

# TRIUNFO DO XINGU GROUPED REDD+ PROJECT



Document Prepared By Systemica Inteligência em Sustentabilidade S.A.

<b>Project Title</b>	Triunfo do Xingu Grouped REDD+ Project
<b>Version</b>	1
<b>Date of Issue</b>	03-October-2025
<b>Project Location</b>	Brazil, Altamira (PA)
<b>Project Proponent(s)</b>	SYSTEMICA INTELIGÊNCIA EM SUSTENTABILIDADE S.A., Rua Frei Caneca, nº 1246 - cj 41 – Consolação, São Paulo (SP), Brazil, Postal Code 01307-002, munir@systemica.digital, <a href="https://systemica.digital/">https://systemica.digital/</a>
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<b>Project Lifetime</b>	31 <sup>th</sup> August 2022 to 30 <sup>th</sup> August 2082; 60-year lifetime
<b>GHG Accounting Period</b>	31 <sup>th</sup> August 2022 to 30 <sup>th</sup> August 2052; 30-year lifetime
<b>History of CCB Status</b>	Under validation
<b>Gold Level Criteria</b>	GL1. Climate Change Adaptation Benefits: The planned project activities shall assist the community and biodiversity in adapting to climate change by primarily providing four adaptation benefits. Firstly, Education and Access to Information, encompassing activities designed to improve education services, strengthen environmental and civic education, strengthen community communication, and improve energy security. Secondly, Biodiversity Conservation, consisting of activities aiming the permanence of biodiversity, through awareness workshops, technical training, monitoring, forest surveillance, maintenance of firebreaks, and wildlife and spring protection. The third planned benefit is Institutional Strengthening and Well-Being,

<p><b>Expected Verification Schedule</b></p>	<p>encompassing activities aimed at strengthening community's governance, healthcare, access to water resources and their quality of life. Lastly, Employment and Income Generation, consisting of activities aimed at strengthening and diversifying the community's sources of income, as well as generating job opportunities. These adaptation benefits are expected to build resilience on both the community and biodiversity to the impacts of climate change.</p>
	<p>GL2. Exceptional Community Benefits: The project meets the Gold Level criteria for exceptional community benefits because it is located in an administrative area of a medium-development country, where at least 50% of households within the communities are below the national poverty line. In Caboclo Village, the project community, 62% of people live below the national poverty line, which means their income is equal to or less than half of the Brazilian minimum wage. For this reason, the planned project's activities involve increasing income generation and opportunities, and improving access to education, healthcare, communication, leisure, and water. Additionally, community governance activities are designed to empower the community to manage and execute their own collective interests with autonomy. Thus, the project aims to bring medium and long-term benefits, including poverty reduction, but also gender inequality reduction, enhanced community governance, and increased resilience to climate change. With special attention to the identified vulnerable community groups, those with low income, and women.</p> <p>GL3. Exceptional Biodiversity Benefits: The project meets the Gold status of High Biodiversity Conservation by the vulnerability KBA qualifying criteria, conserving the endangered (EN) trigger species <i>Ateles marginatus</i> (white-cheeked Spider Monkey). With activities to protect the project area, raise environmental awareness and reduce human-fauna conflicts, the project will contribute to the maintenance and permanence of the local population of the trigger species <i>Ateles marginatus</i>, also contributing to the conservation of other species of fauna and flora that are present in the project area, at some level of threat.</p>
	<p>November 2025</p>

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## 1 SUMMARY OF PROJECT BENEFITS

### 1.1 Unique Project Benefits

The Impacts or Outcomes estimated by the end of project lifetime, which are considered, among the project activities, as Unique Project Benefits are shown in Table 1.1, as well as a summary of its benefits, related to this project Theory of Change<sup>1</sup>.

*Table 1.1. TdX Project Unique Benefits.*

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
<p>Community empowerment will be strengthened when community members actively participate in future decisions that affect their collective life and have access to improved communication, leisure, and mobility resources. Outputs such as the creation of communication channels, the implementation of internet access spaces, and the provision of community infrastructure will lead to outcomes like increased social participation, the promotion of leisure spaces, and enhanced communication skills. Cumulative efforts will result in an impact where the community gains a stronger voice, organizes to address local challenges, and improves its quality of life through cooperation and collective decision-making.</p>	2.1.8
<p>The promotion of gender equality will occur through future activities that generate income opportunities and encourage women’s social participation, such as hiring female labor for the project and implementing awareness campaigns. These outputs are expected to translate into outcomes like increased and diversified income for women and reduced levels of economic vulnerability within the community. Governance initiatives focused on promoting women’s participation in decision-making processes will further reinforce these outcomes. Thus, the long-term impact of promoted gender equality will be realized as women occupy decision-making and leadership roles within the community.</p>	2.1.8
<p>Increased resilience to climate change will be fostered through activities that aim to improve environmental education, protect permanent preservation areas, and promote the sustainable use of water resources. Outputs such as the implementation of drinking water access structures, future workshops on spring protection, and the construction of septic tanks will enhance local water security. These actions are expected to lead to outcomes such as maintaining adequate microclimatic conditions for species and conserving riparian areas. With secure water access and the adoption of sustainable practices in the future (for example, in soil management and fire prevention), the community will be better equipped to face the effects of climate change.</p>	2.1.8

<sup>1</sup> 231018\_TheoryofChange.pdf

## 1.2 Standardized Benefit Metrics

The values for each metric are shown in Table 1.2 below.

Table 1.2. Standardized Benefit Metrics Table.

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	Not applicable	Not applicable
	Net estimated emission reductions in the project area, measured against the without-project scenario	524,777.75 t CO <sub>2</sub> e	3.2.2
Forest <sup>2</sup> cover	For REDD <sup>3</sup> projects: Estimated number of ha of reduced forest loss in the project area measured against the without-project scenario	10,704.58	3.3.1
	For ARR <sup>4</sup> projects: Estimated number of ha of forest cover increased in the project area measured against the without-project scenario	Not applicable	Not applicable
Improved land management	Number of ha of existing production forest land in which IFM <sup>5</sup> practices are expected to occur as a result of project activities, measured against the without-project scenario	Not applicable	Not applicable
	Number of ha of non-forest land in which improved land management practices are expected to occur as a result of project activities, measured against the without-project scenario	Not applicable	Not applicable
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	30 people	2.1.8 4.4.1

<sup>2</sup> 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)

<sup>3</sup> 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)

<sup>4</sup> 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)

<sup>5</sup> 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)

Table 1.2. Standardized Benefit Metrics Table.

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	10 women	2.1.8 4.4.1
Employment	Total number of people expected to be employed in project activities, <sup>6</sup> expressed as number of full-time employees <sup>7</sup>	15 people	2.1.8 4.4.1
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	11 women	2.1.8 4.4.1
Livelihoods	Total number of people expected to have improved livelihoods <sup>8</sup> or income generated as a result of project activities	30 people	2.1.8 4.4.1
	Number of women expected to have improved livelihoods or income generated as a result of project activities	10 women	2.1.8 4.4.1
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	30 people	2.1.8 4.4.1
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	10 women	2.1.8 4.4.1
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	35 people	2.1.8 4.4.1
	Number of women and girls for whom access to, or quality of, education is expected to improve as	14 women	2.1.8 4.4.1

<sup>6</sup> 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.

<sup>7</sup> 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])

<sup>8</sup> 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.

Table 1.2. Standardized Benefit Metrics Table.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	result of project activities, measured against the without-project scenario		
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	69 people	2.1.8 4.4.1
	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	23 women	2.1.8 4.4.1
Well-being	Total number of community members whose well-being <sup>9</sup> is expected to improve as a result of project activities	69 people	2.1.8 4.4.1
	Number of women whose well-being is expected to improve as a result of project activities	23 women	2.1.8 4.4.1
Biodiversity conservation	Expected change in the number of ha managed significantly better by the project for biodiversity conservation, <sup>10</sup> measured against the without-project scenario	10,704.58	5.5.1
Biodiversity conservation	Expected number of globally Critically Endangered or Endangered species <sup>11</sup> benefiting from reduced threats as a result of project activities, <sup>12</sup> measured against the without-project scenario	3	5.1.1 5.1.5

<sup>9</sup> 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.

<sup>10</sup> 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

<sup>11</sup> Per IUCN's Red List of Threatened Species

<sup>12</sup> 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 Project Proponent (G1.1)

The project proponent detailed information is shown in Table 2.1.

*Table 2.1. Project proponent detailed information.*

Organization name	Systemica Inteligência em Sustentabilidade S.A.
Contact person	Munir Younes Soares
Title	Director
Address	Rua Frei Caneca, nº 1246, cj 41, Consolação, São Paulo (SP), Brazil, postal code:01307-002
Telephone	+55 (11) 5039-1080
Email	munir@systemica.digital

Also, in the Tables below (Table 2.2, Table 2.3, and Table 2.4) is the information regarding the other entities involved in this project.

*Table 2.2 Byblos Agronegócio Holding LTDA entity detailed information.*

Organization name	Byblos Agronegócio Holding LTDA
Role in the project	Landowner and partner in the project activity implementation
Contact person	Rafael Bemerguy Sefer
Title	Owner of the Patacho and Campo Lindo farms
Address	Tv SOL D'Oeste, S/N, Sala C, Bom Planalto, Marabá (PA), Brasil, postal code: 68.501-730
Telephone	+55 (91) 9353 1020
Email	rafaelsefer@hotmail.com

*Table 2.3 Santa Maria Pecuaria e Agronegocio LTDA entity detailed information.*

Organization name	Santa Maria Pecuaria e Agronegocio LTDA
Role in the project	Landowner and partner in the project activity implementation
Contact person	Rafael Bemerguy Sefer
Title	Owner of the Belcon, Santa Marta, Retiro Encantado and Vó Lina farms
Address	Av. SOL D'Oeste, S/N, Sala B, Liberdade, Marabá (PA), Brasil, postal code: 68.501-730
Telephone	+55 (91) 9353 1020
Email	rafaelsefer@hotmail.com

Table 2.4 Didácio Milhomens Barros entity detailed information.

Organization name	Didácio Milhomens Barros
Role in the project	Landowner and partner in the project activity implementation
Contact person	Didácio Milhomens Barros
Title	Owner of the Nossa Senhora Aparecida farm
Address	QSC 19, Chácara 25, Conjunto F, Lote 11, Taguatinga, Distrito Federal (DF), Brazil, postal code: 72.017-221
Telephone	+55 (61) 8406 5165
Email	didmilhomens@yahoo.com.br

### 2.1.2 Project Objectives (G1.2)

The overarching objective of the Triunfo do Xingu Grouped REDD+ Project is to preserve 10,704.58 ha of tropical forest through studies based on scientific methodologies, remote and terrestrial monitoring and, above all, through the territory socio-environmental dynamics transformation over time to make it increasingly sustainable, bringing new employment and income alternatives to the people who live around it, strengthening a development economy with low greenhouse gas (GHG) emissions and low negative environmental impact in general.

To achieve these objectives, the project aims to carry out activities on the following fronts: climate, community and biodiversity. The objectives of each front are specified below:

#### 2.1.2.1 Climate

Through forest inventory activities, modelling of deforestation and land use data, study of the dynamics of deforestation and land use and occupation, and the development and implementation of a climate monitoring system, the aim is to reduce emissions by 655,972.19 t CO<sub>2</sub>e over the 30-year credit period (considering the deforestation rate from the PADA report<sup>13</sup> from the start date (August 31, 2022)) until the end of the Baseline Validity Period (BVP; from January 1, 2019 to December 31, 2024) and, to cause exceptional climate benefits, promote climate resilience for the community and biodiversity that are part of the project by improving access to water resources.

#### 2.1.2.2 Community

The project covers the community of Caboclo Village and through social diagnosis activities, closer contact and dialogue with the community, the participatory development of a communication procedure, the structuring of community governance, and the joint development and implementation of socio-environmental activities, the objective is to improve the social well-being of the community (especially for vulnerable groups) and to promote sustainable development through transformations in land use and occupation practices.

#### 2.1.2.3 Biodiversity

Through fauna inventory activities, fauna monitoring, awareness campaigns and environmental education, the objective is to maintain species richness and maintain or slightly increase the populations of endangered species, endemic species and trigger species of fauna and flora identified in the project area, in addition to promoting environmental awareness and reducing conflicts between humans and wild animals. Also, to

<sup>13</sup> PADA Report - VCS 3738.pdf

cause exceptional biodiversity benefits, conserving the populations of the endangered (EN) trigger species *Ateles marginatus* (white-cheeked Spider Monkey).

### 2.1.3 Physical Parameters (G1.3)

The Triunfo do Xingu Grouped REDD+ Project's area is situated in Altamira municipality, State of Pará, Brazil (Figure 2.1). This municipality is 832 km far from Belém, the capital of the State of Pará and its estimated population, based on the IBGE estimates of 2021, is around 117 thousand inhabitants. Its territorial area averages 160 thousand square kilometers, equivalent to  $1,6 \times 10^9$  ha. The project area is part of the APA Triunfo do Xingu, a protected area established by State Decree 2.612 in 2006, and it makes neighborhood with two other types of protected areas, the Terra do Meio Ecological Station and the Serra do Pardo National Park (ISA, 2012).

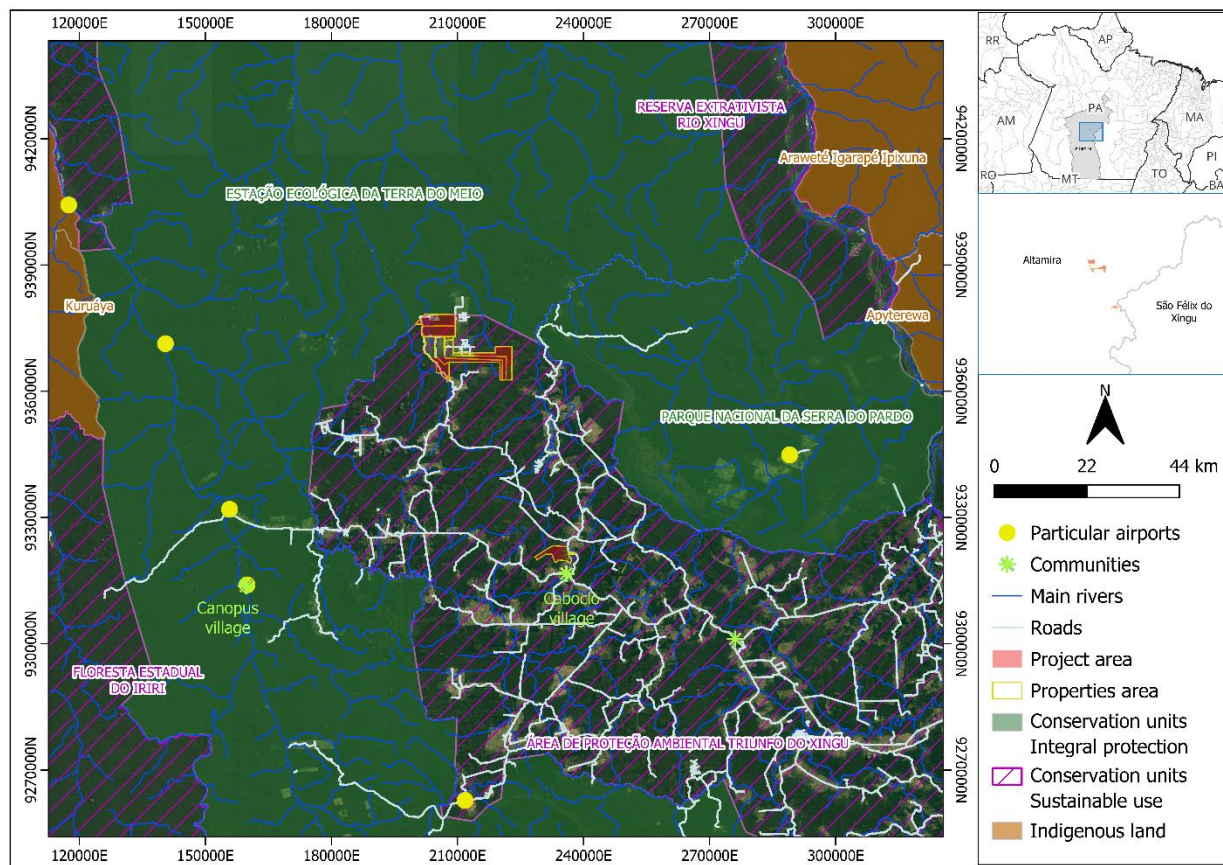


Figure 2.1. Location and context in the surroundings of the project area.

#### 2.1.3.1 Climate

The project region is classified as Tropical Climate – Am and Af categories – in the Köppen climate classification (Kottek et al., 2006). The region is undergoing a climate transition, which is why it has two climate categories. Most of the project region is classified as category Am (Figure 2.2). The database used to define the region's climates, according to the Köppen classification system, was a vector database published by (Alvares et al., 2013). The average precipitation for the Af climate is about 2,233 mm, lower than the average precipitation for the Am climate, which is about 2,401 mm (Figure 2.3). The rainy season runs from December to May, while the dry season runs from June to November. Temperatures vary

between 27 and 32 °C (Figure 2.4), with October being the hottest month and February the coldest (Carvalho et al., 2022).

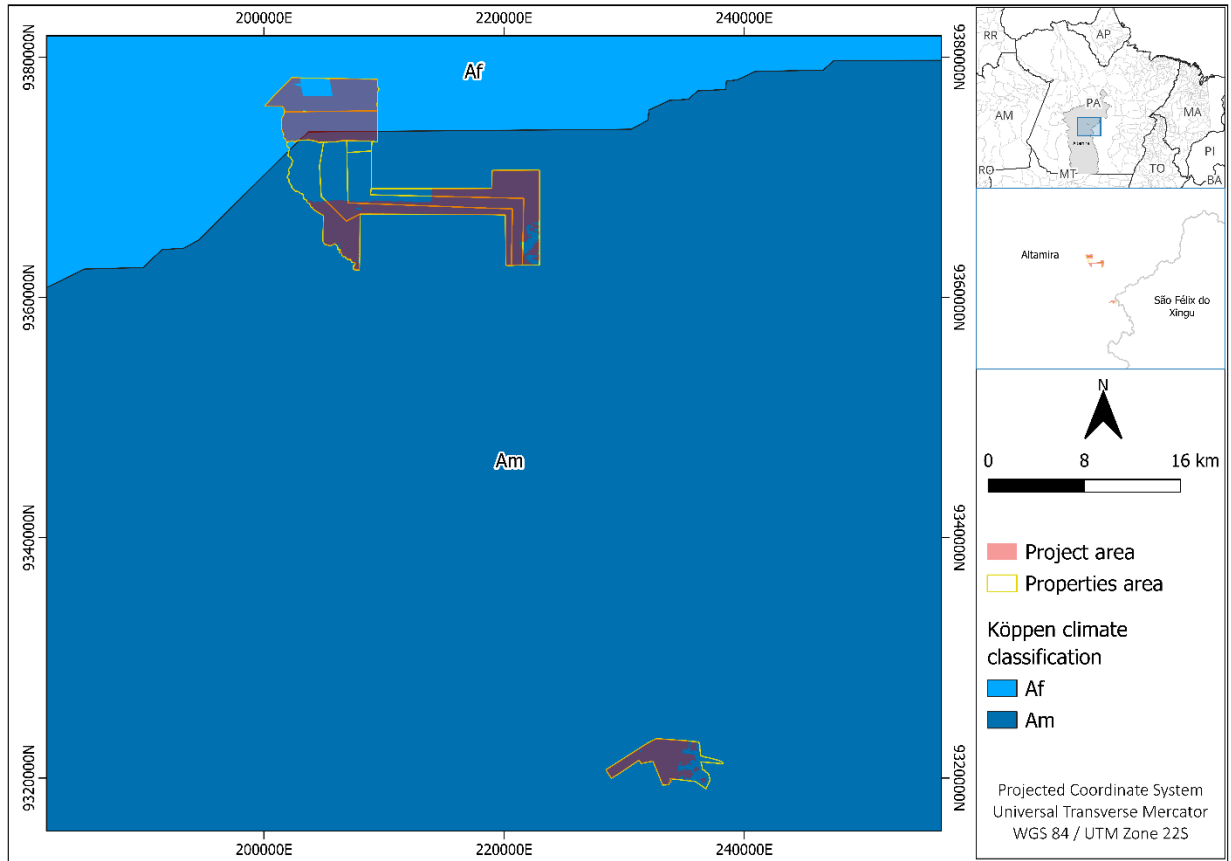


Figure 2.2. Climate category of the project region according to Köppen’s classification (Alvares et al., 2013).

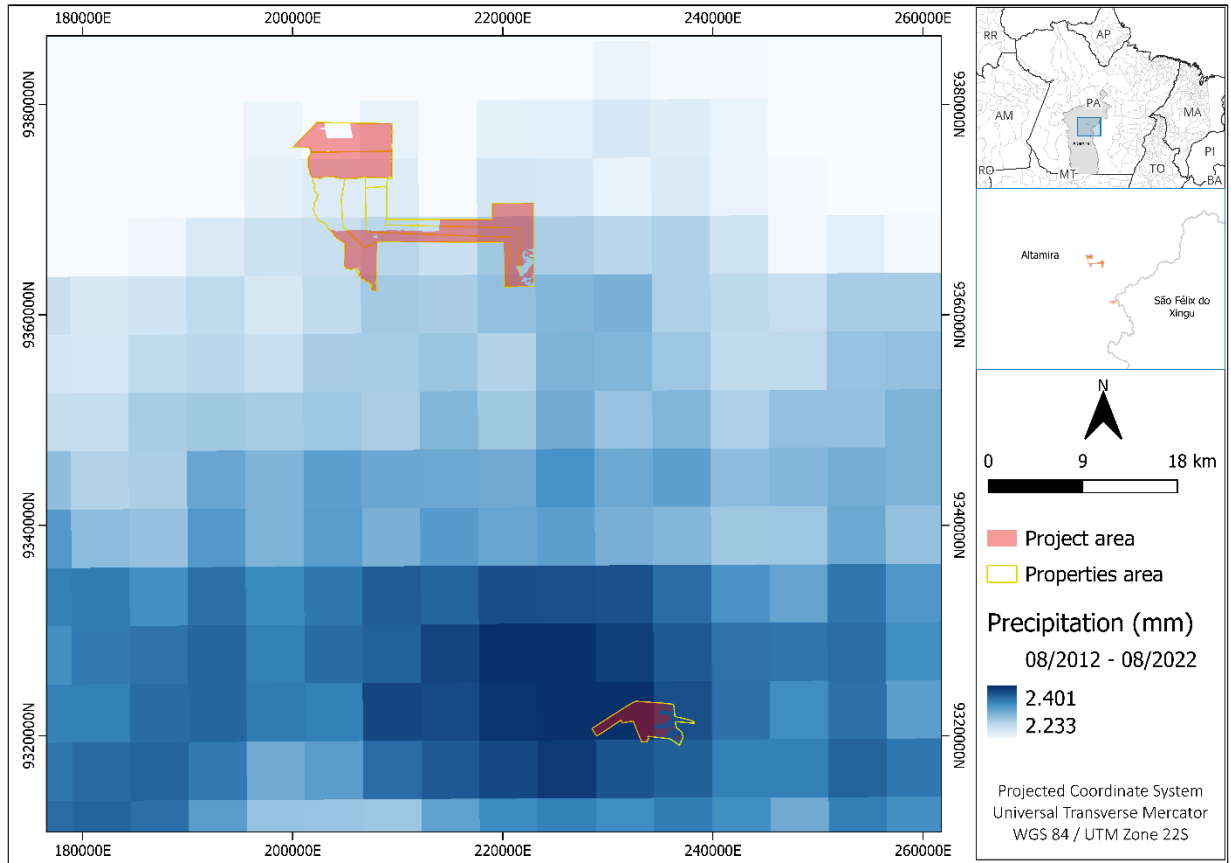


Figure 2.3. Annual average precipitation (mm) for the project region.

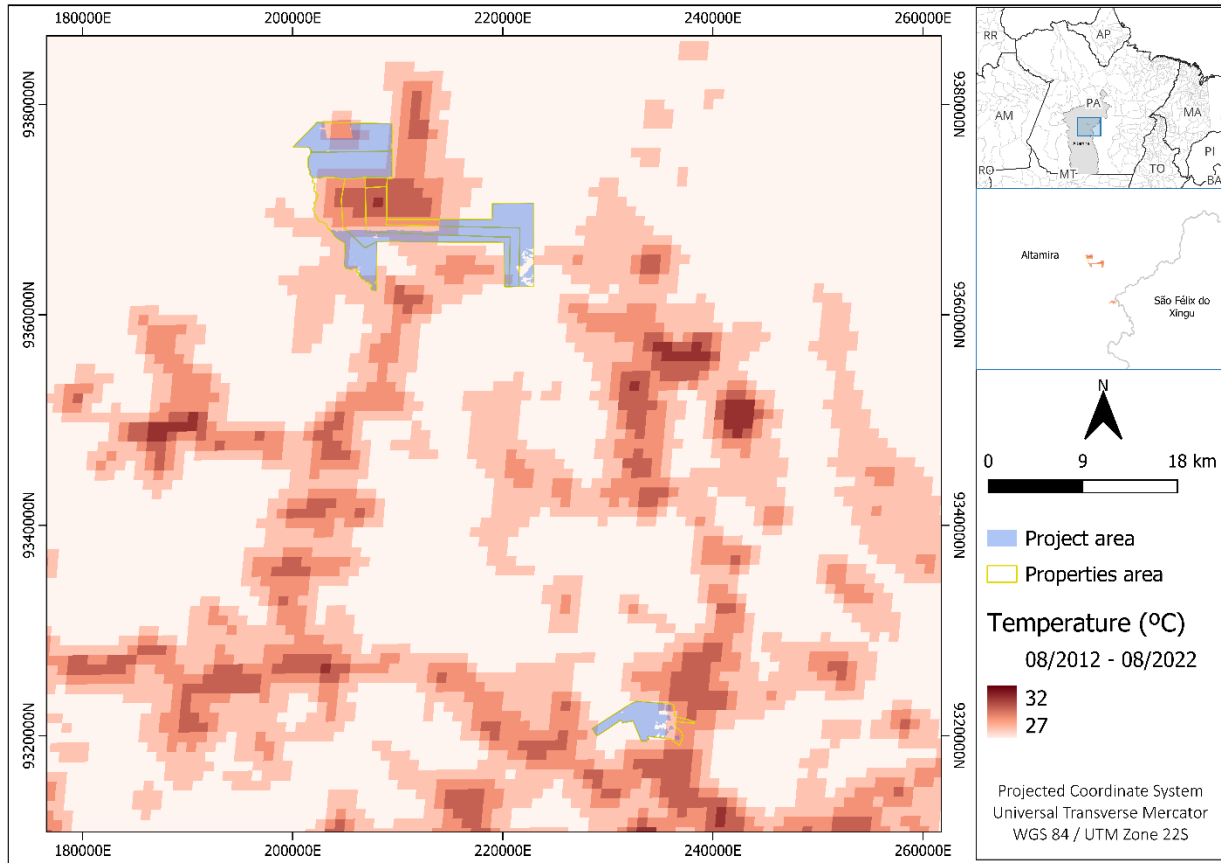


Figure 2.4. Annual average temperature (°C) for the project region.

### 2.1.3.2 Geology, Topography and Soils

Regarding geology, the municipality of Altamira is located on the tertiary and quaternary Amazonian plateau. In the valleys of the Xingu and Tapajós rivers, the outcrops found are from the Devonian period, while the Eo-Devonian are found on display in the Xingu riverbed, and in the Igarapé das Panelas. Downstream of the waterfalls between Tubarão and Igarapé Canoé belong to the Mesodevonian period, and to the northeast of Altamira there is a large flat and slightly undulating area whose formation is due to the evolution process of sediments from the Tertiary, Pliocene period (Falesi et al., 1967).

The project region is formed by Argisols and Neosols. In particular, the relief is one of the factors in the formation of soils in Altamira. In flat reliefs, the Argisol predominates, represented by the Yellow Latosol with medium and clayey textures and, in the wavy areas, there is an occurrence of the Red-Yellow Latosol - medium and clayey textures – and Red-Yellow Podzolic – medium and clayey textures (Figure 2.5) (Falesi et al., 1967).

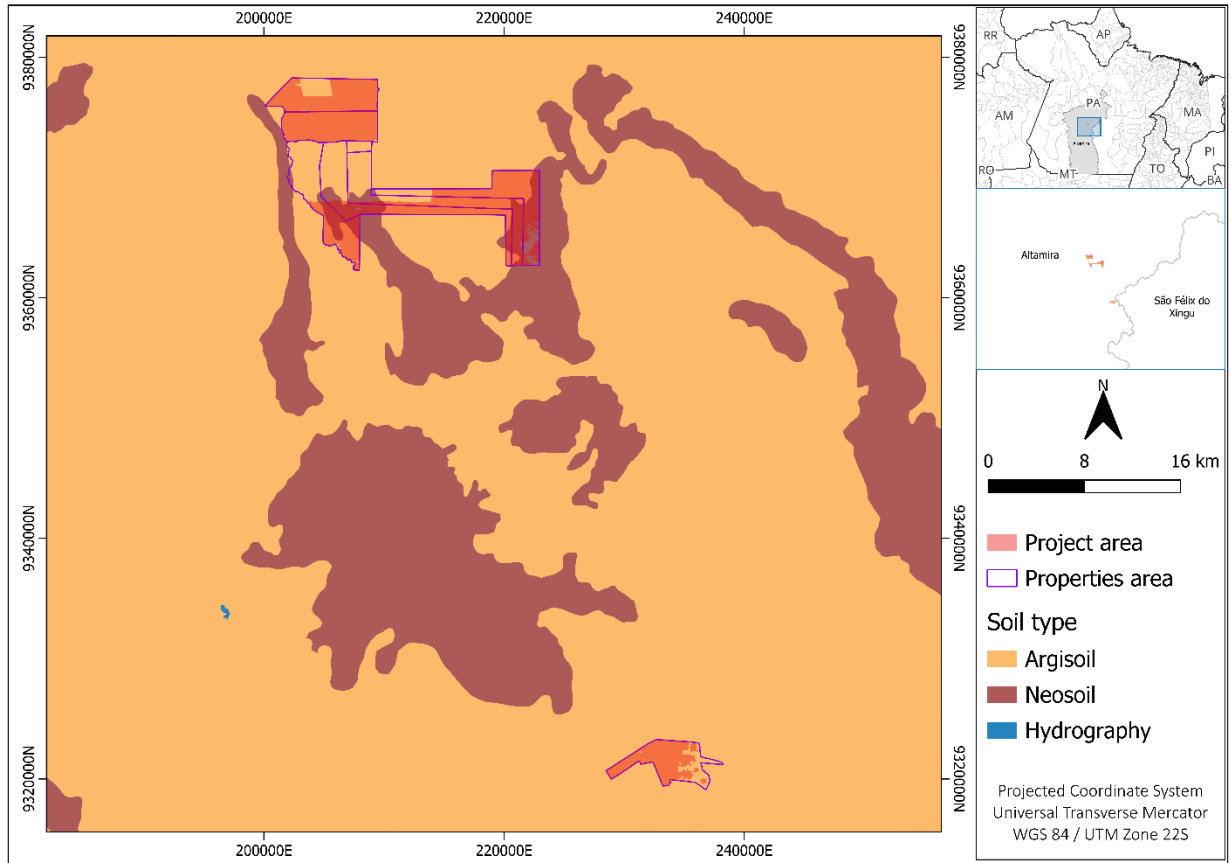


Figure 2.5. Predominant soil types in the project region.

With regard to slope, part of the project region is sloped and other areas are not, as there is a wide variation in slope, as can be seen on the map (Figure 2.6), and the altitude in the project region ranges from 162 to 587 meters (Figure 2.7). To obtain elevation and slope information, a mosaic of digital elevation models, provided by NASA, with a spatial resolution of 30 meters (Farr et al., 2007). Topography is often related to physical and chemical soil variations that are often reflected by vegetation.

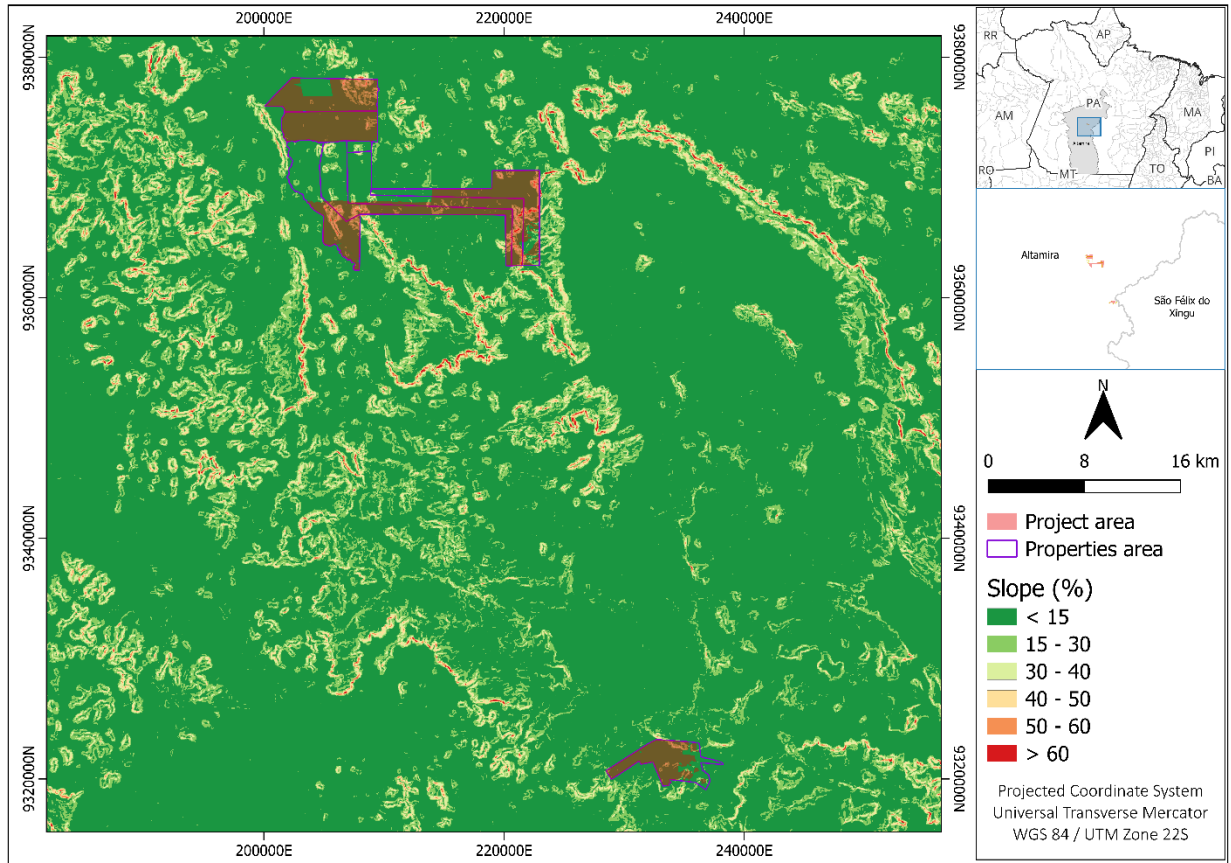


Figure 2.6. Slope percentage in the project region.

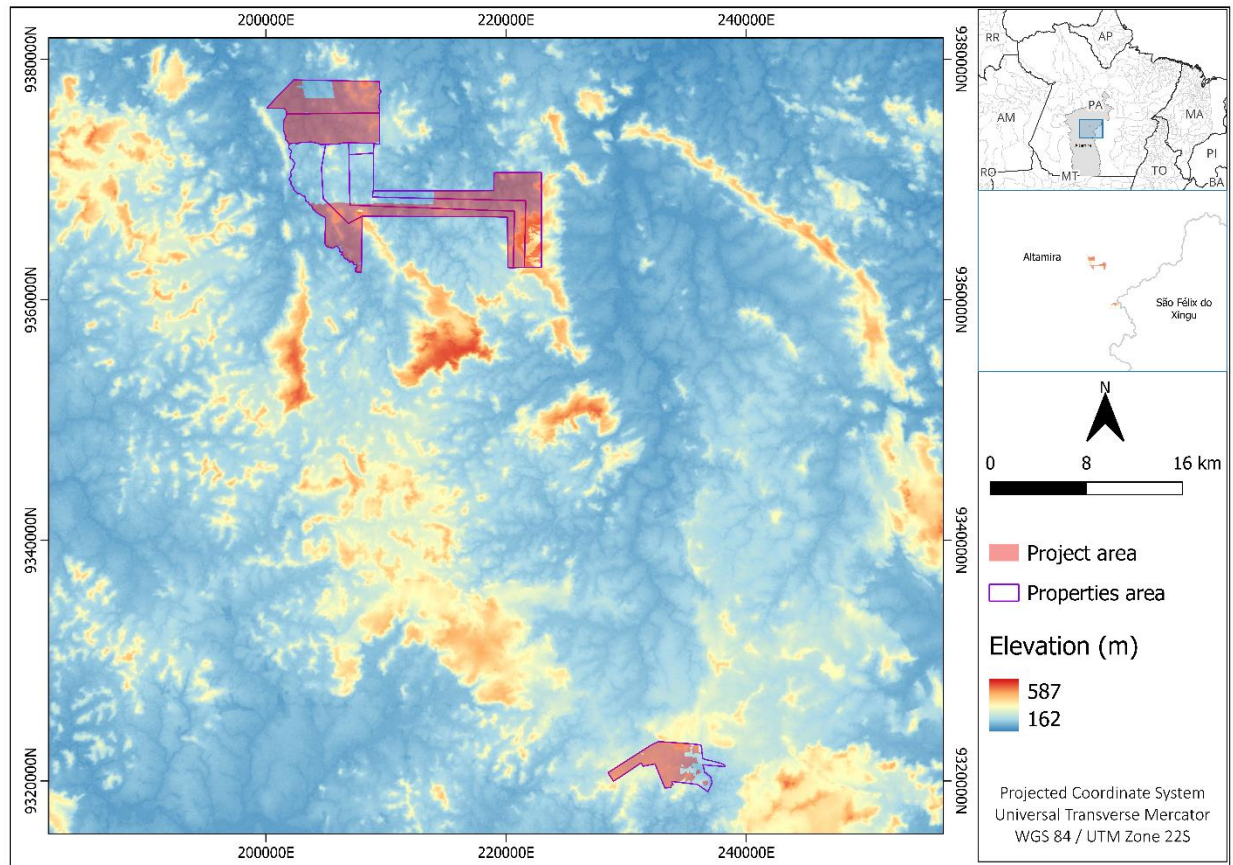


Figure 2.7. Elevation (m) of the project region.

### 2.1.3.3 Vegetation

The project is located within the Brazilian Amazon ecosystem. According to the IBGE Environmental Database (BDiA) (IBGE, 2022a), the area covered by this project is predominantly forested, comprising three main phytophysioognomies mapped in the region: (i) ombrophilous forest of open canopy, (ii) forest transition zones, and (iii) ombrophilous forest of dense canopy. This classification highlights the diversity of vegetation types present in the project area, as shown on the map (Figure 2.8).

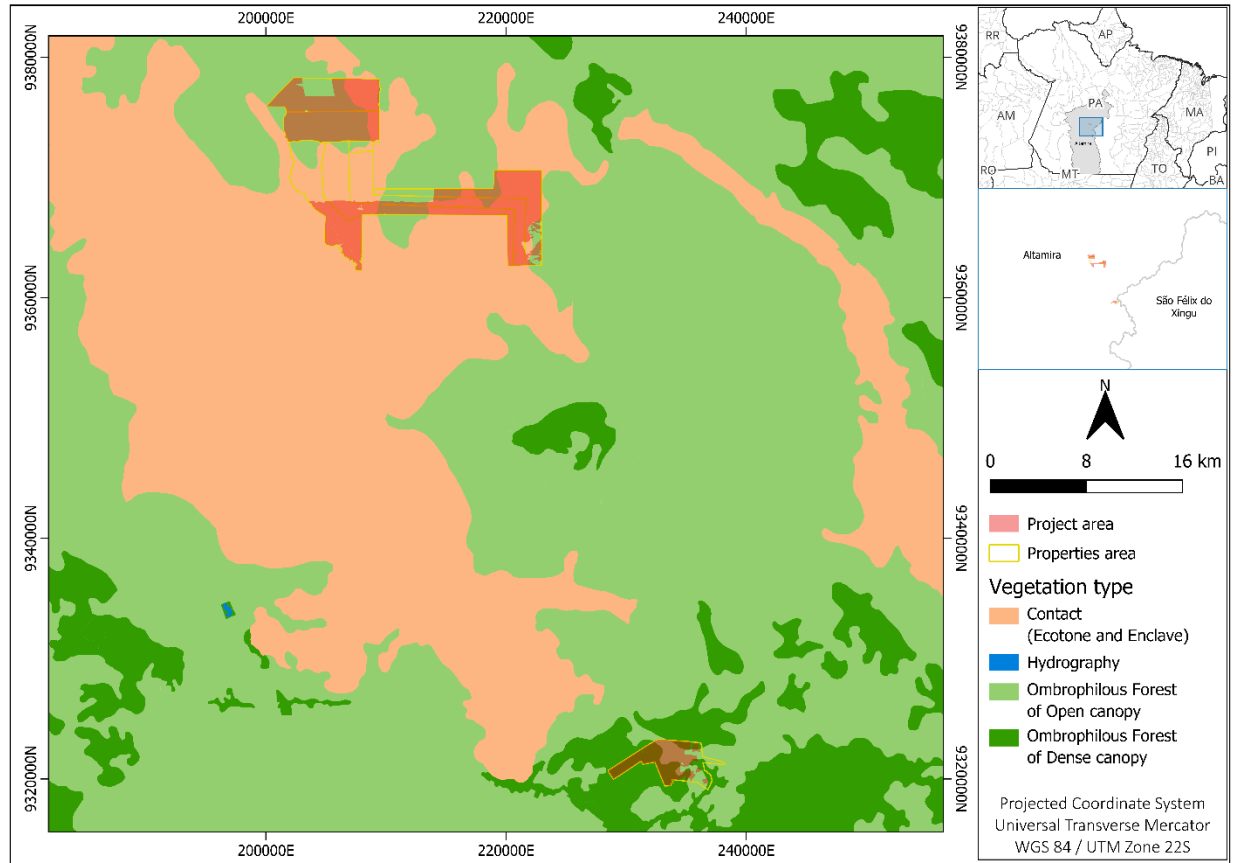


Figure 2.8. Forest cover and forest types in the project region.

The areas with ombrophilous forest of dense canopy rainforest are characterized by dense vegetation in all strata (tree, shrub, herbaceous, and lianas) (SFB, 2019). In the most preserved areas of ombrophilous forest of dense canopy rainforest, where physical conditions allow, the height of vegetation increases, and there is presence of epiphytes. In these areas, natural disturbances can be observed, which occur due to the natural death of trees or events such as lightning, strong winds, and other reasons (IBGE, 2012). On the other hand, the ombrophilous forest of open canopy rainforest is a variation of the ombrophilous forest of dense canopy, being a more open forest formation, where combinations of particular species in associations are commonly observed (SFB, 2019).

Beyond the project region, the broader context of the municipality also reflects the predominance of Amazonian forest formations, which integrate with other types of land cover and use. The municipality is part of the Amazon Biome, presenting an extensive territorial area covered by dense equatorial forest with large trees and emerging vegetation. Its fauna follows the biological variety of the flora, presenting itself as rich and diversified (SEMAT, 2012). In addition to the Amazon rainforest, the municipality has other features such as secondary vegetation and crops such as sugarcane, cocoa, as well as subsistence crops (Figure 2.9) (SEMAT, 2012).

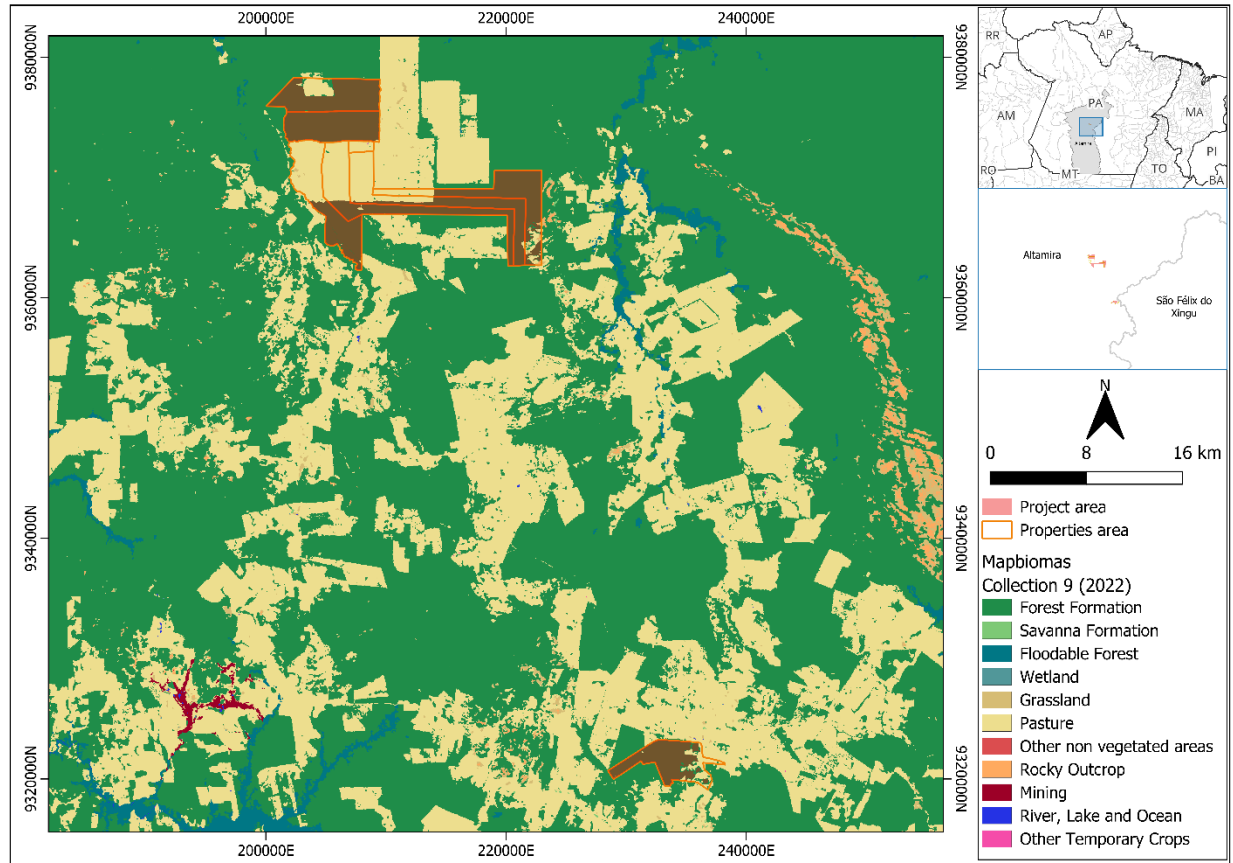


Figure 2.9. Other land use categories found in the project region (MapBiomias, 2022a).

#### 2.1.4 Social Parameters (G1.3)

According to the social diagnosis<sup>14</sup>, there are no settlements, indigenous lands or traditional communities within the project area or surrounding areas, instead there are one main village: Caboclo Village (Figure 2.10). This community belongs to the territory of Altamira, 1,400 kilometers away from the municipal seat. Caboclo Village, in particular, is located close to the properties that are part of the Triunfo do Xingu Grouped REDD+ Project: Belcon, Campo Limpo, Patacho, Retiro Encantado, Santa Marta and Vó Lina Farms; at 60 kilometers, and 8 km from Nossa Senhora Aparecida Farm.

The Caboclo Village community is a rural village, where most residents live from subsistence farming and the provision of rural services, with most of the local labor being allocated to harvest periods or to jobs linked to the farms in the region. Approximately 30% of households provide various commercial services, including food sales, bars, gas and gasoline sales, and personal grooming services like haircuts and manicures. Also, the hunting of wild animals in the Caboclo Village was documented in questionnaires about the community's relationship with biodiversity<sup>15</sup> as common among 16% of the population and part of the community's means of life.

The village is home to approximately 69 inhabitants, with men comprising about 44% of the population, women 33%, and children 23%. This corresponds to around 30 men, 23 women, and 16 children. There

<sup>14</sup> SocialDiagnosis.zip

<sup>15</sup> 02\_Hiring.zip

are 48 students enrolled throughout the grades of the elementary school Novo Pacto and a number of 300 people was given by the local Health Center as the number of people that access the health service, which indicates that the people who live near Caboclo Village also use these services in the village (Amaral et al., 2006). Due to its proximity to one of the areas in the project (N. Sra. Aparecida Farm), Caboclo Village will be the target community for the design and implementation of the planned actions.

Caboclo Village has a public health facility, a gas station, and an arrival station (Amaral et al., 2006). Its importance for the local population has been recognized, and the local municipality has made investments and announced several works and services in this location. The municipality has also held meetings with the population to assess the needs in the areas of health, education, agriculture, work, and services that will help improve the quality of life and infrastructure for the local community. It is worth mentioning that the region has received investments partly from royalties, with part of the profits from the use of water resources from the Belo Monte hydroelectric plant being used for programs and actions of the local government (PMA, 2021).

According to the social assessment, there are other villages near Caboclo Village, including Canopus Village, which is located 45.3 km and 35.9 km away, and Fumaça Village, situated 16.5 km and 26.5 km from the primary properties that make up the project area. These villages, apart from Caboclo, are not communities or other stakeholders in the project.

In the case of Canopus Village, it is an area where land invasions and land grabbing occurred, especially in the 1980s, and whose population currently lives mainly from cattle ranching and illegal mining (da Costa, 2013; Escada et al., 2005). Canopus Village has greater importance and influence, especially due to its strategic location. It also plays an important role in the process of transformation of the area, as evidenced, for example, by the deforestation activities in its surroundings (Amaral et al., 2006).

Regarding Fumaça Village, which, along with Caboclo Village, is located within a 20 km radius of the project area boundary, the project has established through satellite images and field information that the Caboclo Stream has some of its headwaters within the project area on one of the private properties. This means that the Caboclo Village community, which depends on the existence and maintenance of this stream for use in productive and recreational activities, is indirectly dependent on the project area. This is not the case with Fumaça Village, which is farther from Caboclo Village and does not have access to the Caboclo Stream.

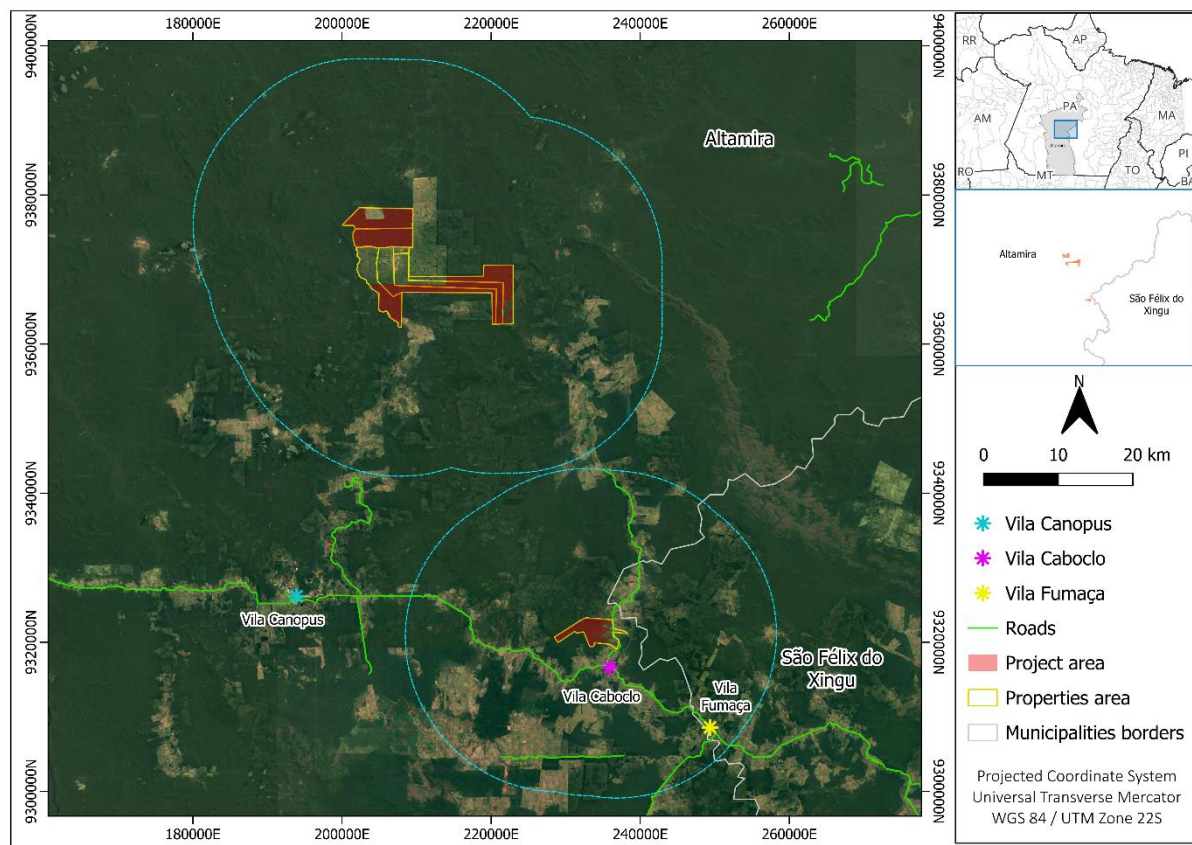


Figure 2.10. Location of Caboclo, Fumaça and Canopus Villages, the main villages close to the project area. The blue circle is the 20 km radius of the project area boundary.

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

According to the CCB Standard v3.1, the project zone must include the project area and areas where project activities are implemented, as well as all potential project areas, since it is a grouped project.

Moreover, the VCS Standard defines eligibility criteria for the baseline scenario and project activity instances, which are now determined using jurisdictional data as defined in methodology VM0048 and module VMD0055. This jurisdictional approach provides spatial demarcation for gathering information on rates, agents, and patterns related to deforestation, which is used for historical analysis of land use change, projection of future deforestation, and monitoring. Therefore, the jurisdictional boundaries define the geographic scope where new climate project activity instances may be implemented in the future. As the initial project instance is located in Pará State, new project areas can be implemented anywhere within this state's jurisdictional boundaries. The jurisdictional data approach eliminates the need for project-specific reference region delimitation, with methodology details provided in the updated VM0048 methodology documentation. Regarding the potential project areas, the project's VCS PDD shows the eligible forest areas within the jurisdictional boundaries, which corresponds to mature native vegetation over 10 years old. However, only part of these areas is included in lands with regularized ownership, according to SIGEF. These lands will be highlighted in the project zone map (Figure 2.11).

The HCVs identified in this project include threatened and endemic species and APA Triunfo do Xingu (HCV 1), Intact Forest Landscapes (HCV 2), and the Caboclo stream (HCV 4). See Sections 4.1.3 and 5.1.5 for details.

The offsite climate impacts correspond to the VCS leakage belt (see Section 3.3), and as described in Section 5.4.1, no negative impacts on biodiversity are expected outside the project zone resulting from project activities.

As pointed out in Section 2.1.7, the only community where project activities are taking place is Caboclo Village. The communities that could potentially be included in the project during a future verification are all the local populations located within or outside the 20 km buffer zone around the project area, which, according to the CCB definition, can be project communities.

The project area is 10,704.58 ha, and the properties involved in the first instance of the project (TdX I-1) and Caboclo Village are located only in the municipality of Altamira. The geodetic coordinates of the project areas are presented in archive “kml”<sup>16</sup>.

Furthermore, in order to better organize the layers and information that constitute the project zone, four maps were created. Figure 2.11 shows the TdX I-1 project areas, the location of Caboclo Village, and the potential project areas along with the properties registered at SIGEF. Figure 2.12 shows the HCVs and the leakage belts along with the project areas and the project zone. This map was also divided into two for better visualization (Figure 2.13 and Figure 2.14).

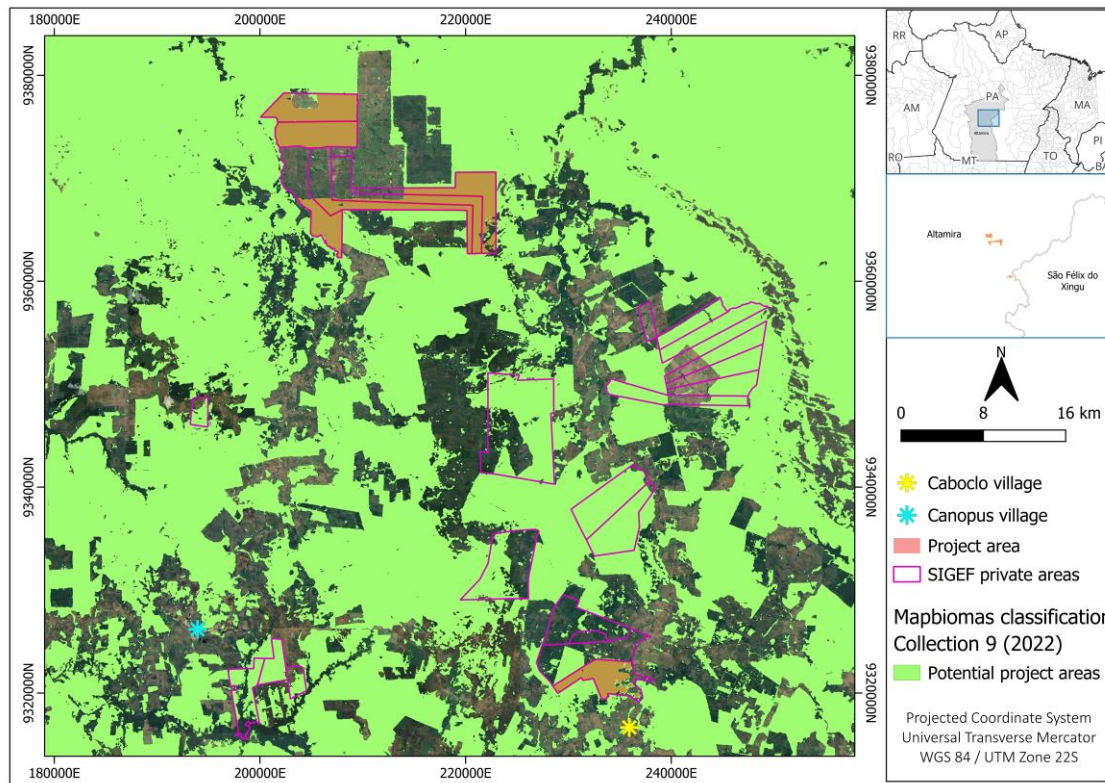
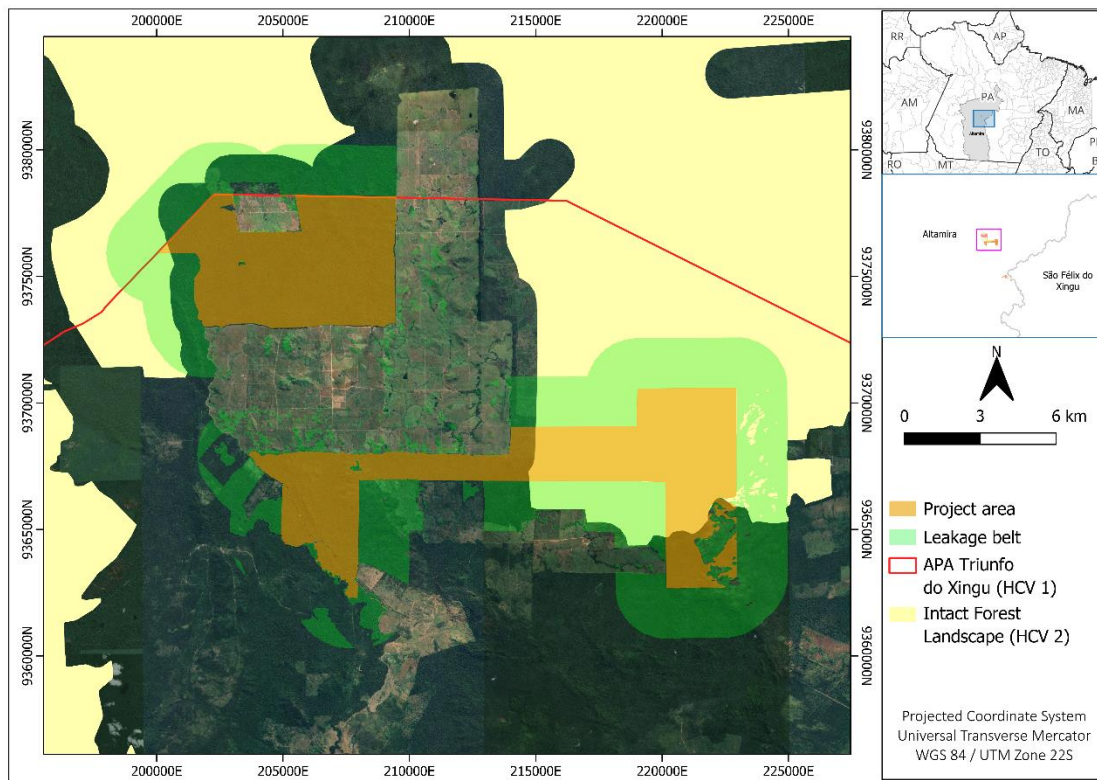
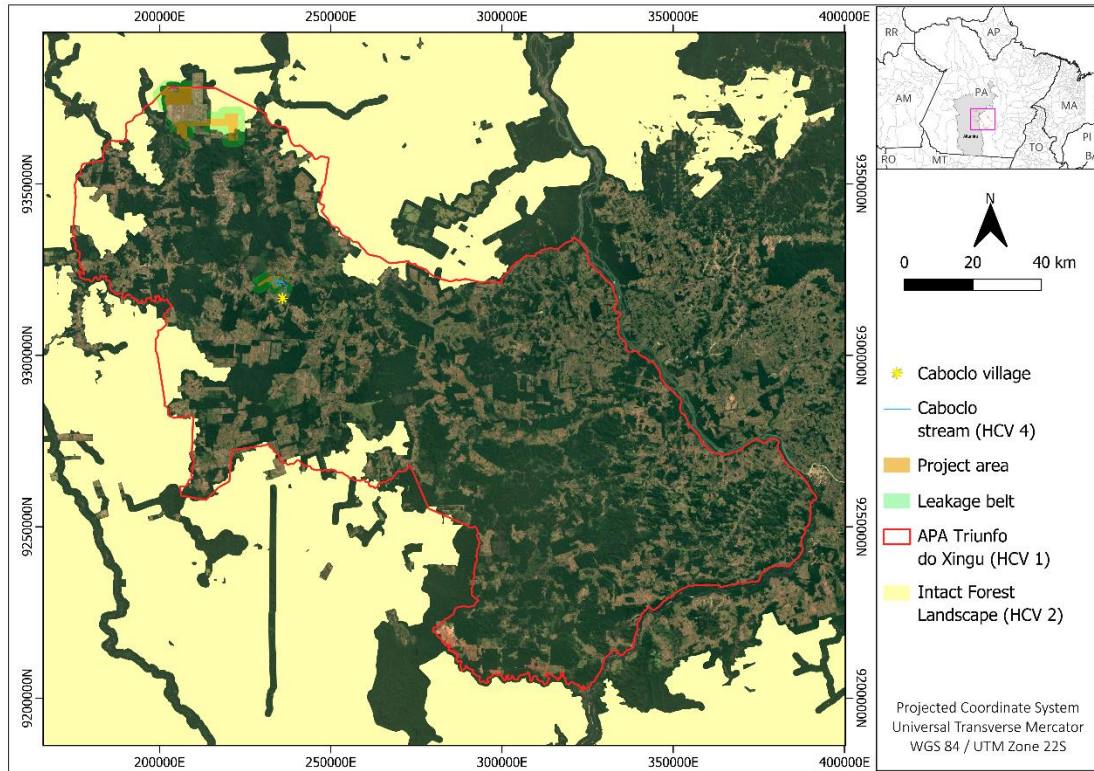


Figure 2.11 Example of potential project areas

<sup>16</sup> 221014\_project\_area\_TdX.kml



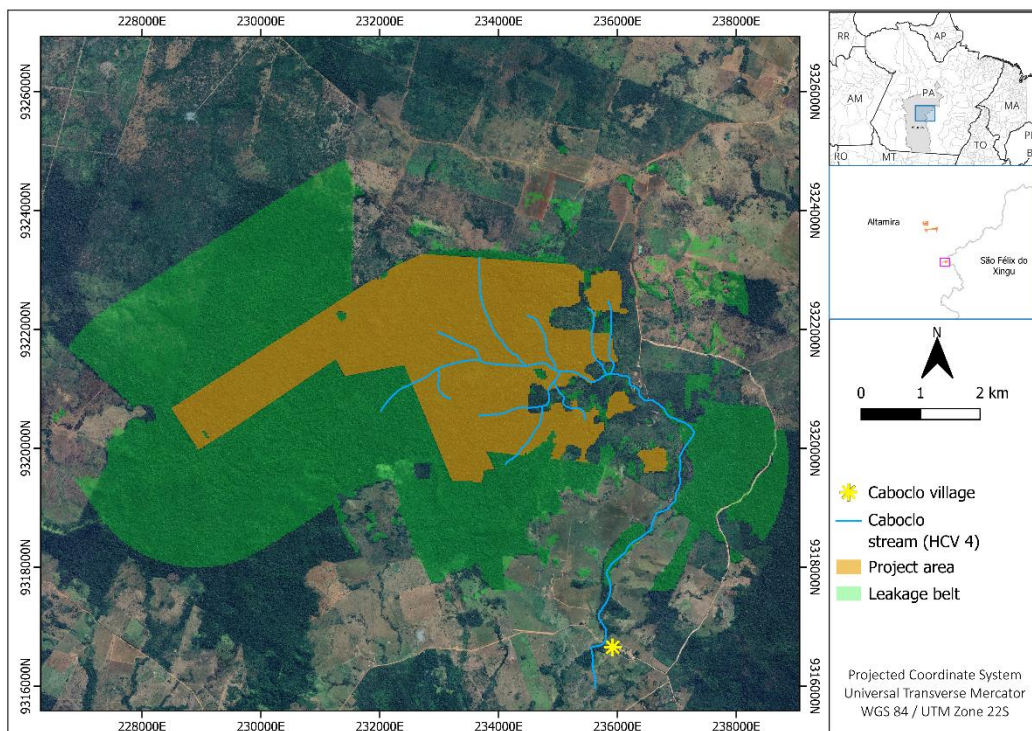


Figure 2.14. Project zone, HCVs, and offsite climate impacts - Didácio project area.

### 2.1.6 Stakeholder Identification (G1.5)

The stakeholder identification of the TdX project was developed in two stages: the first of them aimed at identifying the presence of populations and other occupations through satellite images and the second, using theoretical and practical methodologies for the definition of stakeholders and analysis of quantitative and/or descriptive data (Amaral et al., 2006). The first identification activity involved a collective brainstorming to classify the stakeholders and subsequent division into the categories of community, community groups, and other stakeholders, according to CCB Standard v3.1, and finally, an analysis of the rights, interests, and importance of each of the identified stakeholders (Wilson, 2013).

To rank the level of influence and importance of each group, a scoreboard was designed and positioned in it each of the groups according to the level of influence (low to very influential) and importance (unknown to critical). Then, the last activity in the Stakeholder Identification was a Basic Needs Survey (BNS) that was conducted with primary data (previously collected in the field) and with secondary data for a socioeconomic description of the Community's stakeholders (Davies, 2023). More details about this socioeconomic description and the step-by-step process used for identification and classification are described in the annex<sup>17</sup>.

The identification was initially aided by satellite imagery, attempting to identify communities and areas of interest near the project area. The result showed that the surroundings of the project area consist of an area with a demographic void, where there is no occurrence of Indigenous Lands, registered *Quilombola* Communities, Settlement Projects, and Traditional Communities (riparian, extractivism, fishing, or gathering communities). Also, no evidence of the presence of rubber tappers, extractivism, *piassaba* workers, or

<sup>17</sup> StakeholderIdentification.zip

fishermen was found in the region, this is due to the lack of freely available official data sources on the population of southwestern Pará<sup>18</sup>.

Few populations were identified near the project (Table 2.5), and to be able to identify them, an exploration with geoprocessing tools was carried out by Systemica's team, based on secondary data of rural communities provided by technicians from the ADEPARÁ - Agricultural Defense Agency of the State of Pará, which can be found in the social diagnosis. The satellite image measured straight-line distances between the project properties and the communities is represented below.

*Table 2.5 Straight line distance between the community settlements and the project properties*

Rural populations	Straight line distance to Rafael Sefer's properties (km)	Straight line distance to Didácio Milhomens's property (km)
Caboclo Village	48.8	4
Canopus Village	45.3	35.9
Fumaça Village	61.7	16.5
Pontalina Village	69.0	26.5
Pontal Village	70.9	30.5
dos Crentes Village	72.9	32.8
Central Village	83.4	43.2
Primavera Village	106.1	75.7

Caboclo Village is considered the priority of the identified populations because, in addition to being the closest community to one of the project properties (Nossa Senhora Aparecida), since the Caboclo stream (Figure 2.15), a creek that runs through the community and is used by them for recreation and amateur fishing, has some of its springs protected by the project area on Nossa Senhora Aparecida property. In addition, it is the community that will benefit from the project scenario, which is in conformity with the CCB Standard v3.1 definition. With the support of secondary and primary data, two community groups were identified within Caboclo Village, that is, sub-groups within the community that have similar income, livelihood and/or cultural values. They are the sub-group of women and those who live below the poverty threshold.

<sup>18</sup> SocialDiagnosis.zip

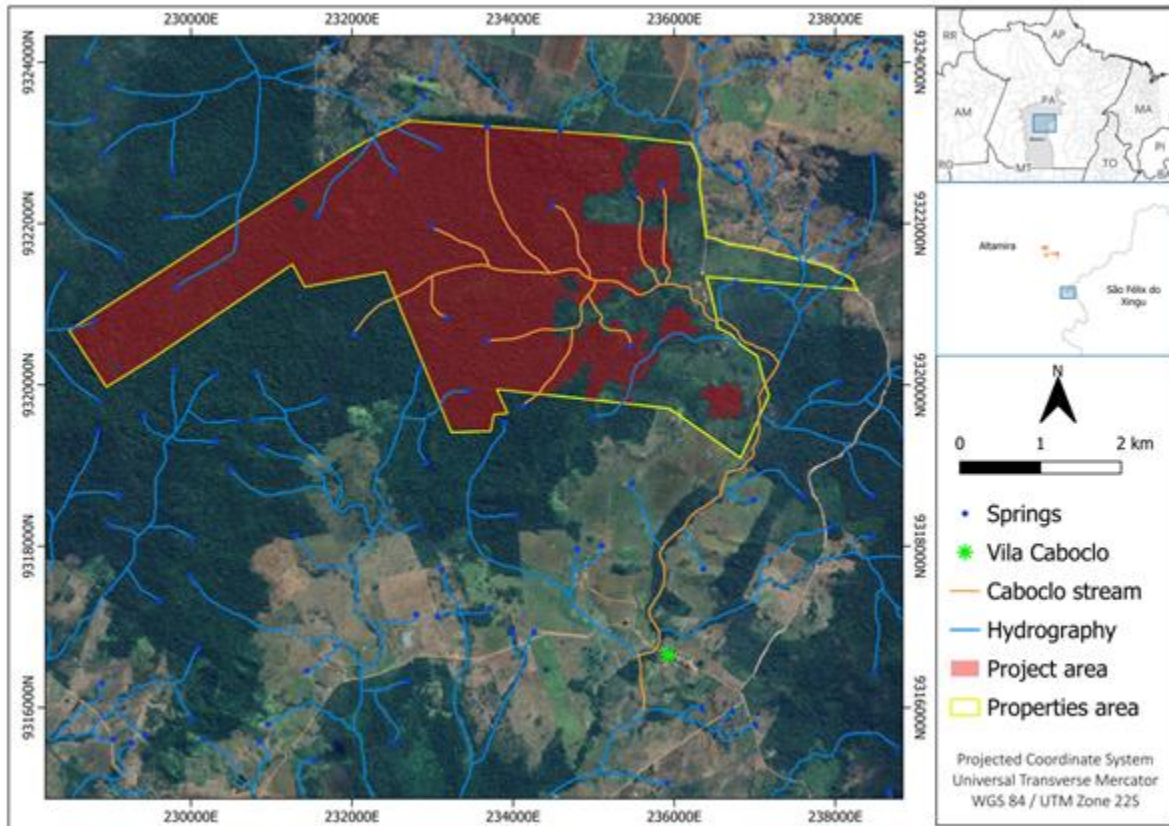


Figure 2.15 Hydrography of the Caboclo stream: some of its springs are located within the project area, the stream runs alongside the village and is used by its residents.

This means that the Caboclo Village community, which depends on the existence and maintenance of this stream for use in productive and recreational activities, is indirectly dependent on the project area. This is not the case with Fumaça Village, which is farther from Caboclo Village and does not have access to the Caboclo Stream, as the social diagnosis shows.

The other stakeholders of this project, that is, the parties that can affect or be affected by the project activities, are government agencies, municipalities, and environmental and agricultural agencies of the municipality.

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

The Caboclo Village is considered the main stakeholder of TdX project, since it is the community that depends indirectly on the project area to maintain its well-being and cultural values at the start of the project and that will benefit from the project scenario as well, as defined by the CCB Standard v3.1. The Caboclo Village is a rural community, where most residents live from subsistence farming and the provision of rural services with most of the local labor being allocated to harvest periods or to jobs linked to the farms in the region. There is an elementary school and a local health center, and soccer is a form of leisure and sport in the community, especially for children, youth, and adult men. The village has about 69 inhabitants, as orally informed by local leaders, and approximately 21 families, according to the social diagnosis and the stakeholders' identification document<sup>19</sup>. Out of this number of households, 17 household representatives

<sup>19</sup> StakeholderIdentification.zip

were interviewed by Systemica Inteligência em Sustentabilidade S.A. team, which represents just over 80% of the community's population.

From these interviews, the search for secondary data, and visits to the community, two community groups were identified within Caboclo Village, that is, sub-groups that share similarities in terms of income, livelihood, and/or cultural values. The first group consists of those living below the national poverty line (with an income equal to or less than half the minimum wage) and is the most significant group in the community, comprising approximately 62% of the population with a monthly per capita household income of less than or equal to half the minimum wage. This group is considered vulnerable because economic restrictions affect their access to basic nutrition, leisure, health, and other necessities. The condition of this group in Caboclo Village is also essential as it demonstrates that the project fulfils one of the indicators to achieve the exceptional community benefits of the CCB Standard v3.1, which is to show that at least 50% of households within the communities in the project zone are below the national poverty line.

Another vulnerable subgroup in Caboclo Village is the group of women. In the community, as well as in the municipality of Altamira, women are primarily responsible for caring for children and household chores. They may occasionally engage in paid work, either temporary or continuous, but they earn less than men and are more frequently in informal employment. Gender inequality exposes women to strenuous work routines, domestic violence, and limited access to education and leisure.

The TdX project involves a wide range of "other stakeholders," who play important roles at different administrative levels, including municipal, state, and deliberative council institutions. In the municipality of Altamira, for example, the relevance of relationships with various secretariats was identified, such as the Municipal Secretariat of Environmental Management (SEMMA), which oversees local environmental issues, the Secretariat of Public Works and Infrastructure (SEMOVI), focused on development and infrastructure, as well as the Secretariats of Education (SEMED) and Health (SESMA), which can contribute to discussions on environmental issues by incorporating the dimensions of well-being and education. The Rural Union of Altamira (SIRALTA), which represents the interests of rural producers in the region, is also relevant, along with the Municipal Government of Altamira (PMA), which integrates the local management perspective.

In the municipality of São Félix do Xingu, the Fire Department and the Municipal Secretariat of Environment and Mining (SEMMAS) are other stakeholders, which may be relevant for establishing partnerships, particularly for firefighting and ensuring the balance between economic activities and environmental preservation.

Additionally, at the state level, the project could count on the support of institutions such as the National Rural Learning Service (SENAR) can also act as an important partner by promoting education and training in the rural sector.

The assessment of rights, interests, and relevance to the project for each stakeholder group is detailed in the Table 2.6 below.

Table 2.6 Stakeholders description

Stakeholder Group	Rights, Interest and Overall Relevance to the Project
Communities: Caboclo Village	<b>High</b> - Caboclo Village is, according to the CCB Standard v3.1 definition of community, a local population that benefits from the project scenario and, therefore, is the target community of the TDX project and the one that will most benefit from it. It is of interest that they have access to alternative form of socioeconomic assistance, and improvement of living conditions. The community is the collectivity most susceptible to impacts arising from the implementation of project actions. Engaging the members of this community is necessary for the planned activities and actions to be carried out, and therefore the potential results to be achieved.
Community Groups - Caboclo Village: Below poverty threshold	<b>High</b> - The people that are below the national poverty line form a group within the Caboclo Village that obtain an average monthly income equal to or less than half the minimum wage, being considered a vulnerable group. It is of interest that they have access to alternative forms of socioeconomic assistance, and improvement of living conditions, in order to reduce social inequalities and social and economic vulnerability of this group. Engaging this group of the Caboclo Village is essential for project activities to achieve the desired results.
Community Groups - Caboclo Village: Women	<b>High</b> - The women group within the Caboclo Village are women responsible for the children and domestic duties, eventually performing paid work, temporary or continuous, with an average monthly income lower than that of men. It is of interest that these women have more access to information and capacitation in order to reduce inequalities and other gender issues, and increase well-being and participation in decision-making. Engaging women of the Caboclo Village is essential for project activities to achieve the desired results.
Other stakeholders: Workers participating in project activities	<b>High</b> - These employees are stakeholders of the project because they work and are involved in project activities and the consequent benefits, risks, or impacts identified. These workers often reside in the project communities or neighboring regions. It is of interest that they receive adequate training, for example, for forest protection activities, and also have access to socio-environmental education, which can help reduce long-term deforestation in the region and the adoption of more sustainable practices.
Other stakeholders: Institutions of the Municipality of Altamira	<b>High</b> - Articulate with other sectors of society to improve the permeability of public policies. It is of interest to bring the municipal bodies of Altamira as partners in the project, being able to bring together the demands and priorities of the communities with the creation and expansion of policies and benefits for the population in the areas of health, education and the environment. Furthermore, the partnership tends to facilitate the implementation of the project activities, reducing costs and increasing the efficiency, scope and magnitude of the planned improvements. It is these institutions that develop, implement and expand public policies for the municipality in which the Project is located, therefore they are the ones that can scale the project's activities, expand to other regions and make it lasting.

Stakeholder Group	Rights, Interest and Overall Relevance to the Project
Other stakeholders: Institutions of the Municipality of São Félix do Xingu	<b>Medium</b> - Articulate with other sectors of society to improve the permeability of public policies. It is of interest to bring the municipal bodies of São Félix do Xingu as partners in the project, because although the project areas are not in this municipality, the ATX, the protected area in which the Project is located is also part of São Félix do Xingu. Therefore, the partnership tends to facilitate and reduce bureaucracy in the implementation of programs and actions, reducing costs and increasing the efficiency, scope and magnitude of the planned improvements. The municipal institutions of São Félix do Xingu also develop, implement and expand environmental policies for the ATX, so they are the ones who can scale the project's activities, expand it to other regions and make it lasting.
Other stakeholders: State institutions - Pará	<b>High</b> - Articulate with other sectors of society to improve the permeability of public policies. It is of interest to bring the state institutions of Pará as partners in the project, being able to bring together the demands and priorities of rural populations, as well as the environmental demands that must be included in the state agenda. Furthermore, the partnership tends to facilitate and reduce bureaucracy in the implementation of programs and actions, reducing costs and increasing the efficiency, scope and magnitude of the planned improvements. It is these institutions that develop, implement and expand public policies for territory and the environment, for example, for all municipalities in the State of Pará and, therefore, they are the ones that can scale up project activities and expand to other regions.

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

The project activities were designed based on the community's priority issues, defined during the social diagnosis in a participatory process, and on a SWOT Analysis that identified strengths, weaknesses, opportunities, and threats related to the project. The SWOT Analysis and activities design process are shown in detail in the annex<sup>20</sup>. Afterwards, the preliminary project activities were disseminated to the community of Caboclo Village for consultation, adaptation, and approval<sup>21</sup>, and their revised version is briefly described below.

#### 2.1.8.1 Theory of Change

The theory of change for the Triunfo do Xingu Grouped REDD+ Project was developed to describe the causal chain resulted by the execution of project activities, in accordance with the Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects (Richards, 2011). The focal issues defined by the theory of change are:

- Economic vulnerability
- Weak community organization
- Gender inequality
- Biodiversity loss
- Escalation of climate change and vulnerability to its impacts

A set of inputs were used by the technical team to develop the project's theory of change, including<sup>22,23,24</sup>.

- Social diagnosis (Figure 2.16)
- Stakeholder identification
- Community scenario analysis
- Report of the first governance meeting
- Biodiversity report on secondary data
- Participatory impact assessment (Figure 2.17)

After describing the focal issues, the technical team was able to identify the expected outputs, outcomes and impacts of the project activities, which were further complemented by a participatory impact assessment carried out with the community of Caboclo Village. All the theory of change process and its results can be seen in detail in the annex<sup>25</sup>. Furthermore, a table showing all expected activities, outputs, outcomes, and impacts can be seen in Table 2.7. It is worth noting that the output's estimated quantifications were defined considering a planning horizon of 5-10 years, in accordance with the recommendation that the theory of change be reviewed periodically, "as the project context, understanding, and strategies evolve as part of an adaptive management process" (Richards (2011).

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<sup>20</sup> TheoryOfChangeTdX.zip

<sup>21</sup> ValidationMeetings.zip

<sup>22</sup> SocialDiagnosis.zip

<sup>23</sup> StakeholderIdentification.zip

<sup>24</sup> 230912\_SecondaryDataReportBio.pdf

<sup>25</sup> TheoryOfChangeTdX.zip



Figure 2.16 Social diagnosis in Caboclo Village.

ATIVIDADE	PRODUTO	IMPACTO ou RISCO	DIRETO ou INDIRETO	DIMENSÃO	GRUPO/PORTE AFETADA	IMPORTÂNCIA	+/-	DIMINUIÇÃO
EDUCAÇÃO	FORMA	ALIMENTAÇÃO SAUDÁVEL / <i>Alimentação</i>	DIRETO	SAÚDE	SAÚDE	ALTA/ALTA	+/-	
	OFICINA	APRENDIZADO	DIRETO	SAÚDE	SAÚDE	ALTA	+	
	MATERIAIS	TERCEIRA ACESSO À EDUCAÇÃO	DIRETO	SAÚDE	SAÚDE	ALTA	+	EDUCACIONAL/SAÚDE
RENTA	CURSOS	REVENHA DE RENDA	DIRETO	ECON. SOCIAL	TODOS	ALTA	+	
	CONTRIBUIÇÃO	REVENHA DE RENDA	DIRETO	ECON. SOCIAL	TODOS	ALTA	+	
ENERGIA	PAINEL	ENERGIA SOLAR / <i>energia limpa</i>	DIRETO	SAÚDE SOCIAL	TODOS/TODOS	ALTA/ALTA	+/-	
SANEAMENTO	MATERIAIS	TERCEIRA ACESSO À SAÚDE	DIRETO	SAÚDE SOCIAL	TODOS	ALTA	+	
GOVERNANÇA	REUNIÕES	REVENHA DE RENDA	DIRETO/INDIRETO	SAÚDE SOCIAL	TODOS/TODOS	ALTA/ALTA	+/-	
	REUNIÕES	REVENHA DE RENDA	DIRETO/INDIRETO	SAÚDE SOCIAL	TODOS/TODOS	ALTA/ALTA	+/-	
LAZER	ESP. CORUM / <i>INFORMÁTICA</i>	REVENHA DE RENDA	DIRETO	SAÚDE SOCIAL	TODOS/TODOS	ALTA/ALTA	+/-	
ED. COMUNITÁRIA	PALCETAS	REVENHA DE RENDA	DIRETO	SAÚDE SOCIAL	TODOS/TODOS	ALTA/ALTA	+/-	
SUSTENTABILIDADE	PROPOSTA	REVENHA DE RENDA	DIRETO	SAÚDE SOCIAL	TODOS/TODOS	ALTA/ALTA	+/-	
	PROPOSTA	REVENHA DE RENDA	DIRETO	SAÚDE SOCIAL	TODOS/TODOS	ALTA/ALTA	+/-	
ÁGUA	PROPOSTA	REVENHA DE RENDA	DIRETO	SAÚDE SOCIAL	TODOS/TODOS	ALTA/ALTA	+/-	

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6.17775264S 53.38372432W

Figure 2.17 Participatory impact assessment.

Table 2.7 TdX Theory of Change.

Activities	Outputs	Outcomes	Impact	Relevance to project's objectives
Improving environmental and formal/informal education for children, young people and adults	01 school garden implemented and maintained	Improved food safety	Strengthened local economy  Permanence of biodiversity  Increased climate change resilience	The implementation of a school garden and the execution of awareness campaigns aim to promote environmental education and citizenship while providing a practical learning opportunity. By involving teachers and students in these activities, the community can deconstruct negative views on environmental issues and learn to adopt more sustainable practices, such as peaceful coexistence with local wildlife. In the medium and long term, these actions contribute to reducing unplanned deforestation, directly impacting the project's climate objective while the community becomes more aware and engaged in conserving local biodiversity.
	01 alignment meeting held with school coordinators and teachers	Improved teaching conditions		
	03 supplies of materials for courses and classes at the local school carried out			
	10 awareness campaigns on environmental and citizenship education carried out	Deconstruction of negative views on environmental issues  Reduction of unplanned deforestation  Prevalence of strategies for sustainable coexistence with wildlife		
Generating income opportunities for the community	10 training courses offered for local employment opportunities	Increased and diversified income for the community  Increased and	Strengthened local economy	The training courses and the hiring of community members, including women, offer new economic opportunities, diversifying income and reducing dependence on

Activities	Outputs	Outcomes	Impact	Relevance to project's objectives
	10 people hired for project activities, including women	<p>diversified income for women</p> <p>Decreased levels of economic vulnerability for the community and women</p>	Gender equality promoted	environmentally harmful activities. With more sustainable livelihood alternatives, economic vulnerability decreases—especially for women—thereby strengthening the community's social fabric. Income generation is directly linked to reducing activities that contribute to deforestation, promoting forest conservation and carbon sequestration, which positively impacts both the climate and biodiversity objectives.
Strengthening community governance and communication	12 communication channels established and maintained with the community	Community participation in collective decision-making	<p>Strengthened community empowerment</p> <p>Gender equality promoted</p>	The creation of communication channels and the promotion of governance initiatives, with special attention to female participation, strengthen the community's ability to make collective and sustainable decisions. Active community participation in decision-making processes increases social engagement and cohesion, directly fostering a governance model that balances socio-environmental needs. These initiatives facilitate the adoption of sustainable practices that help protect the climate and biodiversity, while also enhancing community well-being by providing spaces for leisure and dialogue.
	10 initiatives to structure governance, with a focus on promoting female participation carried out	Participation of women in the social life of the community and in decision-making		
	01 initiative to promote community organization with a focus on improving mobility infrastructure	<p>Reducing levels of economic vulnerability in the community and among women</p> <p>Promotion of leisure spaces and initiatives</p>		

Activities	Outputs	Outcomes	Impact	Relevance to project's objectives
Improved access to technology, health and leisure	01 space with internet network installed	Expansion and improvement of social relations  Improved communication skills and access to information	Strengthened community empowerment  Gender equality promoted  Strengthened local economy	The installation of community infrastructure, such as an internet network, along with the provision of necessary materials, has the potential to expand social relationships and improve access to information and culture, thereby strengthening community cohesion. With improved physical and mental health conditions, the community will be better prepared to adopt sustainable land use practices and coexist with biodiversity. Furthermore, access to technology can facilitate the dissemination of knowledge about sustainability and promote behaviors that contribute to the climate, social, and conservation objectives.
	04 infrastructures, equipment or sets of materials for community use provided	Promotion of physical and mental health  Greater access to leisure and culture		
Conservation and enhancement of local biodiversity	05 attempts at cooperation deals conducted with local authorities/institutions to structure and implement wildlife protection programs	Prevalence of sustainable coexistence strategies with fauna	Permanence of biodiversity  Increased climate	Monitoring campaigns for fauna and flora, combined with fire-fighting actions, help conserve habitats and recolonize degraded areas, protecting endangered and endemic species. These activities are fundamental in reducing unplanned deforestation and improving the microclimatic conditions necessary for species survival, directly impacting biodiversity conservation objectives. Moreover, forest
	04 fauna/flora focal species monitoring campaigns carried out	Conservation of habitat areas and recolonization of fauna		
	08 monitoring reports on endangered, vulnerable and endemic species produced	Reduction of unplanned deforestation		

Activities	Outputs	Outcomes	Impact	Relevance to project's objectives
	30 monitoring of the project area	Suitable microclimate conditions for species	change resilience	preservation contributes to carbon sequestration, aligning with the project's climate objective while strengthening community resilience.
	10 fire-fighting measures			
Improved community and biodiversity access to water resources	01 protection strategy structured and implemented in the riparian zone of the Caboclo stream and/or other water bodies in the territory	Contribute to the maintenance of the riparian zone		The protection of riparian zones and springs, coupled with workshops on the sustainable use of water, aims to ensure continuous access to high-quality water resources for the community and local biodiversity. Conscious water use and improvements in basic sanitation reduce environmental impacts and promote community resilience in the face of climate change. By safeguarding permanent preservation areas, the project ensures the maintenance of both aquatic and terrestrial habitats, fostering species conservation and contributing to the climate and biodiversity objectives.
	02 workshops held on maintaining Permanent Preservation Areas, protecting springs, sustainable water use and building septic tanks	Increased water security		
	01 drinking water access structure implemented in the community			

### 2.1.9 Climate, Biodiversity and Community Benefits Assessment Period (G1.9)

The TdX project started on the 31<sup>st</sup> of August 2022. This date represents the first date when local activities began to be implemented by Systemica Inteligência em Sustentabilidade S.A. through presential meetings with the objective of presenting the TdX project, gathering socioeconomic information, bringing elements of environmental education to local communities near the project areas, and understanding their opinion about it<sup>26</sup>. During these activities, community participation was prioritized to guide some REDD+ capacities, mainly in the themes: (i) reduction of emissions from deforestation; (ii) reduction of emissions from forest degradation; (iii) how to contribute to increasing forest carbon stocks; and (iv) actions and attitudes that can contribute to controlling climate change and global warming.

Engaging the local community helps to spread the existence of REDD+ to them, which is still not very popular among the larger amount households of the Amazon biome, and then, shows them the benefits the project implementation can bring not only to the environment, but also to the local communities. The project's lifetime has a period of 60 years; this is also the time period over which changes in GHG emissions reductions resulting from project activities will be monitored as well as the biodiversity and community benefits.

#### 2.1.10 Differences in Assessment Periods (G1.9)

The GHG emission accounting period of the project is set at 30 years, running from August 31<sup>st</sup>, 2022, to August 30<sup>th</sup>, 2052. In comparison, the monitoring period for emissions, adaptive capacity and resilience to climate change, biodiversity and community well-being will extend over a period of 60 years (longevity).

#### 2.1.11 Implementation Schedule (G1.9)

*Table 2.8 Implementation Schedule.*

Date	Milestone(s) in the project's development and implementation
August to September 2022	Carrying out the social diagnosis, focusing on Caboclo Village.
August 2022	The project start date when local activities started to be implemented by Systemica Inteligência em Sustentabilidade S.A. Presential meetings were done to present the TdX project, to bring elements of environmental education to local communities near the project areas, develop REDD+ capacity building activities and to understand their opinion about it.
August 2022 - so far	Prospect of new PAIs for inclusion in the grouped project, and feasibility studies.
October 2022	Signing of an agreement between Systemica Inteligência em Sustentabilidade S.A. and the owner of Nossa Senhora Aparecida Farm to develop projects and generate certified carbon assets.

<sup>26</sup> 230313\_FirstProjectImplementationActivity.pdf

*Table 2.8 Implementation Schedule.*

Date	Milestone(s) in the project's development and implementation
October 2022	Signing of the agreement for project development and generation of certified carbon assets between Systemica Inteligência em Sustentabilidade S.A. and the owner of the Santa Marta farm complex.
March 2023	Monitoring Project Areas training
March 2023	Meeting with the SEMMAS (Municipal Secretariat for the Environment and Mining of São Félix do Xingu) via video call. Meeting to present the project and audit dates.
March 2023	Meeting with the APA (Environmental Protection Area) Triunfo do Xingu Management Council via video call. Meeting to present the project and audit dates.
March 2023	Meeting with the ITERPA (Pará Land Institute) via video call. Meeting to present the project and audit dates.
1March 2023	Meeting with the SEMMA (Altamira Municipal Department of Environmental Management via video call). Meeting to present the project and audit dates.
April 2023	Carrying out a forest biomass inventory in the project areas and training of local agents and contracting to carry out the forest biomass inventory in the project areas.  Training and execution of carbon inventory techniques - Floristic inventory techniques of carbon biomass in natural Amazonian Forest.
April 2023	Meeting with SESMA (Altamira Municipal Health Department) via video call. Meeting to present the project and audit dates.  This meeting presented the project's health-related activities in detail and discussed the partnership between the project and the Secretariat.
April 2023	Meeting with SEMAS (Pará State Secretariat of Environment and Sustainability) via video call. Meeting to present the project and audit dates.
April 2023	Meeting with STTR (Union of Rural Workers and Family Farmers of the Municipality of Altamira) via video call. Meeting to present the project and audit dates.
June 2023	The first community governance strengthening event with Caboclo Village and the presentation and dissemination of the Communication Procedure containing mechanisms to deal with conflicts and grievance.
June 2023	An open lecture about the environment and sustainable development for Caboclo Village.

Table 2.8 Implementation Schedule.

Date	Milestone(s) in the project's development and implementation
	The lecture was held for the Caboclo Village community on the environment, sustainable development, and biodiversity, ministrated by Bioama, a company hired by Systemica Inteligência em Sustentabilidade S.A. to carry out the fauna survey in the project areas.
June to July 2023	Carrying out the fauna inventory in the project areas, training of local agents and contracting to carry out the fauna inventory in the project areas.
July 2023	Meeting with SEMED (Municipal Department of Education of Altamira) via video call.  Meeting to present the project and strategies to sign the cooperation agreement between the secretariat and the project.
July 2023	Meeting with SEPLAN (Municipal Planning Department of Altamira) via video call.  Meeting to present the project and strategies to sign the cooperation agreement between the secretariat and the project.
September 2023	Signing of the cooperation agreement between the project and SEMED (Altamira Municipal Secretariat of Education).
September 2023	Training local assistants to carry out specific project activities.
September 2023	Training the administrator of Nossa Senhora Aparecida Farm to carry out field monitoring and surveillance rounds in accordance with the Field Monitoring Operating Procedure
September 2023	Development of a participatory impact assessment of the project's activities with Caboclo Village. Two assessments were carried out, one especially for the women of Caboclo Village and the other for all the members of Caboclo Village.
October 2023	Hiring community members to act as local assistants to the project, supporting its main activities.
November 2023	Provision of school materials for the local school
November 2023	Workshop on the ecological functions of fauna and sustainable activities for community school students
November 2023	Preventive safety training for professionals working in the field
November 2023 – so far	Installation of trap cameras to monitor wildlife
November 2023 to October 2023	Pilot monitoring campaigns of focal species of fauna and flora; camera trap monitoring of threatened, vulnerable and endemic species
December 2023	Trap Camera Installation and Maintenance Training Report

*Table 2.8 Implementation Schedule.*

Date	Milestone(s) in the project's development and implementation
December 2023	Preventive safety training with professionals who will be working on the project's implementation activities
December 2023	Monitoring Project Areas training
December 2023	Ecological functions workshop
December to January 2024	Publication for public comment period on the VERRA register
January 2024	Hiring community members to act as local assistants to the project, supporting its main activities.
January 2024 – so far	Camera trap monitoring in project area
January 2024 - so far	Patrolling and monitoring of the project areas
January 2024	Publicizing of the CBB validation and verification audit
January 2024 - so far	Social monitoring
January 2024	Face-to-face meeting to structure community governance
January 2024	Lecture and construction of working group on information and questions of interest about land regularization
January 2024	Lecture and construction of working group on sustainable development and conservation of water resources
January 2024	Supply (donation) of materials for the implementation and maintenance of the school garden
January to April 2024	Implementation of a school vegetable garden to improve student nutrition and environmental education
March 2024	Trap Camera Installation and Maintenance Training Report
March 2024	Preventive safety training with professionals who will be working on the project's implementation activities
May 2024	Training/awareness about hunting practices
May 2024	Donation of a new projector to the Novo Pacto Municipal School.
September 2024	Donation of sports materials to the Novo Pacto Municipal School.
September 2024	Photography, bakery and artificial insemination trainings/courses.
October 2024	Trap camera monitoring training, project area patrol and field security
January 2025	Contract renewal with community agents

Table 2.8 Implementation Schedule.

Date	Milestone(s) in the project's development and implementation
February 2025	Monitoring Project Areas training
April 2025 – so far	Implementation of weekly communication for updates and alignments with community agents
June 2025	Donation of complete uniform for community women's soccer team
June 2025	Donation of 2 computers to the Novo Pacto Municipal School.
July 2025	Forest brigade training for employees and community workers at Sefer property
July 2025	Community Photography Contest
July 2025 – so far	Cleaning, maintenance and planting in the school garden.
August 2025	Donation of 4 backpacks to the São Felix do Xingu Fire Department
August 2025	Community training provided by the São Félix do Xingu Fire Department
August 2025	Re-presentation and updates of the monitoring period results for the community
Future events	Maintenance of firebreaks; provision of workshops and lectures on climate, environmental conservation and sustainable development; provision of structure for access to drinking water implemented in the community.
Future events	Provision of school materials for the local school; provision of training courses; installation and maintenance of photovoltaic panels for the Caboclo Village school and health center; provision of materials for the local health center; holding face-to-face meetings to structure community governance; installation, provision and maintenance of internet for the community; implementation of a community space for Caboclo Village; attempts at cooperative discussions held with local authorities to improve mobility infrastructure; awareness and engagement campaigns to strengthen environmental and citizen education carried out.
Future events	Workshops on the ecological functions of fauna and sustainable activities; protection of riparian zones of the Caboclo Stream; attempts at cooperative discussions conducted with local authorities to structure and implement wildlife protection programs for rural landowners.
Future events	VCS and CCB validation and verification audit and subsequent correction of findings

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

This section identifies likely natural and human-induced risks to the expected climate, community, and biodiversity benefits during the project lifetime. The complete and detailed risks assessment was carried

out through the application of the VCS approved tool “Non-Permanence Risk Report: VCS Version 4.0” and is presented with the annexed materials<sup>27</sup>. Furthermore, potential risks associated with CCB activities were identified during the development of the Theory of Change<sup>28</sup> and Participatory impact assessment with Caboclo Village (see Section 4.5.3). They are listed in Table 2.9 below, along with the measures needed and designed to mitigate these risks

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<sup>27</sup> 230214\_VCSNPRRTriunfoDoXinguGroupedREDD+Project.pdf

<sup>28</sup> 231018\_TheoryofChange.pdf

Table 2.9 Identified natural and human-induced risks and the measures to mitigate these risks.

Identify Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Logistical challenges due to poor road conditions	The poor road conditions hinder the logistics for carrying out project activities, including governance meetings and fauna and flora monitoring campaigns.	Cooperation with the government to improve mobility. This is an activity already planned by the project (see Section 2.1.8), which, besides bringing benefits to the community, is expected to contribute to enhancing the logistical conditions of other project activities.
Lack of community engagement in project activities.	Project-related activities involving training, workshops, and lectures may have their effectiveness reduced if the community does not engage in these activities. Additionally, the lack of engagement may result in landowners around Caboclo Village showing little interest in participating in wildlife protection programs and actions to safeguard the riparian zone of Caboclo stream.	Strengthening governance and community communication. This is an activity already planned by the project (see Section 2.1.8), which, besides bringing benefits to the community, is expected to contribute to increasing community engagement in other project activities.

### 2.1.13 Benefit Permanence (G1.11)

To maintain and enhance the climate, community, and biodiversity benefits beyond the project lifetime, the activities of the TdX project were designed with the purpose of breaking the vicious cycle of illegal deforestation and its effects. To achieve this, the project activities aim to create income and professional development opportunities, foster community governance, promote environmental education, biodiversity conservation, and other objectives that should change the most likely future scenario, which involves deforestation in the project area and the community's enduring low quality of life<sup>29</sup>. Each of the planned activities (see Section 2.1.8) will be monitored through indicators from diagnosis before implementation and throughout its execution. By analyzing these indicators, it will be possible to monitor the expected results and adapt activities as necessary.

Among the activities to be developed, the activity of community governance, specifically, foresees the planning and facilitation of a governance structure that encourages community members' participation and engagement in project activities, as well as facilitating transparency and communication. The goal is for the community to be able to cooperate over time for mutual benefit, coordinating with various institutions and managing resources and conflicts that arise in these situations independently (da Veiga, 2016). In addition to this, the project also proposes advocacy actions with public institutions in the municipality of Altamira and the state of Pará, seeking to facilitate and influence public policies targeted at rural communities (dos Santos, 2011), thus increasing the possibility of scaling the benefits of the project activities, as well as the sustainability of these benefits.

Through the project activities, Systemica Inteligência em Sustentabilidade S.A. has enabled different mechanisms to ensure improved community governance, engagement, and coordination with the government, and new opportunities and life prospects will be passed down from generation to generation, perpetuating the benefits of these changes in the climate, community, and biodiversity.

### 2.1.14 Financial Sustainability (G1.12)

Pertaining the financial mechanisms adopted to provide an adequate actual and projected flow of funds for project implementation and to achieve the project's climate, community and biodiversity benefits there are two means: owners' own resources and the projected revenues from GHG emissions reductions. The simulated project cash flows available in a spreadsheet<sup>30</sup> attached indicate that the project's breakeven point will be reached 4 years after the start date, and the accumulated revenue is sufficient to cover all necessary activities for implementing, conducting and fulfilling the objectives of the project activities.

The project has secured more than 80% of the total cash outflow required before reaching breakeven. Documentation confirming the secured funding is provided through the livestock inventory presented by Rafael Sefer at Santa Marta Farm<sup>31</sup>, which demonstrates the substantial resource base already committed to the project. This livestock inventory serves as tangible proof of the secured assets that will support project operations through the breakeven period. Additionally, Systemica has committed its own internal resources to support the project's financial requirements.

The total cash outflow calculations were developed based on comprehensive service cost consultations conducted for the TdX project execution, incorporating current market realities as assessed by Systemica during the present year. These calculations provide a realistic foundation for determining the funding

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<sup>29</sup> SocialDiagnosis.zip

<sup>30</sup>241113\_TdXCashFlow.xlsx

<sup>31</sup> 230206\_SantaMartaLivestock.pdf

requirements and confirming that the combination of secured external resources and Systemica's proprietary funding exceeds 80% of the necessary capital. The project's financial security is therefore strengthened by this diversified funding approach, which combines external asset backing with internal corporate resources. The complete financial analysis, including detailed cost breakdowns and funding sources from both external and internal channels, is available in the attached documentation for thorough review and verification of the project's robust financial position<sup>32</sup>.

Both financial mechanisms will be used to guarantee the implementation, maintenance and management of the project activities. There are logistical, administrative, and communication costs, as well as the audits and verification of the project. On the other hand, a considerable part of the costs are for patrolling and surveillance (Climate), in addition to the cost of acquiring materials for planned activities with the community (Community) and for biodiversity monitoring activities (Biodiversity), among other specific activities for each of the project's objectives, such as costs for hiring local people or technical staff, training and workshops with the project actors.

**2.1.15 Eligibility Criteria for Grouped Projects (G1.14)**

The Triunfo do Xingu Grouped REDD+ Project is a grouped project of Avoiding Unplanned Deforestation (AUD) project activity, at the present stage, is composed by multiple areas, but only one instance. This first instance (hereinafter also referred to as TdX-I1) has seven properties: six of them are adjacent to another and have the same owner, then there is the seventh one 40 km distant from the others and with another landowner. Since it's a grouped project, there is the possibility of adding new instances in the future, if near landowners are interested on taking part of the project. Any new areas willing to become instances of the project shall comply with the applicability conditions of the selected methodology, including conditions applicable to each activity.

The most important requirements for the incorporation of new areas are described in Table 2.10.

*Table 2.10. TdX set of eligibility criteria and the attendance of the 1st Project Activity Instance.*

VCS Standard Eligibility for Grouped Project	TdX Project Activity Instances
3.6.10. Grouped projects shall specify one or more clearly defined geographic areas within which project activity instances may be developed.	The project has a clearly defined geographic area for the development of new instances of activity, corresponding to the jurisdictional allocation map of Verra (State of Pará). The baseline scenario determination and additionality demonstration were based on the initial project activity instance (Section 2.1.8), which is presented in this PD for validation.
3.6.11. Determination of baseline scenario and demonstration of additionality are based upon the initial project activity instances.	The determinations of the baseline scenario and the additionality were based upon the initial project activity instance: avoiding unplanned deforestation, also described in Sections 3.4 and 3.5 of the PD, respectively.

<sup>32</sup> Financial\_Viability.zip

VCS Standard Eligibility for Grouped Project	TdX Project Activity Instances
	<p>The set of eligibility criteria described here should ensure that the same baseline scenario applies to future instances. All characteristics that impact the applicability of the baseline scenario should be described for the specific eligibility criteria. Particularly, it was established as an eligibility criterion for future instances that Sustainable Forest Management (SFM) must not occur in the project area of new instances in both the project scenario and the baseline scenario.</p> <p>Overall, the project's baseline scenario is characterized by the illegal conversion of forest lands to non-forest uses, a practice aligned with the regional land use common practice. This scenario is linked to the unplanned deforestation of eligible forest areas — which may include APP, LR, and LR surplus — that are cleared for cattle pasture by land grabbers. As discussed in Section 3.4 of the PD, while the distinctions among APP, LR, and LR surplus are relevant from the perspective of landowners, they lose significance for the agents of deforestation. Remember that deforestation agents — essentially land grabbers — disregard formal boundaries, thereby unlawfully encroaching upon the area.</p> <p>In this context, the baseline scenario for all instances applied under this grouped project must mirror the baseline scenario, being characterized by invasion of property by land grabbers, unplanned deforestation, total burning of biomass and subsequent implementation of livestock farming and cattle grazing. New instances must adhere to the same baseline scenario, including confirmation that there is no SFM implementation in the project area, both the project scenario and the baseline scenario.</p> <p>The additionality of the initial project activity instance was demonstrated for the designated geographic area, in accordance with the methodology applied to the project.</p>

VCS Standard Eligibility for Grouped Project	TdX Project Activity Instances
3.6.12. As with non-grouped projects, grouped projects may incorporate multiple project activities.	In validation, the only project activity is avoided unplanned deforestation, and the geographic area corresponds to the jurisdictional allocation map of Verra (State of Pará).
3.6.13. The baseline scenario for a project activity shall be determined for each designated geographic area, in accordance with the methodology applied to the project.	At validation, the project has a single designated geographic area, the first instance project area, with a single baseline scenario for the project activity. If new designated geographic areas are added, i.e. new project area instances, the baseline scenario will be determined for each one of them according to the adopted methodology.
3.6.14. The additionality of the initial project activity instances shall be demonstrated for each designated geographic area, in accordance with the methodology applied to the project.	At validation, the project has a single designated geographic area, the first instance project area, with a single additionality demonstration. If new designated geographic areas are added, i.e. new project area instances, additionality will be demonstrated for each one of them.
3.6.15. Where factors relevant to the determination of the baseline scenario or demonstration of additionality require assessment across a given area, the area shall be, at a minimum, the grouped project geographic area.	All factors relevant to the determination of the baseline scenario or demonstration of additionality were assessed across the grouped project geographic area corresponding to the jurisdictional allocation map of Verra (State of Pará).
<p>3.6.16. Grouped projects shall include one or more sets of eligibility criteria for the inclusion of new project activity instances. A set of eligibility criteria shall ensure that new project activity instances:</p> <ol style="list-style-type: none"> <li>1) Meet the applicability conditions set out in the methodology applied to the project.</li> <li>2) Use the technologies or measures specified in the project description.</li> <li>3) Apply the technologies or measures in the same manner as specified in the project description.</li> <li>4) Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.</li> </ol>	<p>This table has a set of eligible criteria for the inclusion of new project activity instances in the TdX project. It is also ensured that new project activity instances and the TdX-I1:</p> <p>Meet the applicability conditions set out in the methodology applied to the project.</p> <p>Uses technologies or measures specified in the project description and in the same manner as their description.</p> <p>It is subject to the baseline scenario determined in the project description for the project activity specified in the geographic area.</p> <p>Sets out the characteristics for financial, technical and/or other parameters used by additionality of this project. Eventual new</p>

VCS Standard Eligibility for Grouped Project	TdX Project Activity Instances
<p>5) Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area. For example, the new project activity instances have financial, technical and/or other parameters.</p>	<p>instances need to be consistent with this first instance.</p>
<p>3.6.17. New project activity instances shall:</p> <ol style="list-style-type: none"> <li>1) Occur within one of the designated geographic areas specified in the project description.</li> <li>2) Conform with at least one complete set of eligibility criteria for the inclusion of new project activity instances.</li> <li>3) Be included in the monitoring report with sufficient technical, financial, geographic, and other relevant information to demonstrate conformance.</li> <li>4) Be included in an updated project description, with updated project location information, which shall be validated at the time of verification against the applicable set of eligibility criteria.</li> <li>5) Have evidence of project ownership, in respect of each project activity instance,</li> <li>6) Have a start date that is the same as or later than the grouped project start date.</li> <li>7) Be eligible for crediting from the start date of the project activity instance through to the end of the project crediting period (only).</li> <li>8) Only eligible for crediting from the start of the verification period in which they were added to the grouped project.</li> <li>9) Not be-or have enrolled in another VCS project.</li> <li>10) Adhere to the clustering and capacity limit requirements for multiple project activity instances set out in 3.6.8 - 3.6.9.</li> </ol>	<p>New TdX project activity instances:</p> <p>It will take place in the designated geographic area specified in the project description.</p> <p>It will be in conformance with this defined set of eligible criteria.</p> <p>It will be included in the monitoring report.</p> <p>An updated project description will be included, with updated information on the project location, which will be validated by the VVB contracted.</p> <p>It will have evidence of project ownership.</p> <p>It will have the same start date as or later than the TdX grouped project and</p> <p>It will be eligible through all the project activity instance crediting period.</p> <p>It will be eligible for crediting from the start of the verification period in which they were added to the TdX grouped project.</p> <p>It will not be or have been enrolled in another VCS project.</p> <p>It will adhere to the clustering and capacity limit requirements.</p> <p>The TdX-I1:</p> <p>Occurs in the designated geographic area specified in the project description.</p> <p>Comply with this set of eligible criteria presented by this Table.</p> <p>As this is the first instance, it is already included in this PD.</p> <p>It will be validated by the contracted VVB.</p>

VCS Standard Eligibility for Grouped Project	TdX Project Activity Instances
	<p>Have evidence of project ownership, presented in Section 1.8 of the PD.</p> <p>Have the same start date as the grouped project and is eligible through all the project crediting period.</p> <p>It will not leave the VCS project and then enroll in another one.</p>
<p>3.5.17. AFOLU non-permanence risk analyses, where required, shall be assessed for each geographic area specified in the project description.</p>	<p>The AFOLU non-permanence risk analyses will be assessed for each new project activity instance.</p> <p>The TdX-I1 required non-permanence risk analysis is available together with this PD.</p>

Thus, the areas that compose TdX-I1 aim to avoid unplanned deforestation (AUD-type activity); are areas composed by forests with more than 10 years of existence prior to the project start date; are subject to the determination of the without-project land use scenarios and additionality described in this project; uses the technologies and measurements in accordance with the applicable methodology (VM0048, full description in the VCS PDD), as well as the monitoring tools and schedule; and finally, TdX-I1 are subject to the processes for stakeholder engagement and respect for rights to lands, territories and resources including free, prior and informed consent described in this project (Sections 2.3 and 2.5).

### 2.1.16 Scalability Limits for the Grouped Projects (G1.15)

The project is designed to operate within the jurisdictional allocation map defined by Verra (State of Pará). Any new project instances would occur within this jurisdiction and must have similar ecological and socio-economic conditions, comparable deforestation dynamics, and consistent physical and ecosystem characteristics with the first instance. In addition, any new area must meet all eligibility criteria described in Section 2.1.15.

Because project activities focus on avoiding unplanned deforestation, the inclusion of additional areas would not negatively impact biodiversity; on the contrary, expanding preserved areas would enhance biodiversity protection. From an economic and managerial perspective, scalability is primarily limited by land tenure and legal eligibility, i.e., the number of properties within the jurisdictional boundaries that can join the project. New areas will only be added if credit management is sufficient to ensure financial viability. From a managerial standpoint, no restrictions exist, since the project proponent (Systemica Inteligência em Sustentabilidade S.A.) has the capacity to expand its team and management resources as needed. Finally, the applied methodology (VM0048) does not establish any inherent scalability limits and therefore imposes no restrictions on project expansion.

### 2.1.17 Risk Mitigation Approach for Grouped Projects (G1.15)

This is a grouped project, so the new areas must have similar deforestation dynamics and ecosystem aspects of the landscape, the property must meet all land requirements and eligibility criteria and still be

economically viable. Therefore, all risk mitigation measures for climate, community and biodiversity benefits identified in this project area (see Section 2.1.12) will be applicable to any new cases. In addition, the non-permanence risk of the project benefits will be reduced as the project activities for new areas will also be proposed and developed by Systemica Inteligência em Sustentabilidade S.A. multidisciplinary team, which has the capacity and knowledge necessary to properly implement the project activities, as well as the competence to add continuous improvements.

## **2.2 Without-project Land Use Scenario and Additionality**

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

This section aims to present the range of potential land use scenarios within the project area and in the absence of the project, describing the drivers associated with land use changes and identifying which land use scenario is most likely to occur. The assessment of agents, drivers, and historical patterns of deforestation was carried out in accordance with the Consolidated Methodology VM0048 for Reducing Emissions from Deforestation and Forest Degradation (REDD+), version 1.0 (Verra, 2023), for the development of the VCS Project Description. Therefore, complete information on the implementation of the methodology and its results can be found in Section 3 of the VCS Project Description. The potential land use scenarios and the most likely land use scenario within the project area in the absence of the project will be summarized below.

#### **2.2.1.1 Deforestation near the project area**

The TdX project area is located within the municipality of Altamira, one of the municipalities encompassing the Triunfo do Xingu Environmental Protection Area (ATX); the other municipality is São Félix do Xingu. Altamira was the municipality with the highest deforestation rate in Brazil's Legal Amazon region by 2021 (G1, 2021) and deforestation has increased in the past three years, with an average annual deforestation rate exceeding 71,277 ha (INPE, 2022). The conversion of these areas is primarily for pastureland. From 2002 to 2021, over 97% of the forests in Altamira were converted into pastureland, similarly to the municipality of São Félix do Xingu, which recorded 98% of the deforested areas converted into pastureland during the same period (MapBiomas, 2022b). By the way, São Félix do Xingu and Altamira rank as the first and fourth municipalities in terms of cattle herd size in the state of Pará (IBGE, 2021). This land-use pattern is characterized by limited inputs and technology, causing pasture areas to progressively reduce their carrying capacity and experience increased degradation over time (Dias-Filho, 2017; Viana, 2017).

Under the VCS Standard, eligibility criteria for baseline scenarios and project activities are determined using jurisdictional data (methodology VM0048 and module VMD0055), which defines Pará State as the geographic scope for implementing new climate project instances. This jurisdictional approach provides spatial demarcation for deforestation analysis and eliminates the need for project-specific reference regions, with potential project areas corresponding to mature native vegetation over 10 years old in lands with regularized ownership according to SIGEF.

#### **2.2.1.2 Logging being conducted through Sustainable Forest management**

Logging in the State of Pará is a practice that occurs legally and illegally. This is because the related environmental legislation is systematically not enforced, and for that logging could take place through or not the approval of the sustainable forest management plan. According to the legislation on the subject, there is the possibility to execute forest management activities in the forest areas from a Legal Reserve (LR) inside an APA. In this scenario, the landowner would have to develop and approve a sustainable forest management plan under the competent environmental agency to explore his legal reserve area.

However, this scenario seems unlikely, mainly because of the lack of local infrastructure for the forest management production chain, resulting in higher investments and lower incomes. According to (Silva et al., 2014), one of the main causes of disincentive forest management is the high cost of log transportation from the forest to the sawmill, representing 40% of the total logging costs. In addition, the lack of supervision over illegal timber and the bureaucracy for issuing a forest management plan makes legal timber to be less competitive in local markets.

Corroborating this analysis, Bartholomeu et al. (2012) made a detailed assessment of the main waterways, highways, and ports necessary for wood production transportation. The result is that there are bottlenecks involving each one of them: some highways are still not asphalted, are lacking signage and bridges are in poor condition, some waterways have strong river currents and are poorly integrated with other modes of transport, some ports also are not asphalted, don't have access ramps and cargo transport equipment.

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

Section 2.2.1 presented above shows the most-likely land-use scenario for the TdX project in the absence of project activities, which is deforestation of the project area according to the VM0048 methodology. The native vegetation would be replaced by extensive pasture areas characterized by low productivity, minimal input usage, and technology. The data and methodology used to illustrate this scenario are provided in detail in Section 3 of the VCS Project Description. This includes the assessment of agents, drivers, historical deforestation patterns, and the opportunity cost analysis that substantiate the higher likelihood of converting these areas into pastures.

Furthermore, the scenario analysis document for the project community<sup>33</sup> presents the historical context that led to the current situation of the community, as well as the driving forces that perpetuate these conditions. In the absence of the project, one of the main driving forces, deforestation, would give way to extensive pastures, the primary land use and economic activity in the region, which would continue to expand due to low productivity and soil depletion. On the other hand, another significant driving force, the lack of State presence, sustains the actions of criminal organizations, rural violence, and the vulnerable situation of these populations.

In Caboclo Village, over half of the population lives below the national poverty line, with limited access to healthcare, education, and recreation. Most of the residents are dependent on precarious employment in local livestock farms. These and other data are presented in the stakeholder identification document<sup>34</sup>.

### **2.2.3 Additionality (G2.2)**

The climate, community, and biodiversity project benefits would not occur in the absence of the project, because project activities would not have been implemented due to significant financial, technological, institutional or capacity barriers.

To begin with, considering the results obtained from the application of the methodology (Section 3 of the VCS Project Description), it is projected that the project area would undergo complete deforestation by 2032 due to the existing agents, drivers, and causes of deforestation. As a result, 10,704.58 ha of forests would be cleared, leading to the emission of 655,972.19 t CO<sub>2</sub>e greenhouse gases in the without-project land-use scenario.

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<sup>33</sup> 230602\_CommunityScenarioAnalysis.pdf

<sup>34</sup> 231024\_StakeholderIdentification.pdf

The legal deforestation of forests in the Amazon is only allowed on 20% of the property according to the Law of Protection of Native Vegetation 12.651 of 2012 (Brasil, 2012). In practice, however, the law is not enforced, and deforestation in the states that comprise the Legal Amazon continues significantly, both before and after the current law (dos Santos, 2023). The state of Pará, in fact, continues year after year as the state with the highest deforestation rates in the region (Imazon, 2022), and studies show an exponential increase in the number of properties that deforest more than the 20% allowed by law (Costa & Escada, 2023). Without the project, there would be no incentive and funding for forest protection activities to take place.

Furthermore, the conversion of these deforested areas into extensive pasturelands, which require large areas due to low productivity, prolongs the economic insufficiency of the community, as the only available job opportunities, primarily in the local livestock properties, involve arduous and poorly paid work (see Section 4.1.4: Without-Project Scenario: Community) (Lavor, 2012).

Moreover, there is the impact of this land-use scenario on biodiversity, as the pressure from deforestation and the community's negative perspective on environmental issues create a scenario of habitat loss, reduced resilience to climate change, and unregulated hunting. Consequently, the loss of species also results in the loss of ecological functions and ecosystem services they provide (Costa et al., 2018; Giannini et al., 2020) (see Section 5.1.6: Without-project Scenario: Biodiversity).

All these scenarios are intensified by the geographical isolation of the area and the community, as well as the absence of the State. The lack of oversight from public agents leads to frequent land speculation and illegal practices, and the sense of impunity due to the lack of regulatory action further encourages deforestation and fraudulent occupation of public and indigenous lands. Moreover, there is a stigma against environmental agencies, widely shared among rural populations in this region, that portrays these organizations as restricting agricultural and livestock activities and impeding development (as discussed in the attached document of the community scenario analysis<sup>35</sup>). Therefore, the climate, community, and biodiversity project benefits would not occur in the absence of the project, as governmental intervention in the project region is insufficient, and the local population lacks any form of social organization or governance, as identified through community interviews<sup>36</sup>. Without the project, community governance, civic and environmental education, among other activities, would not be implemented, as the absence of the State is one of the main drivers of this scenario.

In summary, considering the history of deforestation in the region and the inadequate performance of the State, if the project activities were not implemented, the desired results and positive impacts would not be achieved (see Section 2.1.8 for theory of change and project activities), as the challenges of geographic isolation and the inefficiency of the State, already described in this section, undermine the possibilities of implementing activities other than through the project. Consequently, none of the expected benefits for climate, community, and biodiversity would be attained, much less their maintenance and enhancement throughout the project's lifetime (see Section 2.1.13: Benefit Permanence).

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

Not applicable. It is not intended to use any distinct climate, community, or biodiversity benefits as offsets. Instead, the focus is on using the VCUs generated by the VCS TdX verification process.

<sup>35</sup> 230602\_CommunityScenarioAnalysis.pdf

<sup>36</sup> 230124\_SurveyCabocloVillageSD.pdf

## 2.3 Stakeholder Engagement

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

The project documentation, including project description documentation and project monitoring reports, will be available to the public through Systemica Inteligência em Sustentabilidade S.A. (Systemica, 2023) electronic communication channels, such as the website, and on VERRA's (Verra, 2023a) own website. Additionally, whenever there is an update, such as after the annual verification audits, the documents on these channels will be updated as well.

To ensure that all project stakeholders have access to the project documentation, emails will be sent with links to access the channels where these documents are disseminated will be provided. In the case of the community, in addition to the option of accessing the information online, it will be possible to present the documentation during in-person meetings, especially the summary project description, which is presented in Portuguese and a less technical and more accessible language for the community. These occasions will serve as opportunities for the public to seek clarifications, voice concerns, or offer suggestions regarding the project.

Systemica Inteligência em Sustentabilidade S.A. will be attentive to any suggestions regarding new channels for document dissemination, and the community field assistants, hired by Systemica Inteligência em Sustentabilidade S.A., will also serve as communication channel between the project team and the community.

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

The summary project documentation is being disseminated and summary information on monitoring results will be disseminated to the community and the other stakeholders in documents, in Portuguese and accessible language, in digital or printed format through Systemica Inteligência em Sustentabilidade S.A. electronic communication channels and exclusive communication channels with the community<sup>37,38</sup>, and orally through in-person meetings with the community<sup>39,40</sup>. All these means of communication will be updated whenever there is a need to update the summary project documentation, and with each new result from the monitoring plan, the community will be informed of this new data.

All dissemination channels can be accessed at any time and by anyone. In the case of in-person meetings, whenever they occur, there are also opportune moments for community members to ask questions about the project, as well as to suggest, complain, or give praise. The community field assistants hired by Systemica Inteligência em Sustentabilidade S.A. will also be trained to assist in this dissemination or to serve as a communication channel between the community and the Systemica Inteligência em Sustentabilidade S.A. team whenever necessary.

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

The informational meetings with communities and local stakeholders aim to enable the circulation of information and mutual dissemination of content regarding the TdX project and Caboclo Village. The meetings are publicized in advance to the community through the communication channels specified in the

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<sup>37</sup> ProceduresProject.zip

<sup>38</sup> OtherStakeholdersCommunications.zip

<sup>39</sup> CommunityCommunications.zip

<sup>40</sup> ValidationMeetings.zip

Communication Procedure of Systemica Inteligência em Sustentabilidade S.A., with the community (attached document<sup>37</sup>), and with other stakeholders through email, phone, or WhatsApp, according to the preference of the respective stakeholder.

Until September 2023, several meetings with the community have been conducted in person during four different field visits<sup>40</sup>:

- between August and September 2022 – marking the start of the project.
- in April 2023 – validation audit of the TdX VCS Project Description.
- in June 2023 – for conducting questionnaires with the community, among other dissemination and research activities involving the population; and
- in September 2023 – for participatory impact assessment with the community and the training of community agents.

In addition, sporadic meetings were held with the community leaders during this period to facilitate and advance project activities, coordinate visits, and so on.

With local institutional stakeholders, numerous online meetings were also conducted, serving different purposes and occurring at various times. These stakeholders include the municipal departments of environment, health, and education, representatives from the Altamira and São Félix do Xingu municipalities, as well as state-level institutions from Pará responsible for forests, biodiversity, and the regularization of public areas. These meetings occur as needed throughout the project. For instance, meetings were held with these stakeholders during the audit process in April 2023. The meetings that followed are reported in the Monitoring Report.

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

Relevant information regarding potential costs, risks, and benefits for the community has been and continues to be transparent since the beginning of the project. During the social diagnosis construction process, the team from Systemica Inteligência em Sustentabilidade S.A. engaged with the residents of Caboclo Village to address any questions they might have had regarding the carbon project, as well as to investigate their perceptions of potential risks and benefits at that time<sup>41</sup>.

In alignment with the Theory of Change development and project activities, subsequent meetings were held with the community, allowing them to provide input on the project activities. These inputs were then used to adjust the activities to better align with the benefits expected by the community. For example, face-to-face meetings that took place between June 18th and 20th, 2023, resulted in project activity adaptations based on the community's reported priorities<sup>42</sup>.

The TdX project does not impose any costs on the community. All risks and benefits identified by the project team were presented to the community via video<sup>43</sup> and later reinforced in a face-to-face meeting for them to provide input or seek clarification. Additionally, in the same fieldwork on September 24th, 2023, the project team, in collaboration with Caboclo Village, conducted a participatory impact assessment activity, ensuring that all impacts (risks, costs, benefits) identified by the community are integrated into the Theory of Change, with mitigation measures outlined by the project<sup>42</sup>.

It is important to highlight that no project activity that could directly impact the entire community in the project zone was carried out before receiving feedback at the June 2023 meeting and presenting the risks, costs,

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<sup>41</sup> SocialDiagnosis.zip

<sup>42</sup> ValidationMeetings.zip

<sup>43</sup> <https://www.youtube.com/watch?v=GEhVsHTBKPs>

and benefits informed in the YouTube video mentioned above, and that was shared on September 5th<sup>42</sup>. This statement is confirmed by the dates presented in Section 2.1.11, where, before September, only activities took place within the project area and meetings with institutional stakeholders.

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

Systemica Inteligência em Sustentabilidade S.A. ensures that the community and other stakeholders are informed about the CCB validation and verification process. This process was elucidated to the community through a video on YouTube<sup>43</sup>, widely shared on the WhatsApp channel with the community<sup>44</sup>, providing ample time for the population to ask any questions and for Systemica Inteligência em Sustentabilidade S.A. team to clarify doubts. As for the other stakeholders, informative letters were shared via email<sup>45</sup>. Both for the community and other stakeholders, communication regarding the occurrence of these processes will be done in advance, always emphasizing the key points of the visits, such as meetings that the audit may require. Furthermore, Systemica Inteligência em Sustentabilidade S.A. communication channels have been and remain open for any stakeholder to get in touch with potential inquiries about these processes.

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

The visits by auditors for the verification and validation processes of the TdX CCB project will always be communicated in advance to the community and other stakeholders. An assurance that this prior communication is being and will be done is the validation process of the TdX VCS PDD that took place in April 2023. As previously outlined, the community and other stakeholders were informed before the visit, as seen in the attached evidence<sup>46,47</sup>. The information about these audit and validation processes has been shared with the project stakeholders, and they are aware of the procedure for notifying them of future auditor visits by Systemica Inteligência em Sustentabilidade S.A., as well as the possibility of independent communication with the auditors, and that Systemica Inteligência em Sustentabilidade S.A. can and will facilitate this communication whenever necessary. This information will always be reiterated prior to the auditor visit process.

### **2.3.7 Stakeholder Consultations (G3.4)**

Since the beginning of the TdX project, when Systemica Inteligência em Sustentabilidade S.A. mapped and identified the involved stakeholders (see Section 2.1.6), they were encouraged to suggest ideas, contribute, or inquire about any existing doubts regarding the project's development if they identified any. There is a significant logistical challenge in the project area region, making it so that all initial contacts with other stakeholders were conducted online<sup>47</sup>. In the case of Caboclo Village, the initial contact was in person and maintained through online communication, as well as during periodic visits of the Systemica Inteligência em Sustentabilidade S.A. to the community.

Up until the completion of this Project Description, there haven't been any idea contributions from the other stakeholders. However, ADEPARÁ - Agricultural Defense Agency of the State of Pará technicians have been essential stakeholders in providing secondary data that aided in identifying rural communities in the project area.

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<sup>44</sup> CommunityCommunications.zip

<sup>45</sup> OtherStakeholdersCommunications.zip

<sup>46</sup> CommunityCommunications.zip

<sup>47</sup> OtherStakeholdersCommunications.zip

In terms of the community, the contributions of the population towards project activities. Initially, through an activity in which the population indicated their priority themes for improving community quality of life<sup>48</sup>. The results of this activity served as the starting point for defining community-related project activities, which were later supported by SWOT Analysis, and Theory of Change. Furthermore, after outlining the activities and presenting them to the community, they suggested some changes that<sup>49</sup>, following joint analysis, are now part of the project's new activity structure.

The TdX project, therefore, has demonstrated and continues to exhibit interest in receiving suggestions, critiques, and other contributions from any of the stakeholders. For this purpose, communication channels are available throughout the project's lifespan<sup>50</sup>.

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

The project has developed a structured Communication and Conflict Resolution Procedure to ensure continuous dialogue, transparency, and adaptive management with communities and stakeholders throughout the life of the Triunfo do Xingu Grouped REDD+ Project (TdX).

Multiple channels are in place to guarantee open, inclusive, and accessible communication:

- WhatsApp groups with community leaders, all members, and a women-only group.
- An official project WhatsApp number and e-mail address for direct contact.
- Physical communication tools, such as posters, pamphlets, and a suggestion box installed in the community.
- Field assistants acting as direct mediators and facilitators of information flow.
- In-person and online meetings with photographic records, attendance lists, and signed minutes.
- Systemica's website and YouTube channel to provide transparent, accessible, and updated information about project activities, risks, benefits, and monitoring results.

Principles guiding communication include reciprocity, co-responsibility, commitment, transparency, clarity, inclusion, attention to vulnerable groups (especially women), equal treatment, and respect for freedom of expression.

All activities impacting the community require prior consent from community members. Validation is conducted during meetings, through questions and confirmation, ensuring mutual understanding.

A Deliberative Forum allows collective decision-making with majority voting, while a Women's Forum guarantees a safe and dedicated space for women to express concerns and participate in decision-making.

Feedback and suggestions are systematically analyzed by the project team and, if feasible, integrated into project management. Proposals for incorporation are discussed with the proposer(s) and subject to approval by affected stakeholders or the community.

The project has a stepwise grievance redress mechanism:

1. Receipt of complaints or suggestions (via assistants, digital channels, or suggestion box).
2. Initial resolution attempts (individual response or community assembly).
3. If unresolved, mediation by the Systemica legal department, Ethics Committee, or external observers.

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<sup>48</sup> SocialDiagnosis.zip

<sup>49</sup> ValidationMeetings.zip

<sup>50</sup> ProceduresProject.zip

4. If still unresolved, referral to competent judicial authorities.

Responses are provided within 60 working days, extendable to 180 days if required. Resolutions of conflicts are formalized in signed agreements, and all cases are archived in the Conflicts, Complaints and Suggestions Form for accountability and learning.

The communication and grievance procedures are subject to periodic review and revision, ensuring lessons learned are incorporated into future management. This adaptive cycle strengthens trust, improves effectiveness, and guarantees that project decisions reflect evolving community needs and stakeholder inputs.

Through adaptive management, Systemica Inteligência em Sustentabilidade S.A. believes that new inputs will emerge over the project's lifespan. Adaptive management is a process that addresses uncertainties in project development to uncover new insights; it involves multiple perspectives in decision-making; and it includes monitoring outcomes for necessary adjustments and changes (Hasselmann, 2017).

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

The consultation process for the TdX project is ongoing, participating, and carried out directly with the project community and representatives of other stakeholders. Therefore, the project has an official communication procedure that outlines all the channels of direct communication between the Systemica Inteligência em Sustentabilidade S.A. team and the community, community groups, and other stakeholders. Through these communication channels, stakeholders can suggest changes and improvements to project activities. Furthermore, whenever the TdX team needs to share any official information or project documents with stakeholders, it emphasizes that stakeholders are aware of the team's openness and the available channels for them to provide input and actively engage with the project. In the case of the community, this is also facilitated through in-person governance meetings.

The annex<sup>51</sup> provides evidence of the sharing of documents project with other stakeholders, containing project information, such as estimates of total greenhouse gas emission reduction, endangered wildlife species, project activities with the community, among other information such as audit dates and validation and verification processes. The available communication channels were also shared.

The field visit report from June 2023 attached<sup>52</sup>, on the other hand, offers evidence of the sharing and validation of the Communication Procedure with the community, which includes all available communication channels, along with other relevant procedures that will be discussed in the sections of this document. In this annex, it is also possible to observe the information that was shared with the community on that occasion. The sharing of project documents and information with stakeholders is not necessarily convergent, as there are agendas that are specific to the community and, therefore, are not shared with other stakeholders.

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

The TdX project ensures that the community participates in the decision-making and implementation processes of project activities. To accomplish this, the community is encouraged to take part in decision-making or governance meetings alongside Systemica Inteligência em Sustentabilidade S.A. During these meetings, everyone is updated on the progress of activities, the individuals involved, and any obstacles that may arise, justifying a new collective decision. In this way, with comprehensive information, the community

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<sup>51</sup> OtherStakeholdersCommunications.zip

<sup>52</sup> ValidationMeetings.zip

is enabled to participate and engage in this process through any of the communication channels, whether through in-person meetings or online (Figure 2.18).

It is important to emphasize that these spaces for decision-making and project progress discussion are participatory spaces, with extensive outreach and efforts to make them as representative as possible of the community. To clarify, to ensure cultural sensitivity in implementation and decision-making, the project has established a variety of communication channels, ranging from written documents and meetings held at appropriate times for the community to the creation of explanatory videos about the project, among other initiatives. On the other hand, to guarantee gender sensitivity, the project has set up exclusive communication channels with the women in the community (Figure 2.19), where they can actively participate and directly influence decisions regarding project activities. The goal is to ensure that these groups also collaborate with the project and have equal access to project opportunities.



*Figure 2.18 Governance meeting in Caboclo Village.*



*Figure 2.19 Womens's governance meeting.*

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

The Systemica team respects all relevant laws related to ensuring anti-discrimination, as set out in the company's Code of Conduct document<sup>53</sup>. Likewise, Systemica Inteligência em Sustentabilidade S.A. requires service providers to comply with the code of conduct for the activities they perform (see Section 2.4.4). In addition, the landowner and the other entity have signed documents stating that all parties must follow all applicable laws regarding the implementation and management of the project. Therefore, all project entities are not involved in or complicit in any form of discrimination based on gender, race, religion, sexual orientation, or other habits and sexual harassment related to the project.

Furthermore, in a non-discriminatory manner, the communication procedure of the TdX project team towards the community and other stakeholders addresses communication principles, which are: ethical treatment, clarity and transparency, communication safety, inclusion and promotion of equality, attention to vulnerable groups, communication governance, freedom of expression, engagement, and equality.

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

The communication procedure of the TdX project has formalized recommendations for conflict resolution that were agreed upon in consultation with the Caboclo Village. The aim was to ensure that the community did not already possess its own conflict resolution method, a fact that was confirmed during an in-person meeting with the community members<sup>54</sup>. Conflict resolution aims to mitigate and sometimes eliminate the negative impacts of potential conflicts on the dynamics of interactions promoted by the project within a reasonable timeframe, following the established resolution stages.

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<sup>53</sup> EntitiesInvolved.zip

<sup>54</sup> ValidationMeetings.zip

These stages can be found in the attached Communication Procedure<sup>55</sup> and are described below, which outlines the approaches to be used based on the severity of the complaint and the involvement of parties, the activation of the ethics committee, the method of resolution disclosure, and archiving.

Once a complaint or report is received, the project representative and coordinator may act as follows:

#### **2.3.12.1 Initial Resolution Attempts:**

- a. In cases of suggestions, questions, or complaints: Depending on the preference of the person who submitted it, the response will be given individually or through a community assembly.
- b. Minimum elements for reporting a crime: If the minimum elements exist to establish the materiality and plausibility of the report, it must be immediately referred to the competent judicial authorities.
- c. Conflict involving only a Systemica employee or service provider: The issue will be directed to Systemica's internal legal department at the following email: [juridico@systemica.digital](mailto:juridico@systemica.digital) describing the nature of the conflict and previous attempts to resolve it. The legal department will review the facts and, if necessary, will call on the Ethics Committee to jointly seek a resolution in the quickest and fairest way possible.
- d. Resolution of comments: All the channels presented here are available to receive suggestions and comments about the project. However, WhatsApp community groups, the suggestion box, in-person meetings in Caboclo Village, the official project phone number, and the project's email are recommended as the best ways to express ideas. Any person, group, or institution may access these channels and submit their comments.

#### **2.3.12.2 Mediation:**

- a. Conflict involving a community member and a Systemica employee or service provider: If Systemica's legal department activates the Ethics Committee, it will be composed of internal and external company representatives and community representatives (not belonging to Systemica or the community in question). Based on Systemica's Code of Ethics and Conduct, all facts will be reassessed in chronological order and possible solutions will be discussed to ensure fairness, avoiding moral harm or unjust material losses for those not responsible.
- b. Other situations: This category covers conflicts presented by third parties involving Systemica and the community in the context of the project. A common forum will be established with an external observer to facilitate mediation and ensure impartial analysis.

#### **2.3.12.3 Courts or Judiciary:**

If the conflict is not resolved amicably through the previous steps, the parties involved may resort to the competent judicial authorities of the relevant jurisdiction to attempt to resolve the situation. In this regard, the parties will appeal to the competent forum (the court or judicial body with legal authority to handle a specific dispute) to settle conflicts unresolved in the earlier stages.

In general, jurisdiction is determined based on criteria such as the geographic location of the parties, the nature of the conflict, and the applicable laws. Furthermore, these courts have the authority to produce and collect evidence, interpret relevant laws, and issue legally binding rulings for the parties involved. Throughout this process, Systemica's legal department will provide all necessary support within the scope of its responsibilities. Everyone has the right to full defense, presumption of innocence, and adversarial proceedings.

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<sup>55</sup> ProceduresProject.zip

General Observations:

- The situations described above are not mutually exclusive. A case may be referred to one or more of the procedures listed above.
- In any situation requiring third-party mediation, the mediator must be independent, that is, not part of Systemica or the community. The parties involved in the conflict must select the mediator or observer by consensus from a list of names suggested by each. If no consensus is reached, the resolution process will move directly to the next stage.
- If mediation is successful and an agreement is reached, a formal document will be drafted and signed by all parties involved.

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

The project's communication procedure, which contains a description of the feedback and grievance redress procedure, has already been shared with the community during an in-person meeting in June 2023 and in 2024<sup>56</sup>.

In this way, the primary channels to disseminate the information to the communities will be WhatsApp and face-to-face meetings. For other stakeholders, publicizing will mainly occur through the official project email and online or in-person meetings when necessary.

All grievances and project responses will be reported in the Conflicts, Complaints, and Suggestions Form. This form will be periodically reviewed to ensure that the relationship between the parties involved becomes increasingly efficient and proper to the project's needs and will be publicized in the same communication channels cited above.

### **2.3.14 Worker Training (G3.9)**

Systemica Inteligência em Sustentabilidade S.A. is responsible for ensuring, either directly or through subcontracted third parties, that all workers involved in project activities, whether from the community or external, receive proper training and guidance regarding the services they need to perform.

As stipulated in the hiring procedure<sup>57</sup> in the case of individuals directly hired by Systemica Inteligência em Sustentabilidade S.A., such as community agents in the community, it is the company's responsibility to provide adequate training for the tasks that workers will perform. If the training falls outside the scope of Systemica Inteligência em Sustentabilidade S.A. expertise, the company will be responsible for hiring a third-party firm to provide the necessary training. Once trained, in the case of turnover, Systemica is responsible, with support from community members, for passing on the technical knowledge acquired to enable new employees to perform the activities.

Whenever possible, the training should be disseminated and made available to a wider audience, i.e. beyond the individuals who will occupy the position, especially women and vulnerable and/or marginalized people. This is to strengthen the building of skills and knowledge within the communities, which in the medium term will enable greater community engagement and participation in project activities, thus ensuring that local capacity will not be lost through staff turnover.

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<sup>56</sup> ValidationMeetings.zip

<sup>57</sup> ProceduresProject.zip

The training provided to community agents during their hiring is entirely focused on project-related activities. One of the skills to be developed, for instance, is the community agents' ability to engage and communicate with the community, aiming to increase the community's involvement in governance meetings and activities, to support forest and biodiversity inventory or monitoring, among others.

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

The Triunfo do Xingu Grouped REDD+ Project (TdX) has established a Hiring Procedure to ensure that people from the project's communities are given equal and fair opportunities to fill all work positions, including management, if they meet the requirements.

- Non-discrimination principle: No applicant is excluded based on gender, age, disability, or sexual orientation. The project actively encourages applications from women, youth, elderly people, LGBTQI+ members, and vulnerable groups.
- Transparency and inclusivity: Job postings are disseminated through channels adapted to the local context, including WhatsApp groups, social media, community posters, and in-person/online meetings, ensuring wide access to information.
- Minimum requirement: The only universal prerequisite is alignment with project values and willingness to engage in activities.

The selection process follows clear and transparent steps:

1. Submission of an application form available through project communication channels.
2. Screening of applications and classification based on engagement, communication skills, predisposition to activities, and availability.
3. Interviews with shortlisted candidates.
4. Verification of references and background information.
5. Final selection of candidates.

This process ensures impartiality, merit-based decisions, and equal opportunity. Additionally:

- For all positions, the project provides orientation and training in task execution, equipment uses, safety practices, and labor rights.
- Trainings are available not only to those hired but also to a broader group of community members, especially women and marginalized individuals, strengthening long-term capacity and employability.
- The costs of training are fully covered by the project proponent or contracted third parties.
- Inclusive communication of vacancies and training opportunities through multiple accessible channels (WhatsApp, posters, community meetings).
- Promotion of diversity and equal representation by encouraging participation of underrepresented groups.
- Provision of occupational safety measures, including protective equipment, health and safety briefings, insurance when applicable, and guidance on worker rights under Brazilian labor laws (MEI, RPA, CLT).
- Mandatory adherence to Systemica's Code of Ethics and Conduct, reinforcing non-discrimination, equal treatment, and environmental and social responsibility in the workplace.

The procedure is periodically reviewed, and feedback from the community is incorporated to strengthen fairness and inclusivity. This ensures that employment opportunities remain open, accessible, and aligned with both community needs and project objectives.

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

The project proponent is aware of and will adhere to the relevant Brazilian laws and regulations concerning workers' rights. The Code of Ethics and Conduct<sup>58</sup> document of Systemica Inteligência em Sustentabilidade S.A., states that the company is committed to diligently monitoring and fully complying with all applicable laws. Furthermore, it emphasizes that all individuals, regardless of location, while carrying out activities on behalf of the company, are expected to respect and abide by the laws. It is also likely that all third parties, including service providers, consultants, representatives, and others, comply with the applicable laws in any activities or business they engage in.

The principal way of contracting the project will be through the Individual Microentrepreneur (MEI in Portuguese) modality. Complementary Law N°. 128 of December 19, 2008 (Brasil, 2008), instituted this simplified business model to facilitate the formalization of activities for those who work autonomously. MEI was created to take self-employed professionals and small entrepreneurs out of informality. It is a simple company that adjusts very well to the needs of those who work autonomously. By formalizing as an MEI, the entrepreneur now has his own National Register of Legal entity (CNPJ in Portuguese), the possibility of issuing invoices, and can access social security benefits, such as old age retirement, sick pay, and maternity pay. It also makes applying for credit and opening a bank account easier.

Another primary method of project hiring will be through Autonomous Payment Receipt, also known as RPA (an abbreviation in Portuguese). The RPA is a document issued to self-employed individuals who do not have a CNPJ registration and are hired on an occasional basis, receiving compensation through receipts. The legality of this hiring and payment method is supported by Brazilian legislation, as established in Law N°. 5,890 of June 8, 1973 (Brasil, 1973).

Although the TdX Project does not rely on the Consolidation of Labor Laws (CLT in Portuguese) for its contracting methods in the communities, Systemica hires workers as CLT, for this the Brazilian Regulatory Standard 31 (Health and Safety at Work in Agriculture, Livestock, Forestry, Logging, and Aquaculture – NR-31 in Portuguese) remains relevant. This NR-31, a complementary regulation to the Consolidation of Labor Laws (Chapter V, Title II), encompasses health and safety in agriculture, livestock, forestry, logging, and aquaculture work. Also, guarantee the protection and health of workers, including capacity building, personal protective equipment, machines, equipment, etc (MTP, 2023).

The workers will be duly informed about their rights during the hiring process and depending on the characteristics and model of the hiring, courses and training involving obligations and rights arising will be carried out. Systemica Inteligência em Sustentabilidade S.A. relies on the support of its legal team, who will be available to address any concerns and help inform workers about their rights, if necessary.

The appendix of the field visit report that took place in June 2023 provides evidence of sharing this information during the candidate selection process for the local community assistants' positions. On the other hand, the field visit report from September of the same year provides evidence of the training with the selected community residents for the positions<sup>59</sup>.

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<sup>58</sup> EntitiesInvolved.zip

<sup>59</sup> ValidationMeetings.zip

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

During the implementation and execution of the project, a comprehensive assessment of substantial risks to the safety of workers that may arise was conducted. According to this assessment, risks may occur in two key project activities: Biomass Monitoring in the project area and Wildlife Monitoring in the project zone. To determine the level of risk, two criteria were considered: the frequency of the activity (Unlikely (L), Highly Likely (HL)) and the severity of the potential risk (no injury, minor injury, severe injury or occupational illness, fatality, or permanent disability). Based on this, the following risk levels were established: Low Risk (LR), Moderate Risk (MR), High Risk (HR), and Critical Risk (CR).

The table below outlines the potential risks that could arise during the project's implementation, their corresponding levels, and the measures that will be implemented to minimize these risks:

Table 2.11 Risks to the safety of workers.

Description			
Biomass monitoring activities in the project area and Fauna monitoring activities in the project zone			
Frequency			
Regular and intermittent			
Risks	Risk level	Effects	Mitigation measures
<b>Physical risks</b>			
Exposure to intense solar radiation for long periods	HR	Insolation	Use of PPE (field cap)
	(serious injury or occupational disease, probable)	Sunburn	
		Dehydration	
		Skin cancer (long term)	
<b>Ergonomic risks</b>			
Inadequate working postures	HR	Muscle pain	Taking active breaks and passive measures to avoid overexertion
	(minor injury, probable)	Reduced work capacity	
Physical effort	HR	Muscle pain	Designing effective field routes
	(minor injury, highly probable)	Reduced working capacity	
<b>Mechanical risks: Exclusively biomass monitoring activities in the project area.</b>			
Accidents involving falling trees	HR	Fractures	Use of PPE (hard hat)
	(fatal or permanent disability, unlikely)	Injuries that can lead to permanent disability	
Falling field accidents	HR	Fractures	Training in good fieldwork practices
		Muscle pain	

	(serious injury or occupational disease, probable)	Reduced working capacity Injuries that can lead to permanent disability	Designing efficient routes
<b>Biological risks</b>			
Exposure to ticks, insects or stinging plants	HR	Injuries from tick or insect bites	Wearing PPE (pants and long-sleeved shirts)
	(minor injury, highly probable)	Allergic reactions	Field workers with tick bites should be monitored for darkening of the bite site or signs of fever First aid kit
<b>Biological risks: Exclusively fauna monitoring activities in the project zone</b>			
Accidents handling wild animals	HR	Bite, scratch or impact injuries	Only trained and certified professionals can handle animals
	(serious injury or occupational disease, probable)	Infections resulting from bites or scratches	
Encounters with dangerous animals	HR	Injuries from venomous animals	Prior knowledge of venomous or predatory animals that occur in the area
	(fatal or permanent disability, unlikely)		Training in field work
			Avoid disturbing habitat areas such as burrows, the underside of logs and rocks
			Prior training on how to behave when sighting a predatory animal
<b>Accident risks</b>			
Driving vehicles on rural roads	HR	Accidents due to adverse road and bridge conditions.	Plan routes considering adverse road conditions.
	(serious injury or occupational disease, probable)	Jams.	Skilled and experienced pilots on the team
		Car breakdown.	Use properly equipped cars for field work.

Additionally, depending on the specific contract, the nature of the work, the location, and the conditions, the following measures may be adopted related to emergency cases:

- Insurance contracting.
- Elaboration of medical information register.
- Availability of transport for medical care.

After signing the contract, employees will undergo courses and training on occupational safety, necessary safety protocols, and contract procedures. These measures will ensure that workers are equipped with the knowledge and skills required to mitigate potential risks and maintain a safe working environment. The field visit report from September 2023<sup>60</sup> provides evidence of training with local community assistants, with particular attention to sharing legislation and labor standards related to the type of hiring and the risk matrix in rural work. The annex also provides guidelines related to workplace safety that were shared with the owner of the Nossa Senhora Aparecida Farm and the supervisor responsible for field monitoring in this project area.

## 2.4 Management Capacity

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

The project will be managed by Systemica Inteligência em Sustentabilidade S.A., as the proponent of this project, and by the landowners of the Triunfo do Xingu Grouped REDD+ Project as other entities involved. An agreement<sup>61</sup> between the landowners and Systemica Inteligência em Sustentabilidade S.A. regulates the responsibilities of the parties involved in the project. In addition to the project proponent and other entities involved, within the governance structure, the community of the project participated in this design of project activities through meetings and consultations supported by questionnaires and participatory activities. To develop some implementation activities and provide the necessary inputs for the design and monitoring, service providers also participated. The roles and responsibilities of each part are detailed in Table 2.12 and the project’s governance structure is presented in Figure 2.20.

Table 2.12. The roles and responsibilities of each part of the project.

Role and Responsibilities	
Systemica Inteligência em Sustentabilidade S.A.	<p>It is the proponent of the Triunfo do Xingu Grouped REDD+ Project. It oversees the technical management of the project, being able, for that purpose, to carry out the administrative, technical and commercial management for the project design and implementation.</p> <p>In this sense, as described in the contract, among other responsibilities, it has to manage and carry out project activities in accordance with applicable and relevant rules, provide the owner with the necessary information for the regular fulfillment of its obligations, prepare and maintain project documentation, including relevant calculations of greenhouse gas emissions and resulting carbon assets, as well as coordinating and paying for all activities inherent to the development of the project.</p>

<sup>60</sup> ValidationMeetings.zip

<sup>61</sup> GeneralLegalDocs.zip

Table 2.12. The roles and responsibilities of each part of the project.

Role and Responsibilities	
Landowners	As landowners and other entities involved in the Triunfo do Xingu Grouped REDD+ Project, the landowners among other responsibilities, have to fully observe of Systemica Inteligência em Sustentabilidade S.A., instructions for the execution of the project and periodically present the information of its responsibility on the respective execution; ensure that the implementation of project activities does not lead to the violation of any applicable legal norm; not carrying out activities that lead to harmful changes to the way of life of communities and existing biodiversity in the area of influence of the project; bear the costs of issuing carbon assets charged by the VCS and CCB standard on the part of the carbon assets that it owns; as well as carrying out the proprietary protection of its territory, as well as allow Systemica Inteligência em Sustentabilidade S.A. to carry out, to the maximum extent, technical, operational and administrative actions, under of Systemica Inteligência em Sustentabilidade S.A. responsibility.
Service providers	They are part of the team that collects primary data as inputs for project design and performs some project monitoring activities.
Communities	They are the project's communities and participate in the design and implementation of the project's CCB activities and as beneficiaries of them.

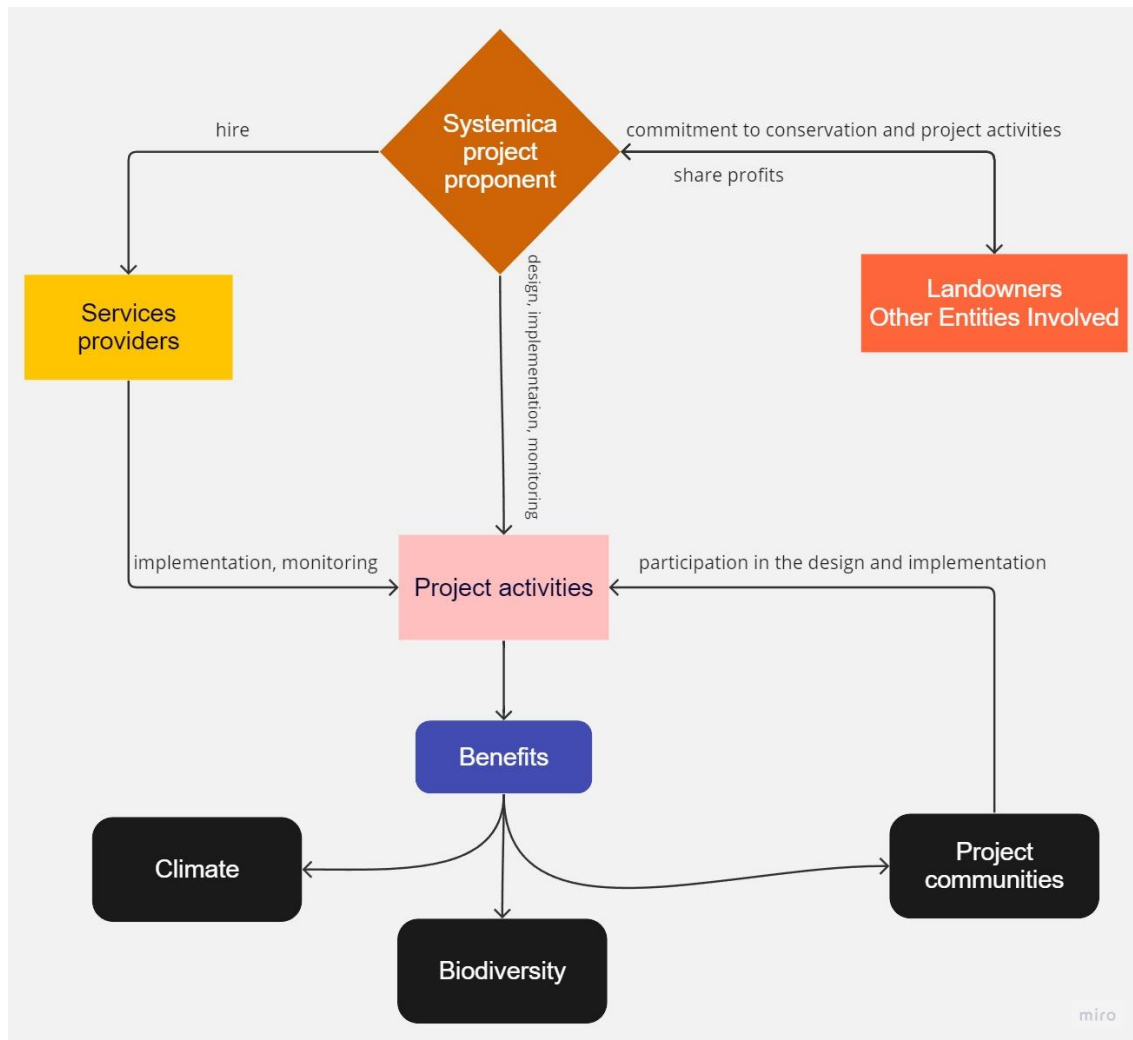


Figure 2.20 The governance structure of the project.

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

The technical skills necessary for the successful implementation of the project are provided by the Systemica Inteligência em Sustentabilidade S.A. team, insofar as the project proponent is responsible for carrying out the proposed activities.

The expertise focuses on the following skills:

- Community engagement: experience and technical knowledge in working with rural communities, farmers, stakeholder engagement, and mastery of participatory methodologies.
- Biodiversity assessment and monitoring: technical knowledge about forest inventory, and agriculture systems, including agroecology and agroforestry. The domain of georeferencing and statistical software. Partners trained in surveying and elaboration of fauna inventories with species of mammals and avifauna.
- Carbon assessment and monitoring: technical knowledge of remote sensing tools and statistical software, practicality in organizing documents to obtain certification, and experience in carbon projects.

- Monitoring and legal support: legal team with experience in carbon projects, and specialized knowledge of legislation related to communities and nature conservation.
- Evaluation and monitoring of social aspects: knowledge and experience working with rural communities, skills with participatory methodologies, and expertise in social technologies. Partners trained in carrying out socio-environmental diagnoses.
- Remote monitoring: technical knowledge for collecting field data, software, and programs that make it possible to monitor the project area and zone through satellite images and its refinement to create figures and maps.

In addition to the Systemica Inteligência em Sustentabilidade S.A., some partners as pointed out in Section 2.4.4, will be able to contribute to the project's activities, emphasizing that the priority is that these partners will be from institutions and organizations close to the project. Also, and as pointed out in Section 2.4.3, the team that participates in the project is made up of professionals from different areas, each one with their specializations, ranging from the main areas of knowledge necessary for the development of the project, as well as social, biological, environmental and forestry sciences.

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

The skill of the Systemica Inteligência em Sustentabilidade S.A. team has been consolidated since 2012, the year of its foundation. Since then, various projects from different segments have been spearheaded in the following areas: ecosystem services, introducing sustainability to governance strategies thinking about value creation, public policies, and forestry projects for the voluntary carbon market. Evidencing that, for the present project, the experience in all these areas provides a fundamental basis for its elaboration and execution. Below is a summary of some of the projects developed by Systemica Inteligência em Sustentabilidade S.A.:

Vale Florestar, reforestation of degraded tropical lands in the Brazilian Amazon<sup>62</sup>: project evaluation and validation to ensure that it complies with the requirements of the Clean Development Mechanism for generating Carbon Credits. The project's objective is to create a local market for renewable wood and, at the same time, contribute to the expansion of forestry, attracting forest-based industries and other associated productive activities to the region.

Agrocortex REDD Project<sup>63</sup>: guidance on the decision to acquire carbon credits related to the project through technical and legal due diligence, with an assessment of the project's environmental integrity. The main objective of the Agrocortex REDD project is to avoid the unplanned deforestation of the project area that belonged entirely to the territory of the Amazon Forest, in the Brazilian states of Acre and Amazonas.

CIKEL REDD Brazilian Amazon APD Project<sup>64</sup>: technical analysis of the project and development of its continuity strategy. The project aims to avoid emissions from planned deforestation on a property in Paragominas, in the Brazilian state of Pará.

Amazon Biome Conservancy Grouped REDD+ Project<sup>65</sup>: responsible for this carbon project as one of its proponents. This project contributes to preserving the most extensive tropical forest in the world in the Brazilian territory while providing significant improvements in the social interface. It is registered under the Verified Carbon Standard (VCS) and the first project activity instance is in the Itacoatiara municipality, the state of Amazonas, near its capital Manaus.

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<sup>62</sup> 230509\_PD Vale Reflorestar.pdf

<sup>63</sup> 230509\_PDAgrocortexREDD.pdf

<sup>64</sup> 230509\_PDCIKELREDD.pdf

<sup>65</sup> 230509\_PDABC.pdf

Florestal Santa Maria Project (FSM-REDD PROJECT)<sup>66</sup>: The FSM Forest property, a rural property exclusively dedicated to the sustainable management of natural forests, is located in the municipality of Colniza. The FSM-REDD Project was designed to give this forest management company the opportunity to take full advantage of the REDD regulatory system being developed through the VCS standard. The specific area of the carbon project is part of a larger colonization initiative, started in 1975, through the state's legally established effort to develop the northern region of the State of Mato Grosso.

The Systemica Inteligência em Sustentabilidade S.A. team directly involved in the project is multidisciplinary, with experience relevant to and qualified for the project. It has professionals from different areas of knowledge, such as biological, social, and exact sciences. Additionally, several members have specializations, graduate degrees, and professional experience in areas directly related to the project, such as the carbon market, extension, rural communication, forest inventory, statistics, and geoprocessing.

*Table 2.13 summarizes the professional team's experience working on the Triunfo do Xingu Grouped REDD+ Project: Risk Assessment.*

Management Team Experience	
Risk Assessment	Munir Soares <sup>67</sup>
Role	Chief Executive Officer (CEO)
Summary	Munir is the co-founder and CEO of Systemica, a developer of socio-environmental asset projects. With over fifteen years of experience as a Low Carbon Strategist, Team Leader, and Portfolio Manager, he has extensive expertise in serving large corporations and NGOs across Latin America. Throughout his career, he has gained unparalleled field experience in Brazil, with a particular focus on the Amazon region, managing and working with multicultural teams. Munir also holds a master's and PhD in Energy and Climate Change from the University of São Paulo (USP).
Contact	munir@systemica.digital
Risk Assessment	Tiago Gonçalves de Oliveira Ricci <sup>68</sup>
Role	Legal Director and Prospecting
Summary	Tiago Ricci is a lawyer with an LLM in Financial and Capital Markets Law and a specialist in Tax Law, with over 17 years of experience in structuring and developing public policies, projects, and corporate ventures focused on technological innovation and climate change. His expertise ranges from conducting due diligence on carbon projects to international negotiations for large investments. He has served as a specialist consultant in the development

<sup>66</sup> 230719\_ProjDesc24Feb2012.pdf

<sup>67</sup> 250801\_ResumeMunirSoares.pdf

<sup>68</sup> 2 250801\_ResumeTiagoRicci.pdf

Table 2.13 summarizes the professional team's experience working on the Triunfo do Xingu Grouped REDD+ Project: Risk Assessment.

Management Team Experience	
	of public policies on climate change, being one of the key contributors to the formulation of climate legislation in various Brazilian states.
Contact	tiago.ricci@systemica.digital
Risk Assessment	Ricardo Zwarg <sup>69</sup>
Role	General Director of Restoration Projects
Summary	Environmental Engineer from the Faculty of Technology at UNICAMP. Master's degree in science and technology from the Federal University of São Paulo - UNIFESP. Completed an academic exchange at the Helmholtz Centre for Environmental Research, Leipzig, Germany. Has worked as a project coordinator for NBS (Nature-Based Solutions) in private areas and traditional communities. Currently he serves as Technical Director at Systemica, working on the development of carbon projects, MRV (Monitoring, Reporting, and Verification), and various modeling for REDD and ARR.
Contact	ricardo@systemica.digital
Risk Assessment	Thiago de Freitas Viscondi <sup>70</sup>
Role	Project Intelligence Supervisor
Summary	Bachelor's, Master's, and Doctor's degrees in Physics at the University of Campinas. Former postdoctoral researcher at the Institute of Physics and at the Escola Politécnica of the University of São Paulo. Practical experience in developing and managing projects targeting the voluntary carbon market. Extensive knowledge of methodologies and documentation required for certifying carbon projects, especially those aimed at reforestation and avoiding deforestation. Proficiency in the conceptualization and implementation of technological tools for geospatial assessment of territories and management of carbon projects, such as models for predicting deforestation and evaluating reforestation suitability.
Contact	thiago@systemica.digital

<sup>69</sup> 250801\_ResumeRicardoZwarg.pdf

<sup>70</sup> 250801\_ResumeThiagoViscondi.pdf

Table 2.13 summarizes the professional team's experience working on the Triunfo do Xingu Grouped REDD+ Project: Risk Assessment.

Management Team Experience	
Risk Assessment	Larissa Oliveira Paulista <sup>71</sup>
Role	Conservation Project Manager
Summary	Larissa Oliveira Paulista holds a PhD in Environmental Engineering from the Faculty of Engineering of the University of Porto (FEUP), Porto, Portugal. She also holds a double degree from the Polytechnic Institute of Bragança (IPB), Portugal, and a master's in environmental technology. With over five years of experience in CO <sub>2</sub> , she currently works as Conservation Project Manager at Systemica. Her work focuses on conservation projects within the voluntary carbon market, using certifications such as Verified Carbon Standard (VCS) and Climate, Community & Biodiversity (CCB). She has experience in standards and methodologies focused on REDD and IFM projects, as well as other methodologies and scopes related to nature-based solutions (NBS).
Contact	larissa@systemica.digital
Risk Assessment	Adriano Grigolo <sup>72</sup>
Role	Modelling specialist
Summary	Adriano Grigolo holds a PhD in Physics from UNICAMP, specializing in computational methods applied to molecular systems. He has been with Systemica since 2021, where he works as a specialist in the development of geospatial models and tools for the technical and economic feasibility analysis of carbon projects.
Contact	adriano@systemica.digital
Risk Assessment	Nathalia Virginia Veloso Aguiar <sup>73</sup>
Role	Technical Specialist I
Summary	Environmental Engineer, graduated from the Federal University of São Carlos, with international experience in technology and programming through an exchange program at Universidad San Buenaventura. Holds a master's degree in Forest Resources from the University of São Paulo and works as a specialist in geospatial technologies within the carbon market and environmental

<sup>71</sup> 250801\_ResumeLarissaPaulista.pdf

<sup>72</sup> 250801\_ResumeAdrianoGrigolo.pdf

<sup>73</sup> 250801\_ResumeNathaliaAguiar.pdf

Table 2.13 summarizes the professional team's experience working on the Triunfo do Xingu Grouped REDD+ Project: Risk Assessment.

Management Team Experience	
	solutions. He has extensive experience in spatial analysis and monitoring using Google Earth Engine (GEE) to handle large datasets, integrating remote sensing with advanced algorithms. Additionally, it has led teams in geoprocessing projects for the energy sector and environmental services.
Contact	nathalia@systemica.digital
Risk Assessment	Pedro Henrique Presumido <sup>74</sup>
Role	Technical Analyst III
Summary	Pedro Henrique Presumido holds a PhD in Environmental Engineering from the Faculty of Engineering at the University of Porto (Portugal), with a focus on environmental issues and treatment solutions. With three years of experience in conservation and forest restoration projects, he specializes in the voluntary carbon market. He is well-versed in standards and methodologies (VERRA - AUD, APD, IFM) designed to support Reducing Emissions from Deforestation and Forest Degradation (REDD), as well as other methodologies and frameworks for Nature-Based Solutions (NBS). Currently, Pedro serves as a climate specialist for REDD projects at Systemica.
Contact	pedro@systemica.digital
Risk Assessment	Laura Juanita del Pilar Rodriguez Ayala <sup>75</sup>
Role	Community Intelligence Analyst
Summary	Juanita Rodriguez Ayala is a Social or Community Specialist at Systemica, with extensive experience in socio-environmental research, the development and application of methodologies, as well as the design and evaluation of activities and outcomes aimed at improving the social well-being of communities. For approximately four years, she has been involved in the development of Nature-Based Solutions (NbS) projects for the voluntary carbon market, focusing on the Brazilian Amazon and the Colombian Orinoquía. The carbon projects she has participated in follow internationally recognized standards. She holds a degree in Social Anthropology and a master's in Sociology from the National University of Colombia. Currently, she is a PhD candidate at the Center for

<sup>74</sup> 250801\_ResumePedroPresumido.pdf

<sup>75</sup> 250801\_ResumeJuanitaRodriguez.pdf

Table 2.13 summarizes the professional team's experience working on the Triunfo do Xingu Grouped REDD+ Project: Risk Assessment.

Management Team Experience	
	Sustainable Development at the University of Brasília, specializing in Policy and Sustainability Management.
Contact	juanita@systemica.digital
Risk Assessment	João Carlos Simonetti <sup>76</sup>
Role	Technical Analyst I
Summary	João Carlos Simonetti, a geoprocessing analyst at Systemica, holds a degree in Forestry Engineering from the Luiz de Queiroz College of Agriculture (ESALQ-USP) and a postgraduate degree in Data Science & Analytics from the University of São Paulo. He has worked in various sectors, such as environmental consulting focused on forest resources, supporting small producers in forest restoration, and the pulp and paper industry, with an emphasis on Geographic Information Systems (GIS) tools.
Contact	joao.simonetti@systemica.digital
Risk Assessment	João Paulo Ferreira <sup>77</sup>
Role	Community Intelligence Coordinator
Summary	João Paulo holds a degree in Law from the Pontifical Catholic University of São Paulo and in Philosophy from the University of São Paulo. He is a specialist in Administrative Law and holds a master's degree in Constitutional Law from PUC-SP. With over fifteen years of experience in public law and human rights, he has worked in both the private sector and public administration. João Paulo has been with Systemica since April 2022, currently serving as the coordinator of the Community Intelligence department.
Contact	joao.swf@systemica.digital
Risk Assessment	Iêda Tenório <sup>78</sup>
Role	Supply Analyst

<sup>76</sup> 250801\_ResumeJoãoSimonetti.pdf

<sup>77</sup> 250801\_ResumeJoãoFerreira.pdf

<sup>78</sup> 250801\_ResumeIêda.pdf

Table 2.13 summarizes the professional team's experience working on the Triunfo do Xingu Grouped REDD+ Project: Risk Assessment.

Management Team Experience	
Summary	Graduated in Production Engineering, with over 15 years of professional experience, 9 of which were spent working in logistics and supply chain in the aerospace and technology/oil and gas industries. She later worked in technology and, subsequently, in project development and the construction of clean rooms, focusing on planning, control, and project management. She has experience in team coordination, interfacing strategic areas such as project development and finance, and managing contracts/projects. Currently, she works in the contracts/supply chain area, focusing on carbon credit and socio-environmental transformation at Systemica.
Contact	ieda.tenorio@systemica.digital
Risk Assessment	Gabriella da Silva Riberio <sup>79</sup>
Role	Project Coordination
Summary	She holds a degree in Forestry Engineering and a master's degree in applied Ecology from the Luiz de Queiroz College of Agriculture at the University of São Paulo (USP). She has experience in the socio-environmental field, focusing on agroforestry systems, environmental education, forest management, and public policy.
Contact	gabriella@systemica.digital
Risk Assessment	Yago Alonso Cipoli <sup>80</sup>
Role	Project Analyst I
Summary	Yago Cipoli, a project analyst at Systemica, holds a degree in Environmental and Sanitary Engineering from the Federal University of Technology – Paraná (UTFPR – Londrina), a master's degree in environmental technology from the Polytechnic Institute of Bragança (IPB – Portugal), and is currently in the final year of a PhD in Environmental Engineering at the University of Aveiro (UA – Portugal). With over six years dedicated to academic research, he has extensive expertise in indoor and outdoor air pollutants, with a focus on their impact on health and the environment. He has conducted research in countries including

<sup>79</sup> 250801\_ResumeGabriellaRibeiro.pdf

<sup>80</sup> 250801\_ResumeYagoCipoli.pdf

Table 2.13 summarizes the professional team's experience working on the Triunfo do Xingu Grouped REDD+ Project: Risk Assessment.

Management Team Experience	
	Portugal, Hungary, and África, leading monitoring campaigns, developing mitigation strategies, and contributing to international scientific publications.
Contact	yago.cipoli@systemica.digital
Risk Assessment	Valéria Christina Araújo Monteiro <sup>81</sup>
Role	Project Analyst I
Summary	Valéria Monteiro has a degree in Forestry Engineering from the Federal University of Amazonas - UFAM/Manaus and is a Specialist in the Environment and its Technologies from the Federal Institute of Education, Science and Technology of Amazonas - IFAM/Manaus. She has experience in research and extension projects with an emphasis on conservation and forest inventory, socio-environmental activities and working with traditional and riverside communities.
Contact	valeria.monteiro@systemica.digital
Risk Assessment	Agatha Oliveira Ramos <sup>82</sup>
Role	Legal Project Analyst I
Summary	A lawyer graduated from the Escola Paulista de Direito (EPD), with a specialization in land issues and a focus on the Legal Amazon. She completed the course "Climate Change and Carbon Market: Scenarios and Perspectives" at the Escola Superior de Advocacia of OAB. She has solid experience in due diligence for private and collective properties, as well as extensive work in drafting and analyzing contracts, particularly in projects related to sustainability, land regularization, and the generation of environmental assets.
Contact	agatha@systemica.digital
Risk Assessment	Laise de Jesus dos Santos <sup>83</sup>
Role	Project Analyst I

<sup>81</sup> 250801\_ResumeValeria Monteiro.pdf

<sup>82</sup> 250801\_ResumeAgathaORamos.pdf

<sup>83</sup> 250801\_ResumeLaiseSantos.pdf

Table 2.13 summarizes the professional team’s experience working on the Triunfo do Xingu Grouped REDD+ Project: Risk Assessment.

Management Team Experience	
Summary	Master’s and PhD student in Wood Science and Technology at the Federal University of Lavras (UFLA). Forest Engineer graduated from the State University of Pará (UEPA). Former coordinator of the Study Group on Wood Anatomy and Chemical Products at UFLA. Volunteered in the National Volunteer Program of ICMBio at the Conservation Units of the Carajás Mosaic and interned at the Casa da Cultura Foundation in Marabá, working with indigenous populations in southeastern Pará. Member of the Wood Science and Technology League at UEPA. Experienced in the areas of forest resources, ethnobotany, and circular economy.
Contact	laise.santos@systemica.digital

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

The project involves several fronts of action, at first, most of the activities will be carried out by the Systemica Inteligência em Sustentabilidade S.A. team, as well as by the community itself. In this sense, this team has the expertise and knowledge to prepare and monitor project activities that generate impacts on the climate, the community, and biodiversity, as presented in Section 2.4.3.

However, for the development of some initial components of the project, more relevant experience was needed, so hiring partners to support the project and guarantee its quality was essential. This is the case of the fauna and flora inventories. To remedy this deficiency, Systemica Inteligência em Sustentabilidade S.A. obtained the support of TCF & Serviços and the company BIOAMA Soluções Ambientais<sup>84</sup>.

TCF & Serviços, was created in 2015 to support forestry companies in carrying out Forest Management and Reduced Impact Exploitation (MF-EIR, in Portuguese) and FSC Certification and to promote qualified labor. In addition to Training, Capacity Building, Forest Consultancy/FSC Certification, and Forest Services in the Natural Forest of the Amazon. The partnership with TCF & Serviços contributed to generating the forest biomass inventory as input for estimating biomass and calculating changes in the baseline carbon stock, among other aspects.

The company BIOAMA Soluções Ambientais, has professionals with more than 15 years of experience and experience in characterizing vegetation, and carrying out inventories of flora and fauna for environmental compensation projects with state and municipal environmental agencies. The partnership with BIOAMA Soluções Ambientais contributed to the carrying out the preliminary fauna inventory based on secondary data, training and qualification of community collaborators, installation of traps, and the faunal inventory and monitoring of interest groups.

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

Systemica Inteligência em Sustentabilidade S.A., as the implementing organization, has and will continue to have adequate financial support throughout the project’s lifetime. This is evidenced by the budget provisioned for project activities<sup>85</sup>, the projected income from the sale of carbon credits, and balance sheets

<sup>84</sup> EntitiesInvolved.zip

<sup>85</sup> 240119\_TdXCashFlow.xlsx

demonstrating the financial health of the project proponent<sup>86</sup>. This information is commercially sensitive and has therefore been included as attachments to the document, and can be shared with the VVB and Verra upon request.

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

Strategies to guarantee the fairness of the proposing and partner institutions are based on transparency regarding the use of project resources. Institutionally, contracts, terms of reference, a code of conduct and an ethical commitment term legally seal the project's actions, both internally and externally, since several project activities require partnerships with other organizations. In this sense, all Systemica Inteligência em Sustentabilidade S.A. collaborators and partners signed a code of ethics and conduct that supports their actions, as presented in Section 2.4.4. Especially in the code of conduct, it is committed to combating and denouncing all forms of corruption, which include bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion.

Likewise, to date, Systemica Inteligência em Sustentabilidade S.A. is not involved in any form of corruption<sup>87</sup>. The measures needed to be able to provide this assurance are, in the event of any complaint of an illegal or unethical act within Systemica or its partners and collaborators, it has an internal Ethics Committee made up of a person responsible for the reporting channel, a member of the board of directors and a member of the staff, all appointed by the body company's corporate structure after documental, behavioral and social analysis. Also within the functions of this Committee is the ability to issue a technical opinion with the complete report of the procedure and the conclusion of the penalty to be applied to the author(s), which may be Retraining; Simple Warning; Formal Warning; Dismissal and/or termination of service provision contract; and Dismissal for cause, without prejudice to other applicable legal and judicial measures.

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

All documentation containing internal cost assumptions or information regarding trade secrets, financial, commercial, scientific, or other sensitive data that could result in material financial loss or gain, affect the outcome of contractual or other dealings, or otherwise harm or benefit the person or entity to which the information relates is attached to this Project Description and will be available to the VVB and Verra upon request. Any commercially sensitive information is included as attachments in both the Project Description submitted to the VVB and Verra and in the public version of the Project Description. So, no commercially sensitive information has been excluded from the rest of the public version of the Project Description.

Moreover, information related to the determination of the baseline scenario, demonstration of additionality, and estimation and monitoring of GHG emission reductions and removals is not considered commercially sensitive and is described in the public version of the document.

## **2.5 Legal Status and Property Rights**

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

The legal (statutory) and traditional (customary) rights of occupation, use, access, and management over lands, territories, and resources in the project zone were mapped through the analysis of geographic

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<sup>86</sup> 240124\_SystemicaFinancialStatement.pdf

<sup>87</sup> GeneralLegalDocs.zip

information obtained from The Land Management System (SIGEF, acronym in Portuguese). This was developed by INCRA aiming to promote the management of land information in the Brazilian rural environment. The reception, validation, organization, and regularization of georeferenced data of registered rural properties are carried out through the SIGEF system, which also makes the data publicly available. The database on protected areas from the Brazilian Institute of Geography and Statistics (IBGE) and the Chico Mendes Institute for Biodiversity Conservation (ICMbio) was also used.

The available legal information, and primary data obtained in the social diagnosis<sup>88</sup> of the community of the Caboclo Village and legal documentation provided by the landowners of the project were also used. Thus, statutory tenure, use, and access rights to lands, territories, and resources in the project zone, including individual and collective rights and overlapping are presented below in the Figure 2.21.

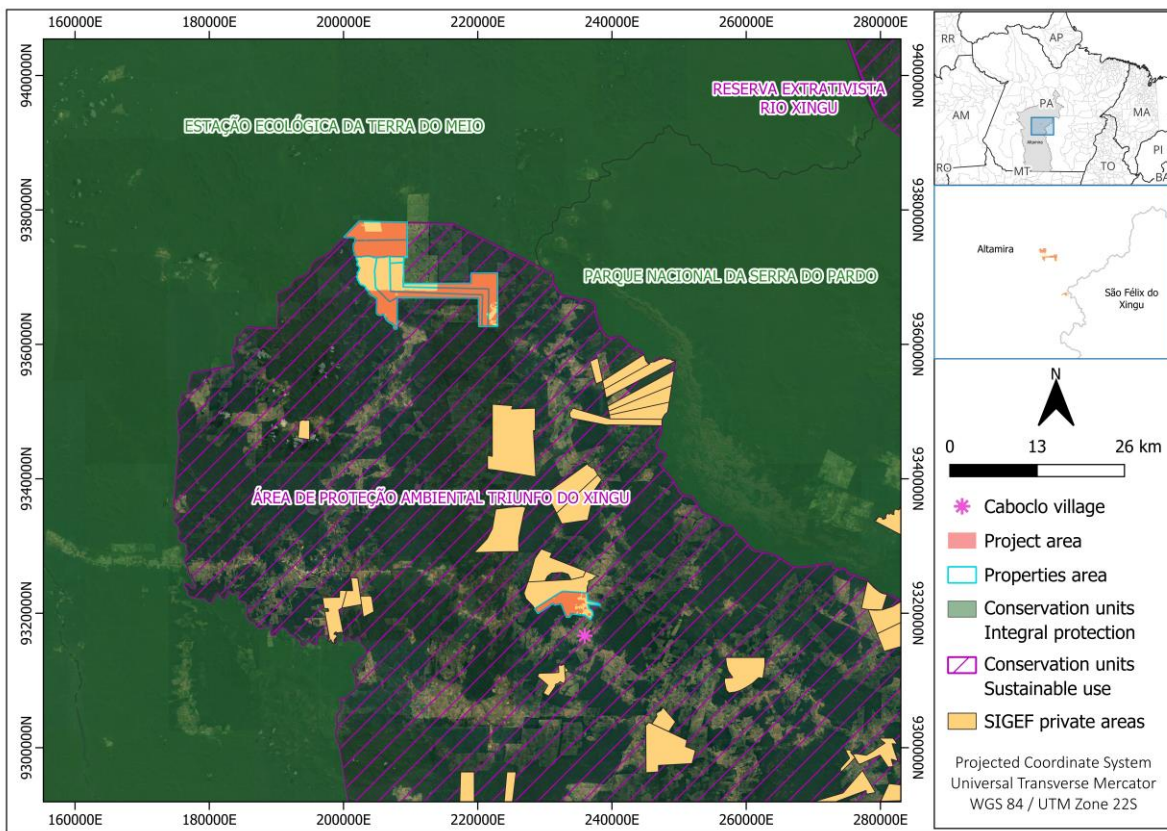


Figure 2.21 Land tenure and overlapping of individual and collective areas.

According to this information, in the project zone, the rights of tenure, use, access, and management of existing lands, territories, and resources are private property (landowners of the project) and lands with individual tenure, but not yet having the property regularized by the State (Caboclo Village). In this sense, on the one hand, the landowners represented by the other entities involved in the project, have legally proven ownership of the farms<sup>89</sup>, access is restricted to authorized persons only, and are within the Triunfo do Xingu Environmental Protection Area (APA Triunfo do Xingu) which covers the municipalities of São Félix do Xingu and Altamira, and as stated in State Decree No. 2,612 of 2006<sup>90</sup>, has “the basic objectives of protecting biological diversity, disciplining the occupation process and ensuring the sustainability of the

<sup>88</sup> 231023\_SocialDiagnosisAnnexes.zip

<sup>89</sup> 230314\_TdXProofOfTitle.zip

<sup>90</sup> 230803\_Decree2612.pdf

use of natural resources, aiming at the improvement of the quality of life of the local population”, but a management plan that puts these objectives into practice has not yet been drawn up and in accordance with paragraph 1 of Art. 15 of the National System of Conservation Units (SNUC) “The Environmental Protection Area comprises public or private lands”<sup>91</sup>.

Likewise, the areas occupied by residents of Caboclo Village are also within the APA Triunfo do Xingu, but in this case, according to the social diagnosis and the maps presented, no residents of Caboclo Village have a deed or other documentation that proves ownership from the land. This is a common fact in the state of Pará, that “almost 62% of its territory has some level of land definition – mainly protected areas (48% excluding APAs) – and 38% without definition. However, many areas under definition have pending issues or conflicts [...] Regarding pending issues, Brito et al. (2019) mapped that only 8% would have some process in progress for the resolution of property rights, with the majority divided between areas under study for the creation of UCs and titling processes of the Terra Legal Program” (Imazon, 2015).

Although the legal ownership of the land is not regularized, the residents of Caboclo Village are supported by Brazilian legislation on their statutory rights of tenure and property, according to Art. 191: “Whoever, not being the owner of rural or urban property, owns as his own, for five uninterrupted years, without opposition, an area of land, in a rural area, not exceeding fifty ha, making it productive by his work or his family, living there, will acquire their property”.

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

The Triunfo do Xingu Grouped REDD+ Project is committed to recognizing, respecting, and supporting legal rights over land, which, as seen in Section 2.5.1, includes the property rights of the landowners in the area project and the rights possession and regularization of the property by residents of Caboclo Village or future project communities in other instances. To help guarantee statutory rights in the project area, necessary measures were taken, such as legal advice to one of the landowners in the project, which clarified the groundlessness of claims on the land<sup>92,93</sup>. The project also encouraged another landowner in the project to complete the total regularization of property ownership, which can be seen as presented in Section 2.5.1 In addition, considering the constitutional right of possession and ownership of the land of the residents of Caboclo Village and other future communities of the project, to help guarantee the statutory rights, measures will be taken jointly with the community, and it will be developed within the scope of one of the project activities, as can be seen in Section 2.1.8 of this document. In addition, meetings will be held with the city hall and the responsible state secretariats to deepen the design of support mechanisms for land regularization.

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

Free, prior, and informed consent (FPIC) is a right internationally enshrined for indigenous and tribal peoples by Convention 169 of the International Labor Organization (ILO, 1989). This convention is currently in force in Brazil through Decree No. 10,088 of November 5, 2019 (Brasil, 2019).

FPIC is “the establishment of conditions under which people exercise their fundamental right to negotiate the terms of externally imposed policies, programs, and activities that directly affect their livelihoods or well-being, and to give or withhold their consent to them” (RECOFTC, 2011).

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<sup>91</sup> 230803\_L9985SNUC.pdf

<sup>92</sup> 230602\_RSAreportTJDFT.pdf

<sup>93</sup> 230602\_RSAreportTJPA.pdf

Free, prior, and informed consent should not be understood as a single yes-no vote or as a veto power for a single person or group. Instead, it is a process by which Indigenous peoples, local communities, government, and companies can reach mutual agreements in a forum that gives affected communities sufficient influence to negotiate conditions under which they can proceed and an outcome that clearly leaves the community better off (RECOFTC, 2011).

The Free, Prior, and Informed Consent (FPIC) process must be conducted in accordance with applicable national and international legislation, involving communities whose property rights may be affected. However, in the context of the TdX Project, there is no participation of indigenous or traditional communities, as recognized by national or international law, nor any impact on their property rights, since these communities do not reside in or depend on the project area. Nevertheless, the TdX Project follows internal guidelines as well as those established by the CCB and VCS Program regarding FPIC, ensuring consent for participation in activities by communities present in the project zone.

For Systemica, the consent process is continuous and structured in multiple, systematic stages, ensuring that consent is not treated as an isolated act or limited to a single moment or phase of the project. The consent process with the landowners of the TdX Project consisted of three main phases: prospecting, contract negotiation, and technical viability. In the first phase, initial contacts were made, and the prospects of the proposed project were presented. In the second phase, the necessary documents were requested, the contractual clauses, benefits, costs, and risks of the project were discussed, and technical and legal doubts were clarified. In the last phase, the environmental component and the technical viability of the project were discussed in depth, as well as the prospect of gains or not continuing the contract between the parties<sup>94</sup>. In this sense, consent to participate was obtained from the landowners in the project, where the project area is located, through the contract signed with Systemica Inteligência em Sustentabilidade S.A.

Also, consent was obtained from the Caboclo Village community to participate in CCB activities through a series of meetings. In the light of the limited community organization and governance, the process required multiple sessions to explain the project and inquire whether the community would like to participate. The first moment took place between August 28, 2022, and September 8, 2022<sup>95</sup>, during which social diagnosis, community and local stakeholder engagement was conducted. Throughout this period, meetings were held with the Caboclo Village Community and Santa Marta Farm.

These meetings involved community diagnostic questionnaires and providing explanations about the project, aiming to communicate its key points, concepts, and implications regarding the implementation of a carbon credit project. It is noteworthy that there was also dissemination of summarized project documents, including the distribution and posting of flyers in the Caboclo Village and Santa Marta Farm. During these sessions, questions were clarified, and project communication channels were publicized. Thus, it can be concluded that during this initial contact, efforts were made to provide transparent information about the project in an appropriate language, along with conducting collective workshops and participatory diagnostic activities aimed at incorporating the community's demands and opinions.

The second phase took place on June 19th, 2023, the project and its concepts were explained once again<sup>96</sup>. During this moment, project activities were also discussed, with the most relevant ones for the community highlighted, and the consent for the initiation of some of these activities was obtained. Additionally, on June 20th, 2023, communication procedures, code of ethics and conduct, and suggestion box procedures were

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<sup>94</sup> GeneralLegalDocs.zip

<sup>95</sup> Social Diagnosis.zip

<sup>96</sup> ValidationMeetings.zip

also discussed. Therefore, during this second moment the community consented to participate in the activities and made some suggestions.

Lastly, the third phase occurred in September 2023<sup>97</sup>. On September 23rd, 2023, the participatory impact assessment of the project took place alongside the women of the Caboclo Village community. It's worth noting that the project's risks, costs, and benefits had been previously discussed on the project's YouTube channel, along with other relevant information (<https://www.youtube.com/channel/UCg-cAvRpmmy10x5mj9e1ArA>). However, project activities, their risks, costs, and benefits were presented again, and the participatory assessment was conducted. Then, on September 24th, 2023, the impact assessment of the project's activities was conducted with the Caboclo Village community. Additionally, during the meeting, project communication channels were highlighted once again. It's important to mention that during this meeting, there was a reaffirmation of the community's consent regarding the project and its activities. Thus, it can be concluded that consent regarding the project implementation was obtained from the Caboclo Village community through an informative and dialogical process consisting of three main phases, in August 2022, June 2023, and September 2023.

Thus, based on the signed contract, on the referenced consultation and validation meetings, as well as on what was verified in Sections 2.1.8 on project activities and 2.5.2 on the recognition of the property rights of this document, the developers of the Triunfo do Xingu Grouped REDD+ Project understand that property rights are not or will not be affected by project activities, on the contrary, the project recognizes and respects all property rights of project participants and those surrounding the project zone, and therefore restitution or compensation measures are not applicable.

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

Project activities do not provide for the involuntary removal or relocation of property rights holders from their lands or territories and do not force rights holders to relocate activities important to their culture or livelihood, which can be demonstrated in this document by the description of project activities in Section 2.1.8, and through direct interviews with the communities in the field. Rather, the project was designed to respect the rights of property rights holders, strengthen activities relevant to livelihoods and cultural values, and support the Caboclo Village and other communities of the project in formalizing their property rights to the land.

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

The only activity identified in the project region with the potential to be illegal is the hunting of wild animals in the Caboclo Village, which was documented in questionnaires about the community's relationship with biodiversity<sup>98</sup>, as common among 16% of the population and part of the community's means of life. Although Law No. 5,197, of January 3th, 1967<sup>99</sup>, prohibits the hunting of wild fauna, subsequent legislation describes particularities about subsistence hunting that has generated confusion in its interpretation, because the Environmental Crimes Law (Law n° 9.605/1998)<sup>100</sup> brings, in its Art. 37, the exclusions of illegality provided for in the environmental norm, related to the slaughter of an animal, according to this: It is not a crime to slaughter an animal, when carried out: I - in a state of need, to satisfy the hunger of the agent or his family, and in Law n° 11,706 of 2008<sup>101</sup> "the Brazilian State recognizes the subsistence hunter, and, consequently, the importance of exercising subsistence hunting as a means of guaranteeing the food security of families

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<sup>97</sup> ValidationMeetings.zip

<sup>98</sup> 230814\_QuestionnaireEvidence.zip

<sup>99</sup> 230807\_HuntingL5197.pdf

<sup>100</sup> 230807\_HuntingL9605.pdf

<sup>101</sup> 230807\_HuntingL11706.pdf

residing in the rural area" (Ranzi & Da Silveira, 2019). In this sense, it is an open debate in Brazil due to the legislative paradoxes<sup>102</sup>.

However, based on the precautionary principle, the Triunfo do Xingu Grouped REDD+ Project considers the hunting of wild fauna as an illegal activity, and the measures designed to reduce this practice are part of the activities proposed in Section 2.1.8 of this document, specifically within the activities of "Conservation and enhancement of local biodiversity" and "Improving environmental and formal/informal education for children, young people and adults", cooperation deals will conduct with local authorities/institutions to structure and implement wildlife protection programs by rural landowners, monitoring campaigns will be carried out of fauna and flora, as well as awareness campaigns on environmental and citizenship education will carry out with people's community in the environmental area. Considering the above, to achieve the project's CCB objectives, it is very important to reduce this activity and its impact, and therefore, no benefit of the project derives from this illegal activity.

### 2.5.6 Ongoing Disputes (G5.5)

The only disputes over land rights identified as recently closed are the legal processes of Possessory Action and the Ordinary Action for Contractual Termination combined with Termination of Possession that was the object of a property belonging to one of the landowners of the project. According to the legal consultancy<sup>103</sup> regarding the first Action, it was shown that there is not a single document that links the area object of the project to that discussed in the process, that cases are not rare that propose demands based on documents produced unilaterally and without correspondence with official bodies, aiming at shady land purposes (land grabbing), which is similar to the object of the aforementioned legal process and therefore, from a legal point of view, the ownership of the securitized property is not discussed. The legal concept is consistent with the state institution that concluded this legal dispute over the right to land ownership<sup>104</sup>.

Regarding the second legal process mentioned, the legal consultancy<sup>105</sup> showed that the area object of the project is not the same as that discussed in the Action, given that the areas are located in different states of Brazil, being the area object of the project in the State of Pará, while the area discussed in the Action is located in the State of Goiás, in this sense, it is proven in the documents that they are different areas. Based on the foregoing and the updates on the progress of this legal proceeding<sup>106</sup>, it is understood that it is not a valid claim, and therefore, this apparent dispute does not pose a risk to land ownership in the project area.

Considering the above, the Triunfo do Xingu Grouped REDD+ Project carries out no activity that could jeopardize the outcome of an unresolved dispute relevant to the project; on the contrary, the project proponents and other involved entities acted by implementing measures of legal advice and monitoring the progress of legal actions in the independent state institutions to resolve disputes impartially.

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

The activities of the Triunfo do Xingu Grouped REDD+ Project are in line with the principles established in the Federal Constitution of Brazil, according to article 225, for the contribution to the right to an ecologically balanced environment, an asset of common use by the people and essential to a healthy quality of life, and

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<sup>102</sup> 230807\_SubistenceHunting.pdf

<sup>103</sup> 230602\_RSAreportTJPA.pdf

<sup>104</sup> 230929\_LegalResolution1.pdf

<sup>105</sup> 230602\_RSAreportTJDFT.pdf

<sup>106</sup> Updates\_legal\_proceeding.pdf

to the item (I) of this article on preserving and restoring essential ecological processes and providing for the ecological management of species and ecosystems.

The project also observes the provisions of the National Environmental Policy, Law n° 6.938, of August 31, 1981<sup>107</sup>, which declares the objectives of conservation, improvement, and recovery of the environmental quality that is conducive to life, having among its principles the protection of ecosystems with the conservation of relevant areas (Art. 2, IV) and the protection of areas threatened with degradation (item IX), and is in line with Federal Law n° 12.187, of December 29, 2009, which instituted the National Policy on Climate Change<sup>108</sup>, concerning Article 3, item (I) in which it states that everyone has a duty to act, for the benefit of present and future generations, to the reduction of impacts resulting from anthropic interference on the climate system, and item (V) on how, actions at the national level to face climate change, current, present and future, should consider and integrate the actions promoted at the state level and municipal by public and private entities.

Regarding protecting native vegetation policy, the most important regulatory framework is the New Forest Code, Law n° 12.651, of May 2012<sup>109</sup>. This law establishes not only the forest category that must be conserved within private properties but also the maximum amount of native vegetation that can be converted to other land uses for economic purposes. About this, the Triunfo do Xingu Grouped REDD+ Project under the VCS GHG accounting standard and now for the CCB standard, ensured compliance in the project area with the permanence of the Legal Reserve, which for properties in Legal Amazon forests must be 80% of the property area.

Additionally, the private properties of the other entities involved in the project and the community of the first instance Caboclo Village are within the Triunfo do Xingu Environmental Protection Area (APA Triunfo do Xingu), which covers the municipalities of São Félix do Xingu and Altamira, as provided in state decree n° 2.612 of 2006<sup>110</sup>. Even though no management plan puts the objectives of the APA Triunfo de Xingu into practice, the project activities are consistent with these, since it has “as its basic objectives to protect the diversity biological, disciplining the occupation process and ensuring the sustainability of the use of natural resources, aiming at improving the quality of life of the local population”, as well as with Law n° 9.985 of 2000<sup>111</sup> of the National System of Conservation Units (SNUC), that according to paragraph 1 of art. 15 provides that “the Environmental Protection Area includes public or private land”. In this way, as can be seen in the project's CCB objectives presented, the activities are coherent and comply with the relevant legislation for their development.

### 2.5.8 Approvals (G5.7)

The project does not have specific federal or state government authorization to conduct a carbon project in a private area. However, the Triunfo do Xingu Grouped REDD+ Project adopts the attitude of informing and inviting the executive bodies to cooperate with the project and contribute, within their attributions, and thus enhancing the project's positive impacts. Systemica Inteligência em Sustentabilidade S.A. is also involved in discussions on the voluntary carbon market at various points and keeps itself updated (Example: Aliança Brasil Nature-Based Solutions)<sup>112</sup>, an organization dedicated to discussing NBS and mainly the carbon market in Brazil) so that when changes occur, they can promptly update and take necessary action.

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<sup>107</sup> 230706\_NationalPolicyL6938.pdf

<sup>108</sup> 230706\_NationalPolicyL12187.pdf

<sup>109</sup> 230706\_NationalPolicyL12651.pdf

<sup>110</sup> 230803\_Decree2612.pdf

<sup>111</sup> 230803\_L9985SNUC.pdf

<sup>112</sup> LawsandProofs.zip

There is no requirement for community approval for the implementation of the carbon project as it is not part of the project area, but consent to participate in project activities has been obtained from the project community, as presented in Section 2.5.3 of this document.

### **2.5.9 Right to Claim Benefits (G5.8)**

The project proponent is Systemica Inteligência em Sustentabilidade S.A. According to Section 2.1.1, and the landowners hold the statutory property rights over their properties, including the land and vegetation within the project area. Systemica, as the project proponent, does not hold title to the land. However, the company entered into an enforceable co-participation agreement with the landowners, signed on 6 and 7 October 2022, and “term sheets” signed in April and June 2022<sup>113</sup>. This “term sheet” has as its purpose: (i) the execution of studies and data collection to verify the feasibility of projects for the generation of carbon assets and, in the event of a positive feasibility conclusion, (ii) the development of projects for the generation of environmental assets, especially carbon credits. Systemica shall, at its own expense, carry out the necessary surveys and feasibility studies – technical and legal – for the development of a project to reduce or remove greenhouse gas emissions, it being understood that, if feasible and of interest, Systemica shall have the right to exclusively develop, at its own expense, the referred project on the Property.

The agreement and term sheet grant Systemica the legal authority to co-develop, implement, and manage the project activities from the start date. Consequently, Systemica’s project ownership arises by virtue of an enforceable contractual agreement with the holders of the statutory property rights in the land and vegetation, which vests project ownership in the project proponent (Section 3.7 PD VCS).

### **2.5.10 Other Programs (G5.9)**

The Triunfo do Xingu Grouped REDD+ Project is a validated, verified, and monitored project under the VCS standard, and this document serves as its validation for the Climate, Community, and Biodiversity Standards. The project is not registered nor seeks registration in any other GHG program. The project proponent is not interested in issuing another GHG-related environmental credit. The project has not sought or received any other form of GHG-related or non-GHG environmental or social credit to date.

### **2.5.11 Double Counting (G5.9)**

The Brazilian Greenhouse Gas Emissions Trading System (SBCE), established by Law No. 15,042/2024, explicitly prohibits double counting and establishes mechanisms to ensure the integrity of credits in jurisdictional systems.

Pursuant to Article 2 of the law, the SBCE guarantees that legitimate usufructuaries, concessionaires, and landowners — as in the case of the Triunfo do Xingu Grouped REDD+ Project (TdX) — maintain the exclusive right to exploit their areas. To this end, it mandates the exclusion of these properties from jurisdictional REDD+ programs, preventing the double counting of Greenhouse Gas (GHG) emission reductions. The obligation to exclude private areas from jurisdictional REDD programs lies with the state that instituted the program.

Furthermore, the legislation expressly provides that landowners in Brazil, even without REDD projects, may request the exclusion of their lands from non-market state programs or jurisdictional REDD+ programs at any time, based on Article 43, § 13.

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<sup>113</sup> GeneralLegalDocs.zip

Reinforcing this directive, Article 41, paragraph 6, item IV of the same law prohibits the early commercialization of future results by public entities responsible for developing jurisdictional REDD+ programs, ensuring integrity and transparency in carbon credit accounting.

Despite these provisions of Brazilian law, it is important to emphasize that the jurisdictional certification standard adopted by the state of Pará, namely ARTREES (<https://www.artredd.org/trees/>), also mandates the exclusion of private projects carried out within the jurisdiction from state accounting and, consequently, from the deduction of these assets in the issuance of jurisdictional credits.

Thus, it has been confirmed that there is no double counting or double claiming between the TdX project and the Jurisdictional REDD+ Program. The TdX project and its activities focused on reducing emissions from the AUDD category are solely aimed at generating credits under Verra's VCS program.

### 3 CLIMATE

The project has already undergone validation through the VM0015 methodology, as can be verified on the Verra website. However, the project decided to migrate to the new VM0048 methodology to seek the best techniques for applicability, additionality, and calculation. The VM0048 methodology ensures the integrity of greenhouse gas accounting for individual projects within a jurisdiction and allows for the use of the most up-to-date science, data, and technologies.

VM0015 is a methodology that estimates greenhouse gas emissions from areas where unplanned deforestation occurs and quantifies the emission reductions achieved by curbing deforestation. VM0015 is among the older REDD+ methodologies that account for most REDD+ credits on the market, but these older methodologies will not be assessed by ICVCM and credits issued under them will not be able to receive the CCP (Core Carbon Principles) label. In contrast, VM0048 is the new REDD methodology that will strengthen the VCS Program for issuing carbon credits to Avoided Unplanned Deforestation projects and has been approved by the Integrity Council for the Voluntary Carbon Market as meeting the requirements of the Core Carbon Principles Assessment Framework. Under VCS' new VM0048, project developers no longer set their own baselines based on self-selected reference areas, as VCS has agreed to establish project baselines based on jurisdictional deforestation data combined with an assessment of deforestation risk in the specific area. This represents a significant improvement since VM0048 improved the baseline methods, a change that will likely substantially reduce the very high levels of over-crediting found in previous methodologies. Verra requires operational Avoiding Unplanned Deforestation REDD+ projects using the older methodologies to transition across to VM0048, ensuring higher standards and integrity in carbon credit generation moving forward.

#### 3.1 Without-Project Climate Scenario

##### 3.1.1 Without-Project Estimated Greenhouse Gas Emissions (CL1.1)

This section's aim is to show the estimate of total GHG emissions for the GHG accounting period inside the project area under the without-project land use scenario (baseline scenario). The Triunfo do Xingu Grouped REDD+ Project has been validated by the Verified Carbon Standard (VCS) in VM0015 and is in the process of being validated in VM0048. Therefore, complete information about the VCS methodology and requirements can be accessed in the VCS PDD. The probable future scenario for the project area (PA) in the absence of this project will be summarized hereupon.

The PA is an area equivalent to 10,704.58 ha and comprises seven distinct properties in its first instance (TdX-I1). The project satisfies all applicability conditions specified in the VM0048 methodology for avoided unplanned deforestation, as follows:

- No baseline land use conversion activities within the project area are legally designated for forestry operations or deforestation purposes.
- The PA exclusively contains undisturbed forest areas, with no inclusion of deforested, degraded, or anthropogenically modified lands.
- All forest areas within the project boundary meet the qualified forest definition requirements and have maintained forest cover for a minimum of ten years prior to the project commencement date.
- Project implementation activities comply with all applicable legal frameworks and adhere to the complete set of VCS methodology requirements.
- Comprehensive documentation of these applicability conditions and project compliance specifications is provided in Section 3.2 of the annexed VCS PDD.

The areas surrounding the project area, where baseline activities could be displaced due to project activities implemented in the project area (leakage belt), were provided by Verra. Procedures for estimating leakage depend on a combination of data and steps to be taken by Verra and the project proponent. The processes and criteria for developing jurisdictional data are described in Appendix 1 of VMD0055 v1.1.

The development of the project to prevent unplanned deforestation using the VM0048 methodology required establishing an emissions baseline using activity data (AD) allocated by Verra. As described in Appendixes 1 and 2 (VMD0055), the jurisdictional average annual unplanned deforestation rate and the jurisdictional emission factor for land cover transition in areas available for activity shifting outside the UDef LB are produced by Verra. Project proponents use the procedure described in this appendix to get AD for their project from Verra, then convert it into emission baselines using project-specific emission factors for the carbon pools and sources selected for the project according to sections 5.2 Carbon Pools and 5.3 Sources of GHG Emissions of VM0048 (as set out in Section 5.3.2). The deforestation projection for the Triunfo do Xingu Grouped REDD+ Project is based on a spatial and temporal analysis covering the Historical Reference Period (HRP) from January 1, 2009, to December 31, 2018, and extends through the Baseline Validity Period (BVP) from January 1, 2019 to December 31, 2024.

The activity data allocation reveals significant annual deforestation rates within the project boundaries, with the unplanned deforestation project area (ADPA-UDef) experiencing an average of 256.356 ha year<sup>-1</sup> of forest loss, while the Unplanned Deforestation Leakage Belt (ADLB-UDef) shows a higher deforestation rate of 367.784 ha year<sup>-1</sup>. These figures establish baseline deforestation patterns that inform the projection methodology and demonstrate the urgent need for conservation intervention in the region. The area-weighted emission factor for activity shifting outside the unplanned deforestation leakage belt ( $\Delta C_{OLB}$ ) of 424.99 t CO<sub>2</sub>e reflects the carbon stock changes associated with deforestation activities and provides the basis for quantifying emissions reductions achieved through project implementation.

Non-CO<sub>2</sub> emissions from fires used to clear forests can be counted when sufficient data are available to estimate them. However, accounting for these emissions was conservatively omitted in this project. GHG emissions from land use implemented on deforested lands (including biomass burning) are conservatively omitted in the used VM0048. The total estimate of GHG emissions for the GHG accounting period inside the project area under the without-project land use scenario (baseline scenario) is 655,972.19 t CO<sub>2</sub>e. This

result is shown in Table 3.1 together with the estimates for the leakage belt, the sheets can be also consulted in the annex<sup>114</sup>.

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<sup>114</sup> 231016\_CalculationNetGHGEmissionReductions.xlsx

Table 3.1. Annual baseline deforestation for the project and leakage belt areas per stratum (ha).

Vintage period	Baseline Emissions from Deforestation for the Project Area			Baseline Emissions from Deforestation for the Leakage Belt Area
	$\Delta C_{BSL,PA-UDef,t}$	GHG <sub>BSLPA-UDef,E,t</sub>	$\Delta C_{BSL,PA-UDef,t}$	$\Delta C_{BSL,LB-UDef,Ds,t}$
	t CO <sub>2e</sub>	t CO <sub>2e</sub>	t CO <sub>2e</sub>	t CO <sub>2e</sub>
31-Ago-2022 to 31-Dec-2022	40,242.56	2,896.95	43,139.50	57,734.39
01-Jan-2023 to 31-Dec-2023	120,288.96	8,596.63	128,885.59	172,573.77
01-Jan-2024 to 31-Dec-2024	122,870.64	8,596.63	131,467.27	176,277.60
01-Jan-2025 to 31-Dec-2025	125,452.31	8,596.63	134,048.94	179,981.42
01-Jan-2026 to 31-Dec-2026	128,033.99	8,596.63	136,630.62	183,685.25
01-Jan-2027 to 31-Dec-2027	11,196.70	0.00	11,196.70	16,063.46
01-Jan-2028 to 31-Dec-2028	11,196.70	0.00	11,196.70	16,063.46
01-Jan-2029 to 31-Dec-2029	11,196.70	0.00	11,196.70	16,063.46
01-Jan-2030 to 31-Dec-2030	11,196.70	0.00	11,196.70	16,063.46
01-Jan-2031 to 31-Dec-2031	11,196.70	0.00	11,196.70	16,063.46
01-Jan-2032 to 31-Dec-2032	10,326.71	0.00	10,326.71	14,815.32
01-Jan-2033 to 31-Dec-2033	7,745.03	0.00	7,745.03	11,111.49
01-Jan-2034 to 31-Dec-2034	5,163.35	0.00	5,163.35	7,407.66
01-Jan-2035 to 31-Dec-2035	2,581.68	0.00	2,581.68	3,703.83
01-Jan-2036 to 31-Dec-2036	0.00	0.00	0.00	0.00
01-Jan-2037 to 31-Dec-2037	0.00	0.00	0.00	0.00
01-Jan-2038 to 31-Dec-2038	0.00	0.00	0.00	0.00
01-Jan-2039 to 31-Dec-2039	0.00	0.00	0.00	0.00
01-Jan-2040 to 31-Dec-2040	0.00	0.00	0.00	0.00
01-Jan-2041 to 31-Dec-2041	0.00	0.00	0.00	0.00
01-Jan-2042 to 31-Dec-2042	0.00	0.00	0.00	0.00
01-Jan-2043 to 31-Dec-2043	0.00	0.00	0.00	0.00
01-Jan-2044 to 31-Dec-2044	0.00	0.00	0.00	0.00
01-Jan-2045 to 31-Dec-2045	0.00	0.00	0.00	0.00

Table 3.1. Annual baseline deforestation for the project and leakage belt areas per stratum (ha).

Vintage period	Baseline Emissions from Deforestation for the Project Area			Baseline Emissions from Deforestation for the Leakage Belt Area
	$\Delta C_{BSL,PA-Udef,t}$	$GHG_{BSLPA-UDef,E,t}$	$\Delta C_{BSL,PA-Udef,t}$	$\Delta C_{BSL,LB-UDef,Ds,t}$
	t CO <sub>2e</sub>	t CO <sub>2e</sub>	t CO <sub>2e</sub>	t CO <sub>2e</sub>
01-Jan-2046 to 31-Dec-2046	0.00	0.00	0.00	0.00
01-Jan-2047 to 31-Dec-2047	0.00	0.00	0.00	0.00
01-Jan-2048 to 31-Dec-2048	0.00	0.00	0.00	0.00
01-Jan-2049 to 31-Dec-2049	0.00	0.00	0.00	0.00
01-Jan-2050 to 31-Dec-2050	0.00	0.00	0.00	0.00
01-Jan-2051 to 31-Dec-2051	0.00	0.00	0.00	0.00
01-Jan-2052 to 30-Aug-2052	0.00	0.00	0.00	0.00
<b>TOTAL</b>	<b>618,688.73</b>	<b>37,283.46</b>	<b>655,972.19</b>	<b>887,608.01</b>

## 3.2 Net Positive Climate Impacts

### 3.2.1 With-Project Estimated Greenhouse Gas Emissions (CL2.1)

In the Triunfo do Xingu Grouped REDD+ Project area, there is an absence of planned deforestation and wood management, so the planned activities within the project area were not considered in the calculations. Nevertheless, some unplanned deforestation may happen in the project area despite the AUD project activity. The level at which deforestation will be reduced, in the project case, depends on the effectiveness of the proposed activities, which cannot be measured ex-ante. Ex-post measurements of the project results will be considered to determine actual emission reductions.

The project team adopted a conservative approach that estimates an Effectiveness Index (EI) between 0 (no effectiveness) and 1 (maximum effectiveness). The without-project predictions are multiplied by the factor  $(1-EI)$  using the estimated value of  $EI$ , and the result is considered in the ex-ante estimated emissions from unplanned deforestation in the project case using the VM0048 approach. The project design team conservatively estimates that the activities of surveillance can prevent unexpected deforestation inside the project area with an efficacy of 90%. The proposed activities are (i) Identification of strategic points to establish surveillance checkpoints, prioritizing zones bordering areas with high probability of invasion; (ii) establishment of surveillance checkpoints; (iii) establishment of frequent surveillance rounds; (iv) contact with neighboring communities in order to develop environmental education activities; (v) maintenance of firebreaks for fire protection; and (vi) Identification of neighboring landowners in order to prevent leakage.

Patrol, surveillance and satellite monitoring activities play a crucial role in curbing unplanned deforestation by enabling continuous, real-time monitoring of land use changes. These initiatives can quickly detect illegal forest clearings and the early signs of pastureland expansion — a pattern closely associated with cattle farming, land grabbing, and the subsequent use of fire to maintain pastures. This rapid detection allows for immediate intervention by regulatory authorities, effectively disrupting the coordinated actions of cattle farmers, land grabbers, and large-scale property owners. Consequently, a reduction in deforestation rates is expected as these activities inhibit invasive actions and illegal occupations. Additionally, this activity increases the perception of land security in the region, reducing potential conflicts.

Patrol and field surveillance activities rely on effective project governance in collaboration with the local community. Consequently, the initial phase should focus on strengthening the community's REDD capacity (as implemented at the project's start date). This approach establishes a sequential process: robust governance promotes environmental awareness, which, in turn, enhances the community's and local workers' ability to effectively initiate patrols and field surveillance. Conversely, satellite surveillance is implemented from the beginning of the project, as it solely depends on GIS technology.

Finally, hiring and training workers from the local community for patrolling and surveillance provides alternative sources of income, which will contribute to reducing the community's involvement in activities that contribute to deforestation in the region. Therefore, patrol, surveillance, and satellite monitoring activities are expected to yield an EI of 90%, as demonstrated by the benchmarking analysis of previously executed projects.

Consequently, calculations were performed to determine the total ex-ante actual carbon stock change resulting from unavoidable unplanned deforestation in year  $t$  within the project area. The total ex-ante actual non-CO<sub>2</sub> emissions from forest fire due to unplanned deforestation at year  $t$  in the project area are estimated considering the efficacy of 90% ( $EI = 0.9$ ) and the values of the total GHG emission from biomass burning at year  $t$  calculated in the baseline estimation (without project scenario). Since emissions from planned

activities are zero, the total project area emissions equal the sum of estimated unavoidable unplanned deforestation and the ex-ante estimation of actual non-CO<sub>2</sub> emissions from forest fires, as presented in Table 3.2.

The TdX project was validated under VM0015 and will also be validated under VM0048; therefore, the equations and additional information regarding these estimations can be reviewed in the VCS PDD and the accompanying annexes<sup>115</sup>.

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<sup>115</sup> 231016\_CalculationNetGHGEmissionReductions.xlsx

Table 3.2. Total project emissions ex-ante estimation.

Vintage period	UDef PA			UDef LB		
	$\Delta C_{BSL,PA-UDef,t}$ (t CO <sub>2</sub> e)	EA <sub>EF,t</sub> (%)	$\Delta C_{MP,PA-UDef,i,t}$ (t CO <sub>2</sub> e)	$\Delta C_{BSL,LB-UDef,i,t}$ (t CO <sub>2</sub> e)	EA <sub>EF,t</sub> (%)	$\Delta C_{MP,LB,PA-UDef,i,t}$ (t CO <sub>2</sub> e)
31-Ago-2022 to 31-Dec-2022	43,139.50	90%	4,313.95	57,734.39	90%	5,773.44
01-Jan-2023 to 31-Dec-2023	128,885.59	90%	12,888.56	172,573.77	90%	17,257.38
01-Jan-2024 to 31-Dec-2024	131,467.27	90%	13,146.73	176,277.60	90%	17,627.76
01-Jan-2025 to 31-Dec-2025	134,048.94	90%	13,404.89	179,981.42	90%	17,998.14
01-Jan-2026 to 31-Dec-2026	136,630.62	90%	13,663.06	183,685.25	90%	18,368.53
01-Jan-2027 to 31-Dec-2027	11,196.70	90%	1,119.67	16,063.46	90%	1,606.35
01-Jan-2028 to 31-Dec-2028	11,196.70	90%	1,119.67	16,063.46	90%	1,606.35
01-Jan-2029 to 31-Dec-2029	11,196.70	90%	1,119.67	16,063.46	90%	1,606.35
01-Jan-2030 to 31-Dec-2030	11,196.70	90%	1,119.67	16,063.46	90%	1,606.35
01-Jan-2031 to 31-Dec-2031	11,196.70	90%	1,119.67	16,063.46	90%	1,606.35
01-Jan-2032 to 31-Dec-2032	10,326.71	90%	1,032.67	14,815.32	90%	1,481.53
01-Jan-2033 to 31-Dec-2033	7,745.03	90%	774.50	11,111.49	90%	1,111.15
01-Jan-2034 to 31-Dec-2034	5,163.35	90%	516.34	7,407.66	90%	740.77
01-Jan-2035 to 31-Dec-2035	2,581.68	90%	258.17	3,703.83	90%	370.38
01-Jan-2036 to 31-Dec-2036	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2037 to 31-Dec-2037	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2038 to 31-Dec-2038	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2039 to 31-Dec-2039	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2040 to 31-Dec-2040	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2041 to 31-Dec-2041	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2042 to 31-Dec-2042	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2043 to 31-Dec-2043	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2044 to 31-Dec-2044	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2045 to 31-Dec-2045	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2046 to 31-Dec-2046	0.00	90%	0.00	0.00	90%	0.00

Table 3.2. Total project emissions ex-ante estimation.

Vintage period	UDef PA			UDef LB		
	$\Delta C_{BSL,PA-UDef,t}$ (t CO <sub>2</sub> e)	EA <sub>EF,t</sub> (%)	$\Delta C_{MP,PA-UDef,i,t}$ (t CO <sub>2</sub> e)	$\Delta C_{BSL,LB-UDef,i,t}$ (t CO <sub>2</sub> e)	EA <sub>EF,t</sub> (%)	$\Delta C_{MP,LB,PA-UDef,i,t}$ (t CO <sub>2</sub> e)
01-Jan-2047 to 31-Dec-2047	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2048 to 31-Dec-2048	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2049 to 31-Dec-2049	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2050 to 31-Dec-2050	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2051 to 31-Dec-2051	0.00	90%	0.00	0.00	90%	0.00
01-Jan-2052 to 30-Aug-2052	0.00	90%	0.00	0.00	90%	0.00
TOTAL	655,972.19		65,597.22	887,608.01		88,760.80

### 3.2.2 Net Impact (CL2.2)

The TdX project area is strategically located in Altamira municipality, which recorded the highest deforestation rate in Brazil's Legal Amazon region by 2021 (G1, 2021). This critical location underscores the project's potential for significant climate impact, given that deforestation has accelerated over the past three years, with an average annual rate exceeding 71,277 ha (INPE, 2022). The development of the project to prevent unplanned deforestation using the VM0048 methodology required establishing emissions baselines using AD allocated by Verra. As detailed in Appendices 1 and 2 (VMD0055), jurisdictional average annual unplanned deforestation rates and emission factors for land cover transition are provided by Verra for areas available for activity shifting outside the UDef LB. Project proponents utilize Verra's prescribed procedures to obtain project-specific AD, subsequently converting this data into emission baselines using project-specific emission factors for selected carbon pools and GHG emission sources according to sections 5.2 and 5.3 of VM0048.

The deforestation projection for the Triunfo do Xingu Grouped REDD+ Project is based on comprehensive spatial and temporal analysis covering the Historical Reference Period (HRP) from January 1, 2009, to December 31, 2018, extending through the Baseline Validity Period (BVP) from January 1, 2019, to December 31, 2024. The baseline analysis reveals substantial ongoing forest loss that would continue without project intervention, with the Unplanned Deforestation Project Area (ADPA-UDef) experiencing an average of 256.356 ha year<sup>-1</sup> of forest loss, while the Unplanned Deforestation Leakage Belt (ADLB-UDef) shows a higher deforestation rate of 367.784 ha year<sup>-1</sup>. These baseline deforestation patterns establish the reference scenario against which the project's climate benefits are measured, demonstrating the substantial forest carbon stocks at risk without conservation intervention.

The net climate impact of the project is unequivocally positive, calculated as the difference between the total GHG emissions in the without-project scenario (baseline emissions), the significantly reduced GHG emissions resulting from successful deforestation prevention activities, and any decrease in carbon stocks and increase in GHG emissions due to leakage (Table 3.3). The project will prevent approximately 624.14 ha year<sup>-1</sup> of forest loss across project and leakage areas, preserving substantial forest carbon stocks that would otherwise be released as CO<sub>2</sub> and enabling long-term carbon sequestration through continued forest protection. The buffer pool allocation was estimated using the most recent version of the VCS-approved AFOLU Non-Permanence Risk Tool, with the resulting value of 15%, providing conservative accounting that ensures net positive climate impact even under adverse scenarios (see Section 4 of the Non-Permanence Risk document annexed<sup>116</sup>). The project's location in Brazil's highest deforestation municipality, combined with demonstrated high baseline deforestation rates and robust methodology application, confirms that the Triunfo do Xingu Grouped REDD+ Project will deliver substantial positive climate benefits through effective forest conservation.

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<sup>116</sup> VCS\_NPR\_REP\_3738\_31\_08\_2022\_15\_08\_2025.pdf

Table 3.3. Estimated net GHG emission reductions or removals.

Vintage period	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions	Net GHG emission reductions or removals	Buffer pool allocation	Estimated reduction VCUs	Estimated total VCU issuance
	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	
31-Ago-2022 to 31-Dec-2022	43,139.50	4,313.95	4,313.95	34,511.60	5,823.83	28,687	28,687
01-Jan-2023 to 31-Dec-2023	128,885.59	12,888.56	12,888.56	103,108.47	17,399.55	85,708	85,708
01-Jan-2024 to 31-Dec-2024	131,467.27	13,146.73	13,146.73	105,173.81	17,748.08	87,425	87,425
01-Jan-2025 to 31-Dec-2025	134,048.94	13,404.89	13,404.89	107,239.15	18,096.61	89,142	89,142
01-Jan-2026 to 31-Dec-2026	136,630.62	13,663.06	13,663.06	109,304.50	18,445.13	90,859	90,859
01-Jan-2027 to 31-Dec-2027	11,196.70	1,119.67	1,119.67	8,957.36	1,511.55	7,445	7,445
01-Jan-2028 to 31-Dec-2028	11,196.70	1,119.67	1,119.67	8,957.36	1,511.55	7,445	7,445
01-Jan-2029 to 31-Dec-2029	11,196.70	1,119.67	1,119.67	8,957.36	1,511.55	7,445	7,445
01-Jan-2030 to 31-Dec-2030	11,196.70	1,119.67	1,119.67	8,957.36	1,511.55	7,445	7,445

Table 3.3. Estimated net GHG emission reductions or removals.

Vintage period	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions	Net GHG emission reductions or removals	Buffer pool allocation	Estimated reduction VCUs	Estimated total VCU issuance
	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	
01-Jan-2031 to 31-Dec-2031	11,196.70	1,119.67	1,119.67	8,957.36	1,511.55	7,445	7,445
01-Jan-2032 to 31-Dec-2032	10,326.71	1,032.67	1,032.67	8,261.37	1,394.11	6,867	6,867
01-Jan-2033 to 31-Dec-2033	7,745.03	774.50	774.50	6,196.03	1,045.58	5,150	5,150
01-Jan-2034 to 31-Dec-2034	5,163.35	516.34	516.34	4,130.68	697.05	3,433	3,433
01-Jan-2035 to 31-Dec-2035	2,581.68	258.17	258.17	2,065.34	348.53	1,716	1,716
01-Jan-2036 to 31-Dec-2036	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2037 to 31-Dec-2037	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2038 to 31-Dec-2038	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2039 to 31-Dec-2039	0.00	0.00	0.00	0.00	0.00	0	0

Table 3.3. Estimated net GHG emission reductions or removals.

Vintage period	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions	Net GHG emission reductions or removals	Buffer pool allocation	Estimated reduction VCUs	Estimated total VCU issuance
	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	
01-Jan-2040 to 31-Dec-2040	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2041 to 31-Dec-2041	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2042 to 31-Dec-2042	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2043 to 31-Dec-2043	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2044 to 31-Dec-2044	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2045 to 31-Dec-2045	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2046 to 31-Dec-2046	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2047 to 31-Dec-2047	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2048 to 31-Dec-2048	0.00	0.00	0.00	0.00	0.00	0	0

Table 3.3. Estimated net GHG emission reductions or removals.

Vintage period	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions	Net GHG emission reductions or removals	Buffer pool allocation	Estimated reduction VCUs	Estimated total VCU issuance
	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	(t CO <sub>2</sub> e)	
01-Jan-2049 to 31-Dec-2049	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2050 to 31-Dec-2050	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2051 to 31-Dec-2051	0.00	0.00	0.00	0.00	0.00	0	0
01-Jan-2052 to 30-Aug-2052	0.00	0.00	0.00	0.00	0.00	0	0
<b>Total</b>	<b>655,972.19</b>	<b>65,597.22</b>	<b>65,597.22</b>	<b>524,777.75</b>	<b>88,556.25</b>	<b>436,212</b>	<b>436,212</b>

### 3.3 Offsite Climate Impacts (Leakage)

#### 3.3.1 Types of Expected Leakage (CL3.1)

According to VMD0055 v1.1 (VERRA, 2024b), four types of leakage should be assessed: 1) Activity shifting by geographically constrained agents; 2) Activity shifting by geographically mobile agents; 3) Market-effects leakage; and 4) Leakage mitigation emissions.

Emissions from these sources are summed to yield an estimate of the total leakage emissions for the project activities over the monitoring period.

Leakage due to activity shifting by geographically constrained agents is monitored within the UDef LB. Baseline unplanned deforestation allocated within UDef LB is compared to the deforestation monitored ex post.

Leakage due to activity shifting by geographically mobile agents is estimated on the basis of: a) The net reduction (displacement) of deforestation from the baseline to the end of the monitoring period within the combined area of the UDef PA and UDef LB; b) The proportion of geographically mobile agents of deforestation projected in the baseline; and c) Area-weighted emission factors for areas accessible to geographically mobile deforestation agents outside of the UDef LB.

Market effects leakage occurs when, in the baseline case, commodities were produced for regional, national or international markets. Market effects leakage is estimated using VMD0011 Market Effects Emissions Estimation (LK-ME) (VERRA, 2023c). Emissions due to leakage mitigation measures correspond to non-CO<sub>2</sub> GHG emissions from biomass burning or fertilizer use and should be quantified, if applicable.

Procedures for estimating leakage depend on a combination of data and steps to be taken by Verra and the project proponent (Table 3.4). The processes and criteria for developing jurisdictional data are described in Appendix 1 of VMD0055 v1.1 (VERRA, 2024b).

*Table 3.4. Roles in development of leakage estimate.*

Step	Responsible party	Frequency
Definition of UDef LB boundaries	Verra (UDef LB to be adjusted by the project proponent where applicable)	Once prior to starting each jurisdictional BVP
Definition of jurisdictional emission factor for areas outside the UDef LB subject to deforestation from activity shifting by geographically mobile agents	Verra	Once prior to starting each jurisdictional BVP
Assessing emissions from activity shifting due to displacement of unplanned deforestation to the UDef LB	Project proponent	Once per monitoring event
Assessing emissions from activity shifting due to displacement of unplanned deforestation to areas outside the UDef LB	Project proponent	Once per monitoring event

Assessing emissions from leakage mitigation measures	Project proponent	Once per monitoring event
Estimation of total leakage due to the displacement of unplanned deforestation	Project proponent	Once per monitoring event

Figure 3.1 summarizes the key leakage estimation steps to be undertaken by the project proponent.

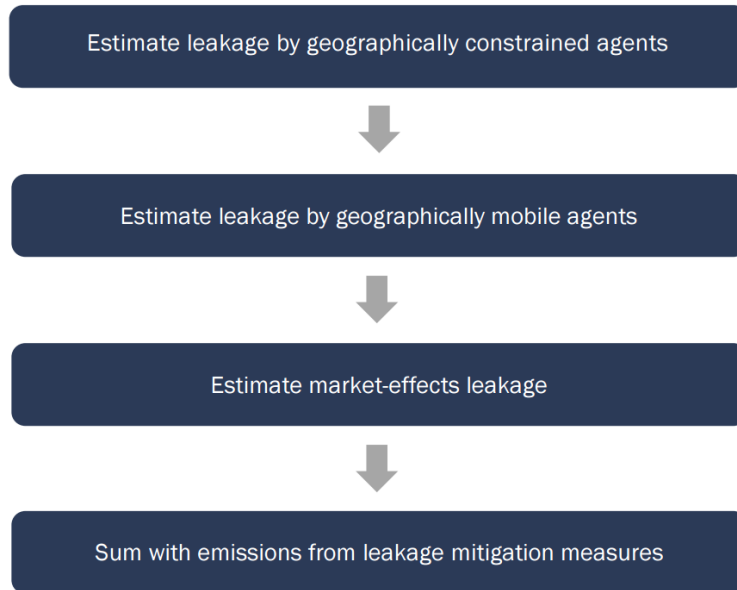


Figure 3.1. Leakage estimation steps.

### 3.3.2 Quantity of Expected Leakage (CL3.1, 3.3)

Ex antique, activity displacement leakage was estimated based on the anticipated combined effectiveness of the proposed leakage mitigation measures and project activities. This was done by multiplying the estimated changes in the baseline carbon stock for the UDef PA by a “displacement leakage factor” (DLF) representing the percentage of deforestation expected to be displaced outside the project boundary. Where deforestation agents identified do not participate in and/or benefit from leakage mitigation measures, the displacement factor is 100%. Where wildfire emissions were included in the baseline, ex ante wildfire emissions due to activity displacement leakage will be calculated by multiplying the baseline wildfire emissions in the UDef PA by the same DLF used to estimate the decrease in carbon stocks.

Ex ante estimates of leakage emissions do not contribute to estimates of ex post monitored project leakage emissions. Monitored leakage emissions are described in Sections 5.3.4.3 – 5.3.4.8 of VMD0055 v1.1.

The project design team estimates that 100% of potential deforestation agents in the project zone will be given the opportunity to participate in leakage prevention activities. The project's proactive measures to combat leakage sources include: (i) identification of strategic points to establish surveillance checkpoints prioritizing zones bordering areas with high probability of invasion; (ii) establishment of surveillance checkpoints; (iii) establishment of frequent surveillance rounds; (iv) contact with neighboring communities in order to develop environmental education activities; (v) maintenance of firebreaks for fire protection; and (vi) identification of neighboring landowners in order to prevent leakage. Thus, the DLF was conservatively

defined as 90%. The value of the ex-ante estimates of leakage emissions can be verified in the spreadsheet<sup>117</sup> and in Table 3.5.

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<sup>117</sup> 231016\_CalculationNetGHGEmissionReductions.xlsx

Table 3.5. Ex-ante estimation of the decrease in carbon stocks and increase in GHG emissions due to activity displacement leakage.

Vintage period	UDef PA		
	$\Delta C_{BSL,PA-UDef,t}$	$EA_{EF,t}$	$\Delta C_{MP,PA-UDef,i,t}$
	t CO <sub>2e</sub>	%	t CO <sub>2e</sub>
31-Ago-2022 to 31-Dec-2022	43,139.50	90%	4,313.95
01-Jan-2023 to 31-Dec-2023	128,885.59	90%	12,888.56
01-Jan-2024 to 31-Dec-2024	131,467.27	90%	13,146.73
01-Jan-2025 to 31-Dec-2025	134,048.94	90%	13,404.89
01-Jan-2026 to 31-Dec-2026	136,630.62	90%	13,663.06
01-Jan-2027 to 31-Dec-2027	11,196.70	90%	1,119.67
01-Jan-2028 to 31-Dec-2028	11,196.70	90%	1,119.67
01-Jan-2029 to 31-Dec-2029	11,196.70	90%	1,119.67
01-Jan-2030 to 31-Dec-2030	11,196.70	90%	1,119.67
01-Jan-2031 to 31-Dec-2031	11,196.70	90%	1,119.67
01-Jan-2032 to 31-Dec-2032	10,326.71	90%	1,032.67
01-Jan-2033 to 31-Dec-2033	7,745.03	90%	774.50
01-Jan-2034 to 31-Dec-2034	5,163.35	90%	516.34
01-Jan-2035 to 31-Dec-2035	2,581.68	90%	258.17
01-Jan-2036 to 31-Dec-2036	0.00	90%	0.00
01-Jan-2037 to 31-Dec-2037	0.00	90%	0.00
01-Jan-2038 to 31-Dec-2038	0.00	90%	0.00
01-Jan-2039 to 31-Dec-2039	0.00	90%	0.00
01-Jan-2040 to 31-Dec-2040	0.00	90%	0.00
01-Jan-2041 to 31-Dec-2041	0.00	90%	0.00
01-Jan-2042 to 31-Dec-2042	0.00	90%	0.00
01-Jan-2043 to 31-Dec-2043	0.00	90%	0.00
01-Jan-2044 to 31-Dec-2044	0.00	90%	0.00
01-Jan-2045 to 31-Dec-2045	0.00	90%	0.00
01-Jan-2046 to 31-Dec-2046	0.00	90%	0.00

Table 3.5. Ex-ante estimation of the decrease in carbon stocks and increase in GHG emissions due to activity displacement leakage.

Vintage period	UDef PA		
	$\Delta C_{BSL,PA-UDef,t}$	$EA_{EF,t}$	$\Delta C_{MP,PA-UDef,i,t}$
	t CO <sub>2</sub> e	%	t CO <sub>2</sub> e
01-Jan-2047 to 31-Dec-2047	0.00	90%	0.00
01-Jan-2048 to 31-Dec-2048	0.00	90%	0.00
01-Jan-2049 to 31-Dec-2049	0.00	90%	0.00
01-Jan-2050 to 31-Dec-2050	0.00	90%	0.00
01-Jan-2051 to 31-Dec-2051	0.00	90%	0.00
01-Jan-2052 to 30-Aug-2052	0.00	90%	0.00
Total	655,972.19		65,597.22

### 3.3.3 Leakage Mitigation (CL3.2)

In the TdX project, to reduce the risk of activity displacement leakage, baseline deforestation agents should be given the opportunity to participate in activities within the project area and in specially designated leakage management areas (outside the project area) that together will replace baseline income, product generation and livelihood of the agents as much as possible, so that deforestation will be reduced and the risk of displacement minimized. In the leakage management area, educational activities will be implemented with the community to reduce the risk of leakage in the vicinity of the project area and leakage belt.

The boundaries of these areas should be established based on a management plan. This plan<sup>118</sup> was provided to the VCS Validation/Verification Body (VVB) at the time of validation. Briefly, the plan aims to reduce the risk of leakage by implementing integrated actions both within the leakage belt (LB) and in the leakage management zone (LMZ). The actions in the plan include:

- Inclusion of baseline deforestation agents in productive and conservation activities (LMZ).
- Implementation of educational actions with the community to raise awareness about environmental conservation and alternative income opportunities (LMZ).
- Continuous monitoring through satellite imagery (LB).
- Training and capacity building for workers and community agents, ensuring the transfer of knowledge even in cases of turnover (LMZ).
- Wide dissemination of job opportunities, prioritizing social inclusion and equal opportunities (LMZ).

For further details on the leakage management plan—including its objectives, targets, deadlines, and responsible parties—please refer to the attached document<sup>118</sup>.

## 3.4 Climate Impact Monitoring

### 3.4.1 Climate Monitoring Plan (CL4.1)

The TdX Monitoring Plan was developed according to the approved VCS methodology VM0048 Reducing Emissions from Deforestation and Forest Degradation v1.0, published on 27-November-2023. The monitoring plan must address the following tasks:

- Monitoring of project implementation.
- Monitoring of actual carbon stock changes and greenhouse gas emissions.
- Monitoring of leakage carbon stock changes and greenhouse gas emissions; and
- Estimation of ex post net carbon stock changes and greenhouse gas emissions.

For each of these tasks, the monitoring plan must include the following information:

- Technical description of the monitoring task.
- Data to be collected (data and parameters to be collected must be listed in the project description).
- Overview of data collection procedures.

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<sup>118</sup> 250203\_LeakageManagementPlan.pdf

- Quality control and quality assurance procedures.
- Data archiving; and
- Organization and responsibilities of the parties involved in all the above.

Outlines the tasks and their frequency for monitoring changes in any carbon pool, any non-CO<sub>2</sub> GHGs, and any emissions sources expected to contribute cumulatively more than 20% of total GHG emissions, as well as leakage. The monitoring activities are the responsibility of the project proponent and the landowner's entities, and they are often interconnected. The project proponent, i.e., Systemica Inteligência em Sustentabilidade S.A., is responsible for planning and guiding REDD+ activities, while the landowners are responsible for the execution and reporting.

Monitoring actual changes in carbon stock and GHG emissions within the Project Area involves four main scopes, which are: (i) monitoring of project implementation, preserving maps and records of implementation for later verification; (ii) monitoring of land use and land cover change, using available high-resolution images; (iii) monitoring of carbon stocks and non-CO<sub>2</sub> emissions, as soon as possible after a catastrophic event or significant fire event through forest inventory; and (iv) monitoring of impacts from natural disturbances and other catastrophic events, including man-made events such as acts of terrorism, even if they are beyond the control of the project proponent, when they are significant.

The TdX project area is not located within a jurisdiction that is monitoring, reporting, verifying and accounting for GHG emissions from deforestation under a VCS or UNFCCC registered program. All significant sources of leakage identified are subject to monitoring following the procedures outlined in the monitoring plan. Such procedures must be consistent with the applicable leakage modules. The monitoring plan must include all relevant parameters in the leakage modules. Project Activity does not involve a decrease in carbon stocks and an increase in GHG emissions associated with leakage prevention activities, only the decrease in carbon stocks and increase in GHG emissions due to activity displacement leakage will be monitored. According to the VM0048 methodology and the sources of leakage identified as significant in the ex-ante assessment in this project, the decrease in carbon stocks and increase in GHG emissions due to activity displacement leakage will be monitored.

More information about the data that needs to be collected at each stage of the monitoring plan, the procedures for data collection and archiving, and the quality control of these processes by Systemica Inteligência em Sustentabilidade S.A., can be found in Section 5 "Monitoring" of the attached VCS PDD.

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

The monitoring plan developed for the TdX Project will be made available to the public in the form of the VCS Project Description on Systemica's (Systemica, 2023) electronic communication channels, such as the website or blog, etc., and on VERRA's (Verra, 2023a) own website, with a link also provided by Systemica Inteligência em Sustentabilidade S.A.. Additionally, whenever there is an update, such as after the annual verification audits, the documents on these channels will be updated as well. Similarly, summaries of the results obtained will be provided as the project activities progress. To ensure that all project stakeholders have access to the monitoring plan and its results, emails will be sent with links to access the documents, and stakeholders will also be informed of any updates. In the case of the community, in addition to the possibility of accessing information online, in-person meetings will be conducted periodically and continuously to share the monitoring plan, results and other relevant information. These will be moments when the population can also clarify doubts, make complaints, or provide suggestions.

Finally, the community field assistants who will be hired by Systemica Inteligência em Sustentabilidade S.A. will also serve as a communication channel between the project team and the community.

### 3.5 Optional Criterion: Climate Change Adaptation Benefits

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

To identify potential climate change and climate variability scenarios, the section was divided into four main discussions. First, it is important to characterize the baseline climate conditions and the key climate trends for the host country, Brazil. Second, the climate conditions and trends for Pará state. Third, the climate change projections for Pará state shall be detailed, and finally the impacts on land use and cover in the absence of the project shall be identified.

It is important to note that all data presented were extracted from the Climate Change Knowledge Portal (World Bank Group., 2021b). The data utilized to identify the scenarios are part of the Coupled Model Intercomparison Project Phase 5 (CMIP5). In the above-mentioned model, four representative concentration pathways (RCP2.6, RCP4.5, RCP6.0, RCP8.5) were selected and structured based on their total radiative forcing, a cumulative measure of GHG emissions from all sources, pathways, and levels by 2100 (World Bank Group, 2021b). For instance, according to the World Bank Group. (2021b), the RCP 2.6 represents a very strong mitigation scenario, while the RCP 8.5 stands for the business-as-usual scenario. It is important to note that these updated RCP scenarios are now called SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5.

##### 3.5.1.1 Brazil’s climate conditions and trends

According to the World Bank Group. (2021b), using as a reference the period between 1991-2020, the following parameters characterize Brazil’s baseline climate conditions (Table 3.6).

Table 3.6. Brazil’s baseline climate condition.

Parameters	Mean Annual Values
Mean Annual Temperature	25.6°C
Mean Annual Precipitation	1,755.8 mm
Mean Maximum Annual Temperature	30.9°C
Mean Minimum Annual Temperature	20.3°C

Table 3.7 shows the projected changes in annual precipitation and temperature for the periods 2020-2039, 2040-2059, 2060-2079, and 2080-2099 (World Bank Group, 2021b).

Table 3.7. CMIP5 projection for RCP 8.5 (World Bank Group, 2021b).

CMIP5 Projection - 50 <sup>th</sup> percentile	2020-2039	2040-2059	2060-2079	2080-2099
Annual Temperature Anomaly (°C)	+1.1	+2.0	+3.1	+4.1
Annual Precipitation Anomaly (mm)	-1.2	-1.5	-1.5	-3.5

Analyzing Table 3.7, it is possible to note a projection of annual temperature increase and annual precipitation decrease. According to data from the World Bank Group. (2021b), the average mean surface air temperature is expected to increase for all scenarios (SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5) by 2080-2099, and these increases, according to the projections, will be most strongly felt during the months between September and November.

**3.5.1.2 Pará State Climate Conditions and Trends**

To characterize the regional climate change scenarios, it is first important to describe the baseline climate, its trends, and variabilities. According to the World Bank’s Climate Change Knowledge Portal (World Bank Group., 2021b) the basic climate variables for Pará state are described in Table 3.8 and Figure 3.2.

Table 3.8 Basic Climate Variables 1990-2020 (World Bank Group., 2021b).

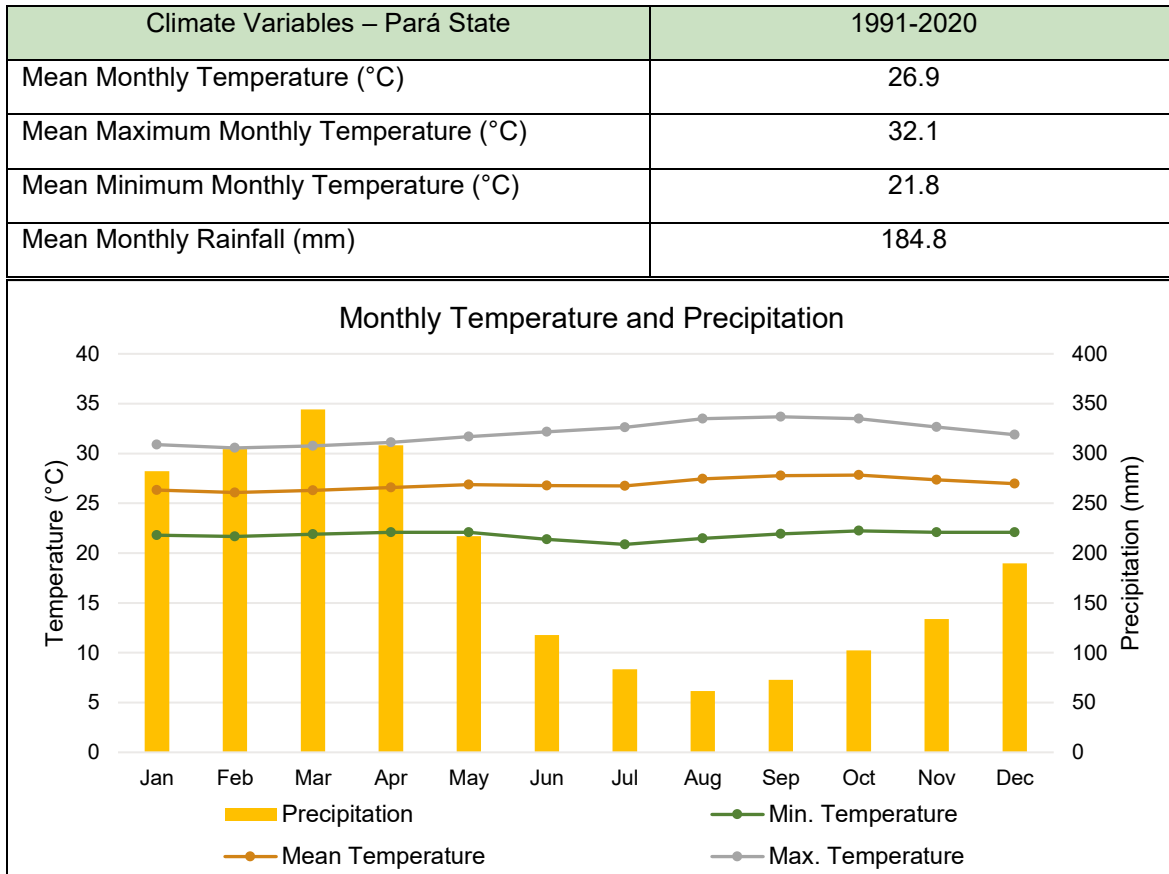


Figure 3.2 Basic Climate Variables 1990-2020 (World Bank Group., 2021b).

Regarding the trends, according to the World Bank Group (2021b), temperatures across the Amazon Basin have risen by 0.5°C since 1980. In Pará state, the average annual temperature, between 1950 and 1969 was 26.1°C (50<sup>th</sup> percentile), between 1970 and 1989 it was 26.2°C (50<sup>th</sup> percentile), and between 1990-2010 it was 26.7°C (50<sup>th</sup> percentile). It is possible to observe this trend in Figure 3.3, in which the increase in the average annual temperatures becomes clearer after 1971. It is important to note that the number of hot days (maximum temperature above 35°C) has increased. Between 1950 and 1969, the median value of the above-mentioned index was 2.8, between 1970 and 1989 it was 3.1, and between 1990 and 2010 it was 9.4 (World Bank Group., 2021b). Regarding precipitation, it was not possible to observe a clear trend through Figure 3.4. However, the Largest 1-Day Precipitation index between 1950 and 1969 was 42.2 mm, while between 1990 and 2010 it was 42.3 mm (World Bank Group., 2021a).

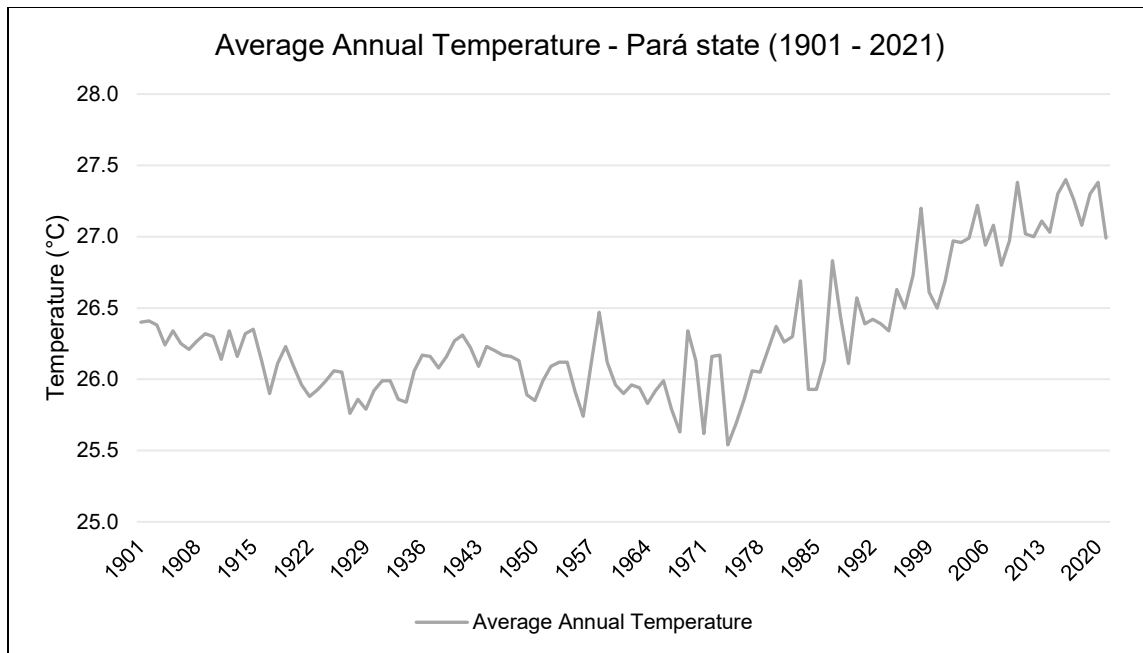


Figure 3.3. Average Annual Temperature Pará State(World Bank Group., 2021a).

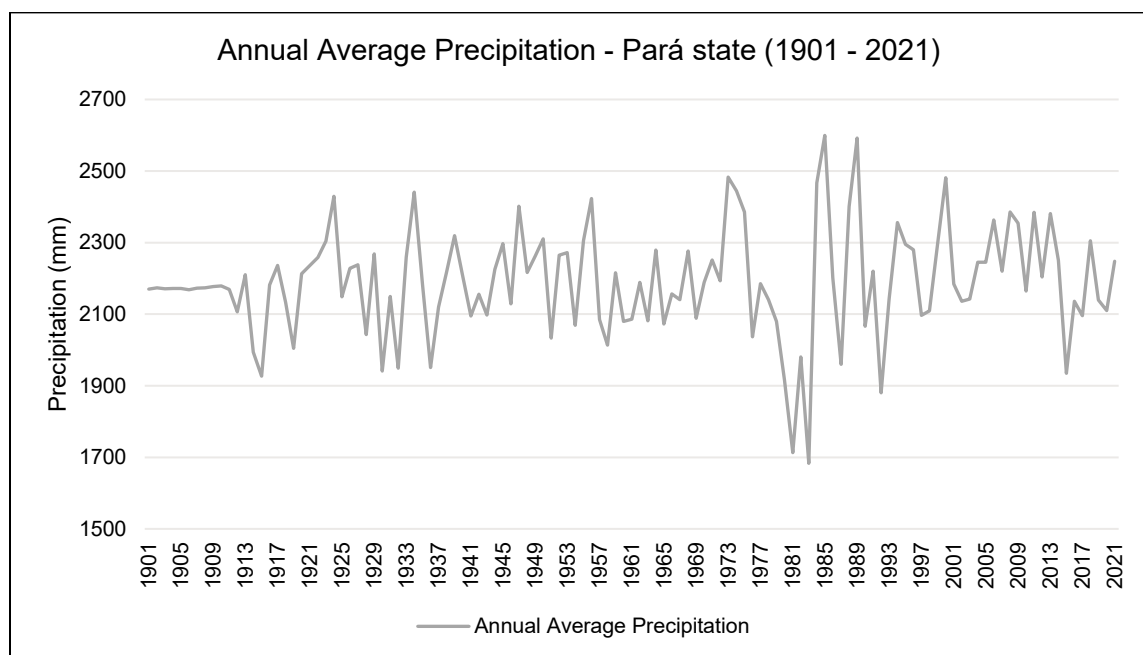


Figure 3.4. Average Annual Rainfall (World Bank Group., 2021a).

### 3.5.1.3 Climate Change Scenarios

As discussed above, the data source utilized for the presentation of the climate change scenarios was the World Bank Group's Climate Change Knowledge Portal, which was based on the Coupled Model Intercomparison Project Phase 5 (CMIP5).

It is possible to note in Table 3.9. the projection for the average annual temperature considering four time periods. For all scenarios, the trend is a temperature increase, and this rise shall occur more significantly mid-century (Figure 3.5). The most significant increases are expected to occur between August and November (World Bank Group., 2021b). The minimum temperatures are also expected to increase (World Bank Group., 2021b). Between 1950 and 2014 (reference period) the minimum temperature in Pará state was 22.1°C (50<sup>th</sup> percentile). Considering the SSP5-8.5 scenario, the projection is that the minimum temperature between 2080 and 2099 will increase to 27.3 °C (50th percentile). This rise is more significant between August and November (World Bank Group., 2021b). The maximum temperatures are also expected to increase. Between 1950 and 2014, the maximum temperature in Pará was 30.3 °C (50th percentile). The projection for SSP5-8.5, between 2080 and 2099, is 35.7 °C (50th percentile). This rise is more significant between August and November (World Bank Group., 2021b). Thus, it is possible to identify a more expressive temperature increase pattern between August and November in Pará state. Furthermore, according to the World Bank Group (2021b), the frequency and duration of heat waves over the Amazon are projected to increase. To support this, the number of hot days (maximum temperature above 35°C) is presented. During the reference period (1950-2014) the mentioned index was 4.2 (50th percentile) days. Between 2080 and 2099, under the SSP5-8.5 scenario, the value of the index is expected to reach 211.9 days (50th percentile). This increase will probably be more significant between June and December.

*Table 3.9. Average Annual Temperatures CMIP5 (World Bank Group., 2021b).*

Climate Variables – Pará State		Median (°C)	10 <sup>th</sup> percentile (°C)	90 <sup>th</sup> percentile (°C)
Historical Reference Period (1950 – 2014)		26.2	25.7	26.8
2020-2039	SSP1-2.6	27.5	26.7	28.6
	SSP2-4.5	27.5	26.8	28.4
	SSP5-8.5	27.7	27.0	28.6
2040 - 2059	SSP1-2.6	28.0	27.0	29.1
	SSP2-4.5	28.2	27.4	29.3
	SSP5-8.5	28.8	27.8	30.1
2060-2079	SSP1-2.6	28.1	27.2	29.3
	SSP2-4.5	28.7	27.7	30.0
	SSP5-8.5	30.0	28.8	32.2
2080-2099	SSP1-2.6	28.0	27.1	29.3
	SSP2-4.5	29.0	28.0	30.6
	SSP5-8.5	31.5	29.7	34.2

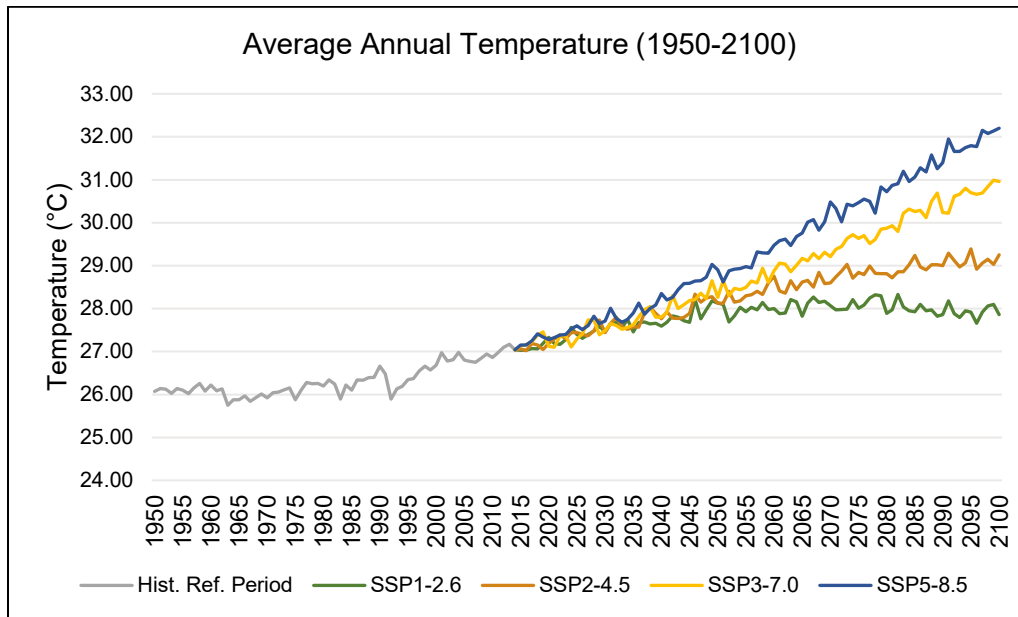


Figure 3.5. Average Annual Temperature 1950-2100 (World Bank Group., 2021b).

Table 3.10 highlights the projection for average annual precipitation. As it is possible to note, an annual decrease of precipitation is expected, in comparison with 1950-2014, in all time frames considered.

It is interesting to note that although the average annual precipitation is expected to decrease, the Largest 1-day Precipitation index (average of the largest daily precipitation amount) is projected to increase. Between 1950-2014 the mentioned index was 42.1 mm (50<sup>th</sup> percentile). Between 2080 and 2099, under the SSP5-8.5 scenario, the index is expected to reach 48.8 mm (50<sup>th</sup> percentile). The Average Largest 5-Day Cumulative Precipitation indicator (average of the largest 5-day consecutive precipitation amount) is also projected to increase. Between 1950 and 2014, the mentioned indicator was 112.9 mm. Between 2080 and 2099, under the SSP5-8.5 scenario, the indicator is expected to reach 121.5 mm. This rise will probably be more significant during the rainy season (World Bank Group., 2021b).

Figure 3.6 represents a summary of the precipitation-related projections. During the dry season, a significant reduction in precipitation is expected. Therefore, according to the projections, the most pronounced effects, in quantitative terms, related to precipitation will be associated with its decrease, especially during the dry season (Figure 3.6). The results also show a percentage decrease in precipitation in October and November, which may indicate a possible extension of typical dry season conditions (Figure 3.6).

Table 3.10. Average Annual Rainfall CMIP5 (World Bank Group., 2021b).

Climate Variables – Pará State		Median (mm)	10 <sup>th</sup> percentil (mm)	90 <sup>th</sup> percentil (mm)
Historical Reference Period (1950 – 2014)		2,163.1	1,798.8	2,468.4
2020-2039	SSP1-2.6	2,087.6	1,687.3	2,432.3
	SSP2-4.5	2,086.1	1,683.2	2,432.8

Table 3.10. Average Annual Rainfall CMIP5 (World Bank Group., 2021b).

Climate Variables – Pará State		Median (mm)	10 <sup>th</sup> percentil (mm)	90 <sup>th</sup> percentil (mm)
2040 - 2059	SSP5-8.5	2,055.9	1,657.2	2,407.9
	SSP1-2.6	2,073.7	1,680.9	2,434.6
	SSP2-4.5	2,048.0	1,630.1	2,409.7
2060-2079	SSP5-8.5	1,972.1	1,533.1	2,389.4
	SSP1-2.6	2,039.4	1,639.5	2,412.7
	SSP2-4.5	1,992.2	1,566.9	2,392.0
2080-2099	SSP5-8.5	1,863.8	1,377.1	2,340.1
	SSP1-2.6	2,055.7	1,666.0	2,423.9
	SSP2-4.5	1,994.0	1,544.7	2,423.6
	SSP5-8.5	1,796.7	1,257.4	2,344.4

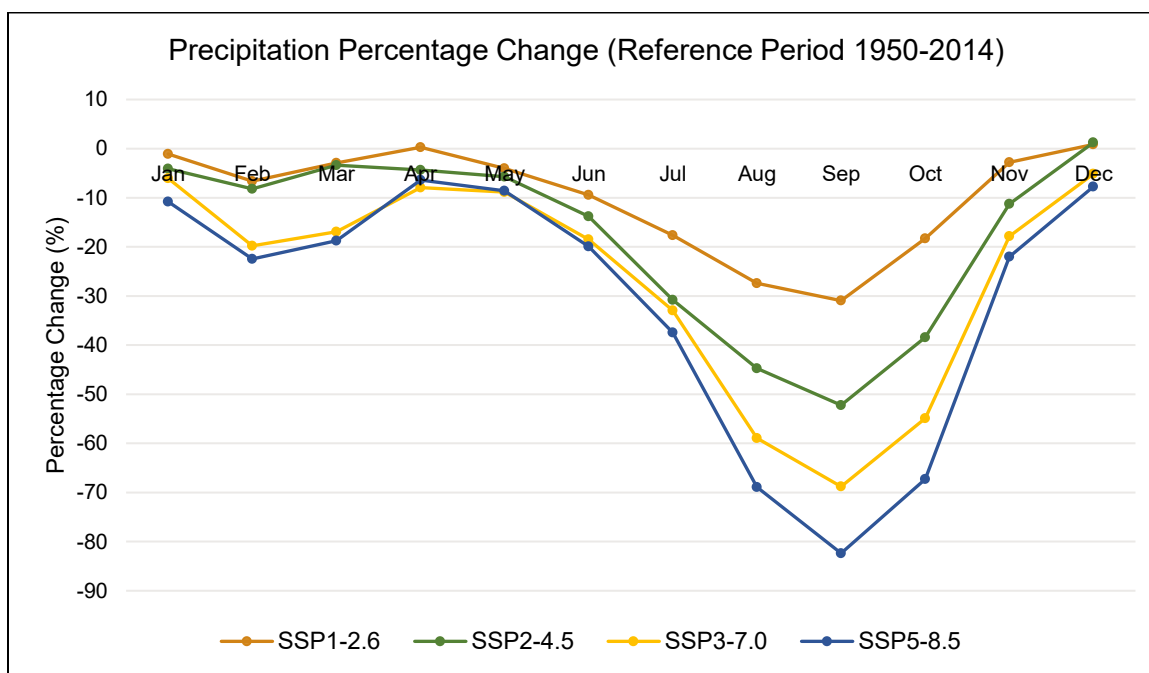


Figure 3.6. Precipitation Percentage Change (World Bank Group., 2021b).

### 3.5.1.4 Impacts and Land Use Changes

According to the World Bank Group. (2021a), climate change is expected to increase the risk and intensity of water scarcity and droughts events across Brazil. Furthermore, the projections demonstrate an increase in indicators related to intense precipitation, possibly indicating a higher risk of extreme events, such as flooding. These more frequent flooding events will likely cause soil erosion and damage crops,

consequently jeopardizing yield potential and increasing food insecurity, particularly for subsistence-scale farmers (World Bank Group., 2021a).

Brazil is projected to experience a worsening of dry conditions and drought severity, representing increased pressure on water resources, particularly by mid-century (World Bank Group., 2021a). As discussed above, within Pará state, temperature increases, and a possible prolongation of the dry season are projected. According to Nobre et al. (2007), the duration of the dry season will likely increase from 3 - 4 months to 5 – 6 months. It is important to note, however, that the Amazon Forest ecosystem is not adapted to extreme high temperatures; therefore, the projected rise in temperatures and prolonged dry conditions will, possibly, lead to changes in the native flora and fauna biodiversity (World Bank Group., 2021a), favoring the forest savannization process and threatening forest resources (Nobre et al., 2007; World Bank Group., 2021a). If large areas of the Amazon are replaced by savanna, it is possible that aridity conditions will worsen, since savanna vegetation has less transpiration (Nobre et al., 2007). According to the World Bank Group. (2021a), the southeastern Amazon faces considerable risks from climate-related changes, and the greatest impacts are expected to occur in the states of Pará, Mato Grosso, and Rondônia. According to Boulton et al. (2022), deforestation and climate change, mainly through the increase in dry conditions and drought events, may have already brought the Amazon close to a critical threshold of forest dieback with serious implications for biodiversity and carbon storage.

According to the *Adapta Brasil* platform (MCTI, 2023), the current risk of drought impact in Altamira is medium. However, the projection considering a pessimistic scenario for 2050 is high risk. Furthermore, according to the MCTI (2023), the current impact index of droughts on food security is 0.29 (low risk), and in 2050, it will possibly be 0.45 (medium risk). Regarding energy security, the current risk index for temperature is 0.54 (medium), and in 2050 the pessimistic scenario defines the index as 0.63 (high). Finally, regarding disasters, the current risk index for floods, mudslides, and inundation is classified as very high, and the index for landslide is classified as high. The projection for 2050 does not represent a significant change from the current state, which also applies to the risk scenarios related to malaria.

The combination of temperature increase, prolongation of the dry season, and a greater frequency of drought events favor the process of savannization of the Amazon. Considering a scenario without the project implementation, more pronounced forest loss due to an increase in the savanna typology is expected to occur in the TdX project zone. It is worth noting that the increase in savanna area represents a possible worsening of aridity. The mentioned conditions also favor the occurrence of forest fires, thus constituting another source of forest cover loss in the project area. In addition, the mentioned change in land cover is a threat to the biodiversity and forest resources, jeopardizing activities practiced in the project zone, such as extractivism, fishing, and agriculture.

As mentioned above, the higher frequency and intensification of heavy precipitation events favor the occurrence of floods. These, in turn, favor soil erosion, representing another source of forest degradation and possible loss of infrastructure. Both increased drought conditions and increased heavy precipitation events undermine soil productivity, leading to a possible increase in the area consolidated for agriculture and pasture within the project zone, considering the without-project scenario.

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

#### 3.5.2.1 Community well-being

As seen in Section 3.5.1, the impacts of climate change on land use and land cover are expected to result in a decrease in forest cover, an increase in the area consolidated for agriculture and pasture, and an increase in the area of savanna. Forest cover has a high capacity to provide a diversity of ecosystem

services, such as provisioning, support, regulation, and cultural services (Burkhard et al., 2009; Burkhard et al., 2012; Siqueira-Gay et al., 2020).

The Amazon region has experienced significant transformations over the past few decades due to factors such as forest degradation, changes in land use, and the influence of global climate change. Understanding how local communities perceive these changes is crucial for risk analysis and making informed societal decisions. Funatsu et al. (2019) focused on Amazonian communities that are particularly vulnerable to alterations in precipitation patterns. The study examined two main aspects: (i) the communities' perception of changes in the annual climate cycle and (ii) their perception of changes in rainfall patterns. About 72% of the sampled population reported perceptions of climate change, with older individuals showing a stronger tendency to perceive these changes. To gain further insights, the researchers compared the communities' perceptions of climate change in 2013-2014 with earlier results from 2007-2008. The findings show that the perception of a changing climate became more widespread and frequently mentioned, indicating increased climate risk awareness among the communities. This heightened awareness is crucial for implementing effective strategies to cope with and adapt to the ongoing changes in the Amazon region's climate and environment (Funatsu et al., 2019).

As discussed, the expected land use changes in the project are, due to climate change, are the reduction of forest cover, expansion of savanna area, and the expansion of agriculture and pasture areas. Nature Contribution to People (NCP), according to IPBES (2022), are all the contributions, both positive and negative, of living nature to the quality of life for people. Siqueira-Gay et al. (2020) developed a matrix evaluating the importance of a set of NCP and its relative importance for each land use and land cover class in the context of Pará State. The land cover classes that contribute with high provision of NCPs are forest cover, water bodies, and other non-forest natural formations, such as savanna. The land use classes that contributes to a high demand for NCPs are urban areas and other non-vegetated areas, mining, pasture, and mosaics of agriculture and pasture.

In terms of the projected land use changes for the project zone, the loss of forest will evidently impact the provision of NCPs. It is worth noting that the land cover representing savanna also has a character of NCP provision, but it is lower than that of forest cover. In addition, the increasing dry conditions and more frequent drought events may impact water bodies. This class is a relevant contributor to the provision of NCPs. At the same time, there is the possibility of an increase in pasture and agricultural uses. Both classes have a general character of demand for NCPs. Therefore, this shift in land use and cover is likely to diminish local communities' access to essential ecosystem services, posing a threat to their overall well-being.

More specifically, the following impacts are possible to occur within the project zone:

- The loss of forests, higher incidence of forest fires, and more frequent events of droughts and floods lead to the degradation of natural resources such as flora, fauna, soil, and water, consequently reducing community access to these resources (Roy et al., 2022).
- Lower soil productivity due to degradation of soil conditions caused by more frequent extreme events such as heat waves, droughts, heavy precipitation, and erosion.
- Reduced water availability for domestic, agricultural and pasture use due to the expected decrease in the overall precipitation levels and increase in dry conditions. It is important to note that the quality of the water resources can also be reduced due to climate change impacts. As highlighted above, soil conditions are expected to be jeopardized, and more frequent soil erosion events can occur. In fact, an issue raised by the community in the governance meeting was the insufficient water supply during the summer period<sup>119</sup>.

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<sup>119</sup> 231019\_ReportGovernanceMeeting.zip

- Increased food insecurity due to the impacts on agricultural production and forest resource degradation, jeopardizing subsistence activities. According to the MCTI (2023), food security will be more impacted by drought events than by precipitation. It is important to note that currently dry conditions are already presenting a low impact on food security in the Altamira municipality (MCTI, 2023) and the projection for 2050, considering a pessimistic scenario, is of medium risk.
- Increased incidence of diseases and favorable conditions for the emergence of parasitic, fungal, viral, and bacterial infections (Dorji et al., 2023; Ellwanger et al., 2020). The social diagnosis identified that healthcare is one of the Caboclo's Village main priority issues<sup>120</sup>, which makes the community vulnerable to these potential impacts of climate change.
- Due to the potential prolongation of the dry season, increasing aridity conditions, alterations in precipitation patterns, and degradation of soil conditions, there is a possibility of a shift in the local community's agricultural calendar. This change could significantly impact their overall well-being (Funatsu et al., 2019).
- According to Savo et al. (2016), slight changes in the environment cause enormous consequences for local communities, increasing the risk of conflicts over limited resources and the exposure of vulnerable members of society, causing community instability. The authors also point out that climate change has considerable potential to jeopardize the social fabric and culture of local communities. It is relevant to note that the social diagnosis identified the need to strengthen community organization<sup>121</sup>.
- Activities already practiced in Caboclo Village, such as extractivism, subsistence agriculture, and fishing could be compromised, impacting the income generation of families.
- There is the possibility that the local community does not associate the changes that are occurring with climate change but rather with natural events, which may hinder their adaptive capacity (Dorji et al., 2023).
- With a greater likelihood of extreme weather events such as droughts, flooding, and heavy precipitation, it is possible that the condition of local roads will worsen. In fact, the poor road conditions in the project zone already pose a relevant threat to the community's logistics, also hindering the logistics for project activities, including governance meetings and fauna and flora monitoring campaigns. This was identified as a risk to the project (see Section 2.1.12) and is one of the main priority issues identified by the community in the social diagnosis<sup>122</sup>
- As can be seen, the impacts of climate change include a potential alteration of the local landscape. As indicated in Section 4.1.3, High Conservation Values (HCV) can possibly be affected by the aforementioned changes. This is relevant because high conservation values correspond to attributes that hold exceptional biological, ecological, social, or cultural significance or critical importance. They are closely linked to the well-being of the community and biodiversity.

### 3.5.2.2 Biodiversity Conservation Status

Climate change and its impacts pose a serious threat to the Amazon biodiversity (Rinawati et al., 2013). According to Ribeiro et al. (2016), the ability of tropical species to adapt to climate change may be jeopardized due to the higher rates of alterations in climate conditions, the fact that tropical species are already living under conditions close to their physiological tolerance limits, and they are usually located in areas where other pressures act, such as deforestation and habitat loss.

<sup>120</sup> 231023\_SocialDiagnosisAnnexes.zip

<sup>121</sup> 231023\_SocialDiagnosisAnnexes.zip

<sup>122</sup> 231023\_SocialDiagnosisAnnexes.zip

In this context, the secondary data fauna report<sup>123</sup> was elaborated in September 2023. The phytosociological report is available for auditors' consultation<sup>124</sup>. From these documents, trigger and focal species present in the project zone were defined.

- Trigger species: *Ateles marginatus* (medium/large-sized mammal fauna).
- Focal species: *Tapirus terrestris* (medium/large-sized mammal fauna), *Panthera onca* (medium/large-sized mammal fauna) and *Alouatta belzebul* (medium/large-sized mammal fauna).

The possible impacts of climate change on biodiversity conservation shall be discussed in terms of the fauna and flora components, taking into consideration the trigger and focal species. A list of endangered and vulnerable flora species found in the project area is presented in Section 5.1.1

### 3.5.2.2.1 Fauna

Ribeiro et al. (2016), conducted a study that aimed at quantifying mammal local exposure to climate change within the Brazilian Amazon. A total of 376 mammal species were analyzed. The study found that 85% of the species are likely to be exposed to non-analogue climate conditions in more than 80% of their range by 2070, and this percentage is higher for endemic mammal species. According to Ribeiro et al. (2016), primates will likely be the mammalian group most vulnerable to climate change.

According to da Silva et al. (2022), primates are one of the most threatened groups of species due to climate change, due to their low capacity for dispersal and low adaptive skills to new climate conditions. The study in question aimed at identifying priority areas for the conservation of 12 primate species endemic to the eastern Amazon. As one of its results, the authors found that 11 of the 12 species considered will likely lose areas of climate suitability, and more than 30% of them might lose a considerable portion of their range. Considering the combined effect of deforestation and climate change, 8 out of the 12 species might have their distribution reduced by up to 90% by 2050, and about 25% of them can possibly become extinct in the next 30 years. The study states that *Ateles marginatus* can suffer a loss of more than 98% of the suitable area of occurrence, considering the climate change projections combined with forest loss (da Silva et al., 2022).

As discussed in Section 3.5.1, an expected impact of climate change is the increase in area of the savanna typology. Rocha (2023), developed a study with the goal of identifying the terrestrial mammal species at risk due to savannization in the southern Brazilian Amazon. The study found that most of the terrestrial mammal community is potentially vulnerable to savannization, including species known as habitat generalists.

Teixeira-Santos et al. (2020), conducted a study aimed at investigating the response of four endangered species of large mammals, including *Myrmecophaga tridactyla*, *Tayassu pecari*, *Priodontes maximus*, and *Tapirus terrestris*, to variations in the quality of their habitats in a context of anthropogenic pressure. As discussed in Section 3.5.1, one of the impacts on land cover from climate change is the loss of forest and the increase in areas of agriculture and pasture, leading to a context of higher anthropogenic pressure. *Tapirus terrestris* results probably indicate the greatest ecological plasticity among all four species studied (Teixeira-Santos et al., 2020).

The higher incidence of extreme weather events, such as droughts and floods, is projected to occur in the Amazon, as seen in Section 3.5.1 Bodmer et al. (2018) conducted research aimed at studying the effects of the intensification of natural climatic fluctuations on wildlife populations in Loreto, Peru. The study found

<sup>123</sup> 230912\_SecondaryDataReportBio.pdf

<sup>124</sup> 230829\_TdXForestSpecies.xlsx

that terrestrial mammal populations decreased by about 95% between 2009-2015 (consecutive years of high-water levels). However, *Tapirus terrestris* did not present significant fluctuations.

Climate change causes alterations in animals' behavior and distributions. Due to the high incidence of droughts, the animals' access to water and other resources may be jeopardized, leading them to search for water bodies closer to the community and rural properties, which can increase the chance of encounters and intensify human-wildlife conflicts (Abrahms et al., 2023; Delgado-Martínez et al., 2018).

#### 3.5.2.2.2 Flora

As discussed in Section 3.5.1, it is expected, as a likely result of climate change the intensification of forest loss. Deforestation reduces the aboveground live biomass (Brandão et al., 2022; Saatchi et al., 2007) and leads to changes in plant species composition; hence, it reduces the availability of non-timber forest products (NTFP) and impacts the livelihood of communities that rely on them (Brandão et al., 2022).

Gomes et al. (2019) overlapped species distribution models for current and projected climate change scenarios with historical and future deforestation. The results indicate that the combination of climate and deforestation may reduce by up to 58% the Amazon tree species richness. Considering only the effect of climate change the projected reduction ranged between 31-37% by 2050. Gomes et al. (2019) also pointed out that, assuming no substantial climate or deforestation policy progress, the Amazonian lowland rainforest by 2050 may be divided into two blocks: one continuous block encompassing 53% of the original area and another severely fragmented block.

In this context, one possible side effect of deforestation and climate change is the increase in forest fragmentation. Some of the effects expected after a fragmentation event are physical vegetation structure changes, intensification of NTFP decreases, and increased tree mortality, due to greater wind exposure, and microclimate changes (Brandão et al., 2022). Moreover, the fragment size is a parameter that negatively affects different forest characteristics. For instance, seed dispersal is lower in fragmented forests (Brandão et al., 2022); there is a decrease in the number of tree and plant species found (Brandão et al., 2022; Laurance et al., 2016), and local extinction rates of pollinators and animal dispersers (butterflies, beetles, birds, primates) are higher in smaller forest fragments (Brandão et al., 2022; Ferraz et al., 2007; Laurance et al., 2016; Peres et al., 2010).

As discussed in Section 3.5.1., with the worsening of dry conditions, the occurrence of forest fires is expected to increase. These events destroy trees, reduce species densities and productivity, and affect the geographical distribution of several plant species (Brandão et al., 2022).

Drought events are also expected to increase, and this results, according to Brandão et al. (2022), in gradual phenological changes, reduced wood production, tree recruitment, and fruit quality, and increased tree mortality. Moreover, the combination of drought and forest fires has increased tree mortality by over 200% in the Amazon (Barlow & Peres, 2008; Brandão et al., 2022).

According to Brandão et al. (2022), the temperature in the Amazon region is around 28°C, and the gross ecosystem productivity is known to reduce at temperatures above 27°C (Brandão et al., 2022; Smith et al., 2020).

In the context of climate change, it is important to note the projected decrease in the geographical distribution of species that are important for the regional economy (Brandão et al., 2022), for instance, the area of occurrence of the Brazil nut could decrease by 25% by 2050 (Brandão et al., 2022; Evangelista-Vale et al., 2021).

Finally, the savannization of the Amazon, according to Brandão et al. (2022), remains poorly studied. The authors indicate that there are some areas within the Amazon classified as savannah vegetation, and in

these, evidences show increased wet-climate species mortality and an increase in the number of species adapted to drier conditions (Brandão et al., 2022).

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

The activities and measures designed to assist the community of Caboclo Village and the biodiversity of the project zone in adapting to the probable impacts of climate change were designed to foster community empowerment and enhance resilience (Reid et al., 2009). To do so, the causal model described in Section 2.1.8 was consulted.

Enamul Haque et al. (2022) analyzed several community-based approach strategies and activities for climate adaptation and classified them into six categories. The first category consists of activities that aim at diversifying the livelihood of communities, mainly by expanding the income sources. The second one, capacity building, encompasses initiatives that support communities by enhancing their access to education, training, and technologies. The third category, ecosystem integrity, includes initiatives that aim at restoring nature's ability to deal with extreme events. The fourth category involves activities that support communities by providing infrastructure to cope with climate variabilities. The fifth group encompasses initiatives that are focused on the financial resources of the community. Finally, the sixth category involves activities that aim at protecting natural resources.

The Stockholm Resilience Centre (2015) established seven principles for building resilience in social-ecological systems. It is important to include resilience in climate adaptation strategies because this approach considers people and communities as part of and in interaction with the biosphere and not as external drivers (Stockholm Resilience Centre, 2015). The principles are outlined below:

- Maintain diversity and redundancy.
- Manage connectivity.
- Manage slow variables and feedbacks.
- Foster complex adaptive systems thinking.
- Encourage learning.
- Broaden participation.
- Promote polycentric governance.

Given the above considerations, the project has a total of 12 activities (Table 3.11). These can be divided into 4 main groups:

- Group 1 – Education and access to information: The first group encompasses activities that aim to improve community communication internally and externally, enhance the documentation and access to information, and improve the quality of education services within the community. The relevance of this group of activities is demonstrated by Reid et al. (2009). The study shows that making scientific information available and accessible to communities is crucial for maintaining long-term adaptation. Furthermore, as highlighted by Enamul Haque et al. (2022), one of the principles that climate adaptation measures should consider is the social empowerment of communities. Finally, this category is aligned with the principle of encouraging learning (Stockholm Resilience Centre, 2015).
- Group 2 - Biodiversity conservation: The second group encompasses activities that aim to conserve the biodiversity of the project zone, through capacity building, lectures and monitoring activities. This group of initiatives is supported by Enamul Haque et al. (2022) and aligns with the principle of maintaining diversity and redundancy, as well as connectivity (Stockholm Resilience Centre, 2015).

- Group 3 – Institutional Strengthening and Well-Being: The third category involves activities that aim at enhancing the governance structure of Caboclo Village and improving community well-being. The category in question is supported by Enamul Haque et al. (2022) since it aims at improving the coordination of action and socially empowering the community.
- Group 4 - Employment and income generation: The fourth category of activities aims at diversifying the income sources of the community, as well as generating employment opportunities. This set of initiatives is aligned with the first group of climate adaptation activities highlighted by Enamul Haque et al. (2022).

Now, the relationship of each activity described in Section 2.1.8 with the adaptation benefits shall be investigated.

The activity “Cooperation with the public authorities to improve education” has the potential to provide three adaptation benefits. The first of these concerns education and access to information, as the activity's outcome involves improving the school's teaching conditions. The second benefit is the promotion of community well-being, as the activity's outcome precisely entails enhancing the quality of education provision and the student's nutrition. Finally, the activity also contributes to income generation and employment, as it aids in the education of community members.

The activity “Improvement of access to technology, information, and leisure” has the potential to provide two adaptation benefits. The first of these concerns education and access to information, as the activity will provide an internet network for the school, the health post, and the community space. The second benefit is the promotion of community well-being, as the activity's outcomes include increased access to leisure and culture, prevention of alcohol and drug abuse, reduction in levels of domestic violence, and expansion and enhancement of social relationships.

The activity “Cooperation with the public authorities to improve healthcare” has the potential to provide one adaptation benefit, which is community well-being, as the activity will offer improvements in physical infrastructure for healthcare services. Furthermore, it is important to highlight that the result of the activity involves precisely improving the quality of health services, directly contributing to improving the well-being of the community.

The activity “Strengthening environmental and civic education” has the potential to provide three adaptation benefits. The first of these relates to education and access to information, as the activity's outputs encompass awareness campaigns and community-wide lectures on topics related to health, citizenship, and the environment. The second benefit is the promotion of community well-being, as the activity's outcomes include prevention of alcohol and drug abuse, increased knowledge and social skills, and reduction in levels of domestic violence. Finally, the activity also promotes biodiversity conservation, since it is expected to address the negative perception that the community presents about environmental issues.

The activity “Provision of clean and sustainable electricity to the community” has the potential to provide two adaptation benefits. The first of these relates to education and access to information, as the activity involves the installation of photovoltaic panels in the school, the health post, and the community space. The second benefit is the promotion of community well-being, as the activity's outcomes include an enhancement in the quality of healthcare services and education provision.

The activity “Generation of income opportunities for the community” encompasses three adaptation benefits. The first of these concerns education and access to information, as the activity aims to promote professional technical training. The second benefit is the improvement of community well-being stemming from the diversification of women's income generation, which is expected to decrease their economic vulnerability. Finally, the third benefit is income generation and employment opportunities, as a significant

outcome of the activity is the increase and diversification of income generation opportunities, through hiring community members as local assistants for project activities.

The activity “Strengthening community governance and communication” has the potential to provide one adaptation benefit. This benefit concerns institutional strengthening and community well-being, as it aims to bolster governance to make the community increasingly autonomous and to increase engagement. In addition to community empowerment, this activity is expected to promote the participation of women in community social life and decision-making, as women-specific channels will be created and female participation in governance meetings will be encouraged.

The activity “Cooperation with the public authorities to improve mobility” has the potential to provide two adaptation benefits. The first of these benefits revolves around information access, successful discussions with the government can lead to better logistical conditions and allow information to reach and leave the community more easily. The second pertains to community well-being since better mobility infrastructure enables expansion and enhancement of social relationships, improvement of healthcare services, and increased access to leisure and culture.

The activity “Conservation and enhancement of local biodiversity” has the potential to offer three adaptation benefits. The first of these pertains to education and access to information, through environmental awareness workshops and technical training, encompassing strategies to mitigate human-wildlife conflicts. The second benefit relates to biodiversity conservation, as the activity includes monitoring of flora and fauna resources, and cooperative discussions to structure and implement wildlife protection programs for rural landowners. Finally, the third benefit is employment and income generation, as the project intends to hire people from the community to assist in this activity.

The activities “Patrolling and surveillance of strategic checkpoints” and “Maintenance of firebreaks” are expected to provide two adaptation benefits. The first benefit relates to biodiversity conservation, as the activities are intended to protect the project area, contributing to preserving habitat areas and enabling fauna recolonization. The second benefit is employment and income generation, as the project intends to hire people from the community to assist in these activities.

The activity “Improvement of community and biodiversity access to water resources” has the potential to offer three adaptation benefits. The first of these pertains to education and access to information, as the activity encompasses environmental awareness workshops and technical training. The second benefit relates to biodiversity conservation, as the activity includes the implementation of protection strategies for the riparian zone of Caboclo Stream. Completely, the third benefit pertains to community well-being, as one of the activity’s outcomes encompasses improving the community’s water security.

Table 3.11. Planned activities and adaptation benefits.

Planned activity	Group 1: Education and access to information	Group 2: Biodiversity and ecosystem Conservation	Group 3: Institutional strengthening and community well-being	Group 4: Employment and income generation
Cooperation with public authorities to improve education	X		X	X
Improvement of access to technology, information, and leisure	X		X	
Cooperation with public authorities to improve healthcare			X	
Strengthening environmental and civic education	X	X	X	
Provision of clean and sustainable electricity to the community	X		X	
Generation of income opportunities for the community	X		X	X
Strengthening community governance and communication	X		X	
Cooperation with public authorities to improve mobility	X		X	
Conservation and enhancement of local biodiversity	X	X		X
Patrolling and surveillance of strategic checkpoints		X		X

Table 3.11. Planned activities and adaptation benefits.

Planned activity	Group 1: Education and access to information	Group 2: Biodiversity and ecosystem Conservation	Group 3: Institutional strengthening and community well-being	Group 4: Employment and income generation
Maintenance of firebreaks		X		X
Improvement of community and biodiversity access to water resources	X	X	X	

## 4 COMMUNITY

### 4.1 Without-Project Community Scenario

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

The community of the first instance of the Triunfo do Xingu Grouped REDD+ Project is Caboclo Village, a rural neighborhood of the municipality of Altamira. This municipality is in Pará state. Below there is a characterization of each of these locations.

##### 4.1.1.1 Historical Context

In the early 17th century, the Pará region's occupation was established with the founding of the Forte do Presépio, later renamed Forte do Castelo, in Guajará bay. Prior to this, the area was subjected to repeated invasions by the English and Dutch in the 16th century, who came in search of guarana, pepper, and annatto seeds. The region was subsequently annexed to the province of Maranhão and Grão-Pará, as part of the Portuguese Crown's strategy to facilitate contact with the metropolis. This was necessary because of communication difficulties caused by unfavorable sea currents, given that the capital of the colony was Salvador (Castro et al., 2002).

During the 17th century, the Pará region experienced prosperity due to the cultivation of rice, cocoa, coffee, sugar cane, tobacco, and livestock. However, the economy stagnated after the region's separation from Maranhão in 1777. Economic growth resumed in the late 19th century with the exploitation of rubber, which brought about significant success. This economic success, combined with other factors, led to attempts at independence from Portugal (Escada et al., 2005).

In the 20th century, mining became a significant economic activity in Pará, and in 1960, the region began mining iron and gold ores in the Carajás region, particularly in Serra Pelada, located in the municipality of Curionópolis. As a consequence of this mining activity, large areas of native forest were frequently deforested to make way for pastures and beef cattle production, which supplied large slaughterhouses (Escada et al., 2005).

The project is located in the municipality of Altamira in the southwest region of Pará, which was settled and colonized after a road was opened by the company Mineradora Canopus. This road, called the "Canopus Road," was initially used by timber explorers, particularly for mahogany, which was widely harvested until it became prohibited. However, legal and illegal logging activities continued, making it possible for farmers to access remote lands by using the hydrographic network to reach established connection points, such as roads and urban centers. This practice lasted from the late 1980s to the early 1990s (Amaral et al., 2006).

Until the mid-1970s, the population of Altamira municipality was mostly rural, with urban occupation concentrated in its original nucleus along the Xingu River. In 1970, the municipality had a total population of 15,345, with 62% living in rural areas. The majority of the population before this period were native people, who mainly subsisted through the collection of latex, Brazil nuts, hunting wild animals, and mining (Amaral et al., 2006). In the 2000s, local farmers with the support of the municipality built another road to reduce the distance of access between São Félix do Xingu and Vila Central (Figure 4.1). This road has since become an essential route for the flow of people and goods between locations in the southwest of Pará.

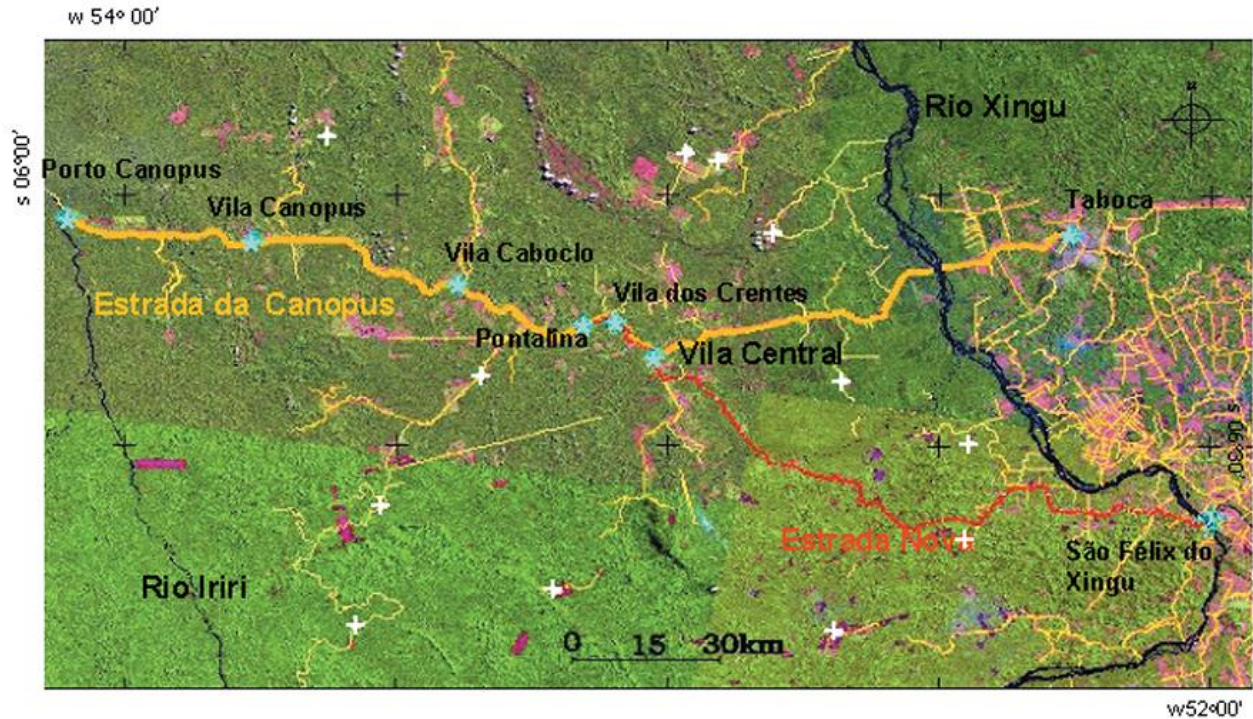


Figure 4.1. New ranchers' road connecting the Canopus Road (Estrada da Canopus) and its villages. Surrounding are the airstrips (white crosses). Source: Amaral et al. (2006).

However, the road's state of conservation is precarious, providing terrible traffic conditions, and requires maintenance. Despite this, the road benefits settlers and farmers whose properties are nearby, with the potential for the development of the commercial sector in the future. A consortium of landowners has organized themselves to take care of the road's maintenance (Amaral et al., 2006).

The maintenance of access roads is essential for the local population's well-being, and the relationship between settlers and farmers is symbiotic, with farmers using the labor of settlers and maintaining roads that benefit both parties. Improvements in health and education are also necessary for the settlers to stay, due to the family-based labor system in the region, improvements in the education system are seen as a necessary condition for keeping settlers and their families in the area. Lack of access to schools can limit the productive process, and settlers who cannot afford to keep their children with them end up abandoning the land (Escada et al., 2005).

The construction of the Belo Monte Hydroelectric Plant, which began in 2011 and was completed in 2019, attracted people, investments, and dynamics to the municipality, resulting in a population increase of around 28%, from 77,401 to 99,075 inhabitants (IFT, 2019). The expectation of the construction of the hydroelectric plant and the development it engendered were factors contributing to this growth. However, with the weakening of environmental policies, especially from the construction of the Belo Monte Hydroelectric Plant, part of the people who had been removed from this region returned to occupy and cause pressure on the protected territories.

#### 4.1.1.2 Regional Context

The State of Pará is located in the Northern region of Brazil, it is the second largest state in land area and the most populated of the Northern region. Its capital is Belém and it has 144 municipalities with a total population of 8,777,124 people (IBGE, 2023). The cities of Abaetetuba, Altamira, Ananindeua, Barcarena,

Castanhal, Itaituba, Marabá, Parauapebas, Redenção, Santarém and Tucuruí are also of great importance for the state.

Altamira is a municipality with an area of 159,533,306 km and an estimated population of 117,320 inhabitants (IBGE, 2023). Its low demographic density of 0.62 hab./km<sup>2</sup> is below the Brazilian and Northern region averages, which are 22.43 and 4.12 hab./Km<sup>2</sup>, respectively (IBGE, 2023). The project region is located in the central part of Altamira and has important Conservation Units such as the Triunfo do Xingu Environmental Protection Area, the Serra do Pardo National Park, the Terra do Meio Ecological Station, and the Iririri State Forest, contributing to the low population density in the region.

Although it is the largest municipality in size, Altamira has economic and development indexes below the national average. Its HDI is 0.665, which is the 12th highest in the state of Pará, and the state itself has extreme inequality in human, social, and economic development. The capital, Belém, has an HDI of 0.746, while the municipality of Melgaço has an index of only 0.418. The state's HDI is 0.646, considered low compared to other units of the federation and the national average, which is 0.723 (IBGE, 2023).

Altamira has a GDP per capita of R\$24,250.13 (IBGE, 2019), ranking as the 18th highest among the 144 municipalities in Pará. According to the Economic-Environmental Diagnosis of Altamira prepared by the Instituto Floresta Tropical (IFT, 2019), the municipality accounted for 42.18% of the regional GDP in 2011, collecting R\$890,626 million, with an economy concentrated mainly in the service sector.

Altamira has 152 elementary and secondary schools, both public and private, with a 93.1% schooling rate for children aged 6 to 14 (IBGE, 2023) However, this places the municipality 102nd in the state and 5,326th among all Brazilian municipalities (IBGE, 2023). The total number of enrolled students in the municipality is 26,508, with most of the educational establishments concentrated in the urban area. As a result, 77.04% of enrolled students study in urban schools, and only 22.96% attend establishments located in the rural area (INEP, 2022).

Altamira's infant mortality rate is 14.15 deaths per thousand live births (IBGE, 2023), higher than the national average (13.3) but lower than the state of Pará (16.3). Primary care services have improved in the last two decades, leading to a decline in infant mortality. However, the public health system still faces challenges due to a lack of doctors and specialists and the difficulty of accessing medical care and supplies in remote areas. Health services are unequally distributed in Pará, particularly between urban and remote areas.

Altamira has 46 health establishments, with 1.63 beds per thousand inhabitants, higher than the state average of 1.58 but below the metropolitan region of Belém and the national average (Minsitério da saúde, 2020). However, access to these beds is challenging for rural communities, some of which are over a thousand kilometers away from the municipal center. This is particularly true for riverside and peasant populations living in distant forest areas. The lack of public policies and social assistance from the state creates a power vacuum, and infrastructure and service supply actions are often managed by large landowners and illegal groups such as mining and land grabbing.

The administrative center of the municipality is located far away from the farms undergoing certification, resulting in the absence of the State and its public policies and social assistance. As a result, infrastructure and social control actions are managed by large landowners and parallel powers. The lack of state efficiency also contributes to the deforestation process, as there is no respect for environmental legislation. The livestock products of the region are subject to sanitary barriers due to foot and mouth disease, preventing their export and leading to an increase in cattle density and deforestation for the formation of new pastures/farms (Escada et al., 2005).

#### 4.1.1.3 Contemporary characteristics of the Caboclo Village

The Caboclo Village is a rural community in the municipality of Altamira, 1,400 kilometers away from the municipal seat, but located close to the properties that are part of the Triunfo do Xingu Grouped REDD+ Project. It is about 60 kilometers away from Belcon, Campo Limpo, Patacho, Retiro Encantado, Santa Marta, and Vó Lina, and only 8 km away from Nossa Senhora Aparecida Farm. The Caboclo Village is considered the priority of the identified populations in the region, because in addition to being the closest community to the project area, part of its cultural values and well-being derive from the project area and are the community that will benefit from the project scenario (see Section 2.1.6 “Stakeholder Identification”), which is in conformity with the CCB Standard v3.1 definition.

The village is situated in the Environmental Protection Area (Área de Proteção Ambiental) of the Triunfo do Xingu (ATX), which poses constant challenges due to its unfavorable geographical position. The village faces difficulties in accessing essential services like health, education, assistance, and transportation infrastructure. As a result, the community relies on the neighboring municipality, São Félix do Xingu, due to the inconsistent provision of services in Altamira. Furthermore, Altamira has high annual deforestation rates as it is among the two municipalities that deforest the most in the Amazon biome. This is the information of the Environmental-Economic Diagnosis of Altamira (IFT, 2019).

The village, known as Caboclo Village, is named after the Caboclo stream, a tributary of the Xingu River. However, its original name, Irinópolis Village, is largely unknown by the community. The village has around 25 residences, of which 21 are occupied by permanent residents and 4 by temporary members. There is no available data on the local population, but approximate numbers were obtained from the school and health center management, also a questionnaire<sup>125</sup> survey was conducted to collect socioeconomic data and subjective perceptions of the villagers, and the representatives of 17 of the 21 households answered the survey. This number is over 80% of the households in the community, so the sampling effort of this research was maximum, i.e., all representatives of households that could be interviewed were interviewed, therefore, this sample is representative of the community as a whole.

The village has about 69 inhabitants, as orally informed by local leaders, and most residents live from subsistence farming and the provision of rural services with most of the local labor being allocated to harvest periods or to jobs linked to the farms in the region. The majority of Caboclo Village inhabitants are originally from the north and northeast regions of Brazil. According to reports from older residents, this migration started in the 1980s, with many coming from other parts of Pará as well, Table 4.1. displays the birth state of the interviewees from the questionnaire.

*Table 4.1 Sample result of the state of birth of the population in Caboclo Village.*

State of birth	Number of respondents	
	Quantity	(%)
PI	1	5,9
GO	2	11,8
TO	4	23,5
MA	3	17,7
PE	1	5,9

<sup>125</sup> 230124\_SurveyCabocloVillageSD.pdf

Table 4.1 Sample result of the state of birth of the population in Caboclo Village.

State of birth	Number of respondents	
	Quantity	(%)
PA	3	17,6
MG	2	11,8
Non-respondents	1	5,9

The population of the village is predominantly male, with 65% of respondents in the survey being men and 35% women. Figure 4.2 shows the responses by gender and age group. Women have a strong presence in the domestic sphere, which limits their participation in social activities compared to men. Despite the lack of detailed data on the village, secondary data from the municipality of Altamira shows significant gender inequalities. According to IBGE data from 2010, an average of 25607 men had an occupation with paid work against an average of 18721 women. In addition, the median per capita monthly income between these groups was also unequal, with an average of R\$650.00 for men against R\$510.00 for women (IBGE, 2023). This shows how gender inequality exposes women to strenuous work routines, domestic violence, and limited access to education and leisure, and for this reason, this is a subgroup within the community, in a vulnerable situation.

Two other community groups were identified within Caboclo Village, that is, sub-groups that share similarities in terms of income, livelihood, and/or cultural values. One of them, it's also a vulnerable sub-group and consists of those living below the national poverty line (with an income equal to or less than half the minimum wage) and is the most significant group in the community, comprising approximately 62% of the population in this condition. This group is considered vulnerable because economic restrictions affect their access to basic nutrition, leisure, health, and other necessities. The condition of this group in Caboclo Village is also essential as it demonstrates that the project fulfils one of the indicators to achieve the exceptional community benefits of the CCB Standard v3.1, which is to show that at least 50% of households within the communities in the project area are below the national poverty line.

The third sub-group is the one of local leaders, who are individuals with significant influence in the community due to the relevant positions they hold, such as the school or health post coordinator, as well as their leadership profiles, exemplified by the village representative. Local leaders are trusted by the residents of Caboclo Village and, therefore, play an important role as facilitators in communication between Systemica Inteligência em Sustentabilidade S.A. and this stakeholder, as well as in community participation and engagement in project activities. Still regarding the representation of leadership, no traditional authority structures were identified in the community, in part because they do not identify themselves as a traditional community.

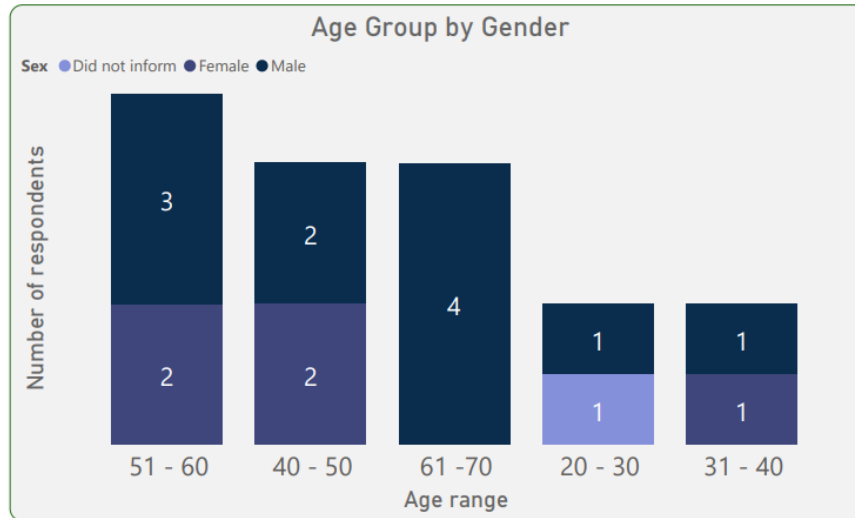


Figure 4.2. Data on age range and gender of the inhabitants of Caboclo Village collected through a questionnaire.

There were no subgroups related to color or race identified in the community, and the majority of the interviewees declared themselves to be brown. (71%), 23% declared themselves as white, and only one respondent (which corresponds to 6%) declared themselves as indigenous (Figure 4.3).

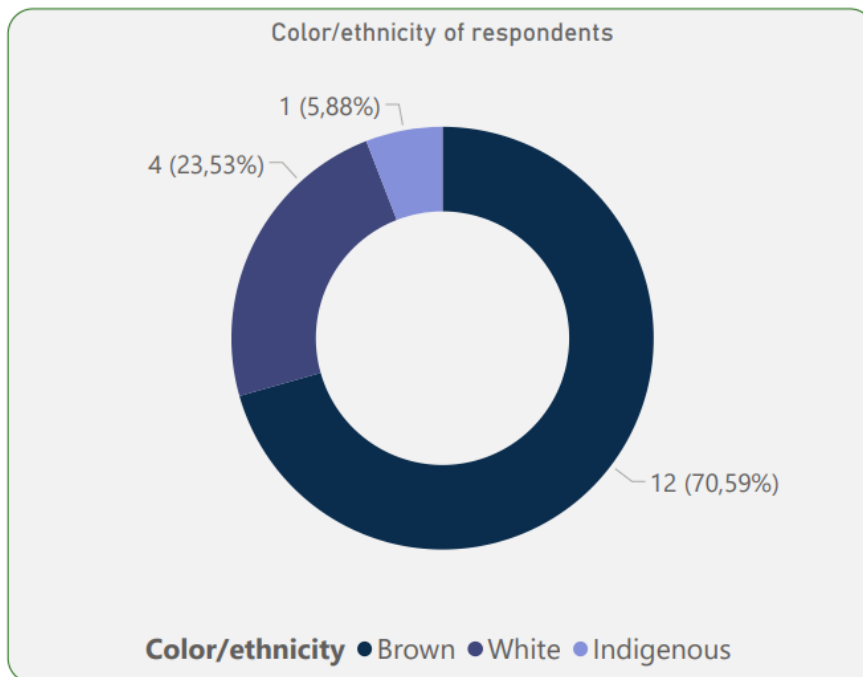


Figure 4.3. Data on color/ethnicity of the inhabitants of Caboclo Village collected through a questionnaire.

Regarding religion, the community has three buildings with religious functions, two of which belong to the Evangelical denomination: Congregação Nova Jerusalém and Congregação Lírio dos Vales da Assembleia de Deus, while the third is a Catholic church that appears to be abandoned. The lack of activity in the Catholic church is reportedly due to the priest not visiting the community for some time and the suspension of religious festivities because of the pandemic. The community has a relatively high number of churches compared to the number of inhabitants. According to a survey, most of the interviewed inhabitants identified

as Catholic, followed by Evangelicals, while a minority reported having no religious affiliation (Figure 4.4). No signs of cosmology or mythology have been identified among the community's inhabitants, in part because it is not a traditional community.

Two evangelical temples were identified in the village, one of which is currently under construction using masonry, while the other still maintains the local construction standard with wooden coating and roofing made of Eternit tiles. Both buildings belong to local residents who serve as community and religious leaders. The interviews revealed the existence of tensions between the religious leaders, as the evangelical community is small in number and therefore demands an active search for new members using persuasive strategies. This situation causes some members of the population to declare themselves as Catholic or without religion to avoid taking sides and pressure from the conflicting groups. Many evangelicals in Caboclo Village consider religion as a leisure activity on weekends, according to field statements. Due to the absence of state presence, there is a lack of options and actions for culture, sports, and leisure within the religious sphere.

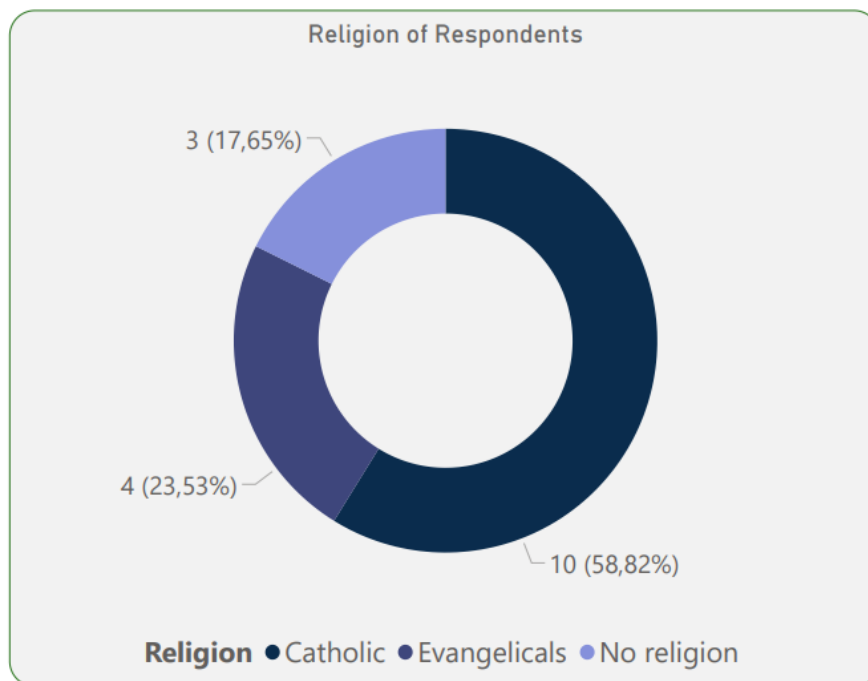


Figure 4.4. Data on religion of the inhabitants of Caboclo Village collected through a questionnaire.

The situation worsens during certain months of the year, especially between December and March, when part of the community is unable to access other locations, services, and goods due to poor local road conditions. Heavy rain makes circulation unfeasible, and options for leisure, culture, and sports become even rarer, leaving the community devoid of any public policy support in these fields. In response, locals either turn to religious temples as their main option for sociability and leisure or frequent the bars in the village, where alcoholism is a latent problem. This reveals the vulnerability of some residents, as assistance and treatment policies are not accessible to the inhabitants of the region, as shown by the social diagnosis<sup>126</sup>.

The economic and land use issues are also challenging in the region. The majority of the community relies on ranching as their main source of income, being allocated in the properties of the region, whose main

<sup>126</sup> 231023\_SocialDiagnosisAnnexes.zip

practice is extensive livestock farming. Additionally, approximately 30% of households provide various commercial services, including food sales, bars, gas and gasoline sales, and personal grooming services like haircuts and manicures. Some residents own land that is not their primary residence, yet all have reported a lack of property documentation. This absence of landownership rights contributes to an unequal distribution of land, frequently resulting in social pressures and conflict. Although no conflicts have been recorded within the community, there are reports from residents of animal theft and violence related to it in the neighborhood, conflicts that are quite common in the rural Amazon region. Many of the interviewees have resided in the village for over a decade, as demonstrated in detail in Figure 4.5.

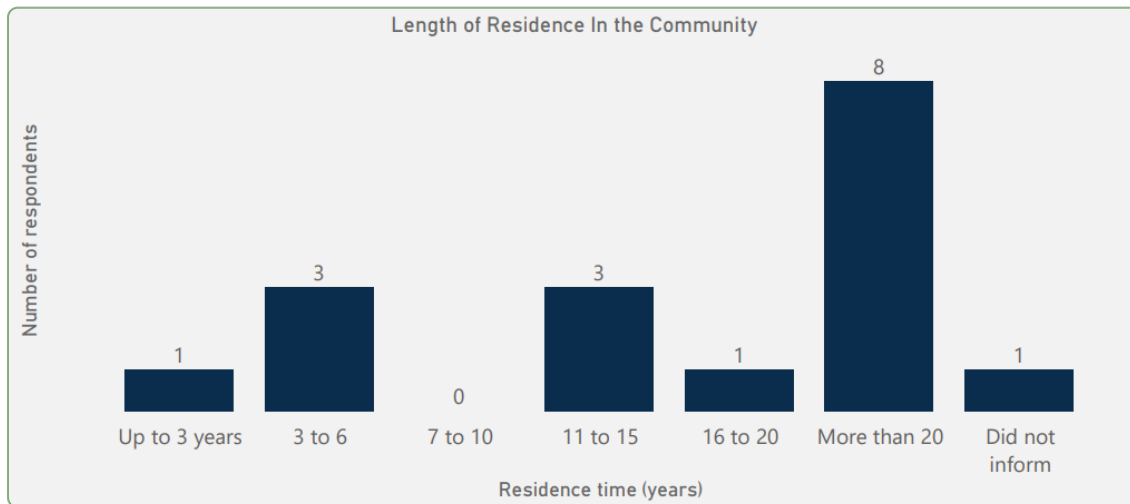


Figure 4.5. Data on residence time of the inhabitants of Caboclo Village collected through a questionnaire.

The social diagnosis highlights the challenges related to access to education, health, water, sanitation, and energy services in the community. The only educational facility available in the village is the Escola Municipal Novo Pacto, a municipal elementary and middle school. Currently, the school serves 48 children and young people between the ages of 5 and 16, offering classes from the 1st to the 9th grades of elementary and middle school. However, despite its potential to become an agricultural school, the education provided doesn't incorporate any aspects of rural life. Based on what was reported by a teacher, it appears that the school curriculum does not adequately address the cultural, culinary, and other aspects of local life, despite the curricular requirements for teaching history and geography. The lack of teaching materials on the region's characteristics, including its population, socioeconomic conditions, and environment, hinders the school's efforts to promote and disseminate information about the community.

The village has a health center that provides basic primary care, vaccinations, and referrals for exams and consultations to other units of the Brazilian public health system. However, accessing the nearest hospital in São Félix do Xingu requires a journey of more than 6 hours on a dirt road, and patients often need to be transported by plane to the city of Altamira in serious cases. Inhabitants report a lack of public health services due to long distances and difficulties accessing care, particularly in emergencies. Specialist doctors are also scarce in the region, and the health units that perform exams are challenging to reach. The health center often lacks medicines for chronic diseases such as hypertension, diabetes, and heart problems, affecting the well-being of vulnerable groups like children, pregnant women, the elderly, and people with chronic diseases.

The social diagnosis revealed that the village lacks any leisure or cultural facilities, with only a soccer field as a recreational option used mainly by children, young people, and adult men. No buildings of historical or

artistic value, popular festivals, or cultural groups were identified in the area. However, it was found that many inhabitants practice backyard gardening for food and medicinal purposes, reflecting aspects of traditional knowledge. The only occurrence regarding potential cultural value is related to the presence of archeological remains such as pottery shards, lithic objects, and lightning stones (Figure 4.6). These artifacts were named by the locals and are found after storms and floods, when the superficial layer of soil is moved, revealing these pieces. No traditional communities such as riparian, extractivist, indigenous<sup>127</sup>, or quilombola<sup>128</sup> were reported in the village or its surroundings, including settlements<sup>129</sup> and urban areas<sup>130</sup>.



*Figure 4.6. Evidence of the occurrence of archaeological remains among the residents of the village and surrounding area.*

Caboclo Village lacks a public sewage system, forcing the population to use rudimentary cesspits that are often constructed without considering relevant aspects such as water veins, groundwater, and cultivated land. In terms of water supply, 94% of residences rely on wells or small dams for both human and productive uses, including irrigation and animal hydration. The Caboclo Stream, which gives the community its name, is the main watercourse and is also used for agriculture and animal husbandry. While it is a popular option for fishing, the presence of piranhas makes recreational use uncommon, and bathing in the stream is avoided by the inhabitants. The community's well-being depends on the Caboclo stream, which in turn depends on the project area, since one of the properties (Nossa Senhora Aparecida Farm) protects most of its springs.

The community has had electricity for only two years. Prior to that, they relied on wood or diesel generators. Although the residents installed the electricity grid themselves, the service is intermittent and often unavailable during the rainy season. Nevertheless, the installation of the grid has brought about significant

<sup>127</sup> 231024\_Socioeconomic\_IndigenousLand\_rev.pdf

<sup>128</sup> 231024\_Socioeconomic\_QuilombolasCommunities\_rev.pdf

<sup>129</sup> 231024\_Socioeconomic\_Settlements\_rev.pdf

<sup>130</sup> 231024\_Socioeconomic\_UrbanAreas\_rev.pdf

improvements in the quality of life for the villagers, such as the ability to refrigerate food and drinks and use household appliances and power tools for routine activities like food preparation and small repairs.

The installation of the electricity grid not only improved the quality of life in the village but also enabled access to the internet. This has provided residents with access to information and communication with the outside world, as well as access to digital services such as banking, social media, medical appointments, and social registries. More than half of the interviewed residents reported having access to the internet, a significant achievement in terms of digital inclusion, which is mainly achieved privately. However, internet access is hampered by signal drops and difficulties accessing certain websites and applications, preventing access to many digital services, especially those requiring document or application downloads.

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

As presented in previous sections of this document (see Sections 2.1.6, 2.1.7, and 4.1.1), two community groups have been identified within Caboclo Village, namely subgroups that share similarities in terms of income, livelihood, and/or cultural values. The subgroups consist of those living below the poverty line, and community women. Considering that the population of Caboclo Village is small - approximately 69 inhabitants, these community groups are highly representative of the community.

In addition to these groups, there is a small percentage of children who have not been defined here as a community subgroup because they are not members who derive similar income, livelihoods and/or cultural values and other contributions to well-being from the Project Area and whose values are different from those of other groups, but who benefit indirectly from the project through activities aimed at the community school. It is also worth mentioning that there is no representative group of young people or teenagers in Aldeia do Caboclo, as the school only admits students until the end of elementary school (when students are around 14 years old). Therefore, from this age onwards, most young people need to live in the nearest urban center to continue their school years.

More information about the subgroups identified by the project can be found below.

##### **4.1.2.1 Community group living below the poverty line:**

Monetary poverty is the condition of economic insufficiency to maintain one's well-being, and in Caboclo Village, this is the condition of 62% of the population, meaning that more than half of the people live with up to half the minimum wage. This community group is the most relevant in terms of social vulnerability because economic insufficiency affects access to basic nutrition, leisure, health, and other needs. However, due to this vulnerability, there is a sense of solidarity within the community, where people empathize with the less fortunate and always extend help whenever needed, whether it be financial assistance, donations of goods, and so on. These actions are primarily initiated by local leaders, as they are often entrusted with knowledge of these situations of need.

##### **4.1.2.2 Women of the community:**

Inequality in Caboclo Village is not limited to the economic context but also extends to gender. For this reason, another significant community group in terms of vulnerability is women. There is a strong social pattern of stigmatization that imposes a submissive social position on women and assigns mandatory roles such as childcare and household chores. Indeed, in Caboclo Village, as well as in other population groups in the region, there is a cultural norm where when a man is hired on a farm, for instance, his wife also starts performing activities without receiving any remuneration for it. Therefore, the gender inequality is visible, and how it affects the daily lives of women in the community, limiting leisure opportunities and social participation.

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

The concept of High Conservation Values (HCV) recognizes the importance of protecting forest areas of exceptional character or critical significance from degradation or negative impacts caused by management practices. The practical application of the HCV concept involves principles and criteria that integrate environmental, ecological, and social safeguards. The assessment of the existence of these areas in the project zone was conducted using the document “*Detecção de Altos Valores de Conservação (AVC)*” produced by the HCV Resource Network (Watson, 2020), and the areas were identified through primary and secondary data from the project community.

Of the six attributes that classify an area as a high conservation value, two are directly linked to the community and the project zone as they refer to the values of the environment for people, that is, they involve regulatory and support ecosystem services, provisioning services (related to basic needs), and cultural services. These are “*HCV 4: Ecosystem Services*”, basic ecosystem services in critical situations, including protection of water sources and control of erosion in vulnerable soils and slopes. The attributes that qualify this HCV as crucial to the well-being of the community, as well as the specific areas that should be the focus for conservation, are described in Table 4.2 below.

Table 4.2 Attributes and focal areas of HCV 4 for the TdX Project.

High Conservation Value	HCV 4: Caboclo stream used for washing, recreation and other purposes
Qualifying Attribute	The Caboclo Stream is a watercourse that encompasses several springs and tributaries, with a considerable portion of them located within one of the areas of the TdX project. The stream is approximately 7.1 km long from the project area until it runs alongside Caboclo Village, where it is used by the community for various activities such as leisure fishing, recreation, washing clothes, and meeting other domestic needs during dry seasons. The protection of the riparian forest and the restoration of vegetation when absent are crucial to maintaining water quality (Turunen et al., 2021) and, consequently, fulfilling the community's usage needs where there are no viable or readily available alternatives. The failure to protect the riparian zone of Caboclo Stream would represent a significant decrease or even the interruption of ecosystem services directly utilized by the community, affecting their health and well-being.
Focal Area	Caboclo stream and riparian zone (from the project area to Caboclo Village) <sup>131</sup>

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

The potential changes expected for the well-being of the community and sub-groups of the community, in a scenario where the project activities were not developed, were analysed using the scenario analysis methodology, which aims to predict the future consequences of a situation if it persists (Kishita et al., 2016). The methodology utilizes the community's historical context, data, and references from the community's trajectory, followed by a group activity to identify the driving forces behind the identified events and the likely scenarios for each of them. Additionally, it is necessary to establish a timeframe for which this analysis

<sup>131</sup> SocialDiagnosis.zip

is conducted, therefore, the historical period was the one used for the baseline calculations of the VCS PDD (20 years: 2002 to 2022) and the project's credit period (30 years: 2022 to 2052) were adopted as the period for future analysis. The scenario predicted based on this analysis is presented below, and further details on each step in formulating this document can be found in the annex<sup>132</sup>.

The TdX project region has been occupied over the past decades due to the rise of certain economic activities such as rubber exploitation, followed by mining and logging. Despite being sparsely populated, the influx of people has accelerated deforestation and exploitation in the region, leading to the emergence and consolidation of extensive livestock farming as the dominant activity (IBGE, 2022b). Today, livestock farming is the main driver of deforestation, primarily fuelled by land speculation and perpetuated by the region's geographic isolation and lack of state supervision. Extensive livestock farming is characterized by low input and technology usage, resulting in higher land demand due to low productivity (Dias-Filho, 2017; MapBiomas, 2021; Viana, 2017). Therefore, not only uncontrolled deforestation but also the unsustainable practices contribute to the degradation of natural resources and the provision of ecosystem services crucial for human well-being. Lastly, this context is closely linked to the economic insufficiency of the population, as the only available job opportunities, often found in the local livestock properties, entail arduous and poorly paid work (Lavor, 2012).

The main driving forces that will perpetuate this scenario in the community in a situation where the project does not develop are deforestation, absence of the State, geographical isolation, land speculation, and demand for agricultural production. Despite being interconnected, the forces that have the most influence on this future scenario are deforestation and absence of the State. Therefore, without the project, it is highly likely that the future scenario for Caboclo Village will involve deforestation in the project area and a decline in critical ecosystem services such as water availability and fish for subsistence fishing, as well as cultural services for recreation. As for the absence of the state, the lack of support and assistance is likely to persist, resulting in a low quality of life in the community. This, in turn, perpetuates the status quo of all the related problems, including illegality, low sustainability, precarious work conditions, stigmatization of public institutions and women, and so on.

## 4.2 Net Positive Community Impacts

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

The CCB Standard v3.0 states that the impacts on community groups should be described in terms of predicted or actual, direct or indirect benefits, costs, and risks. The impacts were assessed based on the project's theory of change<sup>133</sup>, described in Section 2.1.8, and on a participatory impact assessment carried out by Systemica's team with members of the Caboclo Village<sup>134</sup>.

In this project, all costs related to community activities will be assumed by the project proponent. Therefore, no costs related to responsibilities and opportunity costs are expected to community groups. The risks to the project were identified and described in Section 2.1.12. However, potential negative impacts on community well-being identified in the theory of change and validated by the community are presented in this section. Table 4.3 shows the anticipated impacts on each community group, identified in Section 2.1.7, as well as their description and change in well-being.

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<sup>132</sup> SocialDiagnosis.zip

<sup>133</sup> TheoryOfChangeTdX.zip

<sup>134</sup> ValidationMeetings.zip

Table 4.3 Expected impacts on community groups.

Community Group	Community group living below the poverty line
Impact(s)	Strengthened local economy
Type of Benefit/Cost/Risk	<b>Direct predicted benefit.</b> The local economy will be strengthened by activities that promote environmental and formal/informal education (for example, awareness campaigns, alignment meetings with teachers, and the implementation of a school garden). These efforts will generate outcomes such as improved teaching conditions and increased community income, made possible by outputs like hiring people for the project’s activities (including women), providing materials for courses and classes, and creating food production spaces (the school garden). The combination of these factors will enable the community to develop more job and income-generating opportunities, thus strengthening its local economy.
Change in Well-being	With greater access to education and training, the community will become involved in productive activities that increase their income and diversify their sources of livelihood. At the same time, improved food security—made possible by the school garden and the use of more sustainable techniques—helps reduce costs and dependence on external inputs. Thus, the impact of strengthening the local economy is achieved through bolstering productive chains, expanding job opportunities, and promoting local entrepreneurship.

Community Group	Women of the community
Impact(s)	Gender equality promoted
Type of Benefit/Cost/Risk	<b>Direct predicted benefit.</b> The promotion of gender equality will mainly occur through activities that generate income opportunities and social participation for women, such as hiring female labor for the project and carrying out awareness campaigns. These outputs will translate into outcomes, such as increased and diversified income for women and reduced levels of economic vulnerability in the community. Governance initiatives focused on promoting women’s participation in decision-making processes will further reinforce these results.
Change in Well-being	The without-project scenario indicates the lack of activities focusing on women. In a region with low access to information and a cultural pattern that keeps women in a vulnerable position, gender inequality tends to perpetuate. Thus, the desired impact - promoted gender equality- will be achieved as women come to occupy decision-making and leadership spaces within the

	community. The strengthening of their economic and social autonomy is consolidated by inclusive governance policies and the expansion of support networks, fostering the integral and sustainable development of the entire community.
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Community Group	All community
Impact(s)	Strengthened community empowerment
Type of Benefit/Cost/Risk	<b>Direct predicted benefit.</b> Community empowerment will be reinforced when community members actively participate in decisions that affect their collective life and have access to better communication, leisure, and mobility resources. Outputs such as creating communication channels, implementing internet access spaces, and providing community infrastructure lead to outcomes like greater social participation, the promotion of leisure spaces, and improved communication skills.
Change in Well-being	In the scenario without project analysis, community organization tends to weaken, restraining community empowerment and contributing to the intensification of conflicts.  Hence, the sum of these efforts and activities leads to a lasting impact: the community will gain its own voice, organize itself to address local challenges, and improve its quality of life through cooperation and collective decision-making. By strengthening empowerment, the project will ensure the long-term sustainability of its initiatives, as the population becomes an active agent of social and environmental transformation in its territory.

Community Group	All community
Impact(s)	Increased climate change resilience
Type of Benefit/Cost/Risk	<b>Direct predicted benefit.</b> Increased resilience to climate change will be promoted by activities aimed at improving environmental education, protecting permanent preservation areas, and encouraging the sustainable use of water resources. Outputs include implementing structures for drinking water access, holding workshops on spring protection, and constructing water access structures to strengthen local water security. These actions will also contribute to outcomes that include maintaining adequate microclimatic conditions for species as well as conserving riparian areas.
Change in Well-being	When the community has secure access to water and adopts sustainable practices (for example, in soil management and fire prevention), it will become better equipped to cope with the effects

	of climate change, such as prolonged droughts or floods. The final result will be a more balanced environment with greater adaptability and reduced vulnerability, ensuring both the health of human populations and the preservation of local ecosystems. More details can be found in Section 3.5.
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Community Group	All community
Impact(s)	Increased vulnerability to digital scams and access to false information
Type of Benefit/Cost/Risk	<b>Predicted direct negative impact.</b> This impact can be caused by the improved access to the internet. Mitigation measures to prevent this impact are described in Section 4.2.2.
Change in Well-being	This is a potential negative impact that may be caused by the “Improved access to technology, health and leisure” activity, which includes the provision of internet networks in a community space. Access to the internet, while bringing great benefits, can also facilitate the actions of criminals, posing a risk of digital scams and the spread of false information, especially if this access is not accompanied by digital education initiatives. Such a risk can escalate or intensify conflicts within the community and adversely affect community members financially and psychologically.

Community Group	All community
Impact(s)	Decrease in the quality of public services after the end of the cooperation agreement
Type of Benefit/Cost/Risk	<b>Predicted direct negative impact.</b> This impact can be caused by the cooperation with the public authorities to improve education and other services. Mitigation measures to prevent this impact are described in Section 4.2.2.
Change in Well-being	This is a potential negative impact that may be caused by “Improved access to technology, health and leisure” and “Improving environmental and formal/informal education for children, young people and adults” activities. Cooperation agreements with public entities, while bringing great benefits, can also generate a misunderstanding of the objective of the agreements on the part of public institutions and the community, thinking that they can replace the role of the state and suspend the current supply that local institutions do the school and health post. This can cause greater vulnerability of the population and a great dependence on the success of the project.

Community Group	All community
Impact(s)	Increased community mistrust, with fears that the project could increase land inspections
Type of Benefit/Cost/Risk	<b>Predicted direct negative impact.</b> This impact can be caused by the strengthening community governance and communication. Mitigation measures to prevent this impact are described in Section 4.2.2.
Change in Well-being	This is a potential negative impact that may be caused by the “Strengthening community governance and communication” activity, which involves holding lectures and evaluating how to contribute to land regulation. It can also generate distrust in the community, with fears that the project could increase land inspections. This can cause great harm to the population’s quality of life, as well as the continuity of the benefits of the project.

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

The potential negative impacts of project activity on community well-being are related to “Improved access to technology, health and leisure”, “Improving environmental and formal/informal education, and “Strengthening community governance and communication”, as pointed out in Section 4.2.1 and in the theory of change<sup>135</sup>. However, these impacts can be solved through educational processes, participation, and joint community planning.

The feasibility of a stable and sustainable Internet will bring several benefits to Caboclo Village, such as easier and faster access to banking services, health services, training courses, cultural and recreational opportunities, and a tool to promote education. However, the community’s vulnerability to digital crimes and false information may also increase as a result of this activity, as residents may not be familiar with certain scams that occur mainly through social networks, clandestine websites, and malicious advertisements. To mitigate this potential negative impact, the “Improved access to technology, health and leisure” activity will include lectures on digital education, aiming to warn people about possible digital crimes and raise their awareness of the issue.

For the potential negative impact of the decrease in the quality of public services after the end of the cooperation agreement, associated with the activities of cooperation projects with public authorities to improve education, health, and other services, mitigation measures were designed such as establishing long-term agreements, definition of clear parameters with public institutions and greater clarification to the community about how the agreements will work.

On the other hand, to address the potential negative impact of increased community distrust, with fears that the project may increase land inspections, which is associated with the project activity on “Strengthening community governance and communication”, the following measures were formulated mitigation: holding awareness-raising lectures on governance and land regularization and carrying out in-depth assessments on the land situation in the project zone and how the project can contribute to the protection of land rights.

<sup>135</sup> TheoryOfChangeTdX.zip

With respect to the High Conservation Values related to the community, the project will maintain and/or improve the ecosystem services provided by the Caboclo stream. The HCV 4: Caboclo stream used for washing, recreation, and other purposes<sup>136</sup>, which includes the riparian zone of the stream along its extent between the project area and the community, project activities are planned to improve community access to alternative water resources and enhance biodiversity (see Section 2.1.8). Among these activities, there is a specific focus on structuring and implementing a program to protect the riparian zone of Caboclo stream, thus also positively impacting the conservation of this HCV.

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

Caboclo Village is in a region that has suffered and continues to suffer great pressure from deforestation and illegal activities. This is the scenario in which the inhabitants of the village live. However, through the social diagnosis<sup>137</sup>, it was possible to study the conditions of the community in more detail. It was found that the state does not act decisively and effectively in this region with very low population density, practically isolated by the poor quality of the roads that connect the communities. In addition to the lack of resources in the village, the provision of public services such as health, electricity, education, culture, leisure, and security is also precarious, creating a situation in which all actors do not seem to find a way out of their problems. This scenario creates fertile ground for the spread of tensions, conflicts, and illegal activities, as the opportunities for survival are few and not equally accessible to all.

As described in Section 4.1.4 and in the Community Scenario Analysis, the most likely without-project scenario for the community involves deforestation and lack of support and assistance from the state, resulting in illegality, low sustainability, precarious work conditions, stigmatization of public institutions and women, and so on.

Given this reality, initiatives that focus on environmental preservation and community well-being need to be implemented to guarantee the maintenance of the standing forest and the protection of biodiversity in concomitance with the adoption of measures that ensure the improvement of the quality of life of the communities in interface with the forest areas. Therefore, the scenario where the project is implemented anticipates that a strengthened local economy, gender equality promoted, and strengthened community empowerment will be achieved due to project activities, generating positive impacts on all identified community groups (see Section 4.2.1).

Moreover, as pointed out in Section 3.5.2, the region is likely to increasingly suffer from the impacts of climate change, such as savannization and water insecurity. An issue raised by the community in the governance meeting was the insufficient water supply during the summer<sup>138</sup>. On that account, the “Improved community and biodiversity access to water resources” was designed as a project activity, which includes, among other outputs, the implementation of solutions for access to potable water, workshops concerning sustainable water use, construction of structure of access to water drinking, maintenance of Permanent Preservation Areas, and spring protection. These activities are expected to increase local water availability and improve water use efficiency, thus improving water security, contributing to the maintenance of the riparian zone, and consequently improving the community’s resilience to climate change, as described in the project’s theory of change.

Likewise, within the scope of the “Improved community and biodiversity access to water resources” project activity, it is expected to carry out awareness campaigns on environmental and citizenship education carried

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<sup>136</sup> 230725\_Caboclo\_stream\_HCV4.pdf

<sup>137</sup> SocialDiagnosis.zip

<sup>138</sup> 231019\_ReportGovernanceMeeting.zip

out and training on fire control in forest areas, both to contribute to maintaining the project area and to develop the capabilities of community members to combat fire around Caboclo Village. This would help prevent the expansion of fires given the impacts of potential savannization of the region, consequently improving the community's resilience to climate change.

As conclusion, the anticipated net well-being impacts of the project are predicted to be positive for all identified community groups compared with their anticipated well-being conditions under the without-project land use scenario.

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

The community well-being-related High Conservation Value (HCV) won't be negatively affected by the project. This is because the TdX Project's type of activity being AUD, which means none of the project activities are designated for logging or deforestation, and the project area is not composed of degraded or deforested areas, among other requirements of the methodology (VM0048). Furthermore, there will be no forest management activities in the area, meaning the entire project area will be preserved, and this preservation will be ensured through monitoring activities.

Moreover, as pointed out in Section 4.2.2, a set of activities are expected to maintain or improve the HCV related to the community's well-being, such as improving environmental and formal/informal education for children, young people and adults, conservation and enhancement of local biodiversity, improved community and biodiversity access to water resources, related to the implementation of a program to protect the Caboclo stream and the riparian zone. Thus, the project is expected to impact positively on the conservation of this HCV.

### **4.3 Other Stakeholder Impacts**

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

As described in Section 2.1.7, other stakeholders include institutions at the municipal, state, and regional levels, as well as councils and organizations with a mandate over territorial management and conservation areas. Since there are no community groups or local populations identified as other stakeholders (Sections 2.1.6 and 2.1.7) the project activities do not interfere with their well-being. This is because the stakeholders considered in this category are institutional entities rather than human populations, and according to the CCB Program Definitions v3.0, well-being refers to the individual's experience of quality of life, encompassing social, economic, psychological, spiritual, and medical dimensions, including the provision of opportunities, empowerment, and increased security.

It is observed, however, that project execution practices are closely aligned with activities carried out by these institutional stakeholders. In this sense, the project is expected to contribute to the development of social functions in the community and to the well-being of its population, which will likely foster greater dialogue with relevant governmental bodies and strengthen cooperation for project development.

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

As mentioned in Section 4.3.1, no rural populations or communities are identified as other stakeholders. Therefore, the project does not interfere with the well-being scope of the identified other stakeholders, and as a result, there is no mitigation of negative impacts on other stakeholders. Even in project activities involving partnerships, there are no planned actions that could cause any harm to their well-being.

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

Since no community groups or communities are identified as other stakeholders, as mentioned in previous sections of this Project Description, the project does not affect the scope of well-being. Consequently, the net negative impacts on other stakeholders are zero.

## 4.4 Community Impact Monitoring

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

The Community Monitoring Plan is an important tool for assessing whether the project's objectives are being achieved and for tracking the risks and impacts on the well-being of the community that were previously identified. This Monitoring Plan presents the variables to be monitored, the project activity it is related to, whether it is an output, outcome, or impact of that activity, as well as the adopted methodological strategy and the frequency of data collection. The indicators were defined based on the results of the SWOT analysis and Theory of Change<sup>139</sup>, in addition to the metrics required by the CCB standard (Section 1.2). For the identified negative impacts and risks, the technical team at Systemica Inteligência em Sustentabilidade S.A. has planned project activities as a form of mitigation, along with specific indicators; therefore, there are also indicators to be monitored for the risks and negative impacts.

Furthermore, an analysis was conducted to determine which Sustainable Development Goals (SDGs) indicators are related to the project's indicators. Some of these indicators have been adapted to better encompass the project's reality. Both the adapted SDG indicators and the indicators related to the Gold and High Conservation Value (HCV) criteria are indicated in the corresponding columns in Table 4.4 below and in the attachment<sup>140</sup>.

Since the project intends to meet the Gold Level for climate change adaptation benefits and has specific activities for this objective, this Monitoring Plan includes indicators to track the community's adaptation to climate change. The indicators that measure this benefit are those defined to measure the impact of improving access to water by the community. Likewise, the project aims to meet the Gold Level for exceptional community benefits, thus, it has indicators to monitor the impact of activities on the community and the community groups of people below the poverty line and also for the subgroup of women, with specific measures of impact for these subgroups, as well. Additionally, the TdX project will assess, in the monitoring plan, the community's and community groups' perception of the actual impacts of the project activities.

To monitor the progress of the indicators, a baseline was established by conducting surveys with the population, women, and representatives from the Health Center and School of Caboclo Village<sup>141</sup>. Through these interviews, socio-economic data, health and education conditions in the community, infrastructure, water access, perceptions, and population satisfaction in various aspects, including the perception of identified High Conservation Value were collected. This data will enable the evaluation of the maintenance and/or improvement of HCVs for the community.

The monitoring of indicators will be conducted by the Systemica team's members or through notifications by local community agents. Each indicator, methodology, type of measurement, and frequency are listed in Table 4.4 below.

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<sup>139</sup> TheoryOfChangeTdX.zip

<sup>140</sup> ProjectIndicators.zip

<sup>141</sup> 230831\_Diagnostic\_SurveyCabocloVillage.zip

Table 4.4 Monitoring Indicators of project activities.

Indicator	Type	Unit	Sampling Methods	Gold	HCVs
<b>By 2052, at least 40% of the population and 30% of women will have increased the quantity or quality of the products and services that are a source of household income</b>					
4.7 Content and tools for global citizenship education and education for sustainable development are being integrated into teacher and student training	SDGs	Number	Survey conducted on the population	GL2	
1.2 Proportion of the population living below the national poverty line, by sex	SDGs	Percentage	Survey conducted on the population	GL2	
4.3. Participation rate of children, youth and adults in formal or non-formal education and training in the previous months, by sex	SDGs	Percentage	Counting; meeting minutes, documents, reports	GL2	
Percentage of students or community members for whom food insecurity has been reduced	Outcome	Percentage	Survey conducted on the population	GL2	
Improvement of the school's teaching conditions	Outcome	Satisfaction scale (ratings from 1 to 5)	Survey conducted on the population	GL2	
Percentage of students and teachers using new tools and content	Outcome	Percentage	Survey conducted on the population	GL2	
Number of cooperation agreements signed for the short and long term	Risk or Negative Impact	Number	Counting; meeting minutes, documents, reports		
Percentage of the population for which the average household income has increased	Outcome	Percentage	Survey conducted on the population	GL2	
Number of participants in the job-oriented training courses	Outcome	Number	Counting; meeting minutes, documents, reports	GL2	

Average extra income of people who applied acquired knowledge and skills	Outcome	Average in R\$	Survey conducted on the population	GL2	
Percentage of the population with more options for income generation in the community	Outcome	Percentage	Survey conducted on the population	GL2	
Number of school gardens implemented and maintained	Outputs	Number	Counting; meeting minutes, documents, reports	GL2	
Number of children and adults benefited by the implementation of the garden or donations to the school	Outputs	Number	Survey conducted on the population	GL2	
Number of workshops for alignment with the school teaching staff conducted	Outputs	Number	Counting; meeting minutes, documents, reports	GL2	
Number of school supplies replenishments conducted	Outputs	Number	Counting; meeting minutes, documents, reports	GL2	
Number of job-oriented training courses provided	Outputs	Number	Counting; meeting minutes, documents, reports	GL2	
Number of people hired	Outputs	Number	Counting; meeting minutes, documents, reports	GL2	
<b>By 2052, at least 40% of the population and 40% of women will have access to water and secure, affordable water resource management under variable or extreme climatic conditions</b>					
6.1.1 Proportion of the population using safely managed drinking water services	SDGs	Percentage	Survey conducted on the population	GL1	HCV 4
Percentage of people who have gained a better understanding of climate change adaptation and mitigation.	Outcome	Percentage	Survey conducted on the population	GL1	HCV 4
Percentage of women who have gained a better understanding of climate change adaptation and mitigation.	Outcome	Percentage	Survey conducted on the population	GL1	HCV 4
Percentage of people who perceive an improvement in the maintenance of the riparian zone.	Outcome	Percentage	Survey conducted on the population	GL1	HCV 4

Percentage of the area that was benefited	Outcome	Percentage	Remote sensing	GL1	HCV 4
Reduction in the rate of identified threat occurrences during patrol campaigns in the project area	Outcome	Percentage	Patrolling checklist	GL1	HCV 4
Reduction in the percentage of heat spots detected via remote sensing in the project area compared to the total occurrences within a 10 km buffer	Outcome	Percentage	Remote sensing	GL1	HCV 4
Increase in the quality of water for human consumption	Outcome	Water quality parameters	Counting; meeting minutes, documents, reports	GL1	HCV 4
Increase in the availability of water for human consumption	Outcome	Percentage	Survey conducted on the population	GL1	HCV 4
Percentage of people who experienced an improvement in the availability and quality of water for consumption	Outcome	Percentage	Survey conducted on the population	GL1	HCV 4
Percentage of people who believe that ecosystem maintenance or restoration measures and the construction of adaptation infrastructures have contributed to their well-being	Outcome	Percentage	Survey conducted on the population	GL1	HCV 4
Percentage of women who experienced an improvement in the availability and quality of water for consumption	Outcome	Percentage	Survey conducted on the population	GL1	HCV 4
Number of lectures and/or awareness events on environmental and civic education	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Participation obtained in the lectures and/or events on environmental and civic education	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of community members training or participating in monitoring the project area or zone	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of identified threat occurrences during monitoring	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4

Number of fire-fighting measures	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of fire hotspots in the project area	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of fire-fighting equipment/PPE provided	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of people involved in the protection strategy contributing to the protection of the Caboclo Stream riparian zone and/or other water bodies in the area	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of interventions carried out	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of households and other buildings with implemented solutions for access to clean water	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of workshops on maintenance measures for Permanent Preservation Areas (APPs in Portuguese), spring protection, sustainable water use, and construction of septic tanks conducted	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of people participating in climate change adaptation or mitigation workshops and actions	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
Number of women participating in climate change adaptation or mitigation workshops and actions	Output	Number	Counting; meeting minutes, documents, reports	GL1	HCV 4
<b>By 2052, at least 40% of the population, including 40% of women, will have increased their economic autonomy and their capacity to make decisions that directly impact their lives</b>					
16.7 Proportion of the population who believe decision-making is inclusive in the project	SDGs	Percentage	Survey conducted on the population	GL2	
Percentage of women for whom the average individual income has increased	Outcome	Percentage	Survey conducted on the population	GL2	

Average extra income of women who applied acquired knowledge and skills	Outcome	Average in R\$	Survey conducted on the population	GL2	
Percentage of women with more options for income generation in the community	Outcome	Percentage	Survey conducted on the population	GL2	
Increase in women's average income	Outcome	Percentage	Survey conducted on the population	GL2	
Percentage of women actively participating in community or project governance	Outcome	Percentage	Counting; meeting minutes, documents, reports	GL2	
Number of women participating as leaders in community governance	Outcome	Number	Survey conducted on the population	GL2	
Increase in the quality of social relationships for women	Outcome	Percentage per variable	Survey conducted on the population	GL2	
Number of women hired	Output	Number	Counting; meeting minutes, documents, reports	GL2	
Number of women participants in the training courses	Output	Number	Counting; meeting minutes, documents, reports	GL2	
Participation of women obtained in lectures and/or events on environmental and civic education	Output	Number	Counting; meeting minutes, documents, reports	GL2	
Number of girls and women benefited by the implementation of the garden or donations to the school	Output	Number	Survey conducted on the population	GL2	
Number of women participating in in-person meetings for governance structuring focused on promoting women's participation	Output	Number	Counting; meeting minutes, documents, reports	GL2	
<b>By 2052, at least 40% of the population and 40% of women will experience an increase in their capacity to engage in organization and leisure activities in their community</b>					
17.8.1 Proportion of individuals using the Internet	SDGs	Percentage	Survey conducted on the population		

Increase in the quality of social relationships of the community members	Outcome	Percentage per variable	Survey conducted on the population		
Percentage of the population actively participating in community or project governance	Outcome	Percentage	Counting; meeting minutes, documents, reports	GL2	
Percentage of individuals displaying fear and insecurity regarding land tenure issues	Risk or Negative Impact	Percentage	Survey conducted on the population		
Percentage of the population that has experienced digital forms of leisure and culture	Outcome	Percentage	Survey conducted on the population		
Number of individuals who fell victim to digital scams	Risk or Negative Impact	Number	Survey conducted on the population		
Improvement in communication capacity and access to information	Outcome	Percentage per variable	Survey conducted on the population		
Percentage of people and women in the community who have not participated in any project activities	Risk or Negative Impact	Percentage	Counting; meeting minutes, documents, reports		
Percentage of the population for whom healthcare services or spaces have improved	Outcome	Percentage	Survey conducted on the population		
Percentage of the population for whom leisure services, equipment or spaces have improved	Outcome	Percentage	Survey conducted on the population	GL2	
Number of communication platforms with the community implemented and maintained	Output	Number	Counting; meeting minutes, documents, reports	GL2	
Number of cooperation discussions with the government for improving mobility infrastructure conducted	Output	Number	Counting; meeting minutes, documents, reports	GL2	

Number of reports indicating logistical difficulties in accessing the community	Risk or Negative Impact	Number	Counting; meeting minutes, documents, reports		
Number of in-person meetings for governance structuring with a focus on promoting women participation held	Output	Number	Counting; meeting minutes, documents, reports	GL2	
Number of internet network equipment installed and maintenance reports	Output	Number	Counting; meeting minutes, documents, reports	GL2	
Equipment and/or materials for community use provided	Output	Number	Counting; meeting minutes, documents, reports	GL2	
Number of community spaces implemented	Output	Number	Counting; meeting minutes, documents, reports	GL2	

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

The monitoring plan developed for the Triunfo do Xingu Grouped REDD+ Project will be made available to the stakeholders in the form of the CCB Project Description on Systemica's electronic communication channels, such as the website VERRA's. Additionally, whenever there is an update, such as after the verification audits, the documents on these channels will be updated as well. Similarly, summaries of the results obtained will be provided as the project activities progress. To ensure that all project stakeholders (communities and other stakeholders) have access to the monitoring plan and its results, emails will be sent with links to access the documents and summaries, and stakeholders will also be informed of any updates. In the case of the Caboclo Village community, in addition to the possibility of accessing the information online, in-person meetings and massive disclosures of information will be conducted periodically and continuously to share the monitoring plan, results, and other relevant information. These will be moments when the population can clarify doubts, make complaints, or provide suggestions. Finally, the community agents who Systemica will hire will also be a channel of communication between the project team and the community.

#### **4.5 Optional Criterion: Exceptional Community Benefits**

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

The Triunfo do Xingu Grouped REDD+ Project seeks to be validated at the Gold Level for exceptional community benefits. Thus, this section demonstrates how the project meets the requirement of being in an administrative area of a medium-development country, in which at least 50% of the households within the communities are below the national poverty line. This criterion is met by Caboclo Village, the beneficiary community of this project, and was identified through the Social Diagnosis. This diagnosis uses primary data collected in the field through questionnaires with the population and secondary data from the municipality of Altamira, available online.

There are different ways to measure poverty, and the poverty line is a monetary classification that demonstrates the condition of economic insufficiency to maintain one's well-being. There is no official poverty line in Brazil, so different approaches are adopted depending on the desired objective. For TdX, it adopted the understanding of the Brazilian government for identifying the target audience of social programs, which in this case is defined as those who receive up to half of the minimum wage (IBGE, 2022c). This is seen as a conservative decision, as the country ranks ninth most unequal in the world, and in 2019, almost 30% of the population lived on up to half the minimum wage (IBGE, 2020). This is the case in the municipality of Altamira, where 41% of families are below the monetary poverty line, meaning 41% of households have a per capita monthly income equal to or less than half the minimum wage (IBGE, 2010).

These secondary data align with the primary data obtained for Caboclo Village, but in this case, 32 people with a monthly per capita household income of less than or equal to half the minimum wage, out of the 52 people in the 17 households interviewed, represent approximately 62% of the population of Caboclo Village living on a monthly per capita income of less than or equal to half the minimum wage, which in 2022, the year the questionnaire was administered, was R\$606.00. In addition to being below the national poverty line, Caboclo Village is a community in a situation of low development and vulnerability, also related to

education, health, and leisure. All this data can be found in the Basic Needs Survey (BNS) described in the Social Diagnosis or in the attached document<sup>142</sup>.

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

The TdX project will generate short-term and long-term net positive well-being benefits for the community and community groups. These benefits and changes in community well-being, as well as the risks and costs, are described in Section 4.2.1 and were assessed based on the Theory of Change and the Participatory Impact Assessment with the Caboclo Village.

One of the anticipated long-term benefits for the community, especially for those living below the poverty line, is a strengthened local economy. It will be strengthened by activities that aim to promote environmental and formal/informal education (for example, upcoming awareness campaigns, alignment meetings with teachers, and the planned implementation of a school garden). These efforts are expected to generate outcomes or short-term benefits such as improved teaching conditions and increased community income, facilitated by outputs like hiring people for the project's activities (including women), providing materials for courses and classes, and creating food production spaces (the school garden, for example). The combination of these factors will enable the community to develop more job and income-generating opportunities, thereby strengthening its local economy.

With greater access to education and training, the community will engage in productive activities that increase their income and diversify their sources of livelihood. Additionally, the establishment of the school garden will provide in short term, opportunities for environmental education, raise awareness about sustainable practices, and strengthen community ties through collective activities. In the long term, by making garden products available for community use, the initiative will contribute to cohesion, foster a culture of shared responsibility, and promote continuous engagement in sustainable practices. In this way, the garden becomes a service created with and for the community, reinforcing its self-reliance and collective well-being. Ultimately, the impact of strengthening the local economy will be realized through the enhancement of sustainable practices, the expansion of job opportunities, and the promotion of local entrepreneurship.

Another long-term benefit that the project will achieve is gender equality promotion, which primarily affects the well-being of the subgroup of women in Caboclo Village. The promotion of gender equality will occur through activities that generate income opportunities and encourage women's social participation, such as hiring female labor for the project and implementing awareness campaigns. These outputs are expected to translate into outcomes or short-term benefits like increased and diversified income for women and reduced levels of economic vulnerability within the community. Governance initiatives promoting women's participation in decision-making processes will further reinforce these outcomes.

Thus, the long-term impact of promoted gender equality will be realized as women occupy decision-making and leadership roles within the community. The strengthening of their economic and social autonomy will be consolidated by inclusive governance and the expansion of support networks, encouraging the sustainable development of the entire community.

Strengthening community empowerment is another long-term benefit the project hopes to achieve, involving the community of Caboclo Village, as they are fundamental actors for the success of activities in this direction. Community empowerment will be strengthened when community members actively participate in decisions that affect their collective life and have access to improved communication, leisure,

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<sup>142</sup> StakeholderIdentification.zip

and mobility resources. Outputs such as the creation of communication channels, the implementation of internet access spaces, and the provision of community infrastructure will lead to outcomes or short-term benefits like increased social participation, the promotion of leisure spaces, and enhanced communication between community members and the TdX project.

The cumulative efforts will result in a long-term impact where the community gains a stronger voice, organizes to address local challenges, and improves its quality of life through cooperation and collective decision-making. By empowering the community, the project will ensure the sustainability of its initiatives over the long term, as the population becomes an active agent of social and environmental transformation in its territory.

Another significant long-term benefit is that the TdX project will generate an increased climate change resilience. Increased resilience to climate change will be fostered through activities that aim to improve environmental education, protect permanent preservation areas, and promote the sustainable use of water resources. Outputs such as the implementation of drinking water access structures, future workshops on spring protection, and the construction of access to water will enhance local water security. These actions are expected to lead to outcomes or short-term benefits such as the deconstruction of negative views on environmental issues, reduction of unplanned deforestation, and conserving riparian areas.

With secure water access and the adoption of sustainable practices in the future (for example, in soil management and fire prevention), the community will be better equipped to face the effects of climate change, such as prolonged droughts. The final impact will be a more balanced environment, with increased adaptability and reduced vulnerability, ensuring both human health and the preservation of local ecosystems.

The impact of these benefits on the community's well-being and community groups will be monitored through the indicators outlined in the Monitoring Plan (see Section 4.4.1).

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

The TdX project team, in collaboration with Caboclo Village, conducted a participatory impact assessment process. The objective was to understand how the community evaluated the impacts, benefits, and risks the project could bring as they participated in project activities. This activity took place in September 2023 in Caboclo Village, in two sessions: first with the women and then with all members of the community. The evidence from these meetings, the results of the activity, and other activities developed with the community can be found in the attachment to the visit<sup>143</sup>.

The community members did not raise any risks associated with community participation in the project during the impact assessment, and no trade-off was identified by Systemica Inteligência em Sustentabilidade S.A. or the community in this process. However, a risk identified by the project that could hinder community participation is the lack of engagement on the part of the population. That is, the benefits to be achieved through activities such as lectures and training, among others, would be less effective if the community does not participate.

Therefore, as a mitigation measure, the project has a specific activity to strengthen community governance and communication within the community. This activity aims not only to bring social benefits to Caboclo Village but also to engage community members and groups in project participation, attempting to their limitations. Furthermore, Systemica has various communication channels and will carry out ongoing

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<sup>143</sup> ValidationMeetings.zip

consultations so that any impediments that arise can be identified and mitigated as quickly as possible, ensuring that the participation of community members is not compromised.

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

Among the community groups identified by the project (see Section 2.1.6), two of them are marginalized or vulnerable groups: women and those living below the poverty threshold. According to CCB's definition, marginalized groups are those that have little or no influence over decision-making processes and vulnerable groups are those who lack secure access to the assets on which secure livelihoods are built (socio-political, cultural, human, financial, natural, and physical) and with high exposure to external stresses and shocks (including climate change).

The identification of which benefits affect the well-being of these groups, as well as the possible negative impacts of the project or any risks preventing them from enjoying these benefits, was initially carried out through the Theory of Change activity and then validated and supplemented through a participatory Impact Assessment with Caboclo Village. The result of these assessments in the form of benefits, risks, and negative impacts for each of the community groups is presented in the tables below (Table 4.5 and Table 4.6).

*Table 4.5. Net positive impact, benefit access and negative impacts on the community group of below the poverty threshold.*

Community Group 1	Below the poverty threshold
Net positive impacts	The main positive impact generated by the project that primarily affects the group of those below the poverty threshold is a strengthened local economy. It will be strengthened by activities that aim to promote environmental and formal/informal education (for example, upcoming awareness campaigns, alignment meetings with teachers, and the planned implementation of a school garden). These efforts are expected to generate outcomes or short-term benefits such as improved teaching conditions and increased community income, facilitated by outputs like hiring people for the project's activities (including women), providing materials for courses and classes, and creating food production spaces (the school garden). The combination of these factors will enable the community to develop more job and income-generating opportunities, thereby strengthening its local economy, and impacting this community group.
Benefit access	The project risk associated with this community group was identified through the process of developing Theory of Change.  If employment opportunities and training courses are not adequately advertised, they may not reach this group, and without their participation, there will be no strengthening of the local economy. Lack of engagement in the project activities can also limit social and governance changes in Caboclo Village. To

*Table 4.5. Net positive impact, benefit access and negative impacts on the community group of below the poverty threshold.*

	<p>address this, TdX has a formalized communication procedure with 12 channels<sup>144</sup> that will be used for extensive dissemination of project activities and opportunities, aiming to reach the largest number of community members and groups. Additionally, the communication procedure allows the community to have various ways to communicate with Systemica Inteligência em Sustentabilidade S.A., reducing communication barriers.</p>
Negative impacts	<p>Internet provision activity in the community involves the potential negative impact of increasing people's vulnerability to digital scams. To mitigate this potential negative impact, the "Improved access to technology, health and leisure" activity will include lectures on digital education, aiming to warn people about possible digital crimes and raise their awareness of the issue.</p> <p>Also, to address the potential negative impact of increased community distrust, with fears that the project may increase land inspections, which is associated with the project activity on "Strengthening community governance and communication", the following measures were formulated mitigation: holding awareness-raising lectures on governance and land regularization and carrying out in-depth assessments on the land situation in the project zone and how the project can contribute to the protection of land rights</p> <p>Lastly, the potential negative impact on Caboclo Village is associated with the activities of cooperation projects with public authorities to improve education, health, and other services. Mitigation measures were designed such as establishing long-term agreements, definition of clear parameters with public institutions, and greater clarification to the community about how the agreements will work.</p>

*Table 4.6. Net positive impact, benefit access and negative impacts on the community group of women.*

Community Group 2	Women
Net positive impacts	<p>The main positive impact generated by the project that primarily affects the women's group is the promotion of gender equality.</p> <p>The promotion of gender equality will occur through activities that generate income opportunities and encourage women's</p>

<sup>144</sup> ProceduresProject.zip

Table 4.6. Net positive impact, benefit access and negative impacts on the community group of women.

	<p>social participation, such as hiring female labor for the project and implementing awareness campaigns. These outputs are expected to translate into outcomes or short-term benefits like increased and diversified income for women and reduced levels of economic vulnerability within the community. Governance initiatives promoting women’s participation in decision-making processes will further reinforce these outcomes.</p>
<p><b>Benefit access</b></p>	<p>The project risk associated with this community group was identified through the process of developing Theory of Change.</p> <p>Lack of engagement in the project activities can also limit social and governance changes in Caboclo Village. A significant number of women in Caboclo Village hold culturally defined social positions, primarily responsible for household and childcare duties. Few have the opportunity to pursue a profession, and when they do, they face triple workloads, managing their profession, household chores, and childcare<sup>145</sup>.</p> <p>This means that if the project does not pay special attention to the engagement faced by women, this group may be unable to participate in project activities. Hence, the project has designated spaces for women's participation, exclusive communication channels, and actively encourages the involvement of this group.</p>
<p><b>Negative impacts</b></p>	<p>Internet provision activity in the community involves the potential negative impact of increasing people's vulnerability to digital scams. To mitigate this potential negative impact, the “Improved access to technology, health and leisure” activity will include lectures on digital education, aiming to warn people about possible digital crimes and raise their awareness of the issue.</p> <p>Also, to address the potential negative impact of increased community distrust, with fears that the project may increase land inspections, which is associated with the project activity on “Strengthening community governance and communication”, the following measures were formulated mitigation: holding awareness-raising lectures on governance and land regularization and carrying out in-depth assessments on the land situation in the project zone and how the project can contribute to the protection of land rights</p> <p>Lastly, the potential negative impact on Caboclo Village is associated with the activities of cooperation projects with public</p>

<sup>145</sup> SocialDiagnosis.zip

Table 4.6. Net positive impact, benefit access and negative impacts on the community group of women.

	<p>authorities to improve education, health, and other services. Mitigation measures were designed such as establishing long-term agreements, definition of clear parameters with public institutions, and greater clarification to the community about how the agreements will work.</p>
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**4.5.5 Net Impacts on Women (GL2.5)**

The women is one of the community groups identified by the project in Caboclo Village. This group is marked by gender-related socioeconomic differences, namely, women earning less, having less income diversification, and a predominance of domestic duties and childcare responsibilities. Based on this scenario, therefore, since its conception, the project takes into account generating net positive impacts on the well-being of women, as well as ensuring that women participate in or influence decision-making.

To ensure that the benefits of the activities are accessible to women, all activities will be widely publicized and encouraged to ensure the participation of this group, with due attention to the daily limitations that women may face. In the TdX project, through activities that generate income opportunities and encourage women’s social participation, such as hiring female labor for the project and implementing awareness campaigns. These efforts are expected to yield short-term benefits such as increased, diversified income for women and reduced economic vulnerability, while governance measures that involve women in decision-making will further reinforce these outcomes. Ultimately, empowering women to assume leadership roles will enhance their economic and social autonomy, contributing to the sustainable development of the entire community.

A long-term benefit that the project will achieve is gender equality promotion, which primarily affects the well-being of the subgroup of women in Caboclo Village. Therefore, it is expected that this group will have their well-being positively impacted through all project activities directed at the community (see Section 2.1.8), in the short and long term, and in all dimensions of well-being.

To ensure influence and participation in decision-making, the communication procedure of the TdX project has established a deliberate forum for community voting and decision-making. This forum is a democratic mechanism based on free and spontaneous participation, aimed at inclusion and promoting equality. The project team ensures to consult women before field visits, allowing for meeting schedules that accommodate their availability. Additionally, the communication procedure provides exclusive spaces for women, meaning channels through which women can communicate with the project team and with each other, with greater freedom and comfort.

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

The project does not affect the community’s property rights or the use of resources in its territory, so it does not directly involve the community in the agreement on the benefit-sharing mechanism established with the landowners. However, the community is involved in planning the allocation of resources for CCB activities that impact them. Thus, the benefit-sharing mechanism corresponds to the percentages established in the contract with the landowners for the revenues generated by the project. Since a percentage of this resource is earmarked for CCB activities that involve the community, the project has built and validated, together

with the community, a communication procedure that establishes a medium for decision-making on CCB activities that will generate non-monetary benefits for community members.

Regarding this benefit-sharing mechanism, the contracts established with the landowners allocate a percentage of the project-generated revenues to the landowners, another portion to Systemica, and 10% of the revenues to the development and implementation of CCB activities, aimed at generating non-monetary benefits for the community. Although the community does not have direct access to the project's financial revenue, because it is a private contract with the landowners, it has full transparency regarding the allocation of part of this revenue to the implementation of the activities that will impact on them<sup>146</sup>.

Regarding community participation in the allocation of resources to project activities, to ensure that the community participates in defining the decision-making process, the community, together with the project team, discussed, adjusted, and approved the project's communication procedure which includes means that guarantee a democratic and inclusive decision-making process on the project activities that will equitably generate non-monetary benefits for the entire community, as well as on the mechanisms available for suggestions, doubts and suggestions about the project.

Thus, the project activities that will benefit the communities were developed in collaboration with the community and approved through face-to-face meetings between the Systemica Inteligência em Sustentabilidade S.A. team and the community.

As presented in Section 2.3, the project communities had the power to participate in defining the activities from the beginning of the project, during the social diagnosis, and then to provide suggestions for changes during the moments of discussion in the face-to-face meetings. In addition, the benefits generated by the activities were also agreed upon with the community through a participatory impact assessment<sup>147</sup>, in two cases with the women and the community.

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

Adequate information about predicted and actual benefits, costs, and risks has been communicated to the community, and there was an expression of understanding from the community. A presentation containing the project's activities and respective benefits, costs, risks, and impacts identified through the Theory of Change<sup>148</sup> was shared with Caboclo Village through an explanatory video on YouTube<sup>149</sup>. The presentation's content can be found in annex<sup>150</sup> "230905\_TdXCostsRisksBenefits". This information was reiterated later in an in-person meeting with the community, during which a participatory impact assessment was also conducted with the population. During this activity, new benefits and risks were identified by the community, and everyone stated their agreement with the assessment results and confirmed their understanding of all the benefits, risks, costs, and impacts highlighted.

It's worth noting that there are no anticipated costs for the community to participate in the project, and all risks identified in the participatory impact assessment, as well as those previously identified by the Theory of Change, have established mitigation measures and will be monitored through indicators.

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<sup>146</sup> GeneralLegalDocs.zip

<sup>147</sup> ValidationMeetings.zip

<sup>148</sup> TheoryOfChangeTdX.zip

<sup>149</sup> <https://www.youtube.com/watch?v=GEhVsHTBKPs&t=4s>

<sup>150</sup> ValidationMeetings.zip

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

Regarding potential self-governance structures in Caboclo Village, as reported orally by local leaders, there is no governance structure in the community, only an old association that was not democratically elected by the community and therefore does not represent them. Moreover, it is not actively functioning. Therefore, the governance and project implementation structure will be carried out by Systemica Inteligência em Sustentabilidade S.A., as the project proponent, and the landowners, as other involved entities, and with community members indirectly (Figure 4.7).

Systemica Inteligência em Sustentabilidade S.A. has the capability to handle all administrative, technical, and commercial aspects necessary for the project's development and implementation. The landowners, on the other hand, must strictly adhere to the responsibilities outlined in the project contract<sup>151</sup>, executing what is within their responsibility and ensuring compliance with applicable legislation and no alteration to the community's and biodiversity way of life.

The governance and implementation structure also involves a third party, the Caboclo Village community, and other possible communities in the future, which participate in the development and decision-making of project activities (see Section 2.4.1) and are indirectly involved in receiving the benefits. Mechanisms to promote broad participation of community members, especially community groups, are guaranteed and agreed upon with the community through the communication procedure and the following structure.

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<sup>151</sup> 230810\_SystemicaDContract.pdf

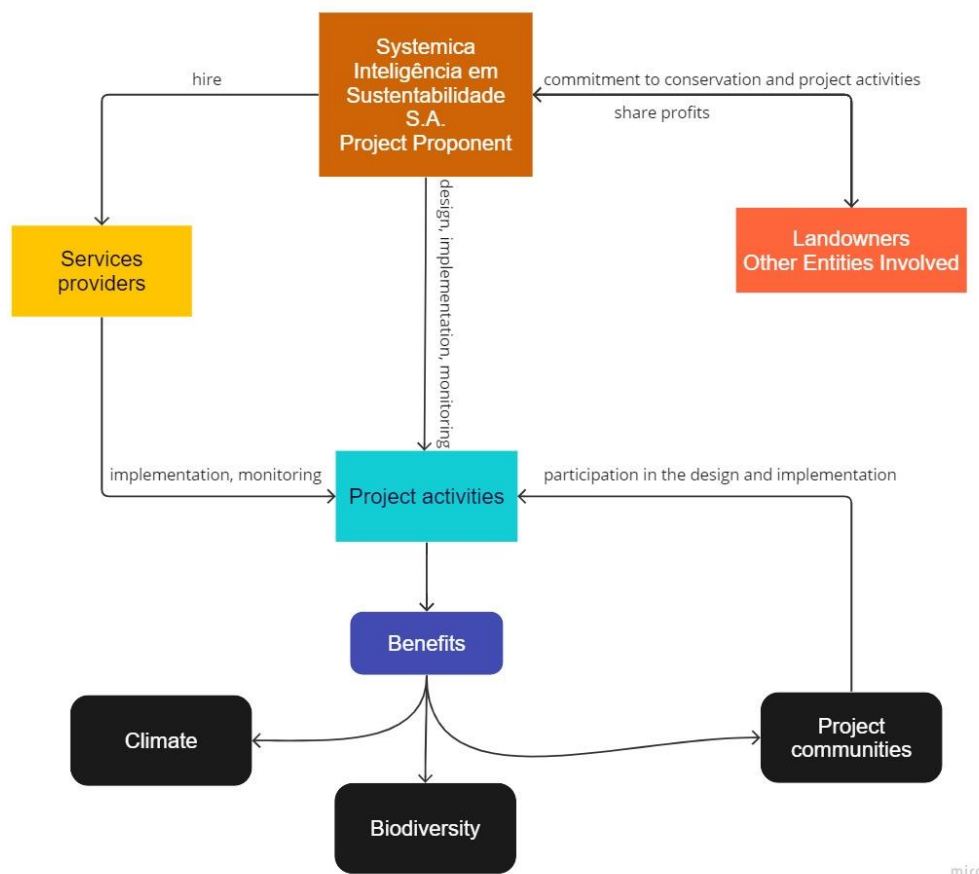


Figure 4.7. Governance and Implementation Structure of the TdX Project.

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

The TdX Project will develop the capacity of smallholders/community members, and relevant local organizations or institutions, to participate effectively and actively in project design, implementation, and management. To achieve this, some activities were defined (see Section 2.1.8), such as: Strengthening community governance and communication or improving environmental and formal/informal education for children, young people, and adults.

The first activity aims to plan and facilitate a governance structure that provides conditions for the community to engage in decision-making processes, including marginalized community groups, especially women. In other words, it is a way to develop social capacities that aim to prepare community members to actively participate in the project's development. It also aims to prepare them so that the community can cooperate over time for mutual benefit, coordinating with various institutions and managing resources and conflicts independently (da Veiga, 2016).

Additionally, as part of this activity, there is the creation and dissemination of the communication procedure<sup>152</sup>, an activity initially aimed at making communication more fluid and effective in the project, among Systemica Inteligência em Sustentabilidade S.A., the community, community groups, and other project stakeholders. In addition to the communication procedure, which is already in use in the project, the

<sup>152</sup> ProceduresProject.zip

in-person meetings with the community in June and September 2023 were activities that put these objectives into practice<sup>153</sup>.

In general, any activity that requires training, workshops, or training sessions with community members will be executed in a way to provide the necessary conditions for the community to participate in the implementation of the project. This type of preparation is already anticipated and is also part of the long-term benefit to be achieved by the project, which is strengthening community empowerment. In summary, all the actions mentioned above aim to empower community members to have autonomy in the design, implementation, and management of the TdX Project.

## 5 BIODIVERSITY

### 5.1 Without-Project Biodiversity Scenario

#### 5.1.1 Existing Conditions (B1.1)

The Amazon rainforest, encompassing an area of approximately 6 million km<sup>2</sup>, is the largest tropical forest in the world and a critical component of the Earth's climate regulation and biodiversity support system (FAO & UNEP, 2020). Most of this immense forest, around two-thirds, is within Brazilian territory, covering approximately 4 million km<sup>2</sup>, constituting the core of the global Amazonian biodiversity hotspot (Butler, 2020; Haffer, 2008). This ecosystem extends across diverse landscapes, from lowland plains to upland hills, and hosts an unparalleled array of flora and fauna, including over 30,000 plant species, 109 primate species, and countless other vertebrate and invertebrate taxa (PNUMA/OTCA, 2008).

The region's ecological functions are vital not only locally but globally, as it plays a major role in the global water and carbon cycles, influencing regional and planetary climate patterns (Houghton et al., 2000). Despite its ecological importance, its conservation faces considerable challenges due to persistent anthropogenic pressures, such as deforestation, land conversion for agriculture and cattle ranching, illegal logging, and forest fires (Skidmore et al., 2021).

The project area is situated within the boundaries of the Tapajós-Xingu Moist Forests, classified as a primary tropical rainforest ecoregion, with liana forests being dominant in the higher relief of the southern portions, characterized by high biodiversity, seasonal flooding, and complex hydrological networks (Schipper, 2023). The landscape is marked by extensive blackwater river systems, which create a mosaic of flooded forests (igapó) and upland terra firme forests. The fauna of the region includes 161 species of mammals such as white-lipped peccary, collared peccary, tapir, brocket deer, puma, and jaguar. 556 species of bird have been listed including harpy eagle, toucans, ospreys, little chachalacas, hoatzin, and the vulnerable hyacinth macaw.

Among the primary threats are uncontrolled agricultural expansion, particularly involving soy cultivation and cattle ranching, which drives deforestation and habitat loss (Lovejoy & Nobre, 2018; Nepstad et al., 2006). Fire regimes have intensified, often used as land management tools but increasingly contributing to forest loss, especially under changing climate conditions that favor more frequent and intense fire outbreaks (Aragão et al., 2014). Illegal logging, driven by demand for timber and agricultural commodities, further fragments the landscape and reduces connectivity among forest patches, critical for maintaining biodiversity and ecological processes (Asner et al., 2013).

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<sup>153</sup> ValidationMeetings.zip

The current landscape characterizes a mosaic of fragmented forest remnants embedded in an anthropized matrix dominated by pasturelands, agricultural fields, and settlements. These fragments, although reduced in size, serve as crucial links, providing habitat corridors that support gene flow and species migration for forest-dependent species, particularly large mammals, avifauna, and amphibians (Tabarelli et al., 2010). Connectivity among these natural patches via riparian corridors and larger protected areas is vital for conserving biodiversity and ensuring ecosystem resilience.

### 5.1.2 Flora

The flora biodiversity data was retrieved from the phytosociological report<sup>154</sup> conducted in the TdX-I1 properties, with clusters installed in two different strata: submontane open ombrophilous forest, and submontane dense ombrophilous forest. The identified individuals are distributed in 186 species belonging to 41 botanical families.

Among the 186 species identified by the forest inventory, 11 are classified as vulnerable or endangered by the IUCN (2023a), CNCFlora (2022b) or MMA (2022). Table 5.1 shows the threatened species identified by the inventory:

Table 5.1. Vulnerable and endangered flora species in the project area.

Species	Conservation Status		
	CNCFlora (2022b)	MMA (2022)	IUCN (2023a)
<i>Bertholletia excelsa</i>	VU	VU	VU
<i>Virola bicuhyba</i>	EN	EN	NE
<i>Apuleia leiocarpa</i>	VU	VU	LC
<i>Hymenaea parvifolia</i>	VU	VU	LC
<i>Mezilaurus itauba</i>	VU	VU	VU
<i>Cedrela odorata</i>	VU	VU	VU
<i>Virola surinamensis</i>	VU	VU	EN
<i>Swietenia macrophylla</i>	VU	VU	VU
<i>Faramea calyciflora</i>	NE	CR	NE
<i>Ocotea fragrantissima</i>	NE	EN	EN
<i>Terminalia parvifolia</i>	VU	NE	LC

The botanical families with the highest richness were Fabaceae, Burseraceae, Malvaceae, Arecaceae, Lauraceae, Sapotaceae and Lecythidaceae, with more than 70% of the registered individuals. The Figure 5.1 shows the distribution of the main botanical families found in the floristic inventory.

<sup>154</sup> 231030\_PhytoReport\_tdx.pdf

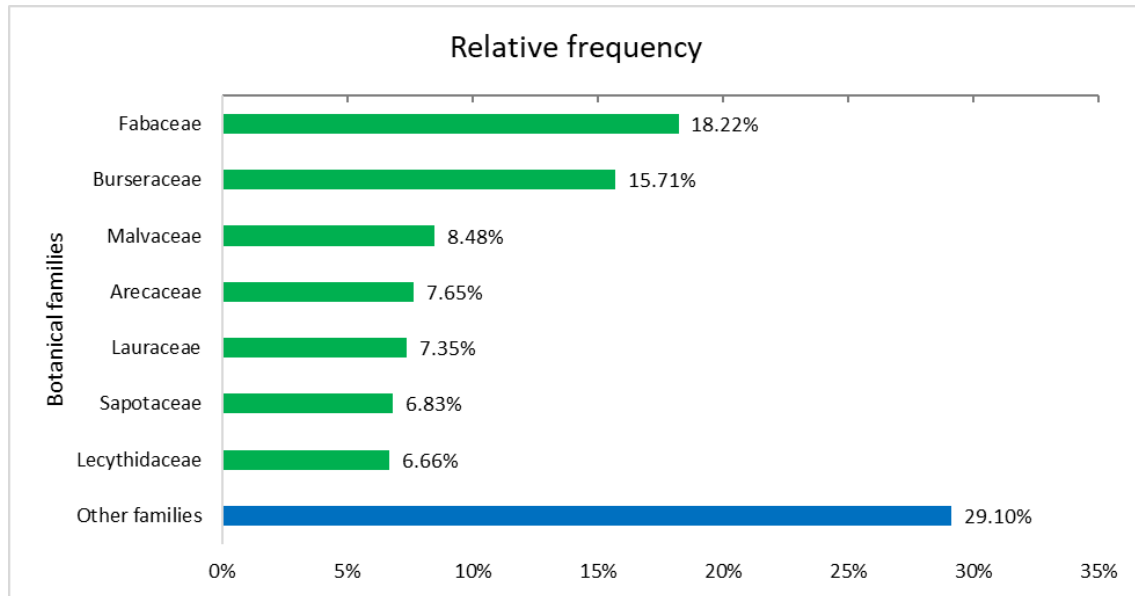


Figure 5.1 The botanical families with the highest frequency in the floristic inventory.

Accordingly, to the phytosociological parameters<sup>155</sup> of the forest horizontal structure, the highest importance is observed for two species *I. capivata* and *P. stevensonii*, especially due to their high density, with 38.51 and 15.54 individuals per ha, respectively. Also, the diversity and dominance indices were calculated for both the entire dataset and for each stratum of the inventory. Shannon diversity index values ranged from 4.09 to 4.19, with values for the entire area close to 4.18, higher than that found by Kerber et al. (2021) in the Jamari National Forest of 3.87, a conservation unit predominantly formed by Open Ombrophilous Forest, similar to the reality of the project area. Miranda (2000), in a phytosociological study in Rondônia, found similar Shannon diversity values, affirming that these values are found in transition regions, such as the project area where the dominant phytophysiognomy is the Open Ombrophilous Forest, a transitional phytophysiognomy between the Dense Ombrophilous Forest and phytophysiognomies with greater water deficit (IBGE, 2012). The Pielou index of 0.80 was very close to that also found by Kerber et al. (2021). These results indicate that the project area has slightly higher richness and similar evenness compared to those found in a federal conservation unit under concession for timber harvesting.

### 5.1.3 Fauna

A study on secondary data<sup>156</sup> was carried out to describe the fauna biodiversity in the project's region, based specially on inventories that had been previously carried out in the region of the Xingu River. All information presented in this section regarding fauna was retrieved from this study.

The Amazon region presents four distribution patterns for terrestrial fauna species occurring or potentially occurring in the area. The first pattern includes animals with broad distribution found in various ecosystems. Examples include “Onça pintada” (*Panthera onca*), “Anta” (*Tapirus terrestris*), “Macaco prego” (*Cebus apela*) “Bem-te-vi” (*Pitangus sulphuratus*), “Jiboia” (*Boa constrictor*), and “Perereca” (*Scinax ruber*). The second pattern encompasses species occurring throughout the Amazon Rainforest, such as “Guaiquica” (*Marmosa domina*), “Papa taóca” (*Pyrgilena leuconota*), and “Perereca” (*Boana cinerascens*).

<sup>155</sup> 231030\_PhytoReport\_tdx.pdf

<sup>156</sup> 230912\_SecondaryDataReport\_Bio.pdf

In the third pattern, we find animals occurring in the Amazonian Terra Firme Forest, including the “Bizogue” (*Callicebus moloch*), “Morcego de listas” (*Saccopteryx bilineata*), “Morcego” (*Eumops perotis*), “Jararaca preguiçosa” (*Dipsa indica*), and “Perereca” (*Osteocephalus taurinus*). The fourth pattern comprises animals from the Amazonian Terra Firme Forest in Pará, such as the “Lagarto” (*Ophryoesoides tricristatus*) and the “Perereca” (*Boana multifasciata*).

The study identified 55 vulnerable, endangered, or endemic species that are potentially present in the project zone. Table 5.2 shows the list of these potential focal species along with their conservation status and endemism. The legend used is: LC= least concern; VU= vulnerable, threatened; NT = near threatened; EN= endangered; DD = insufficient data; NE = not evaluated.

Table 5.2. Vulnerable, endangered, or endemic species potentially present in the project zone.

Scientific name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
<i>Bothrops brazili</i>	LC	LC	Yes
<i>Chelonoidis denticulatus</i>	VU	LC	No
<i>Mesoclemmys nasuta</i>	DD	DD	Yes
<i>Podocnemis unifilis</i>	VU	NT	No
<i>Podocnemis expansa</i>	VU	NT	No
<i>Tinamus major</i>	VU	VU	No
<i>Aburria kujubi</i>	VU	VU	No
<i>Crax fasciolata</i>	VU	VU	No
<i>Pauxi tuberosa</i>	NE	LC	No
<i>Psophia interjecta</i>	VU	VU	No
<i>Anodorhynchus hyacinthinus</i>	VU	NT	No
<i>Monodelphis cf. brevicaudata</i>	LC	LC	Yes
<i>Monodelphis emiliae</i>	LC	LC	Yes
<i>Monodelphis glirina</i>	LC	LC	Yes
<i>Philander opossum</i>	LC	LC	Yes
<i>Neacomys cf. guianae</i>	LC	LC	Yes
<i>Oecomys cf. paricola</i>	DD	LC	Yes
<i>Rhipidomys nitela</i>	LC	LC	Yes
<i>Lonchothrix emiliae</i>	LC	LC	Yes
<i>Mesomys stimulax</i>	LC	LC	Yes
<i>Proechimys cuvieri</i>	LC	LC	Yes
<i>Priodontes maximus</i>	VU	VU	No
<i>Panthera onca</i>	NT	VU	No
<i>Puma yagouaroundi</i>	LC	VU	No
<i>Tayassu pecari</i>	VU	VU	No
<i>Myrmecophaga tridactyla</i>	VU	VU	No
<i>Tapirus terrestris</i>	VU	VU	No
<i>Ateles marginatus</i>	EN	EN	Yes

Table 5.2. Vulnerable, endangered, or endemic species potentially present in the project zone.

Scientific name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
<i>Callicebus sp</i>	DD	DD	Yes
<i>Furipterus horrens</i>	LC	VU	No
<i>Natalus macrourus</i>	VU	NT	No
<i>Glossophaga commissarisi</i>	LC	LC	Yes
<i>Scleronycteris ega</i>	DD	LC	Yes
<i>Hsunnycteris thomasi</i>	LC	LC	Yes
<i>Lophostoma schulzi</i>	LC	LC	Yes
<i>Micronycteris homezorum</i>	LC	LC	Yes
<i>Neonycteris pusilla</i>	DD	LC	Yes
<i>Phyllostomus latifolius</i>	LC	LC	Yes
<i>Carollia benkeithi</i>	LC	LC	Yes
<i>Rhinophylla fischeriae</i>	LC	LC	Yes
<i>Ametrida centurio</i>	LC	LC	Yes
<i>Platyrrhinus brachycephalus</i>	LC	LC	Yes
<i>Platyrrhinus fusciventris</i>	LC	LC	Yes
<i>Platyrrhinus infuscus</i>	LC	LC	Yes
<i>Vampyressa thyone</i>	LC	LC	Yes
<i>Vampyriscus bidens</i>	LC	LC	Yes
<i>Vampyriscus brock</i>	LC	LC	Yes
<i>Cormura brevirostris</i>	LC	LC	Yes
<i>Diclidurus ingens</i>	DD	LC	Yes
<i>Diclidurus isabellus</i>	LC	LC	Yes
<i>Peropteryx pallidoptera</i>	DD	LC	Yes
<i>Saccopteryx canescens</i>	LC	LC	Yes
<i>Thyroptera lavalii</i>	DD	LC	Yes
<i>Eumops trumbulli</i>	LC	LC	Yes
<i>Myotis simus</i>	DD	LC	Yes

From the studies on the herpetofauna, there was predominance of species from the families Hylidae and Leptodactylidae, presenting arboreal and terrestrial habits, respectively. Table 5.3 shows the herpetofauna species identified in the secondary data study.

Table 5.3. Herpetofauna species found in the region.

Scientific name	Popular name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
ORDER ANURA				
Family Aromobatidae				

Table 5.3. Herpetofauna species found in the region.

Scientific name	Popular name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
<i>Allobates marchesianus</i>	Sapinho	LC	LC	No
<b>Family Bufonidae</b>				
<i>Amazophrynella minuta</i>	Sapinho	LC	LC	No
<i>Rhaebo guttatus</i>	Cururu	LC	LC	No
<i>Rhinella miranda-ribeiro</i>	Cururuzinho	LC	LC	No
<i>Rhinella marina</i>	Sapo cururu	LC	LC	No
<b>Family Hylidae</b>				
<i>Dendropsophus minutus</i>	Perereca	LC	LC	No
<i>Dendropsophus leucophyllatus</i>	Perereca	LC	LC	No
<i>Dendropsophus nanus</i>	Perereca	LC	LC	No
<i>Dendropsophus melanargyreus</i>	Perereca	LC	LC	No
<i>Boana cinerascens</i>	Perereca	LC	LC	No
<i>Boana geographica</i>	Perereca	LC	LC	No
<i>Boana multifasciata</i>	Perereca	LC	LC	No
<i>Scinax nebulosus</i>	Perereca	LC	LC	No
<i>Scinax ruber</i>	Perereca	LC	LC	No
<i>Osteocephalus oophagus</i>	Perereca	LC	LC	No
<i>Osteocephalus taurinus</i>	Perereca	LC	LC	No
<i>Trachycephalus typhonius</i>	Perereca	LC	LC	No
<b>Family Phyllomedusidae</b>				
<i>Callimedusa tomopterna</i>	Perereca macaco	NE	NE	No
<i>Pithecopus hypochondrialis</i>	Perereca macaco	LC	LC	No
<i>Phyllomedusa bicolor</i>	Perereca macaco	LC	LC	No
<b>Family Leptodactylidae</b>				
<i>Adenomera andreae</i>	Rãzinha	LC	LC	No
<i>Leptodactylus macrosternum</i>	Jia	LC	LC	No
<i>Leptodactylus mystaceus</i>	Rã	LC	LC	No
<i>Leptodactylus paraensis</i>	Rã pimenta	LC	LC	No
<i>Leptodactylus pentadactylus</i>	Rã pimenta	LC	LC	No
<i>Leptodactylus petersii</i>	Rã	LC	LC	No
<i>Leptodactylus rhodomistax</i>	Rã	LC	LC	No
<i>Physalaemus ephippifer</i>	Rãzinha	LC	LC	No
<b>ORDER SQUAMATA (LACERTILIA)</b>				
<b>Family Sphaerodactylidae</b>				
<i>Chatogekko amazonicus</i>	Lagartinho	LC	LC	No
<i>Gonatodes eladioi</i>	Osga selvagem	LC	LC	No

Table 5.3. Herpetofauna species found in the region.

Scientific name	Popular name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
Family Gekkonidae				
<i>Hemidactylus mabouia</i>	Osga doméstica	LC	DD	No
Family Phyllodactylidae				
<i>Thecadactylus rapicauda</i>	Osga da mata	LC	DD	No
Family Gymnophthalmidae				
<i>Cercosaura ocellata</i>	Calango	LC	LC	No
<i>Colobosaura modesta</i>	Calango-cobra	LC	LC	No
Family Scincidae				
<i>Copeoglossum nigropunctatum</i>	Lagarto-cobra	LC	LC	No
Family Teiidae				
<i>Ameiva ameiva</i>	Calango verde	LC	LC	No
<i>Kentropyx calcarata</i>	Calango marrom	LC	LC	No
<i>Tupinambis teguixin</i>	Jacuraru	LC	LC	No
Family Tropiduridae				
<i>Plica umbra</i>	Tamaquaré	LC	LC	No
ORDER SQUAMATA (OPHIDIA)				
Family Boidae				
<i>Boa constrictor</i>	Jibóia	LC	LC	No
<i>Corallus batesii</i>	Piriquitambóia	LC	LC	No
<i>Corallus hortulanus</i>	Cobra de veado	LC	LC	No
Family Colubridae				
<i>Chironius scurrulus</i>	Acuntibóia	LC	LC	No
<i>Spilotes sulphureus</i>	Papa ovo	LC	LC	No
<i>Imantodes cenchoa</i>	papa-lesma	LC	LC	No
<i>Erythrolamprus reginae</i>	Cobra d'água	LC	LC	No
<i>Mastigodryas boddaert</i>	Cobra de lixo	LC	LC	No
<i>Oxyrhopus petolarius</i>	Coral falsa	LC	LC	No
<i>Xenodon severus</i>	Pepeua	LC	LC	No
Family Dipsadidae				
<i>Clelia clelia</i>	Mussurana	LC	LC	No
<i>Dipsas catesbyi</i>	papa-lesma	LC	LC	No
<i>Atractus albuquerquei</i>	Cobrinha	LC	LC	No

Table 5.3. Herpetofauna species found in the region.

Scientific name	Popular name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
Family Elapidae				
<i>Micrurus lemniscatus</i>	Coral verdadeira	LC	LC	No
<i>Micrurus surinamensis</i>	Coral verdadeira	LC	LC	No
<i>Micrurus spixii</i>	Coral verdadeira	LC	LC	No
Family Viperidae				
<i>Bothrops atrox</i>	Jararaca	LC	LC	No
<i>Bothrops brazili</i>	Jararaca	LC	LC	Yes
<i>Lachesis muta</i>	Surucucu Pico-de-jaca	LC	LC	No
ORDER CROCODYLIA				
Family Alligatoridae				
<i>Melanosuchus niger</i>	Jacaré-açu	NE	LC	No
<i>Caiman crocodilus</i>	Jacaré-tinga	LC	LC	No
<i>Paleosuchus trigonatus</i>	Jacaré-coroa	LC	LC	No
<i>Paleosuchus palpebrosus</i>	Jacaré coroa	LC	LC	No
ORDER TESTUDINATA				
Family Testudinidae				
<i>Chelonoidis carbonarius</i>	Jabuti-piranga	LC	LC	No
<i>Chelonoidis denticulatus</i>	Jabuti	VU	LC	No
<i>Mesoclemmys nasuta</i>	Aperema	DD	DD	Yes
<i>Podocnemis unifilis</i>	Tracajá	VU	NT	No
<i>Podocnemis expansa</i>	Tartaruga	VU	NT	No
<i>Kinosternon scorpioides</i>	Muçuã	DD	LC	No
<i>Rhinoclemmys punctularia</i>	Aperema	DD	LC	No
<i>Chelus fimbriata</i>	Mata-matá	DD	LC	No
<i>Platemys platycephala</i>	Jabuti-machado	DD	LC	No

Birds constitute the most diversified group of terrestrial vertebrates, being mostly cosmopolitan, presenting broad distribution, being conspicuous, and occupying a variety of ecological niches (de Lima Fávoro & Flores, 2010). These characteristics make them crucial as indicators in the assessment of ecological restoration of degraded areas and the environmental quality of ecosystems (Goulart & Callisto, 2003; Kritzing & Van Aarde, 1998; Padovezi et al., 2014).

Over 500 bird species were identified in the study. Table 5.4 shows the species classified as vulnerable by the national or international red lists, and a full list of bird species found in the region is shown in the attached

report. The legend used is: LC= least concern; VU= vulnerable, threatened; NT = near threatened; EN= endangered; DD = insufficient data; NE = not evaluated.

Table 5.4. Threatened and endemic bird species found in the region.

Scientific name	Popular name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
Family Tinamidae				
<i>Tinamus major</i>	Inhambu-serra	LC	VU	No
Family Cracidae				
<i>Aburria kujubi</i>	Cujubi	VU	VU	No
<i>Crax fasciolata</i>	Mutum-de-penacho	VU	VU	No
<i>Pauxi tuberosa</i>	Mutum-cavalo	NE	LC	No
Family Psophiidae				
<i>Psophia interjecta</i>	Jacamim-do-xingu	NE	EN	Yes
Family Strigidae				
<i>Megascops stangiae</i>	Corujinha-do-xingu	NE	LC	Yes
Family Psittacidae				
<i>Anodorhynchus hyacinthinus</i>	Arara-azul	VU	NT	No

The small non-flying mammals are a diverse group of species, that can be affected especially by the land use (Millennium Ecosystem Assessment 2005). Table 5.5 shows the small non-flying mammal species identified in the region. The legend used is: LC= least concern; VU= vulnerable, threatened; NT = near threatened; EN= endangered; DD = insufficient data; NE = not evaluated.

Table 5.5. Small non-flying mammal species found in the region.

Scientific name	Popular name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
ORDER DIDELPHIMORPHIA				
Family Didelphidae				
<i>Caluromys philander</i>	Gambá-da-cauda-preta	LC	LC	No
<i>Didelphis marsupialis</i>	Mucura	LC	LC	No
<i>Marmosa murina</i>	Marmosa-dos-pinheiros	LC	LC	No
<i>Marmosops cf. pinheiroi</i>	Marmosops cf. pinheiroi	LC	LC	No
<i>Marmosops cf. noctivagus</i>	Marmosops cf. noctivagus	LC	LC	No
<i>Metachirus nudicaudatus</i>	Sariguê-de-rabo-pelado	LC	LC	No
<i>Micoureus demerarae</i>	Rato-da-Guiana	LC	LC	No
<i>Monodelphis cf. brevicaudata</i>	Monodelphis cf. brevicaudata	LC	LC	Yes
<i>Monodelphis emiliae</i>	Monodelphis emiliae	LC	LC	Yes
<i>Monodelphis glirina</i>	Monodelphis glirina	LC	LC	Yes
<i>Philander opossum</i>	Gambá-da-virgínia	LC	LC	Yes

Table 5.5. Small non-flying mammal species found in the region.

Scientific name	Popular name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
ORDER RODENTIA				
Family Cricetidae				
<i>Euryoryzomys sp.</i>	Rato-do-mato	DD	DD	No
<i>Hylaeamys megacephalus</i>	Rato-do-banhado	LC	LC	No
<i>Neacomys cf. guianae</i>	Rato-aquático-preto	LC	LC	Yes
<i>Neacomys sp.</i>	Rato-do-mato	DD	DD	No
<i>Nectomys rattus</i>	Rato-do-mato	LC	LC	No
<i>Oecomys bicolor</i>	Rato-de-orelha-branca	LC	LC	No
<i>Oecomys cf. trinitatis</i>	Rato-do-mato	LC	LC	No
<i>Oecomys cf. paricola</i>	Rato-do-mato	DD	LC	Yes
<i>Oecomys sp.</i>	Rato-do-mato	DD	LC	No
<i>Oxymycterus amazonicus</i>	Rato-do-amazonas	LC	LC	No
<i>Rhipidomys nitela</i>	Rato-do-mato	LC	LC	Yes
Family Echimyidae				
<i>Dactylomys dactylinus</i>	Rato-canguru-de-dedos-longos	LC	LC	No
<i>Echimyus chrysurus</i>	Porco-espinho-amazônico	LC	LC	No
<i>Lonchothrix emiliae</i>	Cabeça-de-gato	LC	LC	Yes
<i>Makalata didelphoides</i>	Porco-espinho-de-crista	LC	LC	No
<i>Mesomys stimulax</i>	Rato-do-caribe	LC	LC	Yes
<i>Proechimys cuvieri</i>	Porco-espinho-de-cauda-preta	LC	LC	Yes
<i>Proechimys cf. goeldii</i>	Porco-espinho-de-goeldi	LC	LC	No
<i>Proechimys cf. roberti</i>	Porco-espinho-de-robert	LC	LC	No
Family Sciuridae				
<i>Guerlinguetus sp.</i>	Esquilo	LC	LC	No
Family Caniculidae				
<i>Cuniculus paca</i>	Paca	LC	LC	No
Family Dasiproctidae				
<i>Dasyprocta leporina</i>	Cutia	LC	LC	No
Family Caviidae				
<i>Hydrochoerus hydrochaeris</i>	Capivara	LC	LC	No
ORDER CINGULATA				
Family Dasypodidae				
<i>Dasypus sp.</i>	Tatu	DD	DD	No
Family Chlamyphoridae				

Table 5.5. Small non-flying mammal species found in the region.

Scientific name	Popular name	Conservation Status - IUCN	Conservation Status - MMA	Endemic
<i>Priodontes maximus</i>	Tatu-canastra	VU	VU	No
ORDER CARNIVORA				
Family Mustelidae				
<i>Eira barbara</i>	Irara	LC	LC	No
Family Felidae				
<i>Leopardus sp.</i>	Gato-do-mato	DD	DD	No
<i>Panthera onca</i>	Onça-pintada	NT	VU	No
<i>Puma yagouaroundi</i>	Jaguarundi	LC	VU	No
<i>Puma concolor</i>	Puma	LC	LC	No
Family Procyonidae				
<i>Nasua nasua</i>	Quati	LC	LC	No
<i>Procyon cancrivorus</i>	Guaxinim	LC	LC	No
ORDER ARTIODACTYLA				
Família Cervidae				
<i>Mazama sp.</i>	Veado	DD	DD	No
Family Tayassuidae				
<i>Pecari tajacu</i>	Queixada / Caititu	LC	LC	No
<i>Tayassu pecari</i>	Cateto	VU	VU	No
ORDER PILOSA				
Family Myrmecophagidae				
<i>Myrmecophaga tridactyla</i>	Tamanduá-bandeira	VU	VU	No
<i>Tamandua tetradactyla</i>	Tamanduá-mirim	LC	LC	No
ORDER PERISSODACTYLA				
Family Tapiridae				
<i>Tapirus terrestris</i>	Anta	VU	VU	No
ORDER PRIMATAS				
Family Atelidae				
<i>Ateles marginatus</i>	Coatá-de-testa-branca	EN	EN	Yes
Family Pitheciidae				
<i>Callicebus sp</i>	Sauim	DD	DD	Yes
Family Cebidae				
<i>Saimiri sp</i>	Sagui	DD	DD	No
<i>Sapajus apella</i>	Macaco-prego	LC	LC	No

As for the flying mammals, represented by bats, a significant diversity of eating habits can be observed, which reflects on different ecosystem functions: frugivorous bats play an important role in seed dispersal

(Jones Jr & Carter, 1976), insectivorous bats play a crucial role in insect control, and pollinating and nectar-feeding bats help extract carbohydrates and proteins from plants, including species of economic importance<sup>157</sup>. A list of vulnerable and endemic bat species identified in the region is shown in Table 5.6. The legend used is: LC= least concern; VU= vulnerable, threatened; NT = near threatened; EN= endangered; DD = insufficient data; NE = not evaluated.

Table 5.6. Vulnerable and endemic bat species found in the region.

Scientific name	Conservation Status – IUCN	Conservation Status - MMA	Endemic
<i>Furipterus horrens</i>	LC	VU	No
<i>Natalus macrourus</i>	VU	NT	No
<i>Glossophaga commissarisi</i>	LC	LC	Yes
<i>Scleronycteris ega</i>	DD	LC	Yes
<i>Hsunnycteris thomasi</i>	LC	LC	Yes
<i>Lophostoma schulzi</i>	LC	LC	Yes
<i>Micronycteris homezorum</i>	LC	LC	Yes
<i>Neonycteris pusilla</i>	DD	LC	Yes
<i>Phyllostomus latifolius</i>	LC	LC	Yes
<i>Carollia benkeithi</i>	LC	LC	Yes
<i>Rhinophylla fischeriae</i>	LC	LC	Yes
<i>Ametrida centurio</i>	LC	LC	Yes
<i>Platyrrhinus brachycephalus</i>	LC	LC	Yes
<i>Platyrrhinus fusciventris</i>	LC	LC	Yes
<i>Platyrrhinus infuscus</i>	LC	LC	Yes
<i>Vampyressa thyone</i>	LC	LC	Yes
<i>Vampyriscus bidens</i>	LC	LC	Yes
<i>Vampyriscus brock</i>	LC	LC	Yes
<i>Cormura brevirostris</i>	LC	LC	Yes
<i>Diclidurus ingens</i>	DD	LC	Yes
<i>Diclidurus isabellus</i>	LC	LC	Yes
<i>Peropteryx pallidoptera</i>	DD	LC	Yes
<i>Saccopteryx canescens</i>	LC	LC	Yes
<i>Thyroptera lavalii</i>	DD	LC	Yes

<sup>157</sup> 230912\_SecondaryDataReport\_Bio.pdf

Table 5.6. Vulnerable and endemic bat species found in the region.

Scientific name	Conservation Status – IUCN	Conservation Status - MMA	Endemic
<i>Eumops trumbulli</i>	LC	LC	Yes
<i>Myotis simus</i>	DD	LC	Yes

#### 5.1.4 Hunting pressure and threats to fauna

The study on secondary data also assessed the hunting pressure and the threats to fauna in the region. Regarding the herpetofauna, freshwater turtles play a significant part in the diet of the region's inhabitants, which is the reason why they continue to be hunted, consumed, and traded. Historical threats for alligators include the destruction of natural habitats and hunting. In fact, the low density of alligators in the Xingu River is likely a result of a long history of exploitation of these species, especially during the 1970s. The presence of black caimans (*Melanosuchus niger*) in the Xingu River, with large individuals in the upper stretch, also supports this proposition. Despite the low population density, alligators are still hunted by local residents for meat consumption at a subsistence scale<sup>158</sup>.

Changes in mammals' communities occur as a result of disturbances in preserved habitats, primarily due to alterations in the availability of forest resources (de Paula, 2020). Human activities related to these disturbances include livestock and agriculture, which require clear-cutting of forest vegetation; timber extraction, which if done intensively can lead to soil impoverishment; and the opening of clearings (Fearnside, 2005; Godoy, 2016). As for the bats, the main threats to this group of species include the use insecticides, deforestation and negative influences from legends and superstitions (Reis et al., 2007). Table 5.7 shows a list of species that are commonly targeted for hunting in the Xingu River region.

Table 5.7. Animals commonly targeted for hunting in the Xingu River region.

Scientific name	Popular name
<b>MAMMALS</b>	
<i>Tayassu pecari</i>	Porcão
<i>Cuniculus paca</i>	Paca
<i>Mazama sp.</i>	Veado
<i>Pecari tajacu</i>	Caititu
<i>Tapirus terrestris</i>	Anta
<i>Dasypus sp.</i>	Tatu
<i>Dasyprocta leporina</i>	Cutia
<i>Hydrochoerus hydrochaeris</i>	Capivara
<i>Myrmecophaga tridactyla</i>	Tamanduá-bandeira
<i>Panthera onca</i>	Onça pintada
<i>Didelphis marsupialis</i>	Mucura
<b>HERPETOFAUNA</b>	
<i>Chelonoidis carbonaria</i>	Jabuti-piranga

<sup>158</sup> 230912\_SecondaryDataReport\_Bio.pdf

Table 5.7. Animals commonly targeted for hunting in the Xingu River region.

Scientific name	Popular name
<i>Chelonoidis denticulata</i>	Jabuti
<i>Mesoclemmys nasuta</i>	Aperema
<i>Podocnemis unifilis</i>	Tracajá
<i>Podocnemis expansa</i>	Tartaruga
<i>Kinosternon scorpioides</i>	Muçuã
<i>Caiman crocodilos</i>	Jacaré-tinga
<i>Paleosuchus trigonatus</i>	Jacaré-coroa
BIRDS	
<i>Tinamus guttatus</i>	Inhambu-galinha
<i>Crypturellus cinereus</i>	Inhambu-pixuna
<i>Dendrocygna autumnalis</i>	Marreca-cabocla
<i>Cairina moschata</i>	Pato-do-mato
<i>Amazonetta brasiliensis</i>	Marreca-ananaí
<i>Opisthocomus hoazin</i>	Cigana
<i>Nannopterum brasilianum</i>	Biguá
<i>Crax fasciolata</i>	Mutum-de-penacho
<i>Pauxi tuberosa</i>	Mutum-cavalo

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

The High Conservation Values (HCVs) related to biodiversity must meet qualifying attributes, such as protected areas, threatened species, endemic species, areas with critical time-based concentrations, significant large forest landscapes, and areas of forests that are embedded in or contain threatened or rare ecosystems. To perform this identification, the fauna assessment by secondary data inventory<sup>159</sup> and the phytosociological report<sup>160</sup> were consulted, as well as the most recent study from the Brazilian Ministry of the Environment regarding priority areas for biodiversity conservation (MMA, 2018), and the most recent identification of intact forest landscapes by the Intact Forest Landscapes Organization (IFL, 2020).

As pointed out in Section 5.1.1, the project zone is very likely to hold threatened fauna and flora species, such as the jaguar and tapir, as well as endemic species (CNCFlora, 2022a). Besides, the whole project zone is included in APA Triunfo do Xingu, which is an Environmental Protection Area equivalent to IUCN (2023b) Management Category V, according to UNEP-WCMC and IUCN (2023). Thus, the project zone qualifies as HCV 1.

One way to assess if the project zone includes attributes of High Conservation Values associated with significant large landscape-level areas is by consulting the assessment of intact forest landscapes conducted by the Intact Forest Landscapes Organization. According to Potapov et al. (2017), an Intact Forest Landscape (IFL) is a continuous expanse of natural ecosystems within the current forest extent, showing no detectable signs of human activity, and of sufficient size to maintain all native biodiversity,

<sup>159</sup> 230912\_SecondaryDataReport\_Bio.pdf

<sup>160</sup> 231030\_PhytoReport\_tdx.pdf

including viable populations of wide-ranging species. In Figure 5.2 below, it can be observed that part of the project zone encompasses the border of few IFLs, and part of the areas surrounding the project zone are also IFLs. Besides, part of the TdX-11 project zone within Sefer's properties is also characterized as IFL.

Although these areas do not represent most of neither the project zone or project area (13.5% and 26.1%, respectively), it is interesting for the project to include them as HCV, given the fact that the region presents expressive deforestation and degradation pressures, which are important threats to IFLs. Therefore, the portions of the project zone and the TdX-11 project zone that are included in IFLs can be characterized as HCV 2.

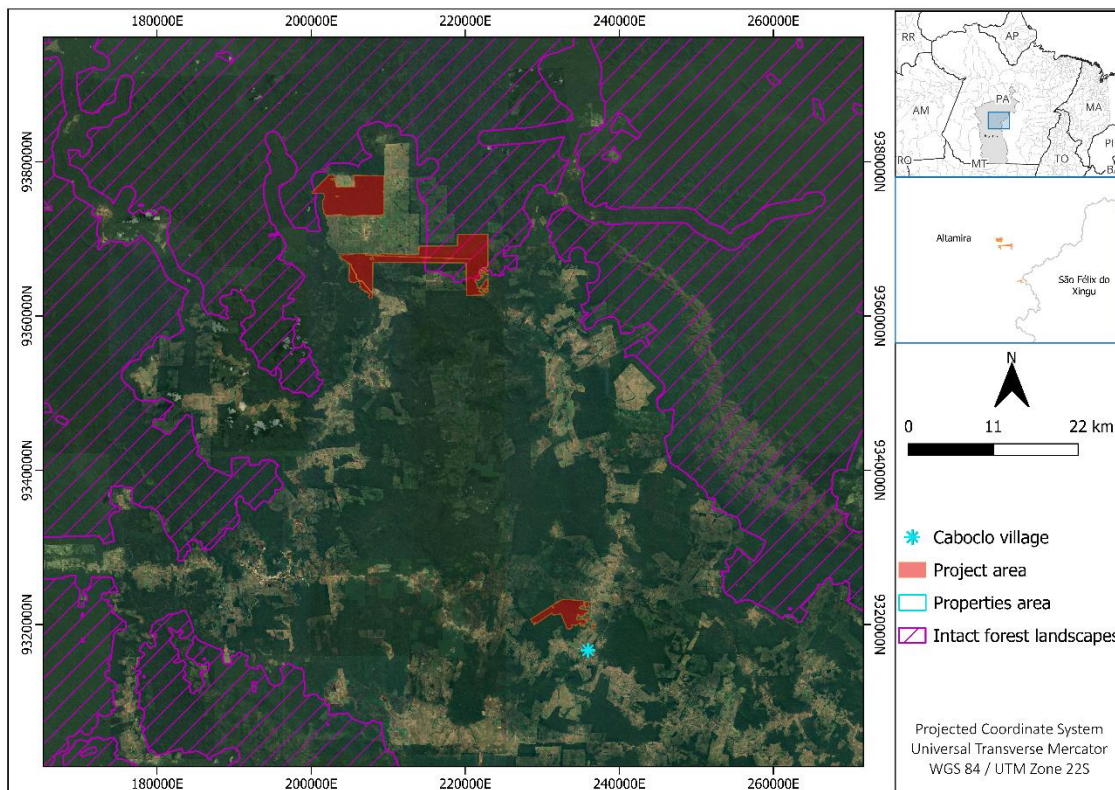


Figure 5.2. Intact Forest Landscapes in the project zone. Source: IFL (2020).

As for the HCV 3, however, the project zone does not encompass priority areas for biodiversity conservation, according to MMA (2018). Thus, HCV 3 is considered absent in the project.

Table 5.8 shows the HCVs related to biodiversity that were identified within the project zone.

Table 5.8 High Conservation Values.

High Conservation Value	Threatened or endemic fauna species in the project zone: see Section 5.1.1 for the list of 55 fauna species at some level of threat or endemic, potentially found in the project zone. Environmental Protection Area: APA Triunfo do Xingu
Qualifying Attribute	According to the forest inventory and secondary data, threatened and endemic species can be found within the project zone.

	Therefore, the project zone includes globally and nationally significant concentrations of biodiversity values, which qualifies as HCV 1.  Besides, the whole project zone is included within APA Triunfo do Xingu, an Environmental Protection Area equivalent to IUCN Management Category V (UNEP-WCMC & IUCN, 2023), which also characterizes it as HCV 1.
Focal Area	Project zone

High Conservation Value	Intact Forest Landscapes
Qualifying Attribute	According to IFL (2020), there are globally, regionally, or nationally significant large landscape-level areas where viable populations of occurring species exist in natural patterns of distribution and abundance, in the project zone, as shown in Figure 5.2. Therefore, this part of the project zone qualifies as HCV 2.
Focal Area	Area within the project zone that is classified as intact forest landscape, which corresponds to 57,417.9 ha in the project zone and 2,779.7 ha in the TdX-I1 project zone.

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

The municipality of Altamira has a history of land use dominated by intensive logging and agricultural activities as its main economic drivers<sup>161</sup>. As a result, there has been a rapid degradation of forests and other natural resources. Even today, the region is under pressure from illegal deforestation, with Altamira still being one of the municipalities with the highest deforestation rates (INPE, 2022; MapBiomas, 2021).

Specifically in the Amazon, deforestation and logging have led to local and regional climate anomalies (Nepstad et al., 2008). Mathematical projections regarding climate change impacts indicate an intensification of extreme events such as floods and droughts in the Amazon basin (Sorribas et al., 2016). Additionally, there is an increase in extreme temperatures, water temperature, and periods of hypoxic conditions in the aquatic environment, leading to the loss of suitable habitat and range for Amazonian biodiversity (Barros & Albernaz, 2014; da Silva et al., 2022; Giannini et al., 2020; Ribeiro et al., 2016). Consequently, the loss of species also results in the loss of ecological functions and ecosystem services they provide (Costa et al., 2018; Giannini et al., 2020).

Another alarming factor in the project region is the negative view of environmental issues and the confrontational relationship between the community and the environmental regulatory agencies. This hinders dialogues on topics such as cultural hunting and indiscriminate killing of wildlife. This political-environmental tension intensifies the disconnect between ways of life and ecosystems and increases human-wildlife conflicts, especially with large felines.

In the without-project scenario, due to the persistence of anthropogenic pressures and climate change, the trend is for fauna and flora populations to decline over time due to deforestation, habitat loss, decreased

<sup>161</sup> 230602\_CommunityScenarioAnalysis.pdf

resilience to climate change, and uncontrolled hunting. This will result in a systemic loss of biodiversity, leading to a consequent decline in ecological functions performed by species and possible ecosystem imbalances.

## 5.2 Net Positive Biodiversity Impacts

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

The Triunfo do Xingu Grouped REDD+ Project is designed to cause positive changes on the specific attributes and goals of biodiversity (Table 5.9), which were identified through the Theory of change rationale<sup>162</sup> and the biodiversity assessment (Tucker, 2005) for the project zone.

Table 5.9 Expected Biodiversity changes.

Biodiversity Element	Threatened, vulnerable, endemic species and HCV 1
Estimated Change	Maintain or increase species richness and abundance
Justification of Change	<p>The project zone includes a high biodiversity of flora and fauna, especially regarding species in some degree of threat, endemic, and migratory species (see Section 5.1.1). In general, these taxa suffer pressure mainly from habitat loss due to deforestation.</p> <p>According to the Theory of Islands Biogeography (MacArthur &amp; Wilson, 2001), larger areas support greater diversity of species and more abundant populations. On the other hand, smaller areas support less diversity and fewer resources, intensifying inter and intraspecific competition. Therefore, due to the great vulnerability of these species to the risk of local extinction or the decline of their populations, activities to protect the native forest cover area and existing ecosystems will guarantee the permanence of habitats and resources suitable for the permanence of these biological populations over time. Section 5.4.1 describes methods for monitoring the permanence of these species.</p>

Biodiversity Element	Area of native forest and HCV 2
Estimated Change	Maintain or increase the area of preserved native forest, especially intact forest landscapes
Justification of Change	<p>Sections 2.2.1 and 5.1.3 describe the probable scenario of changes in the landscape and negative impacts of loss of native forest cover in the project zone. The protection activities of the forest area, maintenance of firebreaks to prevent outside wildfires from entering the project forest area, and the patrolling and surveillance of strategic checkpoints will be fundamental to conserve the HCV 2 areas present in the project zone (Section</p>

<sup>162</sup> 231018\_TheoryofChange.pdf

	5.1.2). Monitoring the vegetation cover in the project area is described in Section 5.4.1.
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Biodiversity Element	Human-wildlife interaction
Estimated Change	Positive change fostering the community's environmental awareness and reducing human-wildlife conflicts
Justification of Change	<p>Humans interact with fauna in different ways, whether for its intrinsic value considering its ecological dimension, for its beauty, extractive utility value or for providing ecosystem services. However, fauna can also transmit diseases, be harmful or poisonous or compete for resources, which in environments on the border of deforestation, can result in conflicts and indiscriminate killing of fauna by humans (Marchini, 2014). These conflicts can be further intensified by fear, lack of information and directed towards specific animal groups such as snakes and large mammals (Bogoni et al., 2023; Marchini et al., 2011).</p> <p>The integration between the human and wildlife dimensions with the management of natural resources and the participatory monitoring of biodiversity is beneficial mainly in developing countries with high biodiversity, such as Brazil (Marchini, 2014). Therefore, the activities of strengthening environmental and civic education (Section 2.1.8) towards environmental sensitization and strategies to pacific human and fauna coexistence will diminish this threat to wildlife and the community, conserve and enhance local biodiversity (de Souza Zara &amp; Tavares, 2014).</p>

### 5.2.2 Mitigation Measures (B2.3)

The project aims to conserve the biodiversity and ecosystems in the project area. All the planned activities described in Section 2.1.8 are designed to lead to positive impact on climate, community, and biodiversity. Nevertheless, in adherence to the precautionary principle, potential adverse impacts in the project zone were identified<sup>163</sup> and mitigation measures were designed, as described below:

#### 1. Misuse of biodiversity information

Potential risk: Use of information on endangered fauna and flora for exploitation

Mitigation Measure: To discourage the misuse of information from fauna lectures and workshops for hunting and exploitation purposes, a focused approach will be employed. The approach will highlight the ecological significance of endangered species in the region, the detrimental effects of predatory exploitation of biodiversity, and the benefits of sustainable practices.

#### 2. Disturbance from monitoring activities

Potential risk: Practicing activities that could be detrimental to biodiversity during fauna and flora monitoring campaigns

<sup>163</sup> 231018\_TheoryofChange.pdf

Mitigation measure: To participate in the project, all service providers must give their consent by agreeing to the code of conduct<sup>164</sup> and integrity protocols embedded in the standard operating procedures. These ensure monitoring is performed with minimal disturbance and compliance with best practices.

Potential Negative Impact	Mitigation Measure(s)
Use of information on endangered fauna and flora for exploitation	In order to discourage the misuse of information from fauna lectures and workshops for hunting and exploitation purposes, a focused approach will be employed. The approach will highlight the ecological significance of endangered species in the region, the detrimental effects of predatory exploitation of biodiversity, and the benefits of sustainable practices.
Practicing activities that could be detrimental to biodiversity during fauna and flora monitoring campaigns	In order to participate in the project, all service providers must give their consent by agreeing to the code of conduct <sup>165</sup> and integrity protocols embedded in the standard operating procedures

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

As described in Section 5.1.6, without the project the biodiversity of the Triunfo do Xingu region would continue to decline due to deforestation, fragmentation, and hunting pressures. By contrast, the project activities described in Section 2.1.8, combined with the mitigation measures outlined in Section 5.2.2, ensure that the project delivers net positive impacts on biodiversity.

Specifically:

1. **Environmental education and awareness campaigns** reduce risks of fauna exploitation and promote sustainable coexistence with wildlife, supporting threatened and endemic species.
2. **Participatory monitoring**, implemented under strict codes of conduct<sup>166</sup>, contributes to species knowledge and long-term conservation while avoiding disturbance.
3. **Community engagement and governance strengthening** increase social support for biodiversity conservation, ensuring that positive impacts are sustained over time.

With these measures, the project not only prevents potential adverse impacts but also guarantees that biodiversity in the project zone will remain in a better condition than under the without-project scenario. Monitoring protocols (Section 5.5.1) will track key indicators to demonstrate this positive balance. Furthermore, by conserving native forest cover and improving community awareness, the project strengthens ecosystem resilience and contributes to biodiversity adaptation to climate change, in line with the Gold Level criteria (GL1.4).

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

The project aims to safeguard High Conservation Value areas (HCVs). It pursues this objective through various initiatives (Section 2.1.8), including improved forest and wildlife protection, active community

<sup>164</sup> 230330\_CodeOfConduct.pdf

<sup>165</sup> 230330\_CodeOfConduct.pdf

<sup>166</sup> 230330\_CodeOfConduct.pdf

involvement, promotion of sustainable livelihood activities, and a reduction in the strain on natural resources. By implementing these collective efforts to preserve both the HCVs and overall biodiversity, the project ensures that no harm will be done to the HCVs.

### **5.2.5 Species Used (B2.5)**

The sole activity that envisions the use of species is the establishment of a communal organic garden. This garden will incorporate some commonly used vegetables within the community, which are already conventionally employed. In general, the emphasis will be placed on utilizing native and PANC (edible non-cultivated plants) species, with decisions made collectively by the community members and local teachers. Below is a list of suggested species to be used in the community organic garden, however, the final list of vegetables will be defined together with the school's participation at the appropriate time to implement this activity:

- lettuce
- tomato
- pumpkin
- cabbage
- arugula
- pepper
- coriander
- Scarlet eggplant
- cucumber
- cassava

### **5.3 Invasive Species (B2.5)**

Considering the Invasive Alien Species National Database Network from Horus Institute (Instituto Hórus, 2023), no invasive species were identified during the flora and fauna inventories. Additionally, the project activities outlined in section 2.1.8 do not involve the utilization of any invasive species.

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

The project will strictly avoid the use of non-native species (see Section 2.1.8).

#### **5.3.2 GMO Exclusion (B2.7)**

In the Triunfo do Xingu Project It is guaranteed that no genetically modified organisms (GMOs) are utilized in any project activities (see Section 2.1.8), including those aimed at generating greenhouse gas (GHG) emissions reductions or removals.

#### **5.3.3 Inputs Justification (B2.8)**

The project completely excludes the use of chemical pesticides, biological control agents, or synthetic fertilizers in any activities outlined in 2.1.8. Instead, the communal organic garden will rely on the application of manure as a natural and organic fertilizer to supply essential nutrients for the plants.

### 5.3.4 Waste Products (B2.9)

In case any waste product is observed resulting from a project activity, the following process will be adopted: segregation according to NBR 10.004/2004 standard (Associação Brasileira de Normas Técnicas, 2004); collection and transport to nearby waste recovery or disposal facilities. Table 5.10 shows specific strategies for each of the waste products that can be potentially generated by project activities, along with applicable national regulations.

Table 5.10 Waste management strategies for each type of waste product.

Waste product	Construction waste
Activities that may generate the waste product	Improvement of community and biodiversity access to water resources; Improving access to technology, information, and leisure.
Waste management process	The contracted company for carrying out the construction works will be required to conduct proper management of waste, including packaging, transportation, and final disposal in an inert landfill, in accordance with CONAMA Resolution 307/02, as amended by 348/04, 431/11, 448/12, and 469/2015 (CONAMA, 2002).

Waste product	Special waste and electronic waste
Activities that may generate the waste product	Conservation and enhancement of local biodiversity; Cooperation with the public authorities to improve healthcare; Cooperation with the public authorities to improve education; Improvement of access to technology, information, and leisure; Provision of clean and sustainable electricity to the community.
Waste management process	The suppliers of electronic products provided in the project activities will be required to implement reverse logistics, in accordance with the National Solid Waste Policy (Brasil, 2010) and CONAMA Resolution 401/08, amended by 424/10 (CONAMA, 2008).  The community agents will also be trained to collect the waste from camera traps and other electronic devices and take them to an adequate collection point in São Félix do Xingu or other nearby cities.

Waste product	Organic and recyclable waste
Activities that may generate the waste product	Strengthening environmental and civic education; Conservation and enhancement of local biodiversity; Improvement of community and biodiversity access to water resources.

Waste management process	<p>All educational and practical activities conducted by the Systemica team and contracted individuals should include the collection and separation of recyclable and organic waste, if applicable (ABNT, 2004). The community agents will also be trained to collect the organic and recyclable waste from any project activities and take it to an adequate collection point in São Félix do Xingu or other nearby cities.</p> <p>Moreover, the suppliers of forest and fauna inventories will be required to manage all the waste products generated by the activity.</p>
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## 5.4 Offsite Biodiversity Impacts

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

The project aims to conserve biodiversity and ecosystems within the project area, with all activities described in Section 2.1.8 designed to generate positive impacts on climate, community, and biodiversity. As described in Section 5.2.2, a potential negative impact was identified within the project area, related to the possible misuse of information and to the disturbance caused by monitoring activities, both of which are mitigated through targeted measures. With respect to areas outside the project zone, no risk of negative offsite impacts was identified. The project activities are focused on strengthening local governance, providing sustainable livelihood alternatives, and raising environmental awareness, all of which reduce rather than displace pressures on surrounding areas. Therefore, no negative impacts beyond the project boundaries are expected.

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

Potential impacts were identified, and the suggested mitigation measures and the project activities (see Section 2.1.8) are designed with a primary focus on conserving and enhancing biodiversity, improving community and biodiversity access to water resources, and promoting environmental education. The ecological services and functions occurring within the project area generate landscape ecology benefits beyond the project zone, such as forest connectivity, preservation of the watershed, climate, and nutrient regulation, among others<sup>167</sup>.

Moreover, the approach to environmental issues and the promotion of environmental education will increase community awareness and reduce human-wildlife conflicts. These new perspectives and alternative practices are likely to spread through interactions between the local people involved and neighbouring communities, encouraging discussions on the subject (Benchimol et al., 2017; de Souza Zara & Tavares, 2014). Therefore, although the activities will take place within the project area, the biodiversity net benefits will be positive and extend offsite.

<sup>167</sup> 230912\_SecondaryDataReport\_Bio.pdf

## 5.5 Biodiversity Impact Monitoring

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

The biodiversity monitoring plan is based on the project's biodiversity objective and specific objectives defined through the theory of change rationale (see Section 2.1.8). The main objective is the permanence or increase in the population of all endangered and endemic fauna and flora species identified in the project area until the end of the project period. Table 5.11 describes the specific objectives, also highlighting the related High Conservation Values for the biodiversity (see Section 5.1.5).

Table 5.11. Biodiversity attributes and specific biodiversity objectives.

Biodiversity attribute	Specific objective
Endangered, vulnerable, and endemic species, and HCV 1	Maintain or enhance the richness and abundance of endangered, vulnerable, and endemic species
Native forest cover and intact forest landscapes (HCV 2)	Maintain native forest cover in the project area, especially intact forest landscapes
Trigger species <i>Ateles marginatus</i> (white-cheeked spider monkey)	Maintain or enhance the population of <i>Ateles marginatus</i> (white-cheeked spider monkey)
Human-wildlife interaction and coexistence	Promote environmental awareness and diminish human-wildlife conflicts

Also, the monitoring of biodiversity attributes will be conducted in two main spheres: the project area and the project zone. In the project area, the focus will be on monitoring the protected forest area, fauna and flora communities, and trigger species. On the other hand, the environmental education and human-wildlife interactions will be monitored in the project zone, specifically involving the community of Caboclo Village. Table 5.12 shows the biodiversity indicators, their sampling methods, monitoring frequency, areas, related HCVs and exceptional benefits, and related Pressure-State-Response (PSR) attribute. A more detailed table, including activities and Brazil's SGD indicators, is presented in the annex<sup>168</sup>.

<sup>168</sup> 230912\_MR\_Biodiversity.xlsx

Table 5.12. Indicators of the Biodiversity monitoring plan.

Indicator	Sampling methods	Frequency of monitoring	Areas to be monitored	HVCs	Gold	PSR indicator
Number of lectures and/or awareness events on environmental and civic education	Counting; meeting minutes, documents, reports	Each 1 – 2 years	Caboclo Village	HCV 4	GL1	R
Participation obtained in the lectures and/or events on environmental and civic education	Counting; meeting minutes, documents, reports	Each 1 – 2 years	Caboclo Village	HCV 4	GL1	R
Percentage of people who recognize the importance of biodiversity	Survey conducted on the population	5 years	Caboclo Village			S
Percentage of women who recognize the importance of biodiversity	Survey conducted on the population	5 years	Caboclo Village			S
Number of community members training or participating in monitoring the project area or zone	Counting; meeting minutes, documents, reports	Each 1 – 2 years	Project zone	HCV 4	GL1	R
Forest and Biodiversity Benefits Perception Index (level of agreement with statements about direct and indirect benefits of biodiversity for human well-being)	Survey conducted on the population	5 years	Caboclo Village			S

Table 5.12. Indicators of the Biodiversity monitoring plan.

Indicator	Sampling methods	Frequency of monitoring	Areas to be monitored	HVCs	Gold	PSR indicator
Number of attempts of cooperative discussions conducted with local authorities/institutions regarding wildlife protection programs	E-mail, meeting notes or documents	5 years	Project zone	HCV 1		R
Percentage of people who perceive some change in biodiversity over time	Survey conducted on the population	5 years	Caboclo Village			S
Number of people interested in participating of wildlife protection programs or measures	Survey conducted on the population	5 years	Caboclo Village			R
Number of strategies for human-wildlife coexistence fostered	Counting; meeting minutes, documents, reports	5 years	Caboclo Village, Project zone			R
Number of monitoring campaigns for focal fauna/flora species carried out	Fauna and Biomass inventories; Phytosociological report	6 years	Project area	HCV 1		R
Species richness and relative abundance indexes	Fauna inventory; Camera trap monitoring	3 years	Project area	HCV 1		S

Table 5.12. Indicators of the Biodiversity monitoring plan.

Indicator	Sampling methods	Frequency of monitoring	Areas to be monitored	HVCs	Gold	PSR indicator
Maintenance or increase in species richness and relative abundance indexes	Fauna and Biomass inventories; Phytosociological report	6 years	Project area	HCV 1		S
Relative abundance and population viability analysis of <i>Ateles marginatus</i>	Active surveys; occasional sights	3 years	Project area		GL3	S
Number of fauna monitoring reports produced (which includes camera trap monitoring reports and <i>Ateles marginatus</i> monitoring reports)	Camera trap monitoring reports; Primate active search reports	Each 1 – 2 years	Project area	HCV 1	GL3	R
Number of hunting pressure assessments	Survey conducted on the population	5 years	Caboclo Village, Project zone	HCV 1	GL3	P
Fauna sights index, during patrolling campaigns	Patrolling checklist	3 years	Project area	HCV 1		S
Maintenance or increase in fauna sights index, during patrolling campaigns	Patrolling checklist	3 years	Project area	HCV 1		S
Number of identified threat occurrences during monitoring	Counting; meeting minutes, documents, reports	Each 1 – 2 years	Project area	HCV 4	GL1	P

Table 5.12. Indicators of the Biodiversity monitoring plan.

Indicator	Sampling methods	Frequency of monitoring	Areas to be monitored	HVCs	Gold	PSR indicator
Reduction in the rate of identified threat occurrences during patrol campaigns in the project area	Patrolling checklist	Each 1 – 2 years	Project area	HCV 4	GL1	R
Number of protected ha of native forest areas of high ecological importance and critical habitats.	Remote sensing	At each verification	Project area	HCV 1; HCV2	GL1	R

### **5.5.2 Biodiversity Monitoring Plan Dissemination (B4.3)**

The project's monitoring plan and its results (VCS and CCB) will be available on the VERRA website (Verra, 2023b) and Systemica's online dissemination platforms throughout the project's lifetime. Therefore, any stakeholder or other stakeholders could learn or obtain more information by accessing these online platforms.

To ensure efficient dissemination of the monitoring plan and its results, the project team will also utilize the established communication channels outlined in the communication procedure<sup>169</sup>. This procedure proposes organized communication flows between the project and the community, facilitating the circulation of information and mutual dissemination of project-related content. The primary channels to disseminate the monitoring plan and its results to the community and other stakeholders will include the project's YouTube Channel (Projeto Triunfo do Xingu Channel, 2023) (of which videos are also publicized in the WhatsApp groups) and occasional in-person meetings.

It is worth noting that the communication procedure is a document that will undergo constant modification as it is updated based on the functioning and effectiveness of the communication channels, as well as the needs and community perceptions. Also, all information will be simplified and translated into Portuguese to become accessible and guarantee that all the local population can understand the project monitoring plan and its results.

## **5.6 Optional Criterion: Exceptional Biodiversity Benefits**

### **5.6.1 High Biodiversity Conservation Priority Status (GL3.1)**

The project meets the Gold status of High Biodiversity Conservation by the vulnerability KBA qualifying criteria, conserving the endangered (EN) trigger species *Ateles marginatus* (described at Section 5.5.2). The presence of the trigger species was identified by direct sighting and recording of an individual, during a field visit in the project area (Figure 5.3).

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<sup>169</sup> 231019\_CommunicationProcedureAnnexes.zip

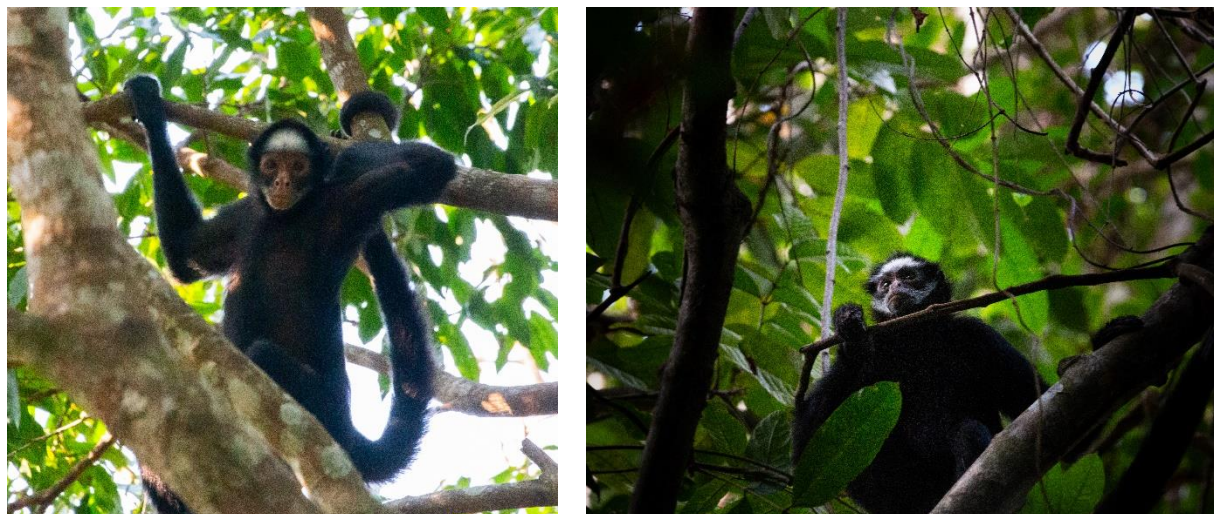


Figure 5.3 *Ateles marginatus* detected in the project area.

Additionally, the project conserves other 3 benefited species being one near threatened (NT) *Panthera onca* and two vulnerable (VU) the lowland tapir *Tapirus terrestris* (Paolucci et al., 2019) and the endemic red-handed howler monkey *Alouatta belzebul* (IUCN, 2023b). Although the exact population sizes for these three species are not yet known, they occur in the project zone<sup>170</sup>, and will be monitored through the project duration.

*Panthera onca* (Linnaeus, 1758) is a near threatened species by (IUCN, 2023b) classification and vulnerable by the national list (ICMbio, 2023). Also, it is classed as a keystone, flagship, and umbrella species, which means that the entire biodiversity will benefit from the conservation efforts dedicated to this large felid.

Although, the exact population density of jaguar is yet not known in the project area, it was identified by vestiges, bioacoustics observation a community relates<sup>1</sup>. Also, there are two registers (L, 2016; MHNG, 2023) from Xingu River, in the Apyterewa village and next to Joales village both from 92 and 74 km away from the project areas, respectively (GBIF, 2023). Despite that, the southeastern Amazon harbors one of the highest population size estimates of  $4.4 \pm 0.7$  jaguar per 100 km<sup>2</sup> (Tobler et al., 2013).

The project zone is comprehended in the Jaguar Conservation unit Xingu (JCUX) (in the Southeast Amazon/Tropical Moist Lowland Forest Jaguar geographic region) defined as a priority area for jaguar conservation (Sanderson et al., 2002). The JCUX has an area of 32,185 km<sup>2</sup> of high probability of jaguar long-term survival. Another study identified that priority areas for jaguar conservation should ensure safeguarding the network of protected areas, indigenous territories, and their buffer zones (Bogoni et al., 2023). Specifically, among the top 10 priority areas is the continuous native landscape made by the Estação Ecológica Terra do Meio, Parque do Xingu, and nearby protected areas, harbor 13.2% of the estimated jaguar population for the Brazilian Amazon, and the project zone is it fits precisely by composing the border of these protected areas and the arc of deforestation, where there is the greatest anthropic pressure for mechanized agriculture and human-wildlife conflicts (Bogoni et al., 2023).

Due to its ecological importance as a top predator and regulator of food chains, in addition to being an umbrella, keystone and flagship species, the jaguar is a focal species that characterizes a conservation priority and will benefit from project activities (see Section 2.1.8).

<sup>170</sup> 230912\_SecondaryDataReport\_Bio.pdf

*Tapirus terrestris* is a highly endangered species, in the Vulnerable classification (ICMBio, 2023), with significant loss of habitat area due to agricultural expansion and deforestation. In addition to having their populations threatened by hunting, roadkill and contamination. The tapir is ecologically more likely to be impacted by hunting due to its long gestation and generational time (Varela et al., 2019). Depends on forest habitats and riparian environments. It is frugivorous and seed dispersers, so its occurrence also guarantees this important ecological function in tropical forests (Fragoso, 1997). By being an umbrella species, actions for its conservation benefit other endangered species and also benefit the conservation of the ecosystems in which it occurs.

*Alouatta belzebul* is endemic to Brazil, VU by national and international classification (ICMBio, 2023; IUCN, 2023). It is threatened mainly due to loss of area and quality of habitat and hunting for human consumption. It has a generational time of 12 years, so the inadvertent removal of individuals can negatively impact the population recruitment of new individuals. Its subpopulations are currently decreasing. Most of its Amazonian distribution occurs in the “arc of deforestation”, so the project zone is an important area for the conservation of this species along the range of greatest deforestation pressure (Valença-Montenegro et al., 2021).

**5.6.2 Trigger Species Population Trends (GL3.2, GL3.3)**

Table 5.13. Project’s trigger species.

Trigger Species	<i>Ateles marginatus</i> (White-cheeked Spider Monkey). Endangered species by the national and international classifications (ICMBio, 2023; IUCN, 2023b).
Population Trend at Start of Project	Decreasing (IUCN, 2023b). It is an endemic species of the Brazilian Amazon, occurring between the Rivers Tapajós and Xingú (Ravetta & Mittermeier, 2021). The documented population density in the areas that occurs is of 4.36 – 13.08 individuals/km <sup>2</sup> (Ravetta, 2015). At the moment, it was identified and registered at least one individual at the project area during field visit (see Section 5.5.1).
Without-project Scenario	This species faces significant challenges primarily from the extensive deforestation occurring due to the expansion of soybean cultivation, cattle farming, and urban development in an area known as the 'arc of deforestation.' This region presently contributes to around half of Brazil's annual forest depletion. Additionally, the species is under the threat of hunting, which has led to the disappearance of the species in certain parts of its habitat (Ravetta & Ferrari, 2009).  Approximately 60% of the ranges of Amazonian primates are situated outside of protected regions (Azevedo-Ramos et al., 2006). Since the last assessment, only one new protected area has been established to shelter this species. In the scenario without intervention, it is probable that the remaining local population faces the risk of local extinction due to the combined impacts of hunting and habitat loss.

With-project Scenario	With activities to protect the project area, raise environmental awareness and reduce human-fauna conflicts, the project will contribute to the maintenance and permanence of the local population of the White-cheeked Spider Monkey.
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