide equivalent ($tCO_2e$) | Calculated | Annual |
| $\Delta CPSPA_t$ | Total inventory change in the Project area in year *t* | Tonne of carbon dioxide equivalent ($tCO_2e$) | Calculated | Annual |

**c) Brief description of the data collection procedures**

*Monitoring of land use and cover change:*

The Project plans to use the data processed by PRODES as a basis for monitoring, and the main activities developed for data collection and processing are:

- Selection of optical satellite images with less cloud cover and date of collection of images near the dry season in the Amazon and appropriate radiometric quality;

- Georeferencing of satellite imagery with scale 1: 100,000 topographic maps or NASA images in ortho-rectified MrSID format;

- Production of a spectral mixing model to estimate the percentage of vegetation, soil and shade components for each pixel in the image;

- Use of segmentation technique determining in the satellite image the spatially adjacent regions (segments) with similar spectral characteristics;

- Classification of the segments to identify forest classes, non-forest vegetation and deforestation.

*Carbon stock monitoring and non-CO2 emissions:*

Carbon stock changes (reduction) will be monitored through the forest inventory and the measurement of the Diameter at Chest Height (130 cm), for each tree with DCH equal to or greater than 15 cm in each plot of the forest inventory. The most widely used variable to estimate the carbon stock and changes in the carbon stock of the REDD+ Project is the DCH.

**d) Quality control procedures and quality assurance**

*Monitoring of land use and cover change:*

The mapping of deforestation occurrence data will be done through data collected in GPS navigation in order to corroborate the information obtained by satellite images. The minimum classification accuracy for use and ground cover is 80%. For cloud-covered areas, images of SAR sensors such as RADARSAT-2, Cosmo SkyMed or TerraSAR-X will be used.

ARC group will be responsible for storing during the Project period the original digital data (raster) and processed (vectors) of satellite images, coordinates, technical maps, photos and field cards. Maps with installed infrastructure, satellite images and annual deforestation reports will be made available to the verification body at each verification event.

Carbon stock monitoring and non-CO2 emissions:

The ARC Group will be responsible for keeping the original reports and field records stored and land owners will keep a digital copy of these documents throughout the duration of the Project. Spreadsheets, forest inventory reports, and parcel monitoring reports will be made available to verifiers at each verification event.

d) Data filing

ARC will keep all REDD Project data and reports stored in digital files for the duration of the Project. The original reports and collected field records produced by the forest management activity will be stored by the ARC Group and as previously stated, land owners will keep a copy of these documents filed in digital format throughout the Project.

Through the ARC's Activity Report and Impact Report prepared periodically, compilation and announcement of social activities results will be carried out, being made available in digital format. All documents related to the monitoring of the REDD Project will be gathered in paper and/or digital files and made available to the verifiers at each verification event.

e) Organization and responsibilities of the parties involved in all of the above

These activities are the responsibility of ARC group.

MonitoriWhang Plan of Impacts to the Community and Other Actors

An Initial Monitoring Plan for Impacts to Communities is presented below, and the complete monitoring plan should be completed later and posted on the Internet and communicated to the communities, project proponents, partners and other stakeholders.

a) Technical description of monitoring tasks

The monitoring of benefits to communities presents five components and aims to access the effectiveness of focused interventions: in the engagement of local actors and stakeholders, in the strengthening of associativism, in the promotion of rural technical assistance, strengthening of the ARC group and improvements in communication and energy systems.

b) Data to be collected

Table 15. Data to be collected to monitor activities

| Component | Data/Parameter | Description | Unit | Source | Frequency |
|---|---|---|---|---|---|
| **Engagement of actors** | No. of Meetings held | Number of meetings with stakeholders held during the reporting period | Number | Meeting minutes, Attendance list, Social activities report | Semester |
| | No. of Engaged Communities | Number of communities engaged in articulation meetings with stakeholders | Number | Meeting minutes, Attendance list, Social activities report | Semester |
| | No. of Institutions Engaged | Number of institutions participating in articulation meetings, including those described in the actors involved in the Project | Number | Meeting minutes, Attendance list, Social activities report | Semester |
| | Status of Referrals | Referral status of guidelines raised and discussed during stakeholder meetings | Does not apply | Meeting minutes, Attendance list, Social activities report | Semester |
| **Strengthening of Associative teams** | No. of Associations Affected | Number of associations contacted and engaged with the Project | Number | Social activities report | Annual |
| | No. of New Associations | Number of new associations formalized from Project intervention | Number | Social activities report | Annual |
| | No. of Cooperatives Affected | Number of associations contacted and engaged with the Project | Number | Social activities report | Annual |
| | No. of New Cooperatives | Number of new cooperatives formalized after Project intervention | Number | Social activities report | Annual |
| | No. of Courses and Training | Number of courses and trainings developed by the Projects | Number | Social activities report | Annual |
| | % of Regularized Associations | Of the total number of cooperatives served by the Project, which percentage is regularized | Number | Social activities report | Annual |

| | | | | | |
|---|---|---|---|---|---|
| | % Regularized Cooperatives | Of the total number of cooperatives served by the Project, which percentage is regularized | Number | Social activities report | Annual |
| | No. of Action Plans Prepared | Number of action plans prepared by associations | Number | Social activities report | Annual |
| | No. of Accessed Public Policies and Services | Number of public policies and services accessed by Project communities | Number | Social activities report | Annual |
| **Realization** | No. of Families Reached | Number of families served | Number | Social Activities Report | Semester |
| | Frequency of Technical Visits | Average attendance of families by extensionist technicians | Average number of visits per month | Advice sheets and social activities report | Semester |
| | No. of Courses and Trainings | Number of courses and trainings developed within the scope of ATER | Number | Social Activities Report | Semester |
| | No. of Cultures Developed in the Property | Average of the diversity of agricultural, livestock and extractive uses developed in the limits of rural properties | Number | Advice sheets and social activities report | Semester |
| | Cultivated Area | Average area per family for agricultural crops and livestock activities | Hectares | Advice sheets and social activities report | Semester |
| | Access to market | Final spaces for the marketing of products produced in rural properties | Does not apply | Advice sheets and social activities report | Semester |
| | Family Income | Monthly average income per family, focusing on the participation of agricultural and extractive activities | R$ (Reais) | Advice sheets and social activities report | Semester |
| **Strengthening of ARC Group** | No. of Contracted Professionals | Number of contracted technicians | Number | Social Activity Reports | Annual |
| | No. of Courses and Trainings for Professionals | Number of courses and trainings developed within the scope of the foundation's performance | Number | Social Activity Reports | Annual |
| | Strategic Planning and Fundraising Plan | Quantity of processed products | Does not apply | Social Activity Reports | Annual |

| | | | | | |
|---|---|---|---|---|---|
| | Amount of Raised Resources | Number of signed fund-raising contracts | Number | Social Activity Reports | Annual |
| | Number of Impact Business Generated | Number of contracts signed | Number | Social Activity Reports | Annual |
| **Energy and Communication** | No. of Meetings for Articulation of Projects for Access to Energy | Number of meetings held | Number | Social activities report | Annual |
| | No. of Public Policies and Services Accessed for Energy Generation | Number of electricity public policies and services accessed by Project communities | Number | Social activities report | Annual |
| | No. of Cellular and/or Internet Antennas Implanted | Number of cellular and internet antennas in operation | Number | Social activities report | Annual |

c) Summary of the data collection procedure

The data will be collected during and after the activities with stakeholders and/or through specific interviews. This information will be systematized and presented through reports of social activities of the Project, every six months.

d) Quality control and assurance procedures

The data collected and portrayed in the reports will be presented and validated during the technical chamber meetings, for which the affected producers, associations and cooperatives will be invited to participate as members throughout the project life cycle.

e) Data filing

All data and reports produced by the REDD Project will be stored by ARC through digital archives during the Project life cycle. Original (physical) reports, meeting minutes and field records produced will be stored by the land owners in the execution of social activities. Project manager will maintain a copy of these documents in digital format throughout the Project. All documents related to the monitoring of the REDD Project will be gathered in physical and/or virtual archives and made available to the verification body in each verification event.

f) Organization and responsibilities of the parties involved in the above

All monitoring activities are the responsibility of ARC group in the execution of social activities.

Monitoring Plan on Biodiversity Impacts

The biodiversity-related monitoring plan aims at implementing the assessment of the local community of flora and fauna in the face of management practices and forest integrity. For the flora, the monitoring plan includes the remeasurement of permanent plots with a frequency of 5 years, in order to evaluate the forest dynamics (recruitment rates, mortality, species substitution) and variations in the carbon stock. For

the fauna, it is planned to implant two annual campaigns, one per semester so that seasonal variations, such as the presence of migratory species and reproductive periods, are considered. Regarding the AHCVs, the verification of the adopted measures effectiveness to maintain and improve them is already incorporated within the described tasks.

#### 3.3.4 Dissemination of Monitoring Plan and Results (CL4.2)

It will be through the website of ARC group that the monitoring plan, as well as its results obtained will be available to the public. Statements of relevant and summary information addressed to communities and stakeholders will be transmitted through the REDD Technical Chamber and visits by Foundation technicians to rural communities.

### 3.4 Optional Criterion: Climate Change Adaptation Benefits

Does not apply

#### 3.4.1 Regional Climate Change Scenarios (GL1.1)

Does not apply

#### 3.4.2 Climate Change Impacts (GL1.2)

Does not apply

#### 3.4.3 Measures Needed and Designed for Adaptation (GL1.3)

Does not apply

## 4 COMMUNITY

### 4.1 Without-Project Community Scenario

#### 4.1.1 Descriptions of Communities at Project Start (CM1.1)

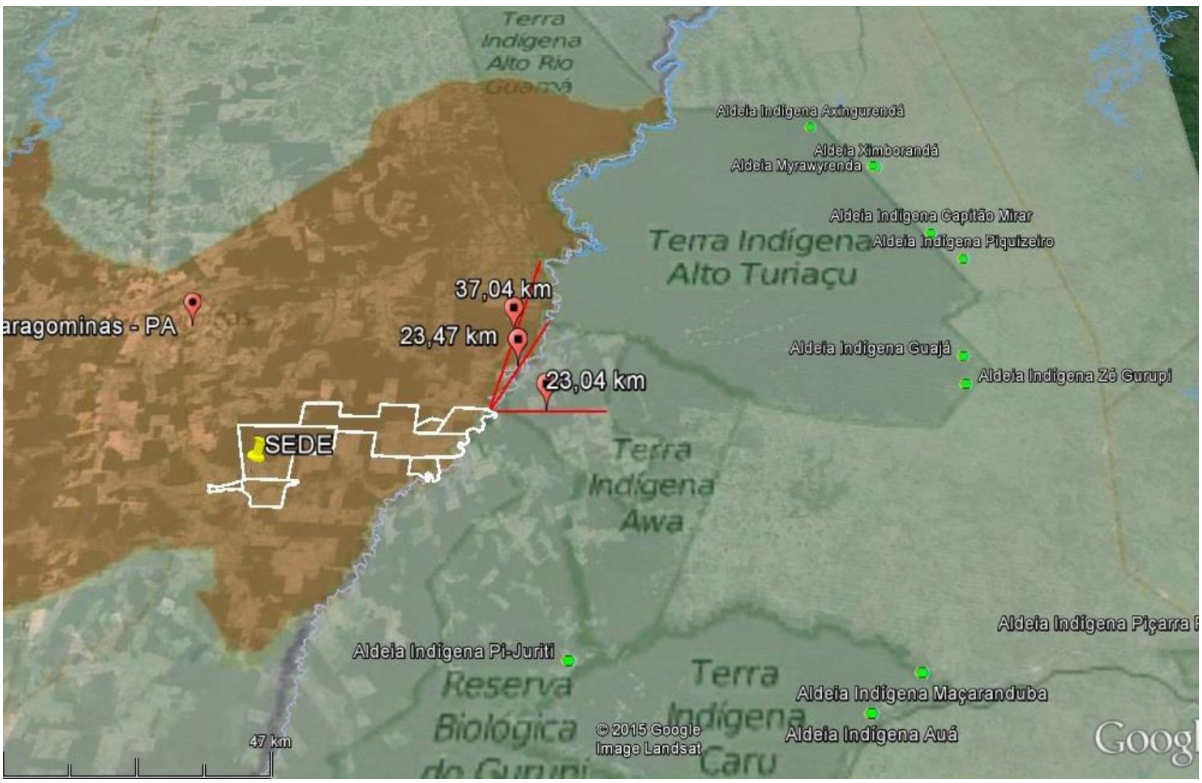
For the social and economic study of the project area, the reference area of the municipalities was taken as a sample, no other municipalities were reviewed as these are very large municipalities and the next most approximate municipality was not directly near the project area, or had no secondary roads that allowed access, thus separated from the relevance of the project. This choice was made because there is a social and economic relationship between the Property and the municipality of Paragominas and Ulianopolis, due to access to the area, the creation of jobs and the destination of raw material (wood), and the fact that the activities of the deforestation agents mainly occur based in the Paragominas and Ulianopolis region.

In addition to the aforementioned relationships, it is also noteworthy that: a) access to the area is via Paragominas, Ulianopolis and Nova Esperanca do Piria; b) the area is non-contiguous in this region; c) the settlements for agrarian reform (considered vectors of deforestation) are located in the municipalities of Paragominas and Ulianopolis not too far from the property; d) all other areas are deforested, privately held, and used for agriculture purposes;

In the Project Zone, corresponding to the private property (private farm), there were no Community, Community Groups or Indigenous Groups prior to the Project or after the project. The only people who lived in the farm were the property keeper and his family. This was the only farm worker and he was responsible for tending to the cows in the pasture.

Shows the block of land closest to indigenous areas that are at the closest 23.04 km away from the property. The darker green where it states Terra Indigena is federal indigenous reserves. The orange is the municipality of Paragominas.

Figure 23: Showing indigenous reserves around the project area



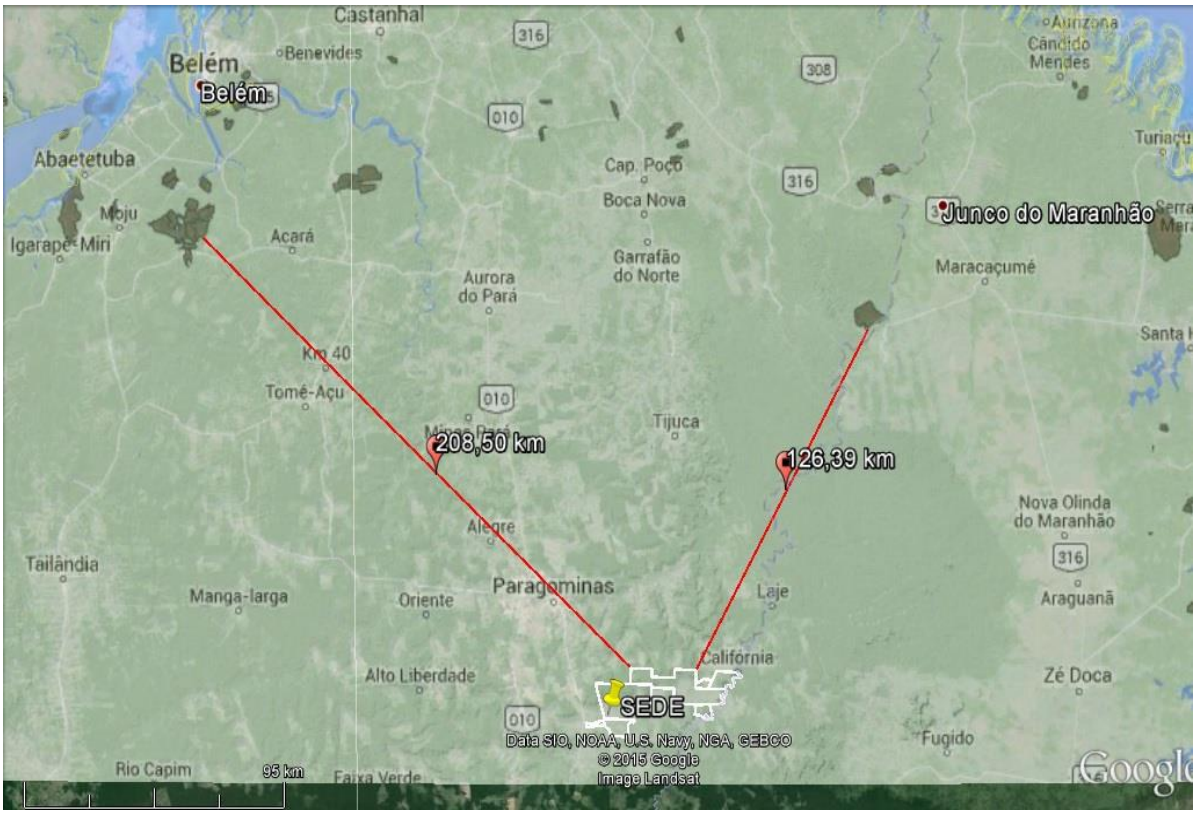

Special interest is taken from ARC to verify the lack of traditional communities within the properties where the management activities are developed. The right to the definitive title of the lands occupied by the remaining communities of quilombos is guaranteed by the Federal Constitution of 1988, in the Transitional Constitutional Provisions Act. This means that no title of real estate registration will be valid in the face of this historical ownership developed by the communities.

Quilombola are people who are descendants of African slaves, who formed communities after slavery was made illegal in 1888.

Even if the quilombola community has not yet obtained title to the area they are occupying, the right to it is a constitutional guarantee, which is why it must be respected and cannot, unless agreed with the community, occupy or use these areas with any activity. The same occurs in the eventual existence of indigenous communities. As the Constitution guarantees to traditional communities the maintenance of

their ways of living (article 216, part II of the CF) there is even possibility of expanding the lands destined to these communities if the necessity for the maintenance of their traditions.

Figure 25: Location of traditional Quilombo communities




The choice of methodology for the social and economic analysis of the Project Reference Region took into account the need to combine the data obtained from municipal authorities and government departments, with the information obtained through the field work and secondary data.

The actors interviewed by the social study were identified as small ranchers, farmers and squatters in rural areas, employees of the property, and in urban areas, representatives of the population and local public agencies such as the education agencies in the three municipalities. The questionnaires were formulated containing closed-ended as well as open-ended questions, because this model allows researchers to observe certain subjective aspects of the respondents that might be hidden in a later stage of data tabulation and analysis.

In this way, questionnaires were used, applied to three groups of the study population, rural area, urban area and farm workers, which served as a basis for further analysis. The questionnaires were applied in field work conducted October 08–17, 2015. The number of questionnaires referred to the sampling effort obtained in the time allotted for the field survey. This procedure was chosen in the field stage, as the following activities were carried out in this period: Interviews with residents of the urban and rural areas of the municipalities and the workers at property. Additionally, researchers' perceptions were obtained

during this period regarding the situation of the municipality. The researchers also contacted staff members of municipal government departments, with whom open interviews were conducted and saved on audio recordings, with the permission of the interviewees.

Socio Economic Situation of the adjacent Area

The main factors that occur in the region and contribute negatively to the development of local communities are:

• Progressive decline in productivity and profitability of traditional agriculture and livestock.

• Lack of work and income generation options in the region.

• Level of poverty and lack of communities.

• Inefficiency by the public power to promote sustainable productive activities, order the occupation of the territory and meet the main demands of the communities for health, housing, education and leisure.

Figure 25:The state ranking of Ulianopolis for IDH

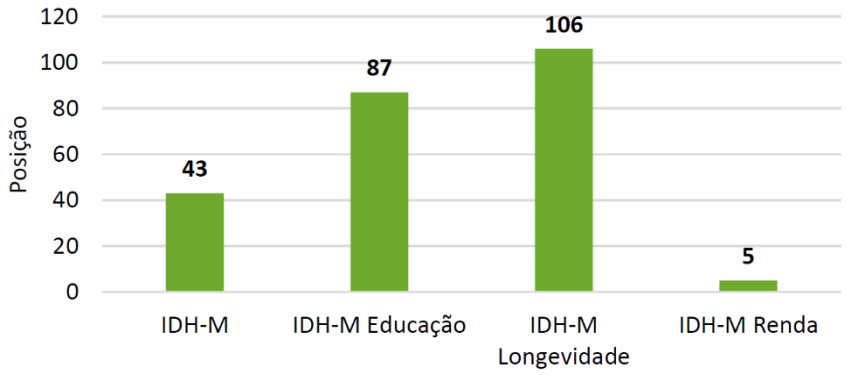



Figure 26: National ranking of Ulianopolis for IDH, out of 5600 municipalities

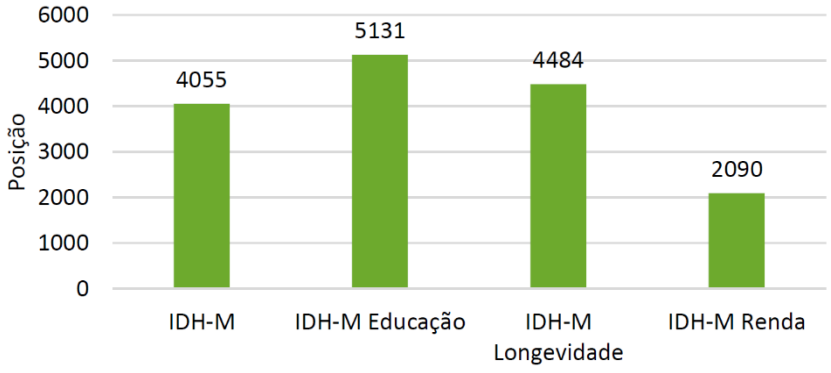


Figure 27: brings the HDI (Human Development Index) of the municipality of Paragominas for the year 2010. Figure 10 is the ranking in the state ranking and Figure 11 in the national ranking (UNDP, 2013). Blue is the average, with yellow being above average and red being below average.

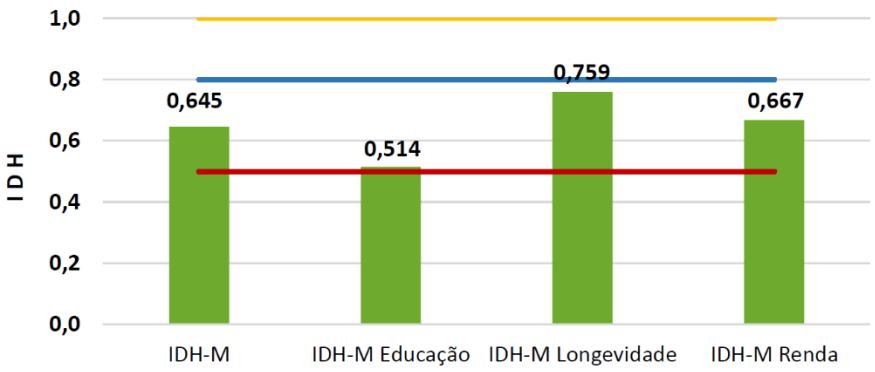



Figure 28: The state ranking of Paragominas for IDH

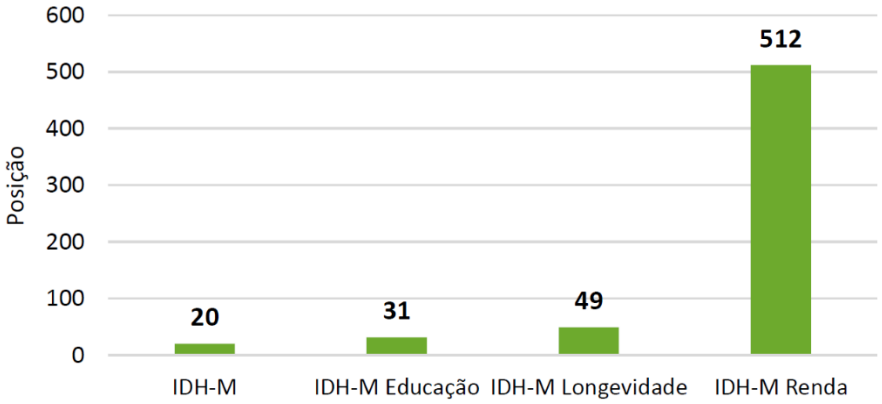



Figure 29: National ranking of Paragominas for IDH, out of 5600 municipalities

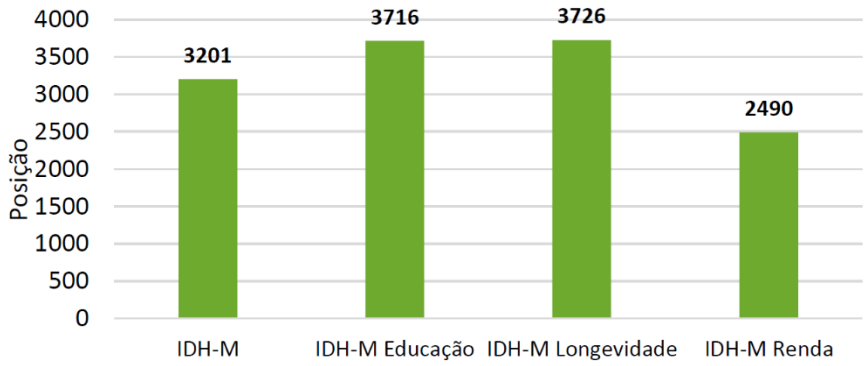


Figure 30 shows the Human Development Index (HDI) of the municipality of Nova Esperança do Piriá for the year 2010.

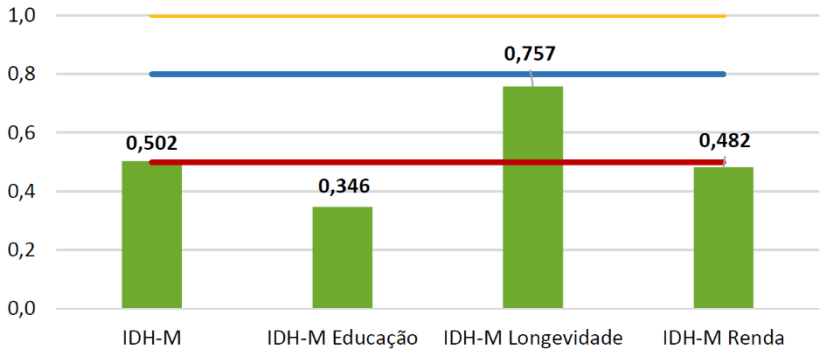



Figure 31:The state ranking of Nova Esperança do Piriá for IDH

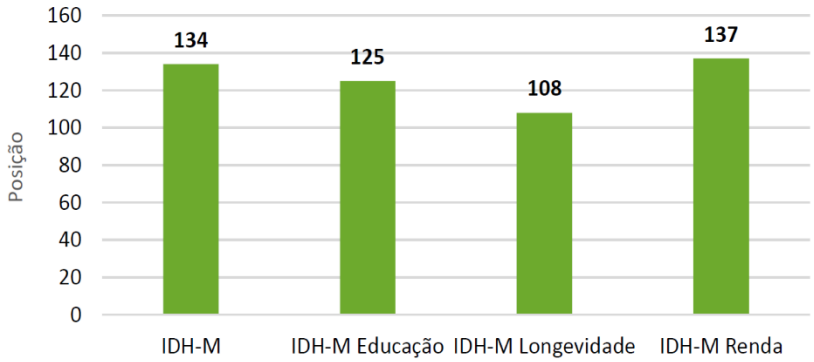
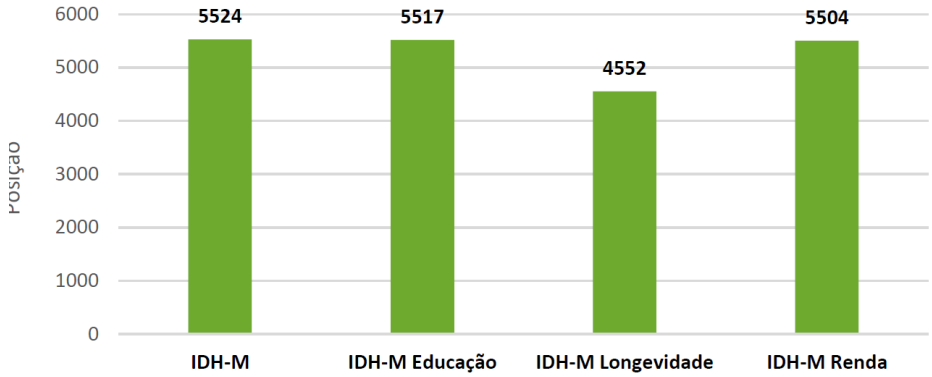



Figure 32: National ranking of Nova Esperança do Piriá for IDH, out of 5600 municipalities



Educational Aspects

In the rural area in 2013 school census, there were 838 enrolments all in Municipal school. Only students attending rural schools have access to transportation. There is no school transportation contemplating students who need to go to the urban nucleus to study.

Among the families interviewed in field work carried out in this municipality, we verified the levels of education described in Figure xx. It can be seen that, as in the urban area, a large number of people (52%) frequenting primary school or just part of it. It is also noticed that 9% did not complete high school, suggesting the occurrence of school drop-out, possibly due to the need for secondary education rural schools or in the urban area, necessitating the use of school transportation.

The illiteracy rate is around 9%, which is equal to the Brazilian rate and slightly lower than the northern region, which is 10.6% (IBGE, 2010). Attention is drawn to the rate of people with a complete or incomplete higher education level, which did not appear in interviews in the urban area, this information should be analysed with caution as it may not represent the reality of higher education professionals, since interviews were sampled within the error limits.

Health aspects

Regarding the sanitation of the residences, only Paragominas has a sewage treatment network and in the rural area, the use of rudimentary cesspit prevailed and in the urban area the use of septic tank. In both cases this issue is of concern in terms of health, since the second CAERD servant interviewed, contamination of rivers and wells due to the use of pits can occur if they are not more than 600 meters from the pit. According to this survey, in the urban area the contamination of wells occurs in all the residences that use them.

Regarding access to health services, there was dissatisfaction among the population. Part of this is due to the existence of only one UBS (Basic Health Unit), insufficient to meet the entire resident population in the rural and urban areas of the Municipality.

These graphs point to similar perceptions regarding the needs of the Basic Health Unit of the Municipality. It was a UBS because both the population living in urban and rural areas of the Municipality are served by UBS located in the urban area of the Municipality. This especially hampers access to care for families in rural areas, who are often in difficulty to transport to the city.

With regard to diagnosis of diseases, was obtained information from the SINAN - Information System on Aggravation and Notification, that the incidence of Leishmaniosis is a concern in the Municipality; however none of the interviewees in an urban or rural area stated that they knew of any cases in the family. This servant also reported a high incidence of Hepatitis, Leprosy and Syphilis, diseases that were also not mentioned and/or appeared in few interviews. The diseases most declared by the interviewees were malaria and dengue. Another cause for entry into the service of the UBS narrated as very frequently are the cases of work accidents related to the activities in the sawmills. These cases were also not mentioned by people interviewed in rural and urban areas.

Another issue of relevance raised by the employees of the health department is that the greatest cause of mortality among the inhabitants is homicide. It is a question related to public safety and the offer of other social devices, but this data ends up being filed by the health department, in view of the entrance to the emergency room. Another problem was the presence of a high number of abuses against minors, practiced mainly by those responsible for the child, a fact also pointed out by the guardianship council during an interview.

Characteristics associated with gender

Women currently constitute a work force working in services that were previously classified as exclusively male. In the urban area, the field research revealed the presence of female heads of household and contributing to the monthly income of the residence, however in more than 50% of the interviews it was verified that the income was less than R $ 1,000.00/month or less than minimum wage, thus slave wages – which has been determined by the government as a major issues in the Amazon region of Brazil.

In the case of the performance of women in the Rural area of the Municipalities, respondents, the majority declared the women not participating in the family income. It may be thought that in this context, although women often perform various activities in the agricultural production phases, their labour is not accounted for and remunerated. However, it is not possible to deepen the discussions because these would require a longer time in the field so that the researchers perceive some nuances of social life that do not arise immediately with the interpretation of the questionnaires.

Economic characteristics

In the rural income, it was difficult to quantify annually, due to the lack of control of the production by the producers and the irregular prices of some of the products produced such as Mandioca (Cassava).

During the interviews it showed the income of the people, and it should be noted that rural income was obtained taking into account only the annual production data of the property. In the case of the homemade interviewees, there were cases where they could not report the annual income of the property or did not want to respond.

Looking for information on possible land use changes, the continuity of the activities already developed in the case the dairy farming was the most cited, however the cultivation of corn, banana, cassava and fish farming appear as alternatives of use from soil.

The presence of large farms, occupied with livestock and soybeans and also small farms producing milk, cocoa, and subsistence agriculture, was verified in the field work around the property. The above fact can be exemplified in two very clear moments found in the field, one that refers to the incorporation of rural plots by farms and another by the maintenance of family agriculture.

In the second case, in the other two secondary roads that finish in the limit of the property, the majority of the properties are split between government settlement area which comprise typically of 100 or 200 hectare plots and large landowners typically of 2000 hectares or more. However, most of the interviewees pointed to the inefficiency of public policies, focused on health, education in the field and technical assistance as the main causes of abandonment and sale of rural properties, together with deficiencies in the soil and lack of resources for investments in land reclamation and acquisition of agricultural inputs.

### 4.1.2 Interactions between Communities and Community Groups (CM1.1)

The project will be developed within three community nuclei, comprising a total of seven communities, which within the nucleus observe a good interaction between communities and community groups. This interaction occurs due to the geographic proximity between them, so the relationship of the outer distant communities of the nuclei is considered incipient and/or superficial due to the geographic distance and the absence of common activities to be carried out jointly by the communities. The REDD+ Project may provide for the proximity and interaction between communities and community groups.

### 4.1.3 High Conservation Values (CM1.2)

The High Conservation Values (HCV) concept was developed by the Forest Stewardship Council (FSC, 1996) for the certification of timber products from responsible forest management, according to standard Principles and Criteria that reconcile environmental and ecological safeguards with social benefits and economic viability (FSC, 2014).

According to Jennings et al. (2003), an area with HCVA represents a natural or managed area with exceptional values or critical importance, meeting the objectives of conservation of biodiversity, rare ecosystems and areas with relevant social and cultural functions.

Within the context of the socio-economic context of the REDD Project, some cultural, historical and relevant aspects are discussed for local traditional communities, which may characterize High Conservation Values Area, which must be identified and managed in order to guarantee their maintenance and improvement (BROWN et al., 2013). From the six listed criteria, two of them are directly related to traditional populations.

### 4.1.4 Without-Project Scenario: Community (CM1.3)

The current scenario of the territory presents socioeconomic indicators, which characterize a region with low socioeconomic well-being conditions and few productive economic alternatives, these circumstances contribute to leave the families in a situation of vulnerability in the search for better living conditions. Therefore, these factors can be considered as potential causes that lead to deforestation in the REDD Project communities.

Within the communities, we highlight the following vectors:

- Low income parameters: the factors that lead to low income in families are due to the limitation of the productive activities developed, presenting low productivity, lack of better production techniques, low diversification, difficulties in the outflow of production, as well as access to the consumer market;

- Low level of education: the communities involved in the project have a relatively low level of education, 57% of the producers have not completed elementary school;

- Developed activities: the agricultural and livestock activities carried out by the producers are developed with the lack of technologies and good productive practices, a fact that contributes to deforestation. In agriculture, the production system used is the cutting and burning system, in which producers every two or three years, due to the infertility of the soil, have the need to open new areas and carry out the burning, to start a new cycle Livestock, despite the low scale, is still done in a conventional way with the opening

of large areas for grazing. Despite the low incidence of interviewed producers practicing this activity, it was verified from the interviews that some of the producers are interested in the opening of areas for pasture, a factor that is a great motivation for deforestation;

- Low social organization: the need for access to public policies and the guarantee of exceptional rights in communities is a fundamental factor in the search for socioeconomic well-being for families, and this is based on a good political and institutional articulation. However, the communities involved have a low level of social organization, which weakens the local conditions of search for these fundamental rights, such as access to education, communication, energy and health. Of the producers interviewed, 50% participate in some community organization, the other 50% do not participate or do not have an organization that represents them. It is worth mentioning that of the existing organizations, only one showed a certain level of social organization, the others showed latent weaknesses in both management and recognition by producers.

Another important measure for the success of these actions is community empowerment, based on strengthening and consolidating social organizations, aiming at the integral and effective participation of community members in decision-making, implementation and management of local socioeconomic development projects, contributing to the management of risks associated with rural activities and the improvement of socioeconomic aspects by the community members themselves.

Table 16. Relationship between vectors, agents, underlying causes of deforestation and scenarios with and without the REDD Project.

| Potential vectors of deforestation | Situation found | Deforestation agents | Underlying Causes of Deforestation | Scenario 1 (without REDD+) | Scenario 2 (with REDD+) |
|---|---|---|---|---|---|
| **Economy and Income** | Low income levels, most of the producers are unemployed and dependent on government programs | Population with insufficient income to meet basic needs | Lack of policy principles for socioeconomic development, as well as development programs for communities | Demand for domestic resources pressures the forest natural resources due to increased unplanned agro-extractivist activities | Activities aimed at the generation of income and jobs and incentives for sustainable practices in the management of forest resources such as the pressures on the forest |
| **Education** | Low level of schooling and difficulties in access to secondary education | Uninformed population with low levels of schooling | Lack of Public Policies for Education | Increase in illegal logging activities due to low formal education and consequent difficulty in getting jobs | Activities aimed at education, technical and professionals courses and incentives for sustainable practices in the management of forest resources reduce illegal activities |
| **Agriculture** | Low productivity. Increase in areas for agriculture | Small-scale, expanding farmers | Population increase and urbanization increase demand for food | Demand for food in the urban environment and low agricultural productivity motivates the conversion of forest areas into agriculture | Increased agricultural productivity, agro- ecological production techniques and strengthening of production marketing channels prevent |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | the conversion of forest areas into agriculture. |
| **Livestock** | Low-scale livestock production and remained constant during the period | Extensive stock farming cattlemen | Population increase and urban eating habits demand higher meat production | Increased demand for meat and low pasture productivity lead to the conversion of forest areas into pasture | Implementing good livestock practices increases productivity and prevents new areas from being converted to pasture |
| **Extractives** | Basis of subsistence for rural communities. Scarcity of official data on the management | Small scale extractives | Domestic and international market demand | Predatory extractives negatively impacts the forest (timber and non-timber resources) | Improvements in traditional management practices, studies on ecology, production and management of forest species and control of the productive chain avoid environmental degradation and allow socioeconomic gains with sustainable extractives |
| **Social Organization** | Absence or fragility of community social organizations | Producers with difficulties in accessing public policies and with levels of access to essential basic rights below expected | Lack of public policies focused on socioeconomic development and education | Demand for better conditions of housing, communication and energy increases the need for producers to leave the community encouraging the rural exodus | Activities that promote social organizational strengthening, facilitate access to existing public policies, avoid rural exodus, and keep families in their territories |

The guarantee of access to a positive scenario and the good progress of the Project demands a rural development agent, with expertise and capacity to attend to the needs of the families. Currently, this role is assumed by the ARC group, actions for its strengthening are planned, with a view to maintaining and expanding its operations, visualizing a more positive scenario for the Project.

## 4.2 Net Positive Community Impacts

### 4.2.1 Expected Community Impacts (CM2.1)

Impacts to the communities described below include benefits, costs, and risks, including those related to social, cultural, environmental, and economic aspects; the following items present issues related to impacts for communities.

| Community Group | 1. *Number of trained people in biodiversity and forest Monitoring* |
|---|---|

| | |
|---|---|
| | 2. *Number of people participating in the monitoring activities each month* |
| Impact(s) | *Improved livelihood* |
| Type of Benefit/Cost/Risk | 1. *Capacity building related to the monitoring and management of the forest and biodiversity.*<br>2. *Job Opportunities* |
| Change in Well-being | *Improved livelihood* |

| | |
|---|---|
| Community Group | Number of community leaders trained to improve their level of organization, management and democratic governability |
| Impact(s) | *Better governance* |
| Type of Benefit/Cost/Risk | overall satisfaction of community |
| Change in Well-being | *Better governance* |

| | |
|---|---|
| Community Group | 1. *Number of people trained in the use of efficient improved cooking stoves*<br>2. *Number of improved cooking stoves pilots implemented in local families* |
| Impact(s) | 1. *Capacity building related to efficient and improved cooking stoves*<br>2. *improvement in health* |
| Type of Benefit/Cost/Risk | overall satisfaction and health of community |
| Change in Well-being | *Improvement in overall satisfaction and health of community* |

| | |
|---|---|
| Community Group | 1. *Number of people trained in agroforestry techniques*<br>2. *Number of implemented agroforestry pilot projects* |
| Impact(s) | 1. *Capacity building*<br>2. *Improved agricultural practices* |
| Type of Benefit/Cost/Risk | overall satisfaction and food security of community |
| Change in Well-being | *Improvement in overall satisfaction and food security of community* |

#### 4.2.2 Negative Community Impact Mitigation (CM2.2)

There are no negative community impacts and hence there is no need for mitigation.

#### 4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

Net Positive community impacts are expected to be:

• Secured land tenure

• Diversification of food through agroforestry practices thus an improvement in local nutrition

• More efficient technologies to produce farinha therefore less time is consume in this activity.

• Generation of income from monitoring activities.

• Better understanding of the importance of protecting the forest and how forest conservation will benefit their livelihoods.

• Opportunity to develop local businesses through an external fund.

#### 4.2.4 High Conservation Values Protected (CM2.4)

The HCVs related to community well-being will not be negatively affected by the project; on the contrary, only positive impacts are expected.

### 4.3 Other Stakeholder Impacts

#### 4.3.1 Impacts on Other Stakeholders (CM3.1)

The Project is designed to generate only positive impacts to the stakeholders living in the LMA and it won't generate impacts to those living outside the 3Km buffer identified during the PRA. No other stakeholders have been identified to use or depend from the resources in the Project's Area or LMA.

#### 4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

As mentioned in the previous item, there area not expected negative offsite impacts thus no mitigation strategies are required.

#### 4.3.3 Net Impacts on Other Stakeholders (CM3.3)

Not Applicable.

### 4.4 Community Impact Monitoring

#### 4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

The project proponents have designed a Social Impacts Monitoring Plan in accordance to the results obtained in the rural participatory diagnosis developed in the project area and initially considering the

indicators for the products of the proposed activities based on the identification of the necessities indicated by the population and the strategies foreseen to accomplish the project goals.

The following Table (Table 17) shows a non-comprehensive list of activities and indicators that will be considered during monitoring. A full and detailed list will be presented in the monitoring plan that will be developed and submitted within the first six months after validation.

Table 17: Some activities and indicators of the Social monitoring

| Activity | Product Indicator |
|---|---|
| 1. Capacity building related to the monitoring and management of the forest and biodiversity. Opportunities to work as control/supervision staff. | • Number of trained people in biodiversity and forest monitoring.<br><br>• Number of people participating in the monitoring activities each month.<br><br>• Number of people returning to the monitoring work positions after one rotation |
| 2. Improving organizational capacities of each community. | • Number of community leaders trained to improve their level of organization, management and democratic governability<br><br>• Number of local leaders participating in the development of an organization system<br><br>• Number of local associations/organizations strengthened by the project activities |
| 3.Providing land ownership legal rights versus conservation results | • Number of people living inside LMA and its proximities<br><br>• Number of people registered in the program to become legal land owners<br><br>• Number of people that meet the forest conservation agreement. |
| 4. Providing assistance to obtain land use rights over the forest owned by the government. | Number of people registered in the program to obtain the use rights over the government land. |
| 5. Providing assistance and training in agroforestry techniques and implementing pilot cases. | • Number of people trained in agroforestry techniques<br><br>• Number of implemented agroforestry pilot projects |

| | |
|---|---|
| 6. Capacity building related to efficient and improved cooking stoves and implementation of pilot demonstrative cases | • Number of people trained in the use of efficient improved cooking stoves<br><br>• Number of improved cooking stoves pilots implemented in local families |
| 7. Providing assistance and training on sustainable small-scale timber extraction in the LMA. | Number of people trained in the sustainable small scale timber extraction |
| 8. Capacity building on the development of small communitarian enterprises. | • Number of people trained in the development and management of a small scale enterprise<br><br>• Number of small scale enterprises developed in the project area |

A Participatory Census will be carried out previously to the design of the definite Monitoring Plan in the Project area. This intends to collect information about the unsatisfied basic needs, health, education, family economy, communal organization, etc., which will become the project baseline and also represent the social indicators to be monitored throughout the project´s execution.

Likewise, in order to develop the social-environmental indicators for the results, several communitarian workshops will take place as a fundamental part of the Social Communitarian Monitoring System that will facilitate the follow-up and evaluation of the benefits of the project to improve the quality of life of the communities.

This system will have trained communitarian monitors that will continuously carry out the follow up activities evaluating the commitments, project activities and communities every 3 to 6 months. Also, the Communitarian Impacts Monitoring Plan will carry out an exhaustive annual assessment of the indicators.

The Social Impacts Monitoring Plan aims at creating an association and mutual responsibility sense between the project and local communities in the management of social environmental impacts, as well as improving the perception of the social responsibility adopted by the project.

### 4.4.2 Monitoring Plan Dissemination (CM4.3)

All results will be publicly available on the internet and summaries are communicated to the Communities and Other Stakeholders through appropriate media. Additionally, all documents and information about the results of the monitoring and verification of this project will be published in the platforms of the VCS and CCB standards as usual.

ARC group has extensive experience working with communities. The most effective medium agreed with communities is workshops and newsletter reporting the progress of the project. The monitoring plan and monitoring result will be disclosed through the President of the community action boards.

Till to date, neither monitoring nor verifications reports have been conducted.

## 4.5 Optional Criterion: Exceptional Community Benefits

The project does not seek to be validated to the Gold Level for exceptional community benefits .

### 4.5.1 Exceptional Community Criteria (GL2.1)

Not Applicable

### 4.5.2 Short-term and Long-term Community Benefits (GL2.2)

Not Applicable

### 4.5.3 Community Participation Risks (GL2.3)

Not Applicable

### 4.5.4 Marginalized and/or Vulnerable Community Groups (GL2.4)

Not Applicable

### 4.5.5 Net Impacts on Women (GL2.5)

Not Applicable

### 4.5.6 Benefit Sharing Mechanisms (GL2.6)

Not Applicable

### 4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

Not Applicable

### 4.5.8 Governance and Implementation Structures (GL2.8)

Not Applicable

### 4.5.9 Smallholders/Community Members Capacity Development (GL2.9)

Not Applicable

# 5 BIODIVERSITY

## 5.1 Without-Project Biodiversity Scenario

### 5.1.1 Existing Conditions (B1.1)

The description of the biodiversity presented in this section corresponds to the flora and fauna that has been reported for the region of reference. More detailed descriptions (municipal scale) are presented only for those municipalities where project areas are located with availability of studies.

At the start of the project there was 53,528 hectares of land that was with degraded forest.

A full analysis was completed at the start of the project in 2014/2015 of the bio-diversity both flora and fauna.

Vegetation and Flora

The area of the Project is composed of ten different plant phytophysiognomies, including forest and non-forest formations, with predominance of Lowland Dense Ombrophilous Forests and Submontane Dense Ombrophilous Forests, as already mentioned in section 2.1.5 - Physical Parameters.

For the phytosociological characterization carried out in the REDD area, a survey was carried out with the installation of 75 sample plots with dimensions of 25 x 25 meters (1 hectare), subdivided into four subplots. At the end of the forest inventory, 8,664 individuals were distributed in 340 tree species, highlighting the richness of the flora existing in this Amazon region (NELSON and OLIVEIRA, 2001). The richest and most abundant families in the Project area were: family Sapotaceae, Mimosaceae, Caesalpiniaceae, Burseraceae and Fabaceae.

Table 18: Inventory of Flora for Central Block - 61 Species, and 28 families

| **Family** | **Scientific Name** | **Common Name** |
|---|---|---|
| FABACEAE | Tachigali sp | tachi |
| | Macrolobium sp | |
| | Dahlstedtia sp. | |
| | Inga alba (Sw.) Willd. | ingaí |
| | Hymenaea sp. | jatobá |
| | Abarema mataybifolia (Sandwith) Barneby & J.W.Grimes | |
| | Inga marginata Willd. | ingá |
| | Inga laurina (Sw.) Willd. | ingá-de-macaco |
| RUTACEAE | Rauia resinosa Nees & Mart. | cafezinho |
| APOCYNACEAE | Lacmellea aculeata (Ducke) Monach | sorvinha |
| ARECACEAE | Astrocaryum gynacanthum Mart. | tucum |
| BURSERACEAE | Protium altsonii Sandwith | breu-branco |
| | Protium sp.2 | breu |
| VIOLACEAE | Rinorea macrocarpa (Mart. ex Eichler) Kuntze | |
| SAPOTACEAE | Pradosia sp.1 | |
| MYRISTICACEAE | Virola sp.1 | |
| | Campnoseura sp. | |
| | Iryanthera sp.1 | |
| RUTACEAE | Sohnreyia excelsa K.Krause | surucucumirá |
| | Rauia resinosa Nees & Mart. | |
| URTICACEAE | Pourouma villosa Trécul | imbaúba-branca |
| | Pourouma sp. | |
| | Cecropia palmata Willd. | imbaúba |

| | | |
|---|---|---|
| SAPOTACEAE | Pouteria sp.1 | |
| | Pouteria sp.3 | |
| | Pouteria sp.4 | |
| | Pouteria sp.2 | goiabinha |
| | Micropholis sp. | |
| | Chrysophyllum sp.1 | |
| | Pouteria sp.6 | |
| LECYTHIDACEAE | Eschweilera sp.1 | |
| | Eschweilera sp.2 | |
| | Cariniana sp. | |
| OLACACEAE | Minquartia guianensis Aubl. | acariquara |
| EUPHORBIACEAE | Aparisthmium cordatum (A.Juss.) Baill. | ariquena-queimosa |
| | Micrandra sp.2 | |
| | Croton matourensis Aubl. | maravuvuia |
| | Micrandra sp.1 | |
| | Mabea speciosa Müll.Arg. | |
| HYPERICACEAE | Vismia baccifera Triana & Planch. | lacre |
| SALICACEAE | Laetia procera (Poepp.) Eichler | apijó |
| | Casearia sp.1 | |
| COMBRETACEAE | Buchenavia sp.1 | |
| SAPINDACEAE | Cupania cf. scrobiculata Radlk. | |
| | Matayba sp. | |
| MELASTOMATACEAE | Bellucia grossularioides (L.) Triana | goiaba-de-anta |
| CHRYSOBALANACEAE | Licania sp.3 | |
| | Licania sp.1 | |
| VOCHYSIACEAE | Vochysia sp. | |
| MALVACEAE | Apeiba echinata Gaertn. | pente-de-macaco |
| SIMAROUBACEAE | Simaba sp. | |
| BIGNONIACEAE | Jacaranda copaia (Aubl.) D.Don | pará-pará |
| NYCTAGINACEAE | Guapira sp. | |
| BORAGINACEAE | Cordia exaltata Lam. | freijozinho |
| ANNONACEAE | Xylopia sp. | |
| | Annona sp. | |
| ANACARDIACEAE | Astronium lecointei Ducke | muiracatiara |
| VIOLACEAE | Rinorea macrocarpa (Mart. ex Eichler) Kuntze | |
| SIPARUNACEAE | Siparuna guianensis Aubl. | caá-pitiú |
| LAURACEAE | Nectandra sp. | |

Table 19: List of Species North Block – 45 species and 19 families

| Family | Scientific Name | Common Name |
|---|---|---|
| MELASTOMATACEAE | Bellucia grossularioides (L.) Triana | goiaba-de-anta |
| | Miconia sp. | |
| EUPHORBIACEAE | Croton matourensis Aubl. | maravuvuia |
| | Micrandra siphonioides | seringarana |
| FABACEAE | Dinizia excelsa Ducke | angelim-pedra |
| | Anadenanthera sp. | |
| | Tachigali sp. | tachi |
| | Inga alba (Sw.) Willd. | ingaí |
| | Copaifera sp. | copaíba |
| | Inga rubiginosa (Rich.) DC. | ingá-ferrugem |
| | Abarema mataybifolia (Sandwith) Barneby & J.W.Grimes | |
| | Inga sp.1 | |
| | Hymenaea sp. | jatobá |
| | Parkia sp. | faveiro |
| MYRTACEAE | Eugenia sp. | |
| | Campomanesia sp. | |
| URTICACEAE | Cecropia palmata Willd. | imbaúba |
| MALPIGHIACEAE | Byrsonima sp. | murici-do-mato |
| | Byrsonima cf. duckeana W.R.Anderson | murici |
| HYPERICACEAE | Vismia baccifera Triana & Planch. | lacre |
| SALICACEAE | Casearia sp.2 | |
| MALVACEAE | Apeiba echinata Gaertn. | pente-de-macaco |
| BURSERACEAE | Protium sp.1 | breu |
| | Protium altsonii Sandwith | breu-branco |
| RUTACEAE | Rauia resinosa Nees & Mart. | cafezinho |
| MELIACEAE | Guarea pubescens (Rich.) A.Juss. | |
| LAURACEAE | Ocotea sp. | louro |
| ANNONACEAE | Annona sp. | |
| COMBRETACEAE | Buchenavia sp.2 | |
| | Buchenavia sp.3 | |
| MYRISTICACEAE | Iryanthera sp.2 | tiriba |
| | Iryanthera sp.3 | |
| | Iryanthera sp.4 | |
| SAPINDACEAE | Matayba sp. | |
| SAPOTACEAE | Pouteria sp.5 | |
| | Manilkara sp. | maçaranduba |
| | Chrysophyllum sp.2 | sabiarana |
| | Pouteria sp.2 | goiabinha |
| | Pouteria sp.6 | |
| | Chrysophyllum sp.3 | guajará-bolacha |
| | Sarcaulus sp.2 | guajará-de- |

| | | |
|---|---|---|
| | | cinza |
| CHRYSOBALANACEAE | Hirtella sp. | casca-seca |
| | Licania sp.2 | |

Table 20: Forest Inventory for the South Block – 40 species with 8 more species unable to be determined.

| |
|---|
| Allophylus edulis (A.St.-Hil., Cambess. & A. Juss.) Radlk |
| Andira inermis (Sm.) Kunth ex DC. |
| Aphelandra aurantiaca (Scheidw.) Lindl. |
| Apuleia leiocarpa (Vogel) Macbride. |
| Attalea phalerata Mart. Ex Spreng. |
| Attalea sp. |
| Bocageopsis multiflora (Mart.) R.E.Fr. |
| Byrsonima spicata (Cav.) Kunth |
| Callisthene major Mart. |
| Caryocar sp. |
| Cecropia sciadophylla Mart. |
| Copaifera sp. |
| Coutarea hexandra (Jack.) K. Schum. |
| Curatella americana L. |
| Didymopanax morototonii (Aubl.) Decne. & Planch. |
| Diplotropis purpurea |
| Duguetia sp. |
| Endlicheria paniculata (Spreng) J.F. Macbr |
| Eugenia pseudopsidium Jacq. |
| Himatanthus sucuuba (Spruce ex Mull. Arg.) Woodson |
| Holopyxidium latifolium (Ducke.) R. Knuth |
| Hymenaea courbaril L. |
| Hymenaea sp. |
| Inga cylindrica (Vell.) Mart. |
| Jacaranda copaia (Aubl.) D.Don |
| Lecythis idatimon |
| Macrolobium bifolium Pers. |
| Manikara huberi (Ducke) Cheval. |
| Morta |
| Nectandra rigida (Kunth) Nees |
| Ocotea sp. |
| Parkia nitida Miq. |
| Pouteria macrophyla (Lam.) Eyma |
| Pouteria ramiflora (Mart.) Radlk. |
| Sagotia brachysepala (Müll.Arg.) Secco |
| Tapirira guisnensis Aubl. |

| |
|---|
| Tetrorchidium rubrivenium Poepp. & Endl. |
| Theobroma grandiflorum (Willd. Ex Spreng.) K. Schum. |
| Triplaris surinamensis Cham. |
| Vismia guianensis (Aubl.) Pers. |

The inventory of Flora within the project area, has resulted in a priority to conserve the flora on Table 21, which are targeted by illegal loggers.

Table 21 –Target Species for Conservation

| Family | Species |
|---|---|
| Sterculiaceae | Sterculia excels Mart. |
| Leguminosae-Mimosoideae | Anadenathera colubrine (Vell.) Brenan |
| Vochysiaceae | Callisthene major Mart. |
| Caryocareaceae | Caryocar microcarpum Ducke |
| Sapotaceae | Chrysophyllum lucentifolium |
| Lecythidaceae | Couratari oblongifolia Ducke et R.Knuth |
| Leguminosae-Papilionideae (Fabaceae) | Diplotropis purpurea |
| Lauraceae | Endlicheria paniculata (Spreng) J.F.Macbr |
| Leguminosae-Mimosoideae | Enterolobium schomburgkii (Benth.) Benth |
| Sapotaceae | Pouteria oblanceolata Pires |
| Burseraceae | Protium puncticulatun Macbr. |
| Sterculianceae | Sterculia excelsa Mart. |
| Leguminosae-Mimosoideae | Zygia selloi |
| Sapotaceae | Manikara huberi (Ducke) Cheval. |
| Burseraceae | Protium heptaphyllum (Aubl.) March |

Fauna:

At the state of the project, between 2014 and 2015 a monitoring program for Fauna, both Avifauna and Mastofauna was in acted. In Tables 22 to 23, we are able to determine the results of the study and the endangered species identified.

Table 22: Avifauna sited

| | Number of Species Seen (AviFauna) 2013 |
|---|---|
| Group II | 149 |
| Group III | 177 |
| Threatened Species | 66 |
| | Number of Species Seen (MastoFauna) 2013 |
| Group II | 19 |
| Group III | 20 |
| Threatened Species | 14 |
| | Number of Species Seen (AviFauna) 2014 |
| Group II | 177 |
| Group III | 199 |
| Threatened Species | 70 |

| | Number of Species Seen (MastoFauna) 2014 |
|---|---|
| Group II | 22 |
| Group III | 19 |
| Threatened Species | 15 |

Table 23: Endangered, At Risk or State priorities: Species of avifauna for monitoring and Conservation

| **Species** | **Popular Name** |
|---|---|
| Penelope pileata | jacupiranga |
| Psophia viridis obscura | jacamim-de-costas-verdes |
| Guaruba guarouba | ararajuba |
| Pyrrhura lepida | tiriba-pérola |
| Pteroglossus bitorquatus bitorquatus | araçari-de-pescoço-vermelho |
| Synallaxis rutilans omissa | João-teneném-castanho |
| Phlegopsis nigromaculata paraensis | mãe-de-taoca |

Table 24: Endangered, At Risk or state priorities for conservation - Species of Mastofauna for monitoring and Conservation

| **Taxom** | **Popular Name** |
|---|---|
| **Dasypodidae** | |
| *Priodontes maximus* | tatu-canastra |
| **Cebidae** | |
| *Saguinus niger* | sagui-una |
| *Cebus paella* | macaco-precgo |
| *Saimiri sciureus* | macaco-de-cheiro |
| **Aotidae** | |
| *Aotus azarae* | macaco-da-noite |
| **Atelidae** | |
| *Alouatta beizebul* | guariba-pteto |
| **Felidae** | |
| *Leopardus pardalis* | jaguatirica |
| *Leopardus tigrinus* | gato-do-mato-pequeno |
| *Puma concolor* | onca-parda |
| *Panthera onca* | onca-pintada |
| **Canidae** | |
| *Cerdocyon thous* | graxaim |
| **Familia Tapiridae** | |
| *Tapirus terrestris* | anta |
| **Tayassuidae** | |
| *Tayassu pecari* | queixada |
| **Cervidae** | |
| *Mazama Americana* | veado-mateiro |

Target species (avifauna) for monitoring and conservation (2015):

• Penelope pileata (jacupiranga).

• Guaruba guarouba (ararajuba). Pteroglossus bitorquatus (araçari-de-pescoço-vermelho).

Target species (mastofauna) for monitoring and conservation (2015):

• Saimiri sciureus (mico-de-cheiro)

According to the analysis of avifauna survey carried out in 2015, in view of the panorama of the original forest cover of the area, which historically can be defined as composed of Amazonian terra firm forest, it is possible to highlight the predominance of forest birds registered in the remaining samples, which occupy the dark understorey of the forests as well as large frugivorous growers of the upper canopy areas (60% of species). The predominance of these species was expected, taking into account the high wealth that the forest areas present, as well as the predominance of these environments in the sampled regions.

Only a small fraction of these fragments remain with visible signs of anthropogenic disturbance. Considering the alteration of the original forest cover, the avifauna was also replaced by colonizing elements characterized by generalist species that commonly inhabit regions of capoeiras or even drastically decharacterized places (WILLIS & ONIKI 1988). In this sense, it is important to highlight the transitional areas, constituted by capoeiras as the second most representative environment in terms of use by birds (30% of species).

As a result of avifauna monitoring in 2015, in view of the panorama of the original forest cover of the area, which historically can be defined as composed of Amazonian terra firme forest can be highlighted the predominance of forest birds registered in the remaining sampled birds that occupy the dark forest understory as well as large frugivorous growers from the upper canopy forest (60% of species). The predominance of these species was expected, taking into account the high species richness of the forest areas as well as the predominance of these environments in the sampled regions.

In the considerations presented on the mastofauna in 2015, the study presents several species that indicate the quality of the environment. Although no sampled fragment has original characteristics of its landscape, it can be affirmed that these still represent areas of great importance for the maintenance of the local fauna.

Two species of large felines were recorded with probable occurrence in the region by the literature. These are species that occupy the top of the food chain and require large territories for their survival, which characterizes them as an umbrella species. The maintenance of environmental requirements for the healthy existence of these feline populations can help to maintain several other species in the environment.

For the monitoring of the mastofauna in 2015, as observed in situ in the studied localities few fragments have characteristics that were originally observed there. However, these fragments still play a fundamental role in the maintenance of the target species and as a direct consequence the maintenance of the entire local biota.

Despite the strong decharacterization of the environment, the number of endangered species recorded was significant, according to the International Union for the Conservation of Nature (IUCN 2014) of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 2014), Ministry of Environment MACHADO et al. 2008) and List of endangered species of flora and fauna in the State of Pará (SEMA 2007). The vast majority of registered species are included in the Vulnerable Category (VU) or CITES Appendix I or II.

**Specific studies of the project areas**

Further complementary studies were conducted in April 2015 in the Central Block and North Block areas in 2015 at the South Block. These surveys aim to generate information on the local fauna composition, establish plans and measures to protect local biodiversity, with emphasis on the target species identified and identify the main threats to biodiversity within project area.

**Mastofauna**

Fauna that is a priority for Conservation and Monitoring spread across the Project Area.

Table 25: Mastofauna South Block

| Order | Family | Species | Common Name |
|---|---|---|---|
| Cingulata | Dasypodidae | Dasypus novemcinctus | tatu, tatu-galinha |
| | | Euphractus sexcinctus | tatu-peludo, tatu-peba |
| Primates | Atelidae | Alouatta belzebul | guariba-de-mãos-ruivas |
| Rodentia | Cuniculidae | Cuniculus paca | paca |
| | Caviidae | Hydrochoerus hydrochaeris | capivara |
| | Dasyproctidae | Dasyprocta prymnolopha | cutia |
| Carnivora | Felidae | Puma concolor | onça-parda, suçuarana, leão-baio |
| | Canidae | Cerdocyon thous | cachorro-do-mato, graxaim, raposa |
| | Procyonidae | Nasua | quati |
| Perissodactyla | Tapiridae | Tapirus terrestris | anta |
| Artiodactyla | Tayassuidae | Pecari tajacu | cateto, caititu |
| | | Tayassu pecari | queixada, porco-do-mato |
| | Cervidae | Mazama americana | veado-mateiro |

Table 26: Mastofauna - Central Block

| Taxonomy | Popular Name |
|---|---|
| **Subfamília Callitrichinae** | |
| *Saguinus niger* | Sagui una |
| **Família Atelidae** | |
| *Allouquata sp* | Macaco capelão |
| **Família Tapiridae** | |
| *Tapirus terrestris* | Anta |
| **Família Dasyproctidae** | |

| | |
|---|---|
| *Dasyprocta leporina* | Cutia |
| **Família Procyonidae** | |
| *Nasua nasua* | Quati |
| **Família Mustelidae** | |
| *Eira barbara* | Irara |

Table 27: List of the species that are at risk in the Central Block

| Taxom | Popular Name |
|---|---|
| **Subfamília Callitrichinae** | |
| *Saguinus niger* | Sagui una |
| **Família Tapiridae** | |
| *Tapirus terrestris* | Anta |

Table 28: List of mastofauna on block North Block

| **Taxom** | **Popular Name** |
|---|---|
| **Família Procyonidae** | |
| *Nasua nasua* | Quati |
| **Família Cebidae** | |
| *Saguinus niger* | Sagui una |
| **Família Atelidae** | |
| *Allouquata sp* | Macaco capelão |
| **Família Cervidae** | |
| *Mazama Americana* | Veado mateiro |
| **Família Didelphidae** | |
| *Didelphis marsupialis* | Gambá |
| **Família Felidae** | |
| *Leopardus tigrinus* | gato-do-mato-pequeno |

Table 29: Mammals that are registered under threat and are in the project area.

| **Family** | **Species** |
|---|---|
| Dasypodidae | Dasypus novemcinctus |
| | Euphractus sexcinctus |
| Atelidae | Alouatta belzebul |
| Cuniculidae | Cuniculus paca |
| Caviidae | Hydrochoerus hydrochaeris |
| Dasyproctidae | Dasyprocta prymnolopha |
| Felidae | Puma concolor |

| | |
|---|---|
| Canidae | Cerdocyon thous |
| Procyonidae | Nasua nasua |
| Tapiridae | Tapirus terrestris |
| Tayassuidae | Pecari tajacu |
| Cervidae | Tayassu pecari |
| | Mazama americana |

### 5.1.2 High Conservation Values (B1.2)

As defined by the HCV Resource Network, the high value attributes for conservation 1, 2 and 3 were considered for the present work, since they are criteria related to biodiversity. Within this context, to guide the following items in this document, the guidelines for identification, management and monitoring of high values were considered, as stated in the "General Guide for the Identification of High Conservation Values" (BROWN et al., 2013), "Common Guidance for the Management & Monitoring of High Conservation Values" (BROWN, SENIOR, 2014), "FSC Principles and Criteria for Forest Stewardship" (FSC, 2012) and "The Climate, Community and Biodiversity Alliance" (CCBA, 2013).

| | |
|---|---|
| High Conservation Value | *Indigenous Reserva Alto Turiacu* |
| Qualifying Attribute | *The Indigenous Reserva Alto Turiacu is considered a critical indigenous reserve in the Amazon region and in Brazil. It is one of the largest concentrations of protected forest land in the eastern Amazon Biome.* |
| Focal Area | *On the eastern border of the reference region there is a national conservation unit called Indigenous Reserva Alto Turiacu. it has an area of 520,000 hectares. The Conservation Units are types of conservation areas that were created to allow sustainable use of the forest and its natural resources* |

### 5.1.3 Without-project Scenario: Biodiversity (B1.3)

According to UNEP, the impacts of agriculture on ecosystem functions can be grouped into five areas: 1) soil structure; 2) nutrients and microorganisms; 3) water cycle; 4) complexity of the landscape; 5) atmospheric properties. Agriculture affects soil structure and biota primarily through the reduction of organic material incorporated above the soil and roots, by ploughing the soil due to tillage and compaction livestock. In particular, in the high mountain areas, intensive soil management carried out in the clean crops have caused, among other adverse effects, lower carbon content and soil nitrogen.

In short, given the current conditions of the territory, it requires a type of sustainable productive activities with the environment and viable for producers. In the absence of the project, the continuation of inefficient exploitation of the soil and other natural resources within the three municipalities selected for the project may affect biodiversity conditions, around the following effects:

Table 30. Impact on biodiversity in the scenario without the project.

| Scenario without project | Environmental impact | Impact on Biodiversity |
|---|---|---|
| Expansion of the agricultural frontier and livestock areas | Deforestation, forest fragmentation and reduction of biological corridors | Loss of habitats for birds and mammals, endemic and migratory species threatened.<br><br>Timber threat of low frequency and high commercial value |
| | Simplification of the vertical structure of vegetation | Destruction of climatic shelters and predators for wildlife and sites for feeding and reproduction |
| Lack of technical assistance and education, which leads to continued poor agricultural practices | Degradation and soil compaction and even in areas of grazing stubbles | Extinction of native species intolerant to intensive livestock |
| | | Loss of habitat quality and capacity of natural forest regeneration |
| | Low productivity and increased use of fertilizers | Threat to soil organisms that play important roles as predators, decomposers and parasitoids. Reduction microfauna |
| | Pollution of water sources and wildlife due to the use of agrochemicals | Threat to aquatic wildlife and incidence |

## 5.2 Net Positive Biodiversity Impacts

### 5.2.1 Expected Biodiversity Changes (B2.1)

The clearing of forests for the expansion of the agricultural frontier can generate fragmentation of remaining forests with high conservation values. Therefore, the project activities to increase sustainable productivity of farms, may decrease the phenomena of fragmentation.

| | |
|---|---|
| Biodiversity Element | *REDD Activities* |
| Estimated Change | *Reducing deforestation and forest degradation* |

| | |
|---|---|
| Justification of Change | *The activities of the Project aim at the reduction of deforestation and forest degradation, based on the practices of sustainable forest management, deforestation monitoring, patrimonial surveillance, technical assistance service and rural extension, among others, thus generating a positive impact on biodiversity.* |

### 5.2.2 Mitigation Measures (B2.3)

The HCV attributes are not expected to be negatively affected by the project. By reducing the deforestation rate in the project area, the project will preserve the habitat for endangered and vulnerable species. The recovery of ecological niches for endemic, vulnerable or threatened species is favoured.

### 5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

The activities proposed by the REDD Project seek to generate diverse benefits to the climate, communities and biodiversity. The main benefits to biodiversity are linked to the reduction of deforestation and forest degradation and the conservation of biodiversity and habitats.

The implementation of the Project activities, as described above, have a direct and positive impact on biodiversity, such as the maintenance of vegetation cover and the conservation of biodiversity, acting directly against the loss of habitats and also against the fragmentation of the local vegetation cover. These positive impacts are due to avoided deforestation, improvements in management practices, monitoring of deforestation and biodiversity, technical assistance and rural extension, patrimonial surveillance, and other activities carried out during the life of the Project.

The effectiveness of the Project's activities is intended to generate positive net impacts to the climate, communities and biodiversity, but negative impacts may arise, and mitigation measures are necessary to avoid and minimize these impacts.

The sustainable forest management implemented by the ARC Group is well planned and performed in a correct manner, following strict norms and well established criteria, which guarantee the abundance and biodiversity of the local species. In large part, the negative impacts of this activity are ephemeral and not very severe, and do not endanger the conservation of the species. Negative impacts may be related to disturbances due to increased vehicle and person traffic in the Project region and noise production, local suppression of few species to open tracks and infrastructure, possible trampling of animals, increased hunting, fishing, and extraction of wood and non-timber products, as a consequence of the opening of tracks and bites.

In the scenario with the Project, we can see the generation of several positive impacts on biodiversity, a result of the reduction of deforestation and forest degradation in the Project area, thus promoting biodiversity conservation and mitigating the risks of extinction, guaranteeing genetic diversity, among others effects. The indirect impacts promoted by climate change on biodiversity will also be attenuated.

### 5.2.4 High Conservation Values Protected (B2.4)

All project activities are aimed at the conservation of forest areas, páramos, and protection of areas and species of fauna and flora.

Specifically, given that the ecotourism activity involves a closer interaction with HCV biodiversity, the implementation of these activities should follow the recommendations outlined in the previous section in order to ensure non-involvement of ecosystem wealth in the project area.

### 5.2.5 Species Used (B2.5)

An important role in the region's economy is filled by vegetable extraction and forestry, mainly as a source of subsistence for families. The vegetal extraction of the municipalities mainly counts on the management of non-timber forest products (NWFP) of native species of the region, such as brazil nuts and açaí.

In addition, the rural communities living in the Project area are mainly engaged in the production of cassava, flour and manioc, according to the Family Diagnosis of the REDD Project. Crops of corn, banana, orange, cabbage, cupuaçu, eucalyptus and cacao are also employed by some local communities but in smaller scales than the others already mentioned.

### 5.2.6 Invasive Species (B2.5)

None of the Project's activities will introduce invasive species or genetically modified organisms. The project's developer will only approve agroforestry activities that use native species commonly known to occur in the Para region and are not in the Global Invasive Species Database before approving the utilization of particular species.

### 5.2.7 Impacts of Non-native Species (B2.6)

As specified above (section 5.2.6 –Invasive Species), the REDD Project encourages the use of native species by local communities. In addition, approximately 75% of the main crops and sources of income of the producers assisted by the Project are based on the development and production of native species (chestnut, açaí, flour, cassava, cupuaçu, among others).

The few non-native species are however used by local communities, i.e., small-scale use and do not have an adverse impact on the environment. Again, quoting the text above, these species have been cultivated for years, being part of the cultural history of the region and serving as a source of subsistence for these communities and not being encouraged their use by the REDD+ Project.

### 5.2.8 GMO Exclusion (B2.7)

Guaranteed that no GMOs are used to generate GHG emissions reductions or removals.

### 5.2.9 Inputs Justification (B2.8)

Not Applicable

### 5.2.10 Waste Products (B2.9)

Not Applicable

## 5.3 Offsite Biodiversity Impacts

### 5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

No potential negative offsite biodiversity impacts have been identified and therefore no measures or activities have been developed.

### 5.3.2 Net Offsite Biodiversity Benefits (B3.3)

No potential negative impacts have been identified due to the environmental-friendly techniques adopted in the proposed project activity.

## 5.4 Biodiversity Impact Monitoring

### 5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

**Mastofauna**

Sampling for the mastofauna is qualitative, aiming to record the target species. The method used is to search actively, at random, to increase the sample effort. Identification of the species is performed through direct visualization and indirect traces such as traces, feces, burrows and scratches. The traces were identified with the help of the Borges & Tomás (2008) footprint guide.

For the South Block, 13 species of wild mammals of medium and large size were registered in the region of the enterprise. These species are distributed in 11 families and 6 orders.

For Central Block, six species of wild mammals of medium and large size were registered in the region of the project. These species are distributed in 6 families.

For the North Block, six species of wild mammals of medium and large size were registered in the region of the enterprise. These species are distributed in 6 families.

**Avifauna**

The collection of data for the survey of avifauna is carried out by means of a fixed point census that, through audio-visual observation, aims to estimate the abundance of birds that inhabit the strata of the forest. For the Soma Block, 788 individuals from 148 species belonging to 40 families and 18 orders were registered. For the Piquiá Block, 73 species belonging to 27 families were recorded and 65 species belonging to 25 families were recorded for the São Pedro Block.

**Monitoring Plan**

The monitoring plan must include a description of aerial, aquatic and terrestrial biodiversity directly affected by the Project, through characterization and analysis of the structure and composition of vegetation and associated fauna, including analysis of frequency, richness and abundance of the identified species. This analysis should include sections related to the connectivity of the ecosystems in the area, the current state of conservation of soils and their sensitivity to agrochemicals or organic products, among others.

In terms of vegetation, it is planned to evaluate the remaining areas of natural forest and its proximity to the area to be operated. Native species should be identified and quantified within the forest inventory. An assessment of the level of degradation of the study area should be carried out and a special effort should be made in order to identify the possible actions or activities to be implemented to offset or reduce these levels of degradation.

In terms of wildlife, an inventory of all individuals present in the area on influence of the Project should be done, with the aim of identifying patterns and relationships between species, such as seed dispersal mechanisms and fauna related to that purpose; identification and description of native species, or species of special character due to their ecological (endemic species), economic (high commercial value) and social (particularly important for certain communities) behaviour.

The wildlife assessment should include the following items:

• Identification and description of niches.

• Description of the main eco-region present in the study area.

• Aquatic, aerial and terrestrial habitat types present in the area and associated communities.

• Description of the landscape elements of special importance.

At the end of each monitoring conducted within the study area, some of the results listed below should be presented, depending on the type of information collected and the purposes of collecting:

*Vegetation map.*

• Results of interviews carried out with local communities, with the aim of identifying wildlife species of special value.

• History of previous research in the area of study (review of secondary information in general), including analysis of threats to biodiversity and management.

• Relationship between the threats described and communities present in the area.

• If any elements with high conservation values are found, they must be located by maps or satellite images. In the case of endemic species, photographic evidence must be provided.

• Description of impacts on biodiversity in the scenario with and without the Project.

• Description of measures to maintain biodiversity.

• Select biodiversity indicators (pressure, state and response indicators are mostly used) in order to facilitate monitoring activities.

• Describe the state of the species found including its social, economic and ecological values.

Table 31: The biodiversity variables to be monitored

| Variables to be monitored | Areas to be monitored | Unit | Sampling method | Frequency |
|---|---|---|---|---|
| Number of trees sampled | Sampled area | Number of Trees | Permanent sample plots | Each verification period |
| Total project area | Forest area | Hectares | Permanent samples plots | Each verification period |
| Reduction in soil erosion | Forest area | Outcomes soil sampling | Soil sampling | Each verification period |
| Increase in biodiversity (Flora) | Forest area | Outcomes flora inventories | Sampling Plots | Continuous, The registries will be compiled and reported every verification period |
| Increase in biodiversity (Fauna) | Forest area | Outcome fauna inventories | Opportune observations | Continuous, The registries will be compiled and reported every verification period |
| Increased natural regeneration in Legal Reserve | Forest area | Hectares | Remote Sensing | Each verification period |
| Frequency and intensity of fires | Forest area | No. of events and affected hectares | Registers and databases | Continuous, The registries will be compiled and reported every verification period |

#### 5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The results of monitoring undertaken will be made publicly available on the internet and through the web site of ARC. Additionally, all documents and information about the results of the monitoring and verification of this project will be published in the platforms of the VCS and CCB standards as usual.

### 5.5 Optional Criterion: Exceptional Biodiversity Benefits

The project does not seek to be validated to the Gold Level for exceptional Biodiversity Benefits.

#### 5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

Not Applicable

### 5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

Not Applicable